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FAMILY-CENTERED MATERNITY CARE

TRAINING OF TRAINERS CURRICULUM

UKRAINE, 1998

adapted* by

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TABLE OF CONTENTS

INTRODUCTION ii
TOT SCHEDULE: WEEK 1 iii

CURRICULUM

1:DAY ONE: Overview/Defining Family-Centered Maternity Care
ADDENDA: DAY ONE
A. Pre-Test
B. Definition of FCMC and FCMC Paper
C. WHO Safe Motherhood Materials
D. Enkin Tables
E. Newborn Practices and FCMC: Lecture Notes
F. Case Study 1
G. Action Plan
H. Instructions for Presentation

2. DAY TWO: FCMC Practices/Adult Learning/Communication/Change Theory
ADDENDA: DAY TWO
A. Working Bibliography and Key FCMC Literature Articles
B. Handout on Adult Education
C. Handout on Communication
D. Lecture Notes on Change Theory
E. Puerperal Sepsis Pre-Test

3. DAY THREE: Partograph/Infection Prevention/Puerperal Sepsis
ADDENDA: DAY THREE
A. Partograph Materials and article from Lancet
B. Infection Prevention Materials
C. Exerpts from WHO Puerperal Sepsis Module
D. Bibliography and Key Articles on Infection and Other Medical Topics
E. Group Exercise on FCMC and Infection Control

4. DAY FOUR: Barriers to Change/Evaluation and Monitoring
ADDENDA: DAY FOUR
A. Bibliography and Articles on Newborn Practices and Breast-feeding
B. Case Studies (3): Barriers
C. Evaluation Lecture Notes and Case Studies
D. Continuous Improvement Strategy, Critical Indicators, Benchmarks, Delivery Record, PP Questionnaire, Hospital Monthly Tally Sheet

5. DAY FIVE: Adaption of FCMC into Various Settings
ADDENDA: DAY FIVE
A. Scenarios for Role Play
B. Evaluation Week One
C. Post-Tests: FCMC, Puerperal Sepsis
D. Clinical Skills List

6. TRAINERS NOTES
7. OVERHEADS: DAY ONE
8. OVERHEADS: DAY TWO
9. OVERHEADS: DAY THREE
10. OVERHEADS: DAY FOUR

2

Introduction
to the
Family-Centered Maternity Care Curriculum
for Training of Trainers

The past two decades have been a time of significant change for maternity care practices. Simultaneous medical and social dynamics have led to increased attention to the need for a balance between technology and the human element when providing maternity care. The result is an approach to care known as Family-Centered Maternity Care (FCMC).

Family-Centered Maternity Care (FCMC) is defined as care which emphasizes the multiple needs of women and uses education and family involvement as major tools for engaging the woman in the process of her own care. FCMC is based on current research which has demonstrated the true effectiveness of maternity care practices.

The FCMC Training of Trainers Project in Ukraine is a part of a larger cooperative agreement between the Ukraine Ministry of Health and USAID. The primary goal of the cooperative agreement is to improve the quality of reproductive health in Ukraine. Family Planning and FCMC are components of this work. The inclusion of FCMC is a response to requests for such content from Ukrainian women's health care providers.

The Ukraine Ministry of Health, Mothercare/JSI and the American College of Nurse-Midwives have collaborated to produce a FCMC project. The main objectives of the FCMC project are to create a core group of women's health care providers to implement FCMC. They will then develop FCMC demonstration projects at their own institutions. Further, these providers will be trained as trainers and will train other Ukrainian practitioners in the philosophy and practices of Family-Centered Maternity Care.

This curriculum serves as the primary teaching tool for the Ukraine Training of Trainers (TOT in Family-Centered Maternity Care. It is also the basis for future training of additional Ukrainian women's health care providers in FCMC.

Through the request for and acceptance of FCMC practices, women's health care providers in Ukraine have demonstrated their commitment to the improvement of maternity services and thus the health and well-being of the mothers and babies in their country.

TOT SCHEDULE WEEK ONE, FAMILY-CENTERED MATERNITY CARE

TIME	Monday	Tuesday	Wednesday	Thursday	Friday
8:30 AM	Convene Welcome speeches	Pre-test Review key literature by trainees	Trainer evaluation	Trainer evaluation Review	Trainer evaluation
9:00-10:00	FCMC Intro Overview TOT	Review key literature on FCMC by trainees	Use of Partograph Labor progress	Newborn Practices and Breastfeeding	Orient to Week Two
10:00 - 11:00	Global MCH Break MCH prac-tices, impact of techno-logy	Adult learning lecture Break	Partograph: fetal & mat. conditions Break	Breastfeeding cont'd Break Small group work on barriers	Role play normal labor scenarios Break
11:00 - 12:00 PM	Newborn Practices MCH in Ukraine	Communica-tion lecture and group work	Small group work on partographs	Barriers work completed	Role play normal labor
12:00 -1:00	Lunch	Lunch	Lunch	Lunch	Lunch
1:00-2:00	Infection prevention & Risk Assessment	FCMC practices discussed	Skills: pelvic & abdominal exam	Evaluation lecture	Role play labor support :deviations from normal
2:00-3:00	More FCMC Case Study: Barriers	FCMC practices completed Break	Infection prevention Break	Group work on and share plans Break	Role play labor prob. Q&A Break
3:00-4:00	Break Q&A and Discussion	Change theory: use in the clinical setting	Puerperal sepsis and perinatal infections	Share plans Consumer involvement	Written evaluation Post-test
4:00-5:00	Meet with trainers	Change Theory and barriers Infection pre-test	Infections Group work on infection scenarios	Group Work on Action & Evaluation plans	Action plans completed

DAY ONE: Overview/Defining Family-Centered Maternity Care

ADDENDA: DAY ONE

A. Pre-Test

B. Definition of FCMC and FCMC Paper

C. WHO Safe Motherhood Materials

D. Enkin Tables

E. Newborn Practices and FCMC: lecture notes

F. Case Study 1

G. Action Plan

H. Guidelines for Presentations

5

DAY 1: Overview/Defining Family Centered Maternity Care (FCMC)

Learning Objectives:
At the end Day 1, the participants will be able to:

1. define and describe FCMC.
2. describe the current and future FCMC Training of Trainers (TOT) Project.
3. describe global trends in maternal-child health practices.
4. discuss newborn practices important in FCMC.
5. describe current thinking on the appropriate use of technology in obstetrics.
6. discuss impact of infection prevention practices and concerns on FCMC.
7. define and describe the anticipated barriers, reactions and outcomes to the integration of FCMC into the maternal health services of the Ukraine.

Morning Session

- Time:
  - 30 minutes of greetings and introductions
  - 2 hours 50 minutes of lecture
- Materials:
  - Slides, Overheads
  - Handouts
  - Flip chart, dry erase board, or chalk board

TOPIC		TIME	TEACHING METHODS
Greetings/introductions/recognitions		30 Minutes	Presentation
I.	(Pre-test)*	(20 Minutes)	(Pre-test)
II.	FCMC definition and introduction	45 Minutes	Lecture, slides
III	Overview/goals of the FCMC TOT Project	15 Minutes	Lecture
IV.	Global maternal-child health (MCH) trends	20 Minutes	Lecture, Overheads
	BREAK	**15 Minutes**	
V.	MCH practices and impact on women's health	20 Minutes	Lecture, Overheads
VI.	Newborn practices and FCMC	30 Minutes	Lecture, Overheads
VII.	The impact of technology on maternal and infant health and well being	20 Minutes	Lecture, Overheads
VIII.	Maternal-Child Health (MCH) in the Ukraine	20 Minutes	Lecture, Slides

*May be given at another time if Day One is for a group larger than the TOT participants

Lunch break: 60 minutes

Day 1: Afternoon Session

- Time:
  - 1 hour 15 minutes lecture to group
  - 75 min. case study and group work
  - 1 hour meeting with week-long participants
- Materials:
  - Case study
  - Overheads
  - Handouts
  - Curriculum with action plan and schedule
  - Flip chart

TOPIC	TIME	TEACHING METHODS
IX. Infection Prevention Practices and Infections: Impact on FCMC	30 Minutes	Lectures, Overheads, Handouts
X. Risk Assessment and FCMC	30 Minutes	Lecture, Overheads
XI. More detail about FCMC	15 Minutes	Lecture, Overheads
XII. Case study of barriers, changes and outcomes for providers, institutions, and consumers as a result of FCMC. Risk assessment and infection control will be highlighted.	45 Minutes	Selected participants will have reviewed the case study and will respond to it. Overheads or flip chart to facilitate talk
BREAK	15 Minutes	
SUMMARY/CLOSING QUESTION AND ANSWER PERIOD	60 Minutes	GROUP LED
XIII. Meet with trainers to orient to week and dispense materials. Discuss goals and objectives of TOT Project and trainers expectations.	60 minutes	Curriculum, Action plan, Handouts, Schedule

7

DAY 1: MORNING SESSION

SESSION OUTLINE	SESSION NOTES
`I. Pre-test	**See Appendix A - Day One**
II. Introduction to Family-Centered Maternity Care (FCMC)	**See Appendix B-1, B-2 - Day One**
1. FCMC Antenatal Care	• Emphasizes education
	• Woman takes active role in health
	• Encourages family involvement
	• Strives for continuity of care to develop trusting relationship
	• LISTENING is paramount
	• Supports a woman's choice based on her individual needs
2. **FCMC Labor and Birth**	• Labor & birth is a joyous life event
	Support person(s) of woman's choice in constant attendance
	• Constant attendance by midwife and/or nurse; quiet calm environment
	• Encourage ambulation, positions of comfort; oral fluids/light eating; analgesia alternatives; hydrotherapy
	• Avoids unnecessary/restrictive procedures: No routine shave or enema; no routine continuous electronic fetal monitoring; avoid supine position
	• Semi -upright, side-lying, squatting for second stage and birth
3. FCMC Postpartum Care	• Immediate skin-to-skin contact
	• Initiate breastfeeding after birth

SESSION OUTLINE	SESSION NOTES
3. FCMC Postpartum Care, contd	• Rooming-in • Facilitate bonding among family including siblings, grandparents • SUPPORT BREAST-FEEDING * Assist with problems * Become Baby-Friendly Hospital * Establish breast-feeding clinic * Home visits/phone consultation • Educate on infant care & self care; • Establish parenting/support groups • Postpartum contraception options
III. Overview of the FCMC Project	
1. History of the FCMC Project	• In 1994, USAID and the Ukraine MOH entered into a cooperative agreement to provide a 3-4 year comprehensive Reproductive Health program in Ukraine. • The emphasis has been on family planning, however FCMC was requested by health care providers in Ukraine and further recommended by visiting consultants. MotherCare accepted this initiative.
2. Goal of the Reproductive Health	• Improve quality of reproductive program health services in Ukraine • Improve access to reproductive health services in Ukraine
3. Goal of this initiative	• Integrate FCMC philosophy and practices into the maternity care services in Ukraine
4. Goals of the TOT	• Create a core group of FCMC trainers • Develop action plans for FCMC implementation into each training site • Develop training strategies for conducting FCMC TOT's at their institutions and others

SESSION OUTLINE	SESSION NOTES
	• Motivate and attain commitment from TOT Trainers to establish a demonstration model for FCMC at their various institutions.
	• Develop strategies to reduce barriers to implementation of FCMC.
	• Maintain technical working groups to provide training oversight each institution.
IV. Global MCH Trends	**See Appendix C - Day One**
1. World-wide maternal mortality and morbidity	▪ Over 500,000 women die annually
	▪ Causes of maternal mortality: hemorrhage, infection, eclampsia, obstructed labor, and abortion complications
2. WHO Safe Motherhood Program Principles	• The Mother-Baby Package is based on principles which are intrinsic elements of primary health care. See handout, **Appendix C - Day One**.
3. United Kingdom	• Health care access for all.
	• Majority hospital births with midwives
	• MMR is 7/100,00 LB
	• IMR is 6.2/1000 LB, Ranks 17th in IMR
	• Undergoing major evaluation and revision of maternity care practices based on the findings of a recent report on childbirth, specifically focusing on: 1. women-centered care 2. accessible and appropriate care 3. efficient and effective care 4. varied birth site options 5. shift to community-based care 6. cost effective care

SESSION OUTLINE	SESSION NOTES
4. Netherlands	• Health care access for all • 36% of births at home and 46% of all births attended by midwives • IMR is 5.5/1000 LB, Ranks 10th in IMR • Offers choice of birth site and uses national-based risk assessment criteria to determine appropriate provider and site for care.
5. United States	• Inadequate access to health care for a large portion of the population • Majority of births in hospitals, 4.8% of all births with midwives • MMR is 8/100,000 LB • IMR is 7.3/1000 LB, Ranks 24th in IMR • High use of technology with high cesarean rates, liability issues and cost • The U.S. is in the midst of a major review and reform of the medical care system due to high cost and questionably effective practices in areas such as maternity care.
6. Sweden	• Health care access for all. • Provides incentives to increase birth rate • Births occur primarily in the hospitals • Boasts very high rate of attendance to prenatal visits (average 14), conducted primarily by midwives • MMR 5/100,000 LB • IMR is 4.2/1000 LB, Ranks 3rd

SESSION OUTLINE	SESSION NOTES
7. Germany	• Health care access for all. • Births occur in hospitals and in birth centers FCMC part of philosophy • Extensive use of midwives throughout the maternity cycle • MMR 8/100,000 LB • IMR is 5.1/1000 LB
8. Italy	• Health care access for all. • Births occur mainly in hospitals, FCMC part of philosophy • Extensive use of midwives throughout the maternity cycle • MMR 7/100,000 LB • IMR is 5.8/1000 LB
V. Impact of MCH Practices	**See Appendix D - Day One**: Enkin Tables
1. Brief description of source	Chalmers et al reviewed maternity care practices and studies to date which either did or did not support their use and effectiveness. The authors then listed these practices in a range from clearly beneficial to harmful. This work represents randomized clinical trials of research-based care practices and is being used by countries such as the UK to review and change current maternity care practices.
2. Beneficial practices	• Emotional and psychological support in labor and birth • Maternal mobility and choice of position in labor • Free mobility during labor to augment slow labor

SESSION OUTLINE	SESSION NOTES
	• Consistent support for breast-feeding moms and unrestricted breast-feeding
3. Likely beneficial practices	• Midwifery care for women with no serious risk factors
	• Antenatal classes for women and their partners who want them
	• Respecting women's choice of companions during labor and birth
	• Presence of a companion on admission to the hospital
	• Giving women as much information they desire
	• Other methods of pain relief in labor such as: maternal movement and position change; counter pressure; superficial heat or cold; touch and massage; music and audio-analgesia; attention focusing and distraction
	• Women's choice of position for second stage of labor and/or giving birth
	• Encourage early infant-mother contact
4. Unlikely beneficial practices	• Routinely involve physicians/obstetricians in the care of all women during pregnancy and childbirth
	• Not involving physicians in the care of women with serious risk factors
	• Routinely withholding food and drink from women in labor
	• Routine intravenous infusion in labor
	• Restriction of sibling visits to babies in hospitals
5. Ineffective or harmful practices	• Routine enema in labor
	• Routine pubic shave in preparation for delivery

SESSION OUTLINE	SESSION NOTES
	• Electronic fetal monitoring w/o access to scalp sampling during labor
	• Rectal exam for labor progress
	• Routine or liberal use of episiotomy for birth
	• Routine lithotomy or supine position in second stage of labor
	• Limitation of suckling time for breast-feeding
	• Routine restriction of mother-infant contact
	• Routine hospital nursery care
VI. Newborn Practices and FCMC	**See Appendix E - Day One**
1. Overview	• Infant and neonatal mortality
	• Interventions aimed at reduction of neonatal mortality and morbidity
2. Principles and appropriate technologies	• Identification of women at high risk of obstetrical complications and provision of appropriate care
	• Active observation of labor with early identification of complications and fetal distress
	• Friendly environment for childbirth and promotion of mother infant bonding
	• Maintenance of body temperature
	• Initiation of spontaneous respiration
	• Prevention and management of infections
	• Breast-feeding beginning shortly after birth
3. Breast-feeding	• Overview
	• Policies that contribute to successful breast-feeding and good milk supply

SESSION OUTLINE	SESSION NOTES
VII. Impact of Technology on Maternal and infant health and well being	
1. Ultrasound	Positive impact: Useful in SPECIFIC situations, e.g. to diagnose fetal congenital anomalies Negative impact: Ultrasound is expensive and routine use on healthy pregnant women does not positively effect perinatal outcomes. There is still missing evidence about the safety of ultrasound during pregnancy.
2. Routine electronic fetal monitoring	Positive impact: Effective in detecting specific fetal compromised situations Negative impact: has not improved overall fetal outcomes and has contributed to the rapidly increased cesarian rate in the U.S. from 4.5% in 1968 to 24.7% in 1988. The cesarian rate for 1993 declined to 21.8% partly as a response to the decreased reliance on electronic monitoring to decide management. Interpretation of fetal heart rate patterns open to wide variation
3. Increased cesarean sections	Positive impact: Life saving for unequivocal indications such as placenta previa and transverse lie Negative impact: Despite improved skills and outcome, cesarian's still have higher morbidity and mortality risks for the mother, including a 2-4 times higher rate of maternal mortality than vaginal birth. Elective repeat cesarian without trial of labor still practiced
4. Epidural anesthesia	Positive impact: Pain relief for women. Negative impact: Increased use of oxytocin. Increased risk of cesarean section and operative delivery
5. Oxytocin stimulation	Positive impact: The use of oxytocin to augment labor with PROM, if successful, may subsequently reduce the rate of infection. When accompanied by amniotomy, oxytocin use can reduce morbidity in cases such as post-datism

SESSION OUTLINE	SESSION NOTES
5. Oxytocin stimulation contd	Negative impact: Hyperstimulation with oxytocin can lead to reduced fetal oxygenation. There is a correlation with increased jaundice in the newborn.
VIII. MCH practices in the Ukraine	
1. Accepted standards of practice	• Educational preparation of women and family members for pregnancy, labor and birth • Partner and family participation • Routine care practices • Mother and infant during the postpartum period • Length of postpartum stay for uncomplicated births
2. Current MCH statistics	• Maternal Mortality Rate • Infant Mortality Rate • Breast-feeding Rate • Abortion Rate • Contraception use • Cesarean Rate • Hospital Infection Rate • Perinatal Mortality
3. Current issues in MCH care	• Concerned about decreasing IMR and MMR • Concerned about ability to increase supplies • Concerned about regulations and requirements that constrain practice

SESSION OUTLINE	SESSION NOTES
3. Current issues in MCH care, contd	• Concerned about improving the quality of care, including implementing FCMC principles and practices such as: 1. updating care practices 2. changing provider attitudes 3. offering labor support 4. not separating mother and baby • Concerned about in-hospital postpartum visitation by family and friends • Concerned about risk of infection • Concerned about ability to increase contraception use • Concerned about the need for many women to do hard physical work during pregnancy

END OF DAY 1, MORNING SESSION

DAY 1: AFTERNOON SESSION

SESSION OUTLINE	SESSION NOTES
IX. Infection control	• Microbes most responsible for perinatal infection and modes of transmission
	• Clinical infections: origin and transmission
	• Changes in policy regarding infection control
	• Evaluation of infection rates post FCMC
X. Risk Assessment	• A method of evaluating pregnant women for medical or behavioral factors that affect their health status. It may effect management, that is where and by whom care is given.
	• Performed throughout the prenatal course and on admission to the birth site
	• Different criteria for different settings
	• Review birth center vs. hospital criteria
	• Elicit list of criteria used by participants
XI. More detail about FCMC	
1. Evolution	• Women's movement brought attention to birth practices
	• Increased consumer knowledge led to increased demands for changes in health care practices
	• Texts such as Chalmer's reported research-based evidence for practices causing countries to evaluate their current systems
	• Studies have been published in peer-reviewed journals evaluating the effect of newer technologies
2 Barriers	• **Institution**: concerns about cost, reluctance to impose changes on consumers or providers, unknown impact on policy and procedure
	• **Provider**: reluctance to change practices,

SESSION OUTLINE	SESSION NOTES
	comfortable with what's known, resistance to accepting effectiveness of new procedures
	• **Consumer:** lack of knowledge about safety of new ideas, general mistrust of medical community, intimated by physicians and a responsiveness to and simultaneous fear of fads
	• **Types of barriers:** Knowledge, skills, attitude, resources
3. Benefits	• Consumer satisfaction
	• Provider satisfaction
	• Institutional well-being through the provision of cost effective care
	• Demonstrated effectiveness to enhance maternal and infant well-being without increasing risk to either
XII. Case study of FCMC	**SEE APPENDIX F - DAY ONE** Discuss particulars of FCMC utilizing a case study which has been previously reviewed by some participants who will lead the discussion. Important aspects of FCMC to be emphasized in the case study include risk assessment and infection control issues. Discussion will address:
	• Initial motivation for implementing FCMC
	• Evaluation of current practices
	• Implementation process
	• Barriers and how they were addressed
	• On-going evaluation after implementation
Question and answer period	Entertain questions from audience utilizing Ukranian resources when able.
Summary and Closure	

DAY 1: AFTERNOON SESSION

SESSION OUTLINE	SESSION NOTES
XIII. Participant orientation	Meet with participants and orient to the week's agenda, curriculum, schedule and materials including action plan **(Appendix G - Day One)** and use of teams to co-teach for practicum experience. Assignment: Have selected participants prepare 5 minute presentation of one of the articles on FCMC for the next day. See **Appendix H - Day One** for guidelines.

END OF DAY 1

References for the Family-Centered Maternity Care Curriculum

Day One

Session II.

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Oakley, A. (1992). "Perspectives of users of the services". International Journal of Technology Assessment in Health Care, 8:Supplement (1), 112-122.

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Varney, H. (1997). Varney's Midwifery. 3rd edition. Jones and Bartlett: Sudbury,

Massachusetts.

Most of the articles can be found in Appendix A, Day Two.

Session IV. Maternal Health and Safe Motherhood Programme, Division of Family Health, WHO, Geneva. Mother-Baby Package: Implementing safe motherhood in countries. WHO/FHE/MSM/94.11

1997 World Population Data Sheet, Population Reference Bureau, 1875 Connecticut Ave, NW, Suite 520, Washington, DC 20009, Tel: (202) 482-1100, e-mail: popref@prb.org, Web address:http://www.prb.org/prb/

Session V. Enkin M, Keirse M, Renfrew M, Neilson J. A guide to effective care in pregnancy and childbirth. 2nd Ed. Oxford: Oxford Medical Publications; 1995

Chalmers I, Enkin M, Keirse M, eds. Effective care in pregnancy and childbirth. Oxford: Oxford University Press; 1989.

Cochrane Pregnancy and Childbirth Database. Information contained in this database is updated every six months and is available on diskette from: Update Software, Summertown Pavilion, Middle Way, Oxford OX2 7LG, UK

Session VI. "Essential Care of the Newborn" Final Draft prepared by Bureau for International Health, Trieste, Italy, WHO Collaborating Center for Maternal and Child Health and Institute of Nutrition, Almaty Kazakhstan, WHO and UNU Collaborating Center for Nutrition. For WHO Regional Office for Europe. (Excerpted here. Manual available in Russian).

WHO. "Care in Normal Birth: Report of the Technical Working Group Meeting on Normal Birth 25-29 March 1996." Maternal Health and Safe Motherhood Program, Geneva, Switzerland.

Session VII. Enkin, as above

Session VIII. MCH Practices are country-specific; obtained through the local Ministry of Health, UNICEF office, visits to clinical sites, etc.

Session VII. See paper "Family-Centered Maternity Care" by Pauline Glatleider in App. B-2.

Session IX. Tietjen L, Cronin W, McIntosh N. Infection prevention for family planning service programs: a problem solving reference manual. OK: Essential Medical Information Systems, Inc; 1992 for JHPIEGO and the International Family Planning Federation

Perry A, Potter P. Clinical Nursing Skills and Techniques. St Louis: Mosby; 1994

Session X. Greulich (from Session II), Enkin (from Session V)

Session XI. See paper "Family-Centered Maternity Care" by Pauline Glatleider in App. B-2.

APPENDIX A

APPENDIX A: DAY ONE - FCMC TOT Pre-Test

Please circle T for True or F for False.

1.	Women are apt to be less embarrassed and therefore more relaxed if no one familiar is around them in labor.	T	F
2.	Women with spontaneous rupture of membranes should remain in bed during labor.	T	F
3.	Newborns are generally too excited to breastfeed soon after birth. They should rest first before attempting to nurse.	T	F
4.	Women, while seeming to be out of control in labor, are in fact hyper-alert and retain what is said and done to them and are impacted by it after birth.	T	F
5.	Routine ultrasound in every pregnancy is an example of the inappropriate use of technology.	T	F
6.	Continuous electronic fetal monitoring has reduced fetal morbidity and mortality extensively.	T	F
7.	Epidural anesthesia has proven effective in reducing cesarean delivery in primigravidas due to the increased relaxation.	T	F
8.	Use of the partograph during labor will assist with early detection of problems and complications.	T	F
9.	Perinatal infection is largely preventable with consistent hand washing and wearing of gloves.	T	F
10.	Allowing family members in street clothes into the labor and delivery unit of a hospital has not increased perinatal infection rates.	T	F
11.	Adults learn best when presented with data in a formal manner such as lecture and handouts.	T	F
12.	Women are significantly impacted by their labor and birth experiences and thus should be significantly involved in the decision-making aspect of their care.	T	F

APPENDIX B

APPENDIX B-1: DAY ONE:

DEFINITION OF FAMILY-CENTERED MATERNITY CARE

FAMILY-CENTERED MATERNITY CARE
Developed by Judith Rooks, CNM, DrPH

Family-centered maternity care is care designed to meet the informational, social, emotional, comfort and support needs of normal pregnant women (those without serious complications or co-existing disease) and their families during pregnancy and childbirth. Family-centered maternity care emphasizes education and preparation to enable the pregnant woman to take a knowledgeable, active role in promoting her own health and that of her fetus and baby; encourages involvement in the pregnant woman's family members or other persons of her choice in her preparation for childbirth and motherhood and invites their supportive presence during labor and delivery; avoids unnecessary use of invasive, uncomfortable and/or restrictive procedures; manages birth as a process requiring cleanliness but not sterility; encourages women to be active during labor--to sit up, walk, assume whatever position is comfortable, change positions frequently, avoiding the supine and lithotomy positions and supporting women to assume squatting or semi-upright positions during second stage contractions; provides skin-to-skin contact between the mother and newborn immediately after the birth, and supports breast feeding and rooming-in.

Appendix B-2, Day One: Family Centered Maternity Care

Presentation by Pauline Glatleider, CNM, MSN
American College of Nurse-Midwives
Consultant for MotherCare

Introductions

This presentation is about Family Centered Maternity Care (FCMC). FCMC is one of the hallmarks of midwifery care in the United States. A certified nurse-midwife in the United States is educated in two disciplines- nursing and midwifery. First, one becomes a nurse and may obtain experience in the field of maternal and child health. Then one completes an accredited nurse-midwifery education program, all of which are offered at the college level. One completes the program when one has attained the Core Competencies for Basic Nurse-Midwifery Practice as defined by the American College of Nurse-Midwives. This includes both written and clinical demonstration of mastery of knowledge and skills. Upon completion of this program, the graduate takes a national certification examination. Successfully passing the exam means that one is now a certified nurse-midwife, certified by the American College of Nurse-Midwives' Certification Council. Nurse-midwives practice independently within a health care system that provides consultation, collaboration with, or referral to a physician.

Nurse-midwives view pregnancy as a normal life event for a woman and her family, rather than as an illness. Thus, family-centered maternity care has always been a part of and supported by midwifery care in the United States.

+1 (Slide Numbers)

First, the components, implementation, and outcomes of Family-Centered Maternity Care are outlined. Included will be some of the scientific literature that supports this model of care, statistical data of outcomes, and "action" photos of women, babies and families who have benefitted from this care. Several components of family-centered maternity care, such as immediate mother-infant contact and breast-feeding, may have been implemented. This presentation may provide you with the information and support needed to further these changes within your own facilities.

+2 "Family-Centered Maternity Care" is care that is designed to meet the informational, social, emotional, comfort and support needs of normal pregnant women and their families during pregnancy and childbirth.

+3 Family-centered care during the prenatal period emphasizes education which enables the woman to take a knowledgeable and active role during her pregnancy in order to promote her own health and that of her fetus. Education is of paramount importance from the first prenatal visit when one explains the process of prenatal care to the last when one reviews the signs and symptoms of labor. Involvement of the mother's family or others of her choice is strongly encouraged.

+4 When providing prenatal care, continuity of care with the same provider is an important goal. A consistent relationship between the woman and the midwife or physician develops mutual trust and respect. Listening to a woman's concerns, providing real information and supporting her choices

based on her individual needs is a hallmark of this care.

+5 Oakley and colleagues (1992) reviewed the literature that documented the views and experiences of women who use antenatal services. The following were consistently identified as key elements:

a. continuity of care within her community,
b. sensitivity to women's social needs and responsibilities,
c. the importance of listening and giving real information.

+6 Further, Oakley articulated a summation of women's views as:

a. pregnancy is not an illness;
b. women are human beings;
c. obstetrics should be scientific; and,
d. happiness is an important measure of good obstetrical care.

+7 The midwife or physician should review information in the prenatal record with the mother....

+8 and provide educational information during the prenatal visit.

+9 Listening to the fetal heart rate can be shared with the mother.

+10 Siblings are encouraged to be present during antenatal visits. This can open up questions and learning for the sibling and mother.

+10A As a sister-to-be listens to the fetal heart she is clearly delighted as is her mother for it helps her to make the baby more of a reality for the older child.

+11 Fathers also like to attend visits. Prepared childbirth classes for women and their spouses or partners are strongly encouraged.

+12 The time for labor and birth is a day anxiously awaited by all. And while being a relatively small segment of time in a woman's entire life, this is one of the most significant life events which merits respect, support and care. A positive experience during labor and birth can set the stage for successful breast-feeding, maternal-infant bonding, heightened self-esteem and initial confidence in parenting.

+13 Family centered maternity care during labor and birth has a number of specific components. These range from a specific philosophy to actual practices of care. Underlying this model of care is the shared belief that birth is a normal and joyous life event. The presence and support of a woman's family or person of her choice is invited and encouraged. Constant attendance by the midwife and/or nurse is important to help maintain labor on a normal course. Within this model, non-hospital birth options are provided such as birth centers and home birth.

+14 Unnecessary use of invasive, uncomfortable and/or restrictive procedures are avoided. Thus, no routine shaves or enemas are given as it has been demonstrated that there is no difference in perinatal outcomes or infection rates when either is routinely used. Oral fluids are encouraged and in early labor some women may want to eat. Women are encouraged to be active. Alternatives to

analgesia are provided and encouraged such as ambulation, bathing, breathing, massage, and position change.

+15 The fetal heart rate, of course, is monitored during labor and birth but continuous electronic fetal monitoring is avoided. The supine/lithotomy position is avoided while semi-upright, side-lying and squatting positions may be used for second stage and birth.

+16 Family-centered maternity care encourages institutional policies designed to provide a supportive environment which is private, calm, quiet, with constant attendance by midwife or nurse. The birth is managed as a process that requires cleanliness but not sterility. By cleanliness, referral is made to the environment and how a woman is prepared for the birth. Of course, one uses sterile gloves and equipment for all vaginal exams, for the birth, placenta and repair of any lacerations.

The evolution of family-centered maternity care or woman-centered care has it's root in the childbirth preparation movement of the 1940's. Gradually women have objected to the medicalization of birth. The beginning of major change occurred in the United States in the 1960s and continues today. Most recently, evaluation of pregnancy and childbirth practices in England and Wales received a serious review by the House of Commons. The subsequent report published in 1993 called "Changing Childbirth" actually stated that "maternity service should provide woman-centered care". While the thrust for change has been generated by the voices of women, one must ask what the scientific investigations show regarding these practices.

+17 Reed, Miller & Paul (1981) looked at ambulation versus oxytocin for labor enhancement.

+18 They found ambulation to be as effective as oxytocin.

+19 Ambulation facilitates a woman's labor process. The effects of maternal posture on uterine activity during labor have been studied initially by Caldero-Barcia in 1960, 1978 and 1979, Mendez-Bauer in 1975 and 76, and Miller and Roberts in the 1980s. Results from these investigations have shown that standing and side-lying provide greater intensity and efficiency of uterine contractions. Further, in five trials, women had significantly shorter labors when allocated to an upright rather than supine position for labor. An upright position is associated with less use of pain medication and epidural anesthesia. The supine position has been shown to adversely affect the fetus and labor progress through interference of the uterine hemodynamics.

+20, 21, 22
Women, when encouraged, will spontaneously choose various positions during labor.

+23 Women have desired and insisted on the presence of a spouse, family and/or friends during labor and birth. In fact, women benefit from constant human support during labor. The initial investigation of labor support was done by Sosa and colleagues (1980) in Guatemala with "doulas". The "doula" is a woman assigned to stay with the laboring mother. The "doula" provides emotional and physical support. She does <u>not</u> leave the laboring woman's side. Their study consisted of 40 women in labor and looked at the effectiveness of providing support personnel during labor and birth, the length of labor , and the interaction between mother and child, their study's control group had no support personnel. Women in the experimental group had the

constant support of a doula.

+24 Sosa and colleagues found that labors were significantly shorter for women in the doula group. The average time between the women's arrival in the maternity ward and the birth of the child was 19.3 hours for the control group and 8.7 hours for the experimental group.

+25 The control group had significantly more perinatal problems and longer labors ($p = 0.001$).

+26 The mothers in the doula group were significantly more awake after delivery, stroked and talked to the baby more.

+27,28 Kennell & Klaus and colleagues writing in JAMA (1991) reported replicating this study in a US hospital. They found similar results. In their study, women who were supported needed fewer epidurals, less augmentation of labor, fewer cesarean and forceps deliveries, shorter hospitalizations for the neonates, fewer sepsis evaluations and maternal fevers.

+29 Marshall Klaus, M.D. and co- author of the investigation just reviewed, remarked on the results of this study and lamented the fervor with which health care providers embrace machines but are not as quick to incorporate a simple, human intervention which has been shown to significantly benefit mothers and babies.

"...Let me note that if I had told you today about a new medication or a new electronic device that would reduce problems of fetal asphyxia and the progress of labor by two-thirds, cut labor length by one-half, and enhance mother-infant interaction after delivery, I expect that there would be a stampede to obtain this new medication or devise in every obstetric unit in the United States, NO MATTER WHAT THE COST. Just because the supportive companion makes good common sense does not decrease its importance."

+30 A woman may choose her spouse to be present during labor or...

+31 she may wish to have other family members, her children and friends present. Facilities should strive to accommodate individual preferences and needs of the laboring woman.

+32 Usually, one sees the intensity and connection between the woman and her partner, while the midwife patiently watches and supports them both. It is this kind of support that helps a woman move through the labor process and thus have shorter labors.

+33 Labor support can easily be provided in the hospital setting.

+34 Maintaining hydration can be done with fluids rather than routine use of intravenous solutions.

+35, 36, 37, 38

If a woman does not choose to use analgesics, alternatives need to be utilized. Ambulation is one alternative. Showering and/or bathing, known as hydrotherapy is another. Other alternatives may include music and vocalizing, touch and massage, acupressure and acupuncture.

+39 And what does the midwife do? Maintains a watchful eye over the mother and fetus, provides a calm presence and cultivates patience. Having a Doppler available for listening to fetal heart tones during labor allows the mother freedom to move about. Intermittent auscultation for women with low risk labors is recommended as every 30 minutes during the active phase of labor and every 5 minutes during the second stage of labor the American College of Obstetricians and Gynecologists and in the American midwifery text "Varney's Midwifery", 3rd Edition, 1997.

+40, 41, 42
During the second stage of labor a woman may choose to or be encouraged to use various positions to facilitate progress. These positions can be used in the hospital setting.

+43,44 She may squat and be held by her partner or sit on a toilet.

+45,46 She may choose to give birth while squatting by the bed or...

+47 squatting on the delivery table in the delivery room.

+48 At the time of birth, the baby is given to the mother.

+49 There is no rush to cut the cord. The father may want to cut the cord - a symbolic ritual which seems to provide pleasure.

+50,51 Breast-feeding is initiated as soon as possible and the family members present share the wonder and joy of this most special event.

+54 Hofmeyr and colleagues (1991) found that support during labor and birth had significant effects on the perception of childbirth and breast-feeding. Women with support during labor had significantly less feeding problems, were significantly more likely to be breast-feeding only, found mothering easier and had flexible feeding intervals. No mothers from the support group stated their babies had a poor appetite.

+55 On the eighth floor at the Los Angeles County/University of Southern California Women's Hospital, there is a unit known as the Normal Birth Center (NBC). The NBC is managed by nurse-midwives, labor nurses and pediatric nurse practitioners. The physicians and OB residents practice on the fifth floor designated as the high risk area. There are no physicians on the Normal Birth Center but they are available for consultation and referrals. Women admitted to the NBC must meet specific criteria for admission to this area. The admission criteria and exclusion criteria for the NBC is on the handout provided (Appendix A). There is a mixed risk of categories including women who desire a vaginal birth after one cesarean section and women with gestational diabetes controlled by diet alone and without macrosomic babies. No pitocin augmentation or induction of labor is done on the Normal Birth Center.

+56 Women are evaluated in the main admitting area by a nurse-midwife. If a woman is in active labor, meets the admission criteria and if there a room available, then she and her family proceed to a simple labor/birth room. It is the care which women receive that makes the greatest difference, not the decor of the room.

+57,58,59

Over twelve years, nurse-midwives have attended more than 30,000 births in this setting. The results from 1981-1992 were published by Greulich, B. et. al in the Journal of Nurse-Midwifery in1994 and are as follows. Of the 196,420 births (100%) done at the Women's Hospital, 36,410 or 18.5% were admitted to the NBC. NBC births totaled 30,311 (15.0%) with transfers needed for 6,099 or 17% of the NBC admissions. Of those transfers, 475 (1.8%) women needed Cesarean section and 590 (2.3%) required forceps or vacuum extraction. Additional outcomes are found in the following table.

+58

Selected Labor and Birth Outcomes 1990-1991 (N=6,109)

Labor/Birth Outcomes	(n)	(%)
Medications in Labor		
None	5,683	93.0
Meperidine	259	4.3
Hydroxyzine	167	2.7
Perineum		
Intact	3,493	57.2
Episiotomy	311	5.1
Laceration		
1st/2nd	2,128	34.8
3rd/4th	109	1.8
Unknown	68	1.1

+59 SLIDE

Selected Labor and Birth Outcomes 1990-1991 (N=6,109)

Apgar Scores		
<8 at 5 minutes	27	0.4
Birth Weight		
<2,500 gm	61	1.0
2,500 - 4,000 gm	5,566	91.0
4,001 - 4,500 gm	445	7.3
>4,500	37	0.7

Greulich, B. et al. JNM 39(4), 1994

+60,61 Ms. Judith Rooks, CNM, MPH, former Past President of the American College of Nurse-Midwives and Consultant, authored a study with others comparing outcomes in free-standing birth centers to similar populations delivering in hospitals in Illinois and Texas. The outcomes in the birth centers were similar or better.

+68 Finally, there are equally important components of family-centered maternity care during the postpartum period. Of immediate importance is skin-to-skin contact between the mother and the newborn immediately after birth, initiating breast feeding in the immediate postpartum period, and facilitating mother-infant bonding including siblings and family members.

+68b Further, avoiding any separation of mother and infant, discontinuing routine nursery care and instituting rooming-in postpartum care are paramount.

+69 All components of family centered maternity care in the postpartum period support breast-feeding. These include assistance to solve breast-feeding problems as they arise, becoming a baby-friendly facility, establishing a breast-feeding clinic, and providing for home visitation and phone consultation.

+70 Lastly, family-centered maternity care during postpartum emphasizes education in baby care, mother's self-care, and parenting and support groups. Timely initiation of postpartum contraception is foremost in ensuring continued reproductive health.

+71 TO END

Recipients of family-centered maternity care speak of being empowered throughout the maternity cycle. They speak of the joy and wonder of birth. Women glow with self-confidence and a sense of their newly discovered power--power to care for themselves and their families. Men find an unexpected sense of awe and wonder--of their wives--of the remarkable ability of the human body--and of their own inner strength and gentleness.

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APPENDIX C

APPENDIX C: DAY ONE

WHO OPERATING PRINCIPLES FOR THE MOTHER-BABY PACKAGE[1]

The Mother-Baby Package is based on principles which are intrinsic elements of primary health care. They are:

Interventions must be based on the best scientific information available and must use only those methods that have been scientifically demonstrated to be valid.

There must be equity in access to care for all, including the poor and disadvantaged.

Services should be provided at the lowest level of the health care system capable of performing them adequately.

Resources, both human and material, must not be concentrated at the apex of the health care system but must be redistributed to the periphery and to the communities where people live (decentralization).

There should be delegation of responsibility and of authority, coupled with supportive supervision.

Quality of care is as important as access to care and implies the existence of the skills and equipment that are necessary, as well as the client-provider relationships that are appropriate.

There should be appropriate use of techniologies, avoiding high-technology interventions when equally effective alternatives are available.

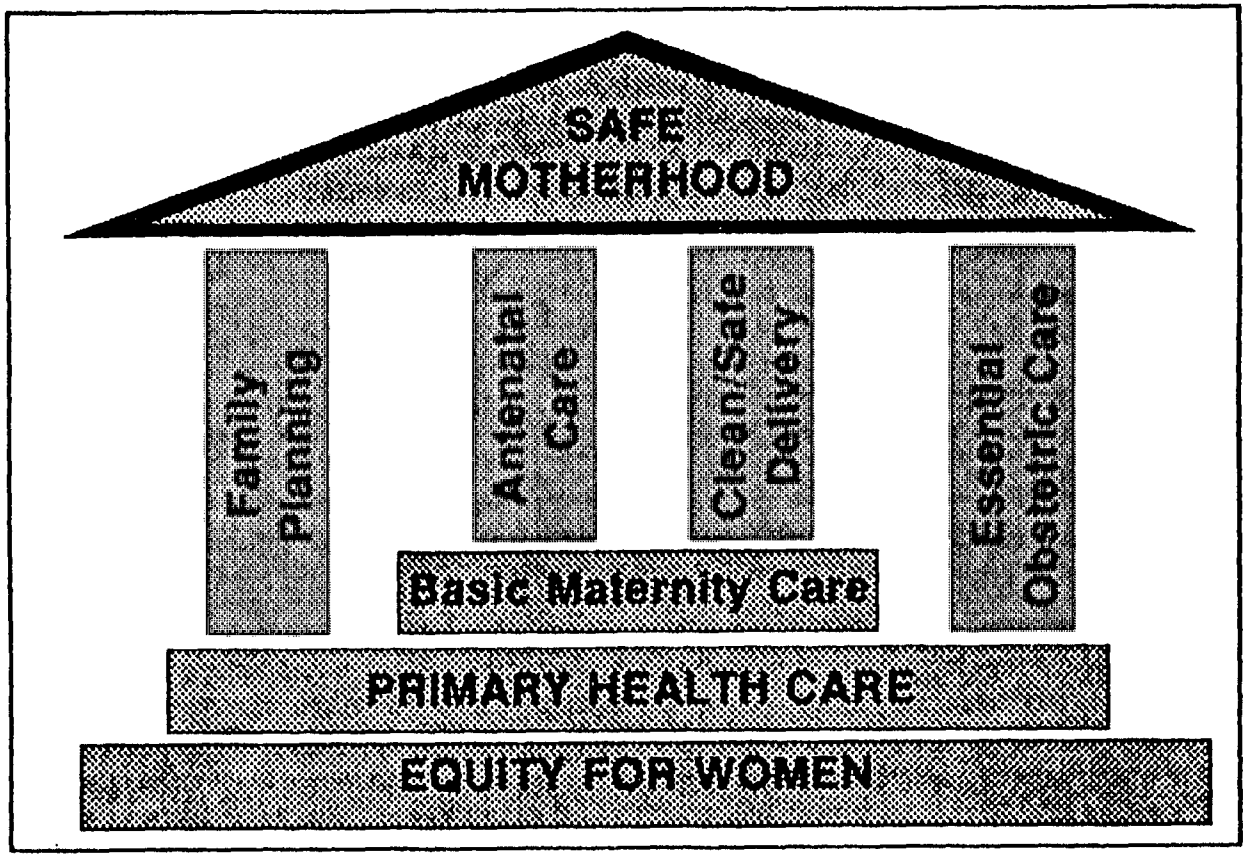
Communities should be involved in developing, implementing and evaluating the services that are provided for them.

Health care providers should work together in a spirit of teamwork and collaboration.

Health interventions must be cost-effective.

[1] Maternal Health and Safe Motherhood Programme, Division of Family Health, WHO, Geneva. *Mother-Baby Package: Implementing safe motherhood in countries*. WHO/FHE/MSM/94.11

Fig. 1 The "four pillars" of safe motherhood



Taken from: Maternal Health and Safe Motherhood Programme, Division of Family Health, WHO, Geneva. Mother-Baby Package: Implementing safe motherhood in countries. WHO/FHE/MSM/94.11, p. xi

Table 4: Mother-Baby Package Interventions

1. Before and during pregnancy

   Information and services for family planning
   STD/HIV prevention and management
   Tetanus toxoid immunization
   Antenatal registration and care
   Treatment of existing conditions (for example, malaria and hookworm)
   Advice regarding nutrition and diet
   Iron/folate supplementation
   Recognition, early detection and management of complications (eclampsia/pre-eclampsia, bleeding, abortion, anaemia)

2. During delivery

   Clean and safe (atraumatic) delivery
   Recognition, early detection and management of complications at health centre or hospital (for example, haemorrhage, eclampsia, prolonged/obstructed labour)

3. After delivery: mother

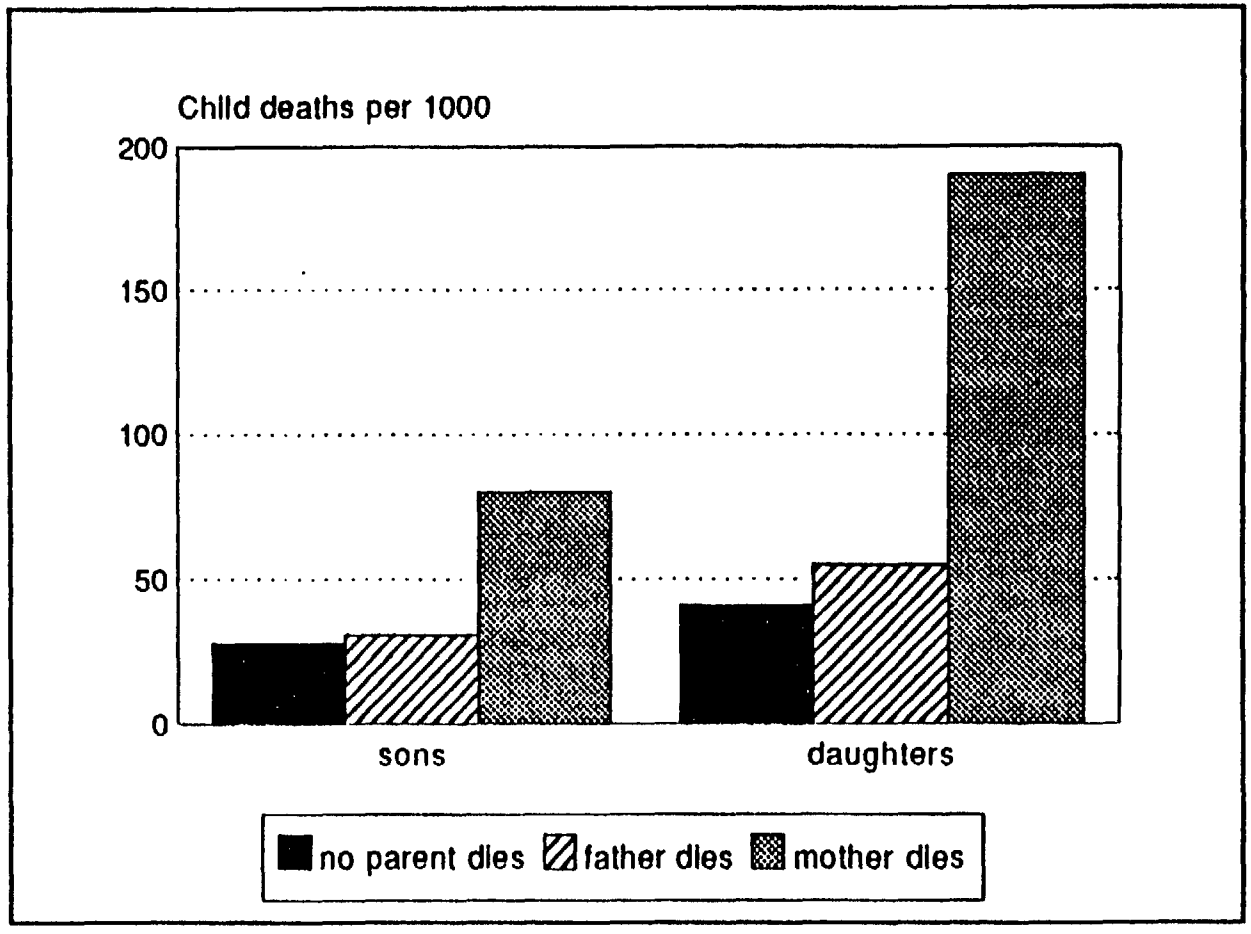
   Recognition, early detection and management of postpartum complications at health centre or hospital (for example, haemorrhage, sepsis and eclampsia)
   Postpartum care (promotion and support to breast-feeding and management of breast complications)
   Information and services for family planning
   STD/HIV prevention and management
   Tetanus toxoid immunization

4. After delivery: newborn

   Resuscitation
   Prevention and management of hypothermia
   Early and exclusive breast-feeding
   Prevention and management of infections including ophthalmia neonatorum and cord infections

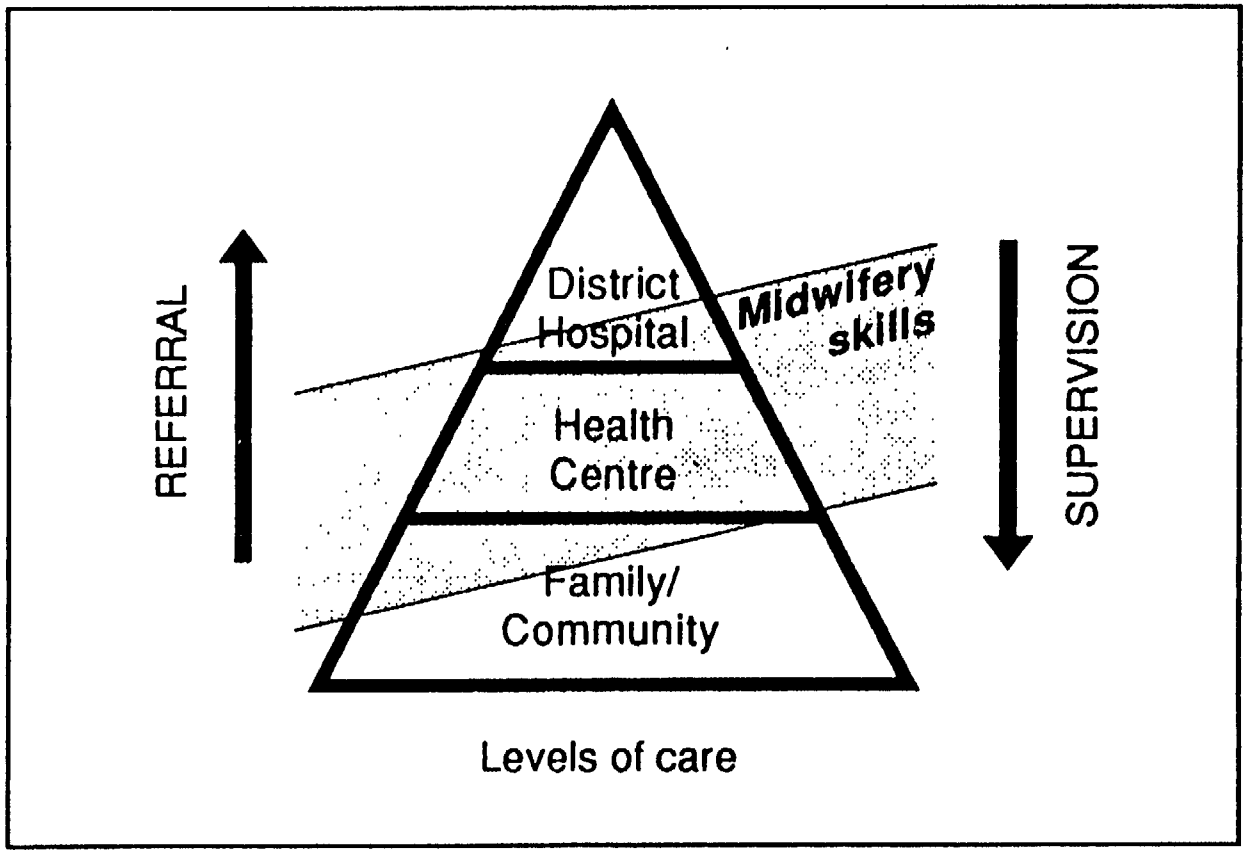
Taken from: Maternal Health and Safe Motherhood Programme, Division of Family Health, WHO, Geneva. Mother-Baby Package: Implementing safe motherhood in countries. WHO/FHE/MSM/94.1, p. xvi

Fig. 4 What happens to the remaining children when the mother dies?



Taken from: Maternal Health and Safe Motherhood Programme, Division of Family Health, WHO, Geneva. Mother-Baby Package: Implementing safe motherhood in countries. WHO/FHE/MSM/94.11, p. 10

Fig. 5 The health care pyramid at district level



Taken from: Maternal Health and Safe Motherhood Programme, Division of Family Health, WHO, Geneva. Mother-Baby Package: Implementing safe motherhood in countries. WHO/FHE/MSM/94.11, p. 12

APPENDIX D

Appendix D, Day One: Notes about the Cochrane Pregnancy and Childbirth Database

In the mid-seventies, a British obstetrician, Dr. Ian Chalmers, began to assemble a register of controlled trials in perinatal medicine. He was joined by colleagues who assisted him to establish explicit criteria for the review of studies to assess the effects of care in pregnancy and childbirth. They reviewed published studies and unpublished data covering all aspects of perinatal care. Their work resulted in a 1500 page book in two volumes: *Effective care in pregnancy and childbirth,* and an electronic database of reviews. This database is available on disk as *The Cochrane pregnancy and childbirth database* and continues to be updated on an ongoing basis.

Murray Enkin and colleagues published a smaller book, *A Guide to Effective Care in Pregnancy and Childbirth*, to make the information in the larger book more readily available to providers of maternal and infant care. The first edition, published in 1989, was very well received as its conclusions were based on sound evidence. It was extensively used by policy makers, midwives, obstetricans, childbirth educators and parents to assist in evaluating maternity car practices and policies. Because of continual updating of material, the first edition was soon outdated and the second edition was published in 1995. All the references used in this curriculum are from the later version.

Many obstetrical practices developed because of convenience and habit rather than scientific examination. Separation of mothers and babies and the central nursery developed because the first women who went to the hospital to give birth (1900 to 1920s), were often very ill and could not care for their babies. When hospital birth became routine, the central nursery remained for far too many years. We now know that both mothers and babies do better--fewer infections, better breast-feeding outcomes--with rooming in. This is just one example how research is helping us to establish practices which support normal physiologic childbearing. The work of Drs. Chalmers, Enkin and others has been extremely valuable in examining and evaluating practices.

Dr. Enkin and colleagues state that they work from two basic principles. First, any practice which would restrict a mother's autonomy, freedom of choice, or access to her baby, would have to have clear evidence that that practice does more good than harm. Second, any process that interferes with the natural processes of pregnancy and childbirth must be shown to do more good than harm. They believe that the onus of proof rests with those who advocate any intervention that interferes with either of these two basic principles.

At the current time, Dr. Enkin's book is not available in Russian. The following pages contain the translation of tables which summarize the information found in each chapter. The number after the table refers to the chapter in which this information is addressed. The six tables presented list the following information:

1. Beneficial forms of care;
2. Forms of care likely to be beneficial;
3. Forms of care with a tradeoff between beneficial and adverse effects;
4. Forms of care of unknown effectiveness;
5. Forms of care that are unlikely to be beneficial;
6. Forms of care that are likely to be ineffective or harmful.

The information presented in Tables 1 and 6 is based on clear evidence from systematic reviews of randomized controlled trials or studies. The conclusions in Tables 2 and 5 are not as firmly based as 1 and 6 as they are based on controlled trials or good observational evidence. The forms of care listed in Table 4 have either no data or data which has insufficient quality and therefore no recommendations can be made.

Many organizations in different countries supported this work including the World Health Organization which funded the initial work of the registry of controlled trials in perinatal medicine.

Table 1 Beneficial forms of care

Effectiveness demonstrated by clear evidence from controlled trials

	Chapter
BASIC CARE	
Support for socially disadvantaged mothers to improve child care	3
Women carrying their case notes during pregnancy to enhance their feeling of being in control	3
Pre-and periconceptional folic acid supplementation to prevent recurrent neural tube defects	5,6
Folic acid supplementation (or high folate diet) for all women contemplating pregnancy	5,6
Programmes (particularly behavioural strategies) to assist stopping smoking during pregnancy	5
Balanced energy and protein supplementation of diet when supplementation is required	6
Vitamin D supplementation for women with inadequate exposure to sunlight	6
Iodine supplementation in populations with a high incidence of endemic cretinism	6
SCREENING	
Doppler ultrasound in pregnancies at high risk of fetal compromise	12
PREGNANCY PROBLEMS	
Antihistamines for nausea and vomiting of pregnancy if simple measures are ineffective	13
Local imidazoles for vaginal candida infection (thrush)	13
Local imidazoles instead of nystatin for vaginal candida infection (thrush)	13
Postpartum adminstration of anti-D immunoglobulin to rhesus-negative women with a rhesus-positive fetus	18
Administration of anti-D immunoglobulin to rhesus-negative women at 28 weeks of pregnancy	18
Antibiotic treatment of asymptomatic bacteriuria	19
Antibiotics during labour for women colonized with group B streptococcus	19
Tight as opposed to too strict or moderate control of blood sugar levels in diabetic women	20

43

Table 1 *continued*

Beneficial forms of care

	Chapter
External cephalic version at term to avoid breech presentation at birth	22
Corticosteroids to promote fetal maturation before preterm delivery	25
Offering induction of labour at 41+ weeks gestation	26
CHILDBIRTH	
Emotional and psychological support during labour and birth	28
Maternal mobility and choice of position in labour	29
Agents to reduce acidity of stomach contents before general anaesthesia	29
Fetal acid–base assessment as an adjunct to fetal heart monitoring in labour	30
PROBLEMS DURING CHILDBIRTH	
Free mobility during labour to augment slow labour	35
Absorbable instead of non-absorbable sutures for skin repair of perineal trauma	36
Polyglycolic acid sutures instead of chromic catgut for repair of perineal trauma	36
TECHNIQUES OF INDUCTION AND OPERATIVE DELIVERY	
Prostaglandins to increase cervical readiness for induction of labour	39
Amniotomy plus oxytocin for induction of labour instead of either amniotomy or oxytocin alone	40
Vaginal prostaglandin E_2 for induction of labour	40
Vaginal prostaglandin E_2 instead of $PGF_{2\alpha}$ for induction of labour	40
Vacuum extraction instead of forceps when operative vaginal delivery is required	41
Antibiotic prophylaxis (short course or intraperitoneal lavage) with caesarean section	43
CARE AFTER CHILDBIRTH	
Use of surfactant for very preterm infants to prevent respiratory distress syndrome	44

Table 1 *continued*

Beneficial forms of care

	Chapter
Consistent support for breastfeeding mothers	46
Personal support from a knowledgeable individual for breastfeeding mothers	46
Unrestricted breastfeeding	46
Local anaesthetic sprays for relief of perineal pain postpartum	47
Cabergoline instead of bromocriptine for relief of breast symptoms in non-breastfeeding mothers	48

Table 2 Forms of care likely to be beneficial

The evidence in favour of these forms of care is not as firmly established as for those in Table 1

	Chapter
BASIC CARE	
Adequate access to care for all childbearing women	3
Social support for childbearing women	3
Financial support for childbearing women in need	3
Legislation on paid leave and income maintenance during maternity or parental leave	3
Midwifery care for women with no serious risk factors	3
Continuity of care for childbearing women	3
Antenatal classes for women and their partners who want them	4
Advice to avoid excessive alcohol consumption during pregnancy	5
Avoidance of heavy physical work during pregnancy	5
SCREENING	
Selective use of ultrasound to answer specific questions about fetal size, structure, or position	8
Selective use of ultrasound to assess amniotic fluid volume	8
Selective use of ultrasound to estimate gestational age in first and early second trimester	8,9
Ultrasound to facilitate intrauterine interventions	8,9
Ultrasound to determine whether the embryo is alive in threatened miscarriage	8,14
Ultrasound to confirm suspected multiple pregnancy	8,17
Ultrasound for placental location in suspected placenta praevia	8,21
Early second trimester amniocentesis to identify chromosomal abnormalities in pregnancies at risk	9
Genetic counselling before prenatal diagnosis	9
Transabdominal instead of transcervical chorion villus sampling	9
Regular monitoring of blood pressure during pregnancy	10
Testing for proteinuria during pregnancy	10
Uric acid levels for following the course of pre-eclampsia	10
Fundal height measurements during pregnancy	12

Table 2 *continued*

Forms of care likely to be beneficial

	Chapter
PREGNANCY PROBLEMS	
Antacids for heartburn of pregnancy if simple measures are ineffective	13
Bulking agents for constipation if simple measures are ineffective	13
Local metronidazole for symptomatic trichomonal vaginitis after first trimester	13
Antihypertensive agents to control moderate to severe hypertension in pregnancy	15
Antithrombotic and antiplatelet agents to prevent pre-eclampsia	15
Anticonvulsant agents for eclampsia	15
Screening all pregnant women for blood group isoimmunization	18
Anti-D immunoglobulin to rhesus-negative women after any bleeding episode during pregnancy	18,21
Anti-D immunoglobulin to rhesus-negative women after any intrauterine procedure	18
Anti-D immunoglobulin to rhesus-negative women sustaining abdominal trauma	18,21
Intrauterine transfusion for a severely affected isoimmunized fetus	18
Routine screening for and treatment of syphilis in pregnancy	19
Rubella vaccination of seronegative women postpartum	19
Screening for and treatment of *Chlamydia* in high prevalence populations	19
Caesarean section for active herpes (with visible lesion) in labour with intact membranes	19
Prepregnancy counselling for women with diabetes	20
Specialist care for pregnant women with diabetes	20
Home instead of hospital glucose monitoring for pregnant women with diabetes	20
Ultrasound surveillance of fetal growth for pregnant women with diabetes	20
Allowing pregnancy to continue to term in otherwise uncomplicated diabetic pregnancies	20
Careful attention to insulin requirements postpartum	20

Table 2 *continued*

Forms of care likely to be beneficial

	Chapter
Encouraging diabetic women to breastfeed	20
Tests for blood clotting defect with severe placental abruption	21
Vaginal instead of caesarean delivery for placental abruption in the absence of fetal distress	21
Vaginal instead of caesarean delivery of a dead fetus after placental abruption	21
Repeat scanning at about 32 weeks for low-lying placenta	21
Delaying planned caesarean section for placenta praevia until term	21
Caesarean section for placenta praevia covering any portion of the cervical os	21
Ultrasound examination for vaginal bleeding of undetermined origin	21
External cephalic version for transverse lie at term	22
External cephalic version for breech in early labour if membranes are intact	22
Corticosteroid administration after prelabour rupture of membranes preterm	23
Vaginal culture after prelabour rupture of membranes preterm	23
Antibiotics for prelabour rupture of membranes with suspected intrauterine infection	23
Allowing labour to progress after spontaneous onset in prelabour rupture of membranes preterm	23
Elective delivery for prelabour rupture of membranes preterm with signs of infection	23
Amnioinfusion for fetal distress thought to be due to oligohydramnios in labour	23,30
Short-term indomethacin to stop preterm labour	24
Offering induction of labour as an option after fetal death	27
Vaginal prostaglandin $E_{2\alpha}$ for induction of labour after fetal death	27
Prostaglandin analogues for induction of labour after fetal death	27

CHILDBIRTH

Respecting women's choice of companions during labour and birth	28
Respecting women's choice of place of birth	28

Table 2 *continued*

Forms of care likely to be beneficial

	Chapter
Presence of a companion on admission to hospital	29
Giving women as much information as they desire	29
Change of mother's position for fetal distress in labour	30
Intravenous betamimetics for fetal distress in labour to 'buy time'	30
Woman's choice of position for the second stage of labour or giving birth	32
Oxytocics to treat postpartum haemorrhage	33
Intramyometrial prostaglandins for severe postpartum haemorrhage	33

PROBLEMS DURING CHILDBIRTH

Regular top-ups of epidural analgesia instead of top-ups on maternal demand	34
Maternal movement and position changes to relieve pain in labour	34
Counter-pressure to relieve pain in labour	34
Superficial heat or cold to relieve pain in labour	34
Touch and massage to relieve pain in labour	34
Attention focusing and distraction to relieve pain in labour	34
Music and audio-analgesia to relieve pain in labour	34
Epidural instead of narcotic analgesia for preterm labour and birth	34,37
Amniotomy to augment slow or prolonged labour	35
Continuous subcuticular suture for perineal skin repair	36
Primary repair of episiotomy breakdown	36
Delivery of a very preterm baby in a centre with adequate facilities to care for immature babies	37,44
Presence of a paediatrician at a very preterm birth	37,44
Trial of labour after previous lower-segment caesarean section	38
Trial of labour after more than one previous lower-segment caesarean section	38
Use of oxytocin when indicated after previous caesarean section	38
Use of epidural analgesia in labour when needed after previous caesarean section	38

Table 2 *continued*

Forms of care likely to be beneficial

	Chapter
TECHNIQUES OF INDUCTION AND OPERATIVE DELIVERY	
Assessing the state of the cervix before induction of labour	39
Transverse instead of vertical skin incision for caesarean section	42
Low-dose heparin with caesarean section to prevent thromboembolism	42
Transverse lower-segment uterine incision for caesarean section	42
CARE AFTER BIRTH	
Keeping babies warm immediately after birth	44
Prophylactic vitamin K to the baby to prevent haemorrhagic disease of the newborn	44
Nasopharyngeal suctioning of infants who have passed meconium before birth	44
Presence of someone skilled in neonatal resuscitation at birth of all infants likely to be at risk	44
Oxygen for resuscitation of distressed newborn infants	44
Cardiac massage for infants born with absent heart beat	44
Naloxone for infants with respiratory depression due to narcotic administration before birth	44
Encouraging early mother–infant contact	45
Allowing mothers access to their own supply of symptom-relieving drugs in hospital	45
Consistent advice to new mothers	45
Allowing women choice of length of postpartum stay in hospital	45
Telephone service of advice and information after women go home from hospital after birth	45
Psychological support for women depressed after childbirth	45
Encouraging early breastfeeding when mother and baby are ready	46
Skilled help with first breastfeed	46
Correct positioning of baby at breast for breastfeeding	46
Flexibility in breastfeeding practices	46
Antibiotics for infectious mastitis in breastfeeding women	46
Hospital support programmes of care for bereaved parents	49

Table 2 *continued*

Forms of care likely to be beneficial

	Chapter
Encouraging parental contact with a dying or dead baby	49
Providing parents with prompt accurate information about a severely ill baby	49
Encouraging autopsy for a dead baby and imparting results to parents	49
Help with funeral arrangements for a dead baby	49
Self-help groups for bereaved parents	49
Specialist counsellors for parents with prolonged grief reactions	49

Table 3 Forms of care with a trade-off between beneficial and adverse effects

Women and caregivers should weigh these effects according to individual circumstances and priorities

	Chapter
BASIC CARE	
Continuity of caregiver for childbearing women	3
Legislation restricting type of employment for childbearing women	3
SCREENING	
Formal systems of risk scoring	7
Routine early ultrasound	8
Chorion villus sampling versus amniocentesis for diagnosis of chromosomal abnormalities	9
Serum alpha-fetoprotein screening for neural tube defects	9
Routine fetal movement counting to improve perinatal outcome	12
PREGNANCY PROBLEMS	
Screening for toxoplasmosis during pregnancy	19
Corticosteroids to promote fetal maturation before preterm delivery in diabetic women	20,25
Induction of labour for prelabour rupture of membranes at term	23
Betamimetic drugs to delay preterm delivery for implementation of effective measures	24
Oral betamimetics to maintain labour inhibition	24
Cervical cerclage for women at risk of preterm birth	24
Betamimetic drugs to stop preterm labour	24
Expectant care versus induction of labour after fetal death	27
CHILDBIRTH	
Continuous EFM plus scalp sampling versus intermittent auscultation during labour	30
Mid-line versus mediolateral episiotomy, when episiotomy is necessary	32
Prophylactic oxytocics in the third stage of labour	33
Active versus expectant management of third stage of labour	33

Table 3 *continued*

Forms of care with a trade-off between beneficial and adverse effects

	Chapter
PROBLEMS DURING CHILDBIRTH	
Routine preloading with intravenous fluids before epidural analgesia	34
Narcotics to relieve pain in labour	34
Inhalation analgesia to relieve pain in labour	34
Epidural analgesia to relieve pain in labour	34
Epidural administration of opiates to relieve pain in labour	34
Early amniotomy in spontaneous labour	35
TECHNIQUES OF INDUCTION AND OPERATIVE DELIVERY	
Endocervical versus vaginal prostaglandin for cervical ripening before induction of labour	39
Oral prostaglandins for induction of labour with a ripe cervix	40
Prostaglandins versus oxytocin for induction of labour	40
Regional versus general anaesthesia for caesarean section	42
Epidural versus spinal anaesthesia for caesarean section	42
Ampicillin versus broader-spectrum antibiotics for caesarean section	43
CARE AFTER CHILDBIRTH	
Prophylactic antibiotic eye ointments to prevent eye infection in the newborn	44
Prophylactic versus 'rescue' surfactant for very preterm infants	44

Table 4 Forms of care of unknown effectiveness

There are insufficient or inadequate quality data upon which to base a recommendation for practice

	Chapter
BASIC CARE	
Social support for high-risk women to prevent preterm birth	3,24
Formal preconceptional care for all women	5
Fish oil supplementation to improve pregnancy outcome	6,15
Prostaglandin precursors to improve pregnancy outcome	6,15
Changes in salt intake to prevent pre-eclampsia	6,15
Calcium supplementation to improve pregnancy outcome	6,15
Magnesium supplementation to improve pregnancy outcome	6,15
Zinc supplementation to improve pregnancy outcome	6
Antigen avoidance diets to reduce risk of an atopic child	6
SCREENING	
Placental grading by ultrasound to improve perinatal outcome	8,12
Fetal biophysical profile for fetal surveillance	12
PREGNANCY PROBLEMS	
Acupressure for nausea and vomiting of pregnancy if simple measures are ineffective	13
Vitamin B_6 for nausea and vomiting of pregnancy if simple measures are ineffective	13
Ginger for nausea and vomiting of pregnancy	13
Prostigmine for heartburn of pregnancy if simple measures are ineffective	13
Dilute acid or lemon juice for heartburn of pregnancy if antacids do not provide relief	13
Increased salt intake for leg cramps	13
Progestogens for threatened miscarriage with a live fetus	14
Human chorionic gonadotrophin for threatened miscarriage with a live fetus	14
Immunotherapy for recurrent miscarriage	14
Bed-rest for women with pre-eclampsia	15
Plasma volume expansion for pre-eclampsia	15

Table 4 *continued*

Forms of care of unknown effectiveness

	Chapter
Choice among magnesium sulphate, benzodiazepines, and phenytoin for eclampsia	15
Hospitalization and bed-rest for impaired fetal growth	16
Abdominal decompression for impaired fetal growth	16
Betamimetics for impaired fetal growth	16
Oxygen therapy for impaired fetal growth	16
Hormone therapy for impaired fetal growth	16
Calcium-channel blockers for impaired fetal growth	16
Plasma volume expanders for impaired fetal growth	16
Prophylactic betamimetics for multiple pregnancy	17
Hospitalization and bed-rest for triplet and higher-order pregnancy	17
Treatment of group B streptococcus colonization during pregnancy	19
Antiviral agents for women with a history of recurrent genital herpes	19
Routine elective caesarean for breech presentation	22
Postural techniques for cephalic version of breech presentation	22
Prophylactic antibiotics for prelabour rupture of membranes at term or preterm	23
Postpartum prophylactic antibiotics after prelabour rupture of membranes	23
Home uterine activity monitoring for prevention of preterm birth	24
Bed-rest to prevent preterm birth	24
Magnesium supplementation to prevent preterm birth	24
Calcium supplementation to prevent preterm birth	24
Progestogens to prevent preterm birth	24
Magnesium sulphate to stop preterm labour	24
Calcium antagonists to stop preterm labour	24
Routine cervical assessment for prevention of preterm birth	24
Antibiotic therapy in preterm labour	24
Oxytocin antagonists to stop preterm labour	24
Adding thyrotropin-releasing hormone to corticosteroids to promote fetal maturation	25
Sweeping of membranes to prevent post-term pregnancy	26,40
Nipple stimulation to prevent post-term pregnancy	26
Induction instead of surveillance for pregnancy at 41+ weeks gestation	26

Table 4 *continued*

Forms of care of unknown effectiveness

	Chapter
CHILDBIRTH	
Routine amnioscopy to detect meconium in labour	30
Routine artificial rupture of membranes to detect meconium in labour	30
Short periods of electronic fetal monitoring as an admission screening test in labour	30
Fetal stimulation tests for fetal assessment in labour	30
Maternal oxygen administration for fetal distress in labour	30
Routinely repeated blood pressure measurements in labour	31
Guarding the perineum versus watchful waiting during birth	32
Prophylactic ergometrine + oxytocin versus oxytocin alone in third stage of labour	33
Early versus late clamping of the umbilical cord	33
Controlled cord traction in third stage of labour	33
Intraumbilical vein oxytocin for retained placenta	33
PROBLEMS DURING CHILDBIRTH	
Abdominal decompression to relieve pain in labour	34
Immersion in water to relieve pain in labour	34
Acupuncture to relieve pain in labour	34
Acupressure to relieve pain in labour	34
Transcutaneous electrical nerve stimulation to relieve pain in labour	34
Intradermal injection of sterile water to relieve pain in labour	34
Aromatherapy to relieve pain in labour	34
Hypnosis to relieve pain in labour	34
Continuous infusion versus intermittent top-ups for epidural analgesia	34
Early use of oxytocin to augment slow or prolonged labour	35
'Active management' of labour	35
Cervical vibration for slow or prolonged labour	35
Histoacryl tissue adhesive for perineal skin repair	36
Phenobarbitone to the mother to prevent intraventricular haemorrhage in the very preterm infant	37
Vitamin K to the mother to prevent intraventricular haemorrhage in the very preterm infant	37

Table 4 *continued*

Forms of care of unknown effectiveness

	Chapter
Caesarean section for very preterm delivery	37
Caesarean section for preterm breech delivery	37
Immediate versus delayed cord clamping at preterm birth	37
TECHNIQUES OF INDUCTION AND OPERATIVE DELIVERY	
Oxytocin by automatic infusion systems versus 'standard regimens' for induction of labour	40
Use of haemostatic stapler for the uterine incision at caesarean section	42
Single-layer versus two-layer closure of the uterine incision at caesarean section	42
Systemic versus intraperitoneal prophylactic antibiotics at caesarean section	43
CARE AFTER CHILDBIRTH	
Tracheal suctioning for meconium in babies without respiratory depression	44
Routine use of antiseptics for the cord	45
Oral proteolytic enzymes for breast engorgement in breastfeeding mothers	46
Cabbage leaves for breast engorgement in breastfeeding mothers	46
Dopamine agonists to improve milk supply in breastfeeding mothers	46
Oxytocin nasal spray to improve milk supply in breastfeeding mothers	46
Oral proteolytic enzymes for perineal pain postpartum	47
Ultrasound and pulsed electromagnetic energy for perineal pain	47
Rubber rings and similar devices to prevent pressure for perineal pain	47
Cabergoline versus physical methods of suppressing lactation	48

Table 5 Forms of care unlikely to be beneficial

The evidence against these forms of care is not as firmly established as for those in Table 6

	Chapter
BASIC CARE	
Reliance on expert opinion instead of on good evidence for decisions about care	2
Routinely involving doctors in the care of all women during pregnancy and childbirth	3
Routinely involving obstetricians in the care of all women during pregnancy and childbirth	3
Not involving obstetricians in the care of women with serious risk factors	3
Fragmentation of care during pregnancy and childbirth	3
Advice to restrict sexual activity during pregnancy	5
Prohibition of all alcohol intake during pregnancy	5
Imposing dietary restrictions during pregnancy	6
Routine vitamin supplementation in late pregnancy in well-nourished populations	6
Routine haematinic supplementation in pregnancy in well-nourished populations	6
High-protein dietary supplementation	6
SCREENING	
Routine use of ultrasound for fetal anthropometry in late pregnancy	8,12
Using oedema to screen for pre-eclampsia	10
Cold pressor test to screen for pre-eclampsia	10
Roll-over test to screen for pre-eclampsia	10
Isometric exercise test to screen for pre-eclampsia	10
Measuring uric acid as a diagnostic test for pre-eclampsia	10
Screening for 'gestational diabetes'	11
Routine glucose challenge test during pregnancy	11
Routine measurement of blood glucose during pregnancy	11
Insulin plus diet therapy for 'gestational diabetes'	11
Diet therapy for 'gestational diabetes'	11
Routine use of Doppler ultrasound screening in all pregnancies	12
Measurement of placental proteins or hormones (including oestriol and human placental lactogen)	12

Table 5 *continued*

Forms of care unlikely to be beneficial

	Chapter
PREGNANCY PROBLEMS	
Calcium supplementation for leg cramps	13
Screening for and treatment of candidal colonization without symptoms	13
Screening for and treatment of *Trichomonas* colonization without symptoms	13
Bed-rest for threatened miscarriage	14
Diazoxide for pre-eclampsia or hypertension in pregnancy	15
Diuretics for pregnancy-induced hypertension	15
Hospitalization and bed rest in twin pregnancy	17
Cervical cerclage for multiple pregnancy	17
Routine caesarean section for multiple pregnancy	17
Routine screening for mycoplasmas during pregnancy	19
Caesarean section for non-active herpes simplex before or at the onset of labour	19
Elective delivery before term in women with otherwise uncomplicated diabetes	20
Elective caesarean section for pregnant women with diabetes	20
Discouraging breastfeeding in women with diabetes	20
Prohibition of oral contraceptives for diabetic women	20
Vaginal or rectal examination when placenta praevia is suspected	21
X-ray pelvimetry to diagnose cephalopelvic disproportion	22
Computer tomographic pelvimetry to predict cephalopelvic disproportion	22
Liberal use (pretrial of labour) of caesarean section for macrosomia	22
Amniocentesis for prelabour rupture of membranes preterm	23
Prophylactic tocolytics with prelabour rupture of membranes preterm	23
Regular leucocyte counts for surveillance in prelabour rupture of membranes	23
Betamimetics for preterm labour in women with heart disease or diabetes	24
Hydration to arrest preterm labour	24
Diazoxide to stop preterm labour	24

Table 5 *continued*

Forms of care unlikely to be beneficial

	Chapter
CHILDBIRTH	
Routine withholding food and drink from women in labour	29
Routine intravenous infusion in labour	29
Routine measurement of intrauterine pressure with oxytocin administration	31,35
Face masks during vaginal examinations	31
Frequent scheduled vaginal examinations in labour	31
Routine directed pushing during the second stage of labour	32
Pushing by sustained bearing down during second stage of labour	32
Breath-holding during the second stage of labour	32
Early bearing down during the second stage of labour	32
Arbitrary limitation of the duration of the second stage of labour	32
'Ironing out' or massaging the perineum during the second stage of labour	32
Routine manual exploration of uterus after vaginal delivery	32
PROBLEMS DURING CHILDBIRTH	
Biofeedback to relieve pain in labour	34
Sedatives and tranquillizers to relieve pain in labour	34
Caudal block to relieve pain in labour	34
Paracervical block to relieve pain in labour	34
Intrapartum X-ray to diagnose cephalopelvic disproportion	35
Diagnosing cephalopelvic disproportion without ensuring adequate uterine contractions	35
Relaxin for slow or prolonged labour	35
Hyaluronidase for slow or prolonged labour	35
Delivery of a very preterm infant without adequate facilities to care for an immature baby	37
Elective forceps for preterm delivery	37,41
Routine use of episiotomy for preterm birth	37
Trial of labour after previous classical caesarean section	38
Manual exploration of the uterus to assess previous caesarean section scar	38

Table 5 *continued*

Forms of care unlikely to be beneficial

	Chapter
TECHNIQUES OF INDUCTION AND OPERATIVE DELIVERY	
Mechanical methods for cervical ripening before induction of labour	39
Relaxin for cervical ripening before induction of labour	39
Nipple stimulation for cervical ripening before induction of labour	39
Extra-amniotic instead of other prostaglandin regimens for cervical ripening	39
Instrumental vaginal delivery to shorten second stage of labour	41
Routine exteriorization of the uterus for repair of uterine incision at caesarean section	42
CARE AFTER CHILDBIRTH	
Silver nitrate to prevent eye infection in newborn babies	44
Elective tracheal intubation for very-low-birthweight infants who are not depressed	44
Routine suctioning of newborn babies	44
Medicated bathing of babies to reduce infection	45
Wearing hospital gowns in newborn nurseries	45
Restriction of sibling visits to babies in hospital	45
Routine measurements of temperature, pulse, blood pressure, and fundal height postpartum	45
Limiting use of women's own non-prescription drugs postpartum in hospital	45
Administering non-prescription symptom-relieving drugs at regularly set intervals	45
Nipple shields for breastfeeding mothers	46
Switching breasts before babies spontaneously terminate the feed	46
Oxytocin for breast engorgement in breastfeeding mothers	46
Antibiotics for localized breast engorgement (milk stasis)	46
Discontinuing breastfeeding for localized breast engorgement (milk stasis)	46
Combinations of local anaesthetics and topical steroids for relief of perineal pain	47
Relying on these tables without referring to the rest of the book	50

Table 6 Forms of care likely to be ineffective or harmful

Ineffectiveness or harm demonstrated by clear evidence

	Chapter
BASIC CARE	
Dietary restriction to prevent pre-eclampsia	6,15
Antenatal breast or nipple care for women who plan to breastfeed	46
SCREENING	
Contraction stress cardiotocography to improve perinatal outcome	12
Nipple-simulation test cardiotography to improve perinatal outcome	12
Non-stress cardiotocography to improve perinatal outcome	12
PREGNANCY PROBLEMS	
ACTH for severe vomiting of pregnancy	13
Diethylstilboestrol during pregnancy	14
External cephalic version preterm to avoid breech presentation at birth	22
Elective delivery for prelabour rupture of membranes preterm	23
Ethanol to stop preterm labour	24
Progestogens to stop preterm labour	24
CHILDBIRTH	
Routine enema in labour	29
Routine pubic shaving in preparation for delivery	29
Electronic fetal monitoring without access to fetal scalp sampling during labour	30
Prophylactic intrapartum amnioinfusion for oligohydramnios	30
Rectal examinations to assess labour progress	31
Requiring a supine (flat on back) position for second stage of labour	32
Routine use of the lithotomy position for the second stage of labour	32
Routine or liberal episiotomy for birth	32
Ergometrine instead of oxytocin in third stage of labour	33
PROBLEMS IN CHILDBIRTH	
Glycerol-impregnated catgut for repair of perineal trauma	36

Table 6 *continued*

Forms of care likely to be ineffective or harmful

	Chapter
TECHNIQUES OF INDUCTION AND OPERATIVE DELIVERY	
Oral prostaglandins for cervical ripening	39
Oestrogens for cervical ripening or for induction of labour	39
Oxytocin for cervical ripening before induction of labour	39
CARE AFTER CHILDBIRTH	
Sodium bicarbonate for asphyxiated babies	44
Routine restriction of mother–infant contact	45
Routine nursery care for babies in hospital	45
Antenatal Hoffman's exercises for inverted or flat nipples	46
Antenatal breast shells for inverted or flat nipples	46
Limitation of suckling time for breastfeeding	46
Nipple creams or ointments for breastfeeding mothers	46
Routine supplements of water or formula for breastfed babies	46
Samples of formula for breastfeeding mothers	46
Encouraging fluid intake beyond demands of thirst for breastfeeding mothers	46
Combined oestrogen–progesterone oral contraceptives for breastfeeding mothers	46
Test weighing of breastfed infants	46
Witch hazel for relief of perineal pain	47
Adding salt to bath water for perineal pain	47
Antiseptic solutions added to bath water for perineal pain	47
Hormones for relief of breast symptoms in non-breastfeeding mothers	48
Bromocriptine for relief of breast symptoms in non-breastfeeding mothers	48

APPENDIX E

APPENDIX E, DAY ONE

NEWBORN PRACTICES AND FCMC (30 Minutes, Morning, First Day)[1]

1. Overview: Infant and neonatal mortality

8.1 million infant deaths per year world wide; 50% occur in neonatal period (first month)
4 million neonatal deaths, 2.8 million occur in the first week of life

Reasons for deaths:	Birth asphyxia	21%
	Pneumonia	19%
	Neonatal tetanus	14%
	Congenital anomalies	11%
	Birth injuries	10.6%
	Prematurity	10.3%
	Sepsis	7.2%

Many other infants survive with life-long disabilities. In most countries, more than 80% of neonatal deaths are still concentrated in babies who do not have congenital anomalies and who have adequate weight. Many of these deaths can be prevented by adequate training of personnel in managing asphyxia, preventing hypothermia and infection.

2. Interventions aimed at reducing neonatal mortality

Appropriate care during pregnancy and delivery can substantially reduce newborn deaths. It must be accompanied by special newborn care and measures to reduce deaths and disabilities from postnatal causes such as infections, hypothermia, and poor management of asphyxia. Preventative interventions are simple, inexpensive, attainable and cost-effective. Good neonatal care is not high tech!

Mother-Baby Package recommended interventions for newborns:

- Resuscitation
- Prevention and management of hypothermia
- Early and exclusive breast-feeding
- Prevention and management of infections including opthalmia neonatorum and cord infections

3. Principles and appropriate technologies for essential newborn care

The following principles, based on evidence through research, have been identified:

A. identification of women at high risk of obstetrical complications and provision of appropriate care

B. active observation of labor with early identification of complications and fetal distress

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[1]Excerpted from WHO "Essential Care of the Newborn" and "Mother-Baby Package"

C. friendly environment for childbirth and promotion of mother infant bonding

D. maintenance of body temperature

F. initiation of spontaneous respiration
G. prevention and management of infections

H. breast-feeding beginning shortly after birth

For some of the principles listed above, we will discuss the appropriate identified technologies (procedures, tools, devices, and routines) that should be made available for every birth. All these technologies are low-cost and can be implemented without major costs except for upgrading the skills, knowledge and practices of health care workers.

A. Identification of women at high risk of obstetrical complications and provision of appropriate care

B. Active observation of labor with early identification of complications and fetal distress.

Routine use of the partograph as presented on day 3 and demonstrated in the clinical setting is one of the technologies for early recognition of complications. It is important that all providers caring for women at any time record appropriate information on this form and in the mother's records.

C. Friendly environment for childbirth and promotion of mother infant bonding.

As discussed in the paper on Family-Centered Maternity Care (see Appendix B), the environment in which a woman gives birth can effect both the health and outcomes for both the mother and the infant. The concept of mother-infant bonding is well researched and we know that the labor, birth and postpartum period provide a time-limited sensitive period for the mother to "take-in" and form a strong relationship with her infant. Appropriate technologies to ensure a friendly environment and to promote bonding are:

* The father or another family member should be allowed to assist the woman during labor and birth and to visit her during the hospital stay.

* Unnecessary traumatic procedures for the mother and baby during childbirth should be avoided

* Traditional practices should be allowed if they do not interfere with good care

* Early contact between the mother and her baby should be encouraged and any unnecessary procedure that separates the baby from his mother should be avoided.

D. Initiation of spontaneous respiration

Interventions to reduce perinatal asphyxia may be the most cost-effective methods to reduce neonatal mortality and preventing further disabilities. However, in about 50% of cases of babies

needing assistance with respiratory effort, this situation cannot be anticipated. Therefore, it is important that at each birth there is the necessary equipment and personnel with the appropriate skills.

In the case of birth asphyxia, encouraging results can be obtained by ventilating with mask or bag and mask, and cardiac massage when bardycardia persists. Health care workers should be trained in the assessment and management of birth asphyxia.

Appropriate technologies are:

Assessment of the newborn immediately after birth for need of resuscitation

Resuscitation by bag and mask and other cardiopulmonary resuscitation procedures if spontaneous breathing does not start.

Management of the post-asphyctic newborn

E. Maintenance of body temperature

Hypothermia occurs when the body temperature drops below 36.5° C. (97.7° F). The best prevention for hypothermia for all newborn infants, including preterm and small infants, is to dry the baby and placed it in skin-to-skin contact with the mother. Initiate breastfeeding, keeping the infant in skin-to-skin contact and covering the infant and the mother together. Swaddling does not prevention hypothermia.

Hypothermia is the starting point for the development of multiple health problems including hypoglycemia, poor feeding, acidosis, abnormal clotting, and is at increased risk of respiratory distress and infection. Initially, the baby may lose enough heat to drop his temperature two to four degrees (C) due to evaporation of amniotic fluid from his body. The baby's ability to respond to cold by increased metabolism and heat production is not fully developed at birth. Sick or small babies are increased risk of hypothermia.

Appropriate technologies to prevent and treat hypothermia are:

Education of staff to apply the concepts of the "WARM CHAIN" immediately after birth: drying the infant, skin-to-skin contact with the mother, covering both of them with a dry, clean blanket.

Early diagnosis of hypothermia by checking the temperature of the infant at regular intervals.

Rewarming hypothermic infants: skin-to-skin contact, water filled mattresses, and air heated incubators as necessary.

Ensure adequate thermal protection during internal transfer or external transport.

F. Prevention and management of infections

Several forms of bacterial infection (neonatal tetanus, sepsis, meningitis, pneumonia, diarrhea)

contribute significantly to neonatal mortality. Neonatal infections can be the consequence of contamination during the late stage of pregnancy, during delivery, and during the first days of life.

Opthalmia neonatorum can be prevented by cleaning the eyes of all newborns immediately after delivery and applying 1% silver nitrate or 1% tetracycline ointment. Also, attention should be paid to prevention and treatment of STDs (gonococcal and chlamydial) in mothers during prenatal care.

Infection prevention practices must be used in caring for the newborn. These include:

- Ensure a clean environment and aseptic techniques during delivery
- Clean hands and gloves at all times
- Clean environment
- Sterilized and/or disinfected equipment and supplies
- Rooming in
- Prevention of overcrowding
- Clean water for staff and family to wash hands

Appropriate technologies to aid in the prevention of infections include:

Appropriate cord care

Avoiding routines that may facilitate infections such as putting more than one baby in a warmer or incubator, not cleaning incubators and other equipment adequately, etc.

Ensuring cleanliness of all personnel caring for newborn babies

Keep babies with mothers as much as possible and avoid overcrowded nurseries

Prevention opthalmia neonatorum

Clinical observation for early recognition of infections

Prompt treatment of local and systemic infections

G. Initiation and support of breast-feeding

Early and exclusive breast-feeding is one of the most important contributors to neonatal and infant health as it protects against infant death and morbidity. The benefits are enhanced if breast-feeding starts within one hour of birth, with demand feeding and no supplemental feeds are given.

Appropriate technologies to support breast-feeding include:

Giving the baby to the mother to breast-feed shortly after birth

Promoting breast-feeding on demand 24 hours per day

Promoting rooming-in (mother and baby are together 24 hours per day)

Informing mothers about the benefits of breast-feeding and the dangers of artificial feeding

Showing mothers how to breast-feed and informing them about problems that may arise

Avoiding any use of breast-milk substitutes and bottle feeding

Avoiding hospital routines that may interfere with breast-feeding

APPENDIX F

APPENDIX F DAY ONE: CASE STUDY

Anna is a 24 year old, gravida 3 para 0 at 38 and 3/7 weeks arriving at the maternity in early labor. She is married to Misha, a taxi driver. Anna stopped working at 32 weeks.

Antenatal Care: attended 8 visits

treated for a urinary tract infection at 24 weeks gestation

saw 5 different doctors and 3 different midwives

did not attend any antenatal classes

always alone at her visits

Anna has 2 sisters who gave birth in the last 2 years - one at the same facility and the other in another city. Anna's knowledge of labor and birth is from her sisters and friends.

ADMISSION/LABOR AND DELIVERY

"FROM OUR HEARTS"

The midwife takes her admitting history, measures the fundus and listens for the fetral heart rate. Prior to calling the doctor, Anna is given an enema, shave and then an antiseptic shower. The midwife tells Anna this is all necessary to prevent infection and ensure a safe and clean delivery.

The physician arrives and tells Anna a vaginal exam needs to be done. Anna is very tense during the exam. The cervix is 60%/1cm/ 3/5 station/ vertex and posterior. There is no bloody show. The membranes are intact. Anna's contractions are 6 to 8 minutes apart and mild to moderate to palpation. The physician only tells Anna that "you are early but you must stay".

Anna is admitted to a large room with 3 other women. The women do not speak to each other. One moans, the other 2 are quiet.

Different midwives come and listen to the fetal heart rates. One midwife stays in the room but seems to day dream while looking out the window. Anna can hear the sounds of labor and birth from another room. Many voices at once--a woman screams...a baby cries.

The midwife comes and tells Anna she must go and be examined. A different physician exams her. She is told that labor is too slow and she must be given medication to increase her contractions. Anna wonders if something is wrong.

The hours seem to pass slowly. Her arm aches from being held out straight for the intravenous infusion. Anna hears other women give birth. Her own pain increases. When will this end? She does not understand. She remains silent as the busy staff checks her periodically. She is afraid. She is silent. She continues to hurt.

No longer. She opens her voice. A midwife and doctor come. It is not time. The physician orders some medication for her pain. Anna drifts off. Her back continues to hurt.

She pushes with all of her might. It is taking so long. She does not recognize the faces. The sounds pierce through. "Push, harder," again. Anna feels the stretch and burn. Her baby is out. The baby cries, is put on her chest and then suddenly gone. "Where is my baby?"

Anna is moved to a narrow stretcher. The midwife brings the baby and squeezes some colostrum from Anna's breast. The baby, fully swaddled, is place upside down over Anna's breast to lick the colostrum. He is unable "latch on" in this position and she is unable to see him well. The midwife takes him away.

In the hallway, Anna has some soup. An ice pack is on her abdomen. It is strangely quiet now. Everyone has given birth. But where is her baby? Where are all the babies?

The midwife says the babies will go to the postpartum rooms with the mothers after the two hour wait. The mothers should rest now and gain some strength. Their babies are wrapped and waiting to go. It won't be long.

Anna lays back. She is next to go to her room.

APPENDIX G

APPENDIX G: DAY ONE -- ACTION PLAN

I. REGULATIONS, POLICIES, PROCEDURES.

A. FCMC regulations and policy on the state and district level.
   1. Ministry of Health
      a. Support
      b. Obstacles (to define the type of obstacle - level of knowledge, attitudes or resources).
   2. District
      a. Support
      b. Obstacles (to define the type of obstacle - level of knowledge, attitudes or resources).
   3. Sanitation Stations
      a. Support
      b. Obstacles (to define the type of obstacle- level of knowledge, attitudes or resources).

B. Maternity and Newly born Care - on the institutional level
   1. Based on the state and district regulations and policy
      a. Support
      b. Obstacles (to define the type of obstacle - level of knowledge, attitudes or resources).
   2. Based on the Institution policy and procedures
      a. Support
      b. Obstacles (to define the type of obstacle - level of knowledge, attitudes or resources).

II. INSTITUTION

A. Administrative Personnel
   1. To define the level of knowledge, capabilities and attitudes to FCMC.
      a. Support
      b. Obstacles

B. Clinical Personnel
   1 To define the level of knowledge, capabilities, attitudes to FCMC.
      a. Support
      b. Obstacles

C. FCMC Training
   1. An action plan contents example
   2. A training schedule example
      a. The number of staff trainees
      b. the training schedule and fixed dates

D. Demonstration model and the real (actual) setting
   1. Preparing FCMC wards for labor, birth and postpartum rooming in.

a. To elaborate a plan, comprising the patients' suggestions and wishes
b. To describe a real setting
c. To work out policies, necessary to implement all these changes

2. Family members or close relatives attendance at birth and preparing facilities for such support in a real setting.
   a. To elaborate a plan of action, which takes into account all the patients' wishes
   b. To describe a real setting
   c. To work out policies, necessary to support such changes.

E. Personnel involvement model.
1. the existing personnel involvement model
   a. labor and birth
   b. postpartum period
   c. a nursery in comparison to a ward for rooming in
2. Adapting the model for personnel involvement within FCMC
   a. labor and birth
   b. postpartum period
   c. a nursery in comparison to a ward for rooming in.

F. To develop a universal standards and FCMC policy for:
1. perinatal care
2. labor and birth
3. postpartum period
4. newlyborns
5. family members and close relatives visits and support at birth
6. sanitation control and cleanliness

III. PATIENTS' INVOLVEMENT (MOTHERS AND FAMILIES) IN THE FCMC CHANGES

A. Patients' wishes and suggestions (mothers, their husbands or partners, families)
1. To describe one of the FCMC methods of a patient's exam.
2. To describe the implementation of this method.
3. To describe how the exam results will be used.

B. Patients Education
1. To prepare a review of the existing methods of training for birth during pregnancy.
2. To define the most essential components of FCMC training for birth during pregnancy.
3. To describe changes necessary in birth training courses, to ensure FCMC.
4. To describe the existing level of knowledge about the postpartum period.
5. To define the most essential FCMC components to develop the level of knowledge about the postpartum period.
6. To describe the changes necessary in the level of knowledge about the postpartum period, to ensure FCMC.

IV. EVALUATION AND MONITORING

A. To describe possible FCMC methods of evaluation.

B. To describe instruments of FCMC evaluation.

C. Monitoring
   1. To describe a monitoring method.
   2. To describe a method of data collection.
   3. To give an example of a report form.

V. COST-EFFECTIVENESS ANALYSIS

A. To describe the FCMC influence on costs. To indicate what is expected - a raise or a drop in the expenses.
   1. Materials, supplies and stocks.
   2. A change in the personnel use model.
   3. A change in the wards furnishing and repairs.
   4. Equipment.

ACTION PLAN WORKSHEET

PROVIDER			
KNOWLEDGE	**SKILLS**	**ATTITUDE**	**RESOURCES**

ACTION PLAN WORKSHEET			
INSTITUTION			
KNOWLEDGE	SKILLS	ATTITUDE	RESOURCES

ACTION PLAN WORKSHEET

CONSUMER			
KNOWLEDGE	**SKILLS**	**ATTITUDE**	**RESOURCES**

APPENDIX H

APPENDIX H: DAY ONE

Literature Review Format for Trainee Presentations

Title_____

Author(s)_____

Journal & Citation_____

Hypothesis_____

Research Methodology_____

Number of subjects N = _____ (total)

N = _____ (experimental)N = _____ (control)

Description of study:_____

_____

_____

Findings:_____

_____

_____

_____

_____

_____

Conclusions:_____

_____

_____

_____

2. DAY TWO: FCMC Practices/Adult Learning/Communication/Change Theory

ADDENDA: DAY TWO

A. Bibliography and Key FCMC Literature Articles

B. Handout on Adult Education

C. Handout on Communication

D. Lecture Notes on Change Theory

E. Puerperal Sepsis Pre-Test

72

DAY 2: Adult Learning Techniques/Communication/FCMC Practices/Change Theory

Learning Objectives:
At the end of Day 2, the participants will be able to:
1. discuss adult learning theory and techniques
2. identify key literature on the topic of FCMC.
3. define and describe the known positive and negative impacts of current MCH practices.
4. list specific FCMC practices for all phases of MCH care.
5. discuss principles, components, and types of communication
6. demonstrate verbal and non-verbal communication skills
7. list components of change theory

Morning Session

- Time:
  - 90 minutes review of key literature
  - 30 minutes lecture adult learning
  - 45 minutes lecture on interpersonal communication
  - 30 minutes group work
- Materials:
  - Slides
  - Overheads
  - Flip chart
  - Handouts

	TOPIC	TIME	TEACHING METHODS
I.	Review of key literature by participants utilizing articles received the night before from faculty	90 Minutes	Handouts, Slides
II.	Adult Learning Techniques	30 Minutes	Lecture, Overheads
	BREAK	**15 Minutes**	
III.	Interpersonal Communication	45 Minutes	Handouts, Overheads Flip chart,
IV.	Communication Exercises	30 Minutes	Group Work

Lunch Break: 60 minutes

Day 2: Afternoon Session

- Time:
  - 1 3/4 hour lecture/demonstration/discussion
  - 1 hour lecture
  - 45 minute group discussion
- Materials:
  - Flip chart
  - Handouts
  - Slides

	TOPIC	TIME	TEACHING METHODS
V.	Specific FCMC practices presented by participants using information received the previous day from faculty	105 Minutes	Handouts, Slides, Demonstrations
VI.	Group Discussion of FCMC practices in participants settings	30 Minutes	Large group work
	BREAK	**15 Minutes**	
VII.	Change Theory and use in the Clinical Setting	60 Minutes	Lecture, overheads, clinical examples
VIII.	Change Theory and Identified FCMC Barriers	45 Minutes	Large group work
IX.	Pre-test on Puerperal Sepsis	15 Minutes	Pre-test

DAY 2: MORNING SESSION

SESSION OUTLINE	SESSION NOTES
I. Key Literature	See Articles in **Appendix A - Day Two** Topics to include: • Care during the prenatal period • Care during labor and delivery including support techniques, maternal desires for companions, place and position of birth and maternal activity in labor and birth and the impact of these • Maternal-infant bonding at delivery • Breastfeeding at delivery and beyond • Postpartum care and teaching • Comparison of outcomes using FCMC
II. Adult Learning	**See Handout in Appendix B - Day Two**
1. Premise	Adult learning is most effective in an interactive environment where the participants discuss, role play, create action plans, etc. The adult learner must see relevance of the material to his/her profession to be motivated to learn it. The adult learner brings her/his own expertise and experience to share with others. The adult learner has the responsibility to: 1. actively participate in learning 2. adequately prepare 3. accept responsibility for learning 4. communicate with faculty
2. Techniques	• Lecture with audio-visual aides such as slides or overheads.

75

SESSION OUTLINE	SESSION NOTES
2. Techniques, cont'd	• Video • Role play and demonstration • Small group work • Case studies • Team teach with participants • Group discussion
III. Interpersonal Communication	**See Handout, Appendix C - Day Two**
1. Definition	"Chat, informal exchange, conversation between two, may be verbal or non-verbal (Ask participants)
2. Components	Communicator: person giving message Message: information Communicant: one who receives message Feedback: two way process, assures connection
3. Principles	Identify one's perceptions and those of target group Use verbal and non-verbal communication effectively 1. listen carefully 2. make eye contact 3. Volume and intonation in your voice 4. non-judgemental attitude 5. feedback 6. watch body language Give information needed (not too much or too little) Give accurate, concise and clear information
4. Types of Communication	**Education:** to give information accurately and to explain a complex topic to a person or group **Promotion:** to persuade someone or a group in order to have them accept a certain attitude or behavior **Counseling:** to help a client to be able to make her own decision by giving information in a neutral manner and providing emotional support

DAY 2: MORNING SESSION - CONT'D.

SESSION OUTLINE	SESSION NOTES
5. Educating clients	-Introduce topic and objective of educational session -Explain briefly the organization of your presentation -Use clear aids/instruments -Use appropriate visuals (give examples) -Encourage participants to ask questions -Correct wrong information (tactfully) -Give information that can be followed up with action -Give information that can be taken home by the client
6. Achieving Promtion	-Raise understanding of the target group about the problem -Tell them the way to overcome the problem -Give them the reason why they must accept the attitude you are suggesting -Sometimes evoke emotion (fears, find out what this would prevent), values (save your loved ones, or keep them healthier), or give praise (you are a good mother if...) -Correct wrong information -Give correct guidelines -Use visual aids that can elecit emotion (TV advertising, etc)
7. Counseling Techniques	-Greet client warmly and offer your help -Ask the client to tell you about their worries/problems. Listen with concern and sympathy (empathy) -Summarize the conversation -Give the client accurate information about her problem -help the client to understand various obstacles that he/she may face in making a decision. -Explain about ways to handle the problem and discuss the efforts needed to overcome the barriers. -Agree on the next meeting if indicated.

IV. Group Work on Communication

END OF MORNING SESSION DAY 2

SESSION OUTLINE	SESSION NOTES
V. FCMC Practices	**Antenatal care-promoting self care** • patient education a key component • involve in decision making process • involve in prenatal care, e.g. weigh self, tell her fundal height measurements • involve significant others in care **Childbirth Preparation** • education decreases fear for labor and birth and increases compliance with prenatal care • involves significant others • opportunity for informal discussion and learning • opportunity for socializing with other couples • a variety of formats available **Labor management and support** • necessary for natural childbirth • usually provider or nurse at bedside and offering active support • promotes maternal activity • encourages oral fluids • utilizes intermittent fetal monitoring • facilitates faster labor and birth • no enema or pubic shave **Management of birth** • minimal analgesia • movement and position changes promoted • calm, quiet environment • maintain perineal integrity • baby on maternal abdomen skin-to-skin at birth • support persons of maternal choice present, may include siblings

SESSION OUTLINE	SESSION NOTES
V. FCMC Practices -cont'd.	**Initiation of breastfeeding** • baby to breast immediately after birth • minimal external stimulation to mother and baby • allow ample time to suckle • offer instruction and support **Infant care** • provide at bedside and teach simultaneously • active participation by mother **Postpartum care and teaching** • interactive techniques • increases success at breastfeeding • include mother and baby care • initiate family planning
VI. Questions and Answers; Group Discussion of FCMC practices in participants' settings	
VII. Introduction to Change Theory in the Clinical Setting See Appendix D - Day Two	
1. Lewin's model	• Three stages of change: **Unfreezing**: purpose is to create disequilibrium, often accomplished by comparing groups **Moving**: purpose is to begin to incorporate new behaviors, very important to be sensitive to feelings and reactions **Refreezing**: purpose is to stabilize the change and integrate new practices • Other significant aspects - recognize allies and adversaries - know your change well - timing is important

SESSION OUTLINE	SESSION NOTES
VII. Change Theory, cont'd	
2. Reinkmeyer's model	• Seven stages of change A. Develop need and desire to change B. Develop change relationship between the change agent and client system C. Clarify problem, need, or objective D. Examine alternative routes and tentative goals and intentions of actions E. Transform intentions into action F. Stabilize G. Terminate relationship between change agent and client • Other significant factors - may not happen in order - requires monitoring throughout
3. Resistance to change	• Positive effect of resistance is to force clarity of purpose and results of the change • May indicate inadequate problem solving and decision making processes • Should be seen as a diagnostic symptom and cause identified • Reasons are multiple and varied including cost, time, perceived threat, vested interests, fear of failure, selective perception and retention

SESSION OUTLINE	SESSION NOTES
4. Conflict resolution	• Conflict may be between individuals or groups • Conflict reflects value systems • May be due to a lack of clarity • Requires open and honest dialogue to resolve • May involve mediation or confrontation Utilize a case study to demonstrate application in the clinical setting
VIII. Change Theory and Identified Barriers	Group exercise to demonstrate the utilization of change theory to address identified barriers to FCMC including identifying different approaches to change depending on barrier type.
IX. Pre-test on Puerperal Sepsis	**Appendix E - Day Two**
END OF DAY 2	

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APPENDIX A

Ashford, Janet Isaacs. "Posture for Labor and Birth." In *Encyclopedia of Childbearing: critical perspectives* ed. Barbara Katz Rothman, 1993; Phoenix: the Oryx Press, p. 314-315

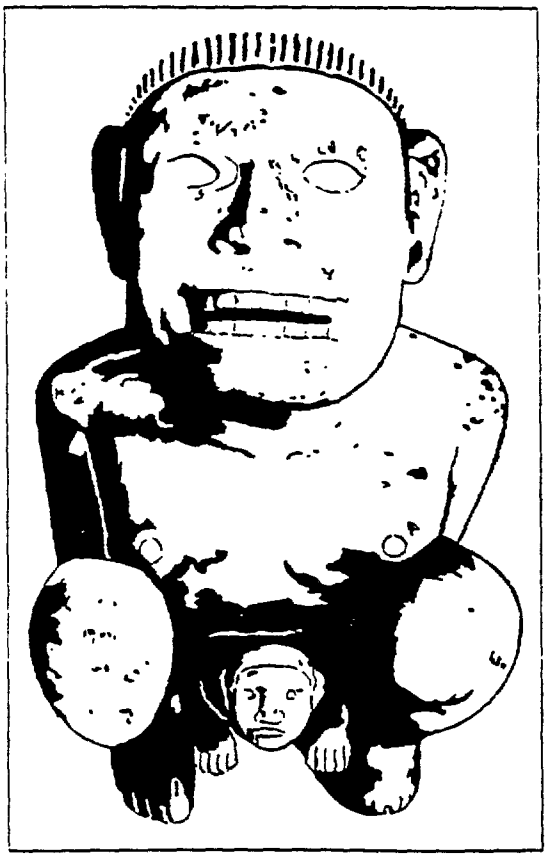
POSTURE FOR LABOR AND BIRTH

Throughout history, in cultures around the world, women have typically walked about during labor and given birth in upright postures, including sitting, standing, and squatting (Atwood, 1976; Russell, 1982). Women have supported themselves in these positions either by hanging onto a stake, bar, or suspended rope; by resting on a low stool or stone; or commonly by leaning back against the chest of a companion (Figure 1).

As the place of birth has shifted to institutions during the past 60 years, most Western women have been required to lie on their backs during both labor and delivery. The supine position is more convenient for the birth attendant and facilitates the use of drugs and instrumental delivery. But recent evidence indicates that the upright posture is more beneficial for mother and baby. In recent years, many hospitals have revised their policies to allow women to walk and assume whatever positions they find comfortable during labor and delivery.

Historical Concerns about Posture. The supine posture first came into use in Europe about 400 years ago. At first, the "lithotomy" posture (back flat, knees drawn up, legs spread apart) was used only for complicated births requiring forceps or some other form of *accouchement forcé*. The supine posture came to be used more and more for normal deliveries, however, until by the turn of the century in the United States, virtually all women giving birth under the supervision of a physician were required to lie on their backs in bed during labor and to assume a lithotomy position on a delivery table for birth.

In 1882, American physician George J. Engelmann published *Labor among Primitive Peoples*, which describes his investigation into the birth postures used by Native American people. Through correspondence with ethnologists and physicians working with native people, Engelmann discovered that most so-called "primitive" people gave birth in an upright posture. Having noted in his own practice that labor in the supine posture could be more painful and slow, Engelmann described the "civilized" practice as irrational. He wrote: "I deem it a great mistake that we in this age of culture, should follow custom or fashion so completely, to the exclusion of reason and instinct, in a mechanical act which so nearly concerns our animal nature as the delivery of the pregnant female" (Engelmann, 1882). But influential physicians during the early part of the 20th century maintained that the lithotomy posture, along with the routine use of forceps, was essen-



Tlazolteotl, the Aztec goddess of childbirth, gives birth in a squatting position. Drawing by Janet Isaacs Ashford after a piece in the Dunbarton Oaks Collection, Washington, DC. © by Janet Isaacs Ashford.

85

Birth custom of the Longo people of central Africa. The mother gives birth standing up, using a tree and slanted pole for support. From "Notes on Labor in Central Africa" by Robert W. Felkin, *Edinburgh Medical Journal*, April 1984. © by Janet Isaacs Ashford.

tial for safety (DeLee, 1920). Until recently, there have been few well-designed studies to investigate the effects of labor posture.

A recently published comprehensive review of the effects of medical care on pregnancy and birth looks at the effects of labor posture. Echoing Engelmann's concerns, the editors state: "At the present time recumbency continues to be a policy in many maternity units, and is required by many of the professionals who provide care during labour. The available data cast doubt on the wisdom of this policy" (Enkin, Keirse, and Chalmers, 1989).

Effects of Posture during Labor. According to the controlled clinical trials surveyed by Enkin, Keirse, and Chalmers, lying down on the back and sitting during labor are associated with reduced blood flow to the uterus, resulting in contractions that are less effective and more frequent. Lying on the side or standing up improves blood flow and the efficiency of contractions. In addition, women who are upright or lying on their sides have shorter labors and use less narcotic analgesia, epidural anesthesia, and oxytocin augmentation than those who are supine (Roberts, 1989). Many hospitals now allow women to walk and assume comfortable positions during labor, though the use of continuous electronic fetal monitoring can restrict the mother's mobility.

Effects of Posture during Birth. Enkin, Keirse, and Chalmers also found that use of an upright posture when the mother is pushing shortens the length of second-stage labor. They found no clear evidence indicating that posture affects the rate of instrumental delivery or the incidence of trauma to the perineum (Sleep, Roberts, and Chalmers, 1989). However, use of a molded birth chair that restricts the mother's freedom of movement has been associated with perineal edema, resulting in significant postpartum hemorrhage if perineal lacerations occur (Goodlin and Frederick, 1983; Cottrell and Shannahan, 1986). Babies born to women in upright postures have fewer abnormal heart rate patterns and less chance of low Apgar scores (Sleep, Roberts, and Chalmers, 1989). Women prefer the upright posture for birth and report less pain and backache than in the supine posture (Schneider-Affeld and Martin, 1982; Marttila, Kajanoja, and Ylikorkala, 1983; Stewart, Hillan, and Calder, 1983; Liddell and Fisher, 1985).

The use of a squatting posture for birth has been shown to increase intra-abdominal pressure and also increase the sagittal diameter of the pelvic outlet (Davies and Renning, 1964; Borell and Fernstrom, 1967; Russell, 1982). Both factors can contribute to a shorter, more effective labor. However, researchers note that Western women are not accustomed to assuming a squatting posture (for defecation or resting, for example) and may find it difficult to assume this position for birth.

Conventional maternity wards are often equipped with labor beds and delivery tables that encourage or enforce the supine posture. However, the use of upright postures can be facilitated by providing a clean sheet on the floor for the mother to squat upon, using a bed with pillows or an adjustable back support, using a low stool or chair, or providing helpers to support the mother in a standing position (Romond and Baker, 1986). The mother's ability to freely change position as prompted by her own feelings of comfort may be as important as the position adopted (Roberts, 1989). • JANET ISAACS ASHFORD

See also: Labor: Overview

See Guide to Related Topics: Childbirth Practices and Locations

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86

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Volume 80
Number 2

Effect of position changes on the intensity and frequency of uterine contractions during labor

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THE influence of position changes during labor has received little attention from clinicians and investigators. Bösch, Ikle, and Kaser[2] and Caldeyro-Barcia and associates[7] mentioned that with the patient in the dorsal position, uterine contractions have a higher frequency and a lower intensity than when the patient lies on her side. Lorand and Pogany[3] stated that uterine contractions are stronger and more efficient in the supine than in the standing position. According to Williams,[9] the contractions have a greater intensity and a lower frequency in the sitting position than in the dorsal position.

Material and methods

In the present work, 84 women have been studied, half during oxytocin-induced labor[3, 6] and the other half during spontaneous labor. Thirty-nine patients were in prelabor (i.e., before 2 cm. of cervical dilatation), and the remaining 45 were in the first stage of labor. Excluded from the study were patients who underwent rupture of the membranes, vaginal examination, or changes in the infusion rate, or who received medication during the proposed study period. Emotional disturbances were avoided as much as possible.

Uterine activity was measured by continuous recording of the amniotic fluid pressure[1] and was calculated in Montevideo units, as we have described previously.[4, 5]

Results

Qualitative study. In the great majority of the cases studied, it was found that, when the patient changes from the dorsal position to the side position (right or left), the intensity of uterine contractions increases and their frequency diminishes (Figs. 1, 4, and 5). On the contrary, when the patient changes from the side (right or left) to the dorsal position, opposite modifications occur in uterine contractility; that is, the frequency of uterine contractions increases, whereas their intensity diminishes (Figs. 2 and 3). No

From the Servicio de Fisiología Obstétrica Facultad de Medicina.

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**Dr. Noriega-Guerra was under a research fellowship of the Organization of American States.*

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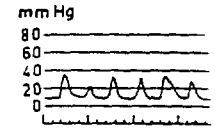

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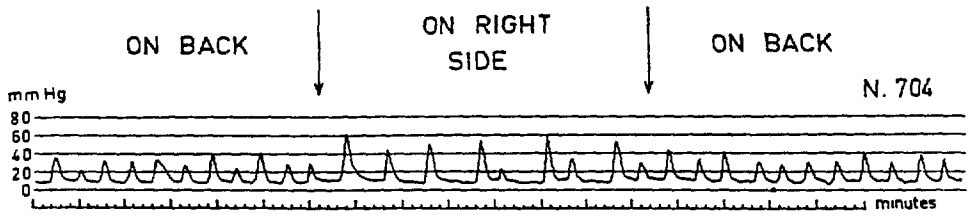


CERVICAL DILATATION 4 cms

TONUS	10.	11. mm Hg	12. mm Hg
INTENSITY	27.	38. mm Hg	28. mm Hg
FREQUENCY	3.4	2.6 cont. per 10 min.	3.4 cont. per 10 minutes
UT. ACTIVITY	97.	98. Montevideo Units	96. Montevideo Units

Fig. 1. Full-term pregnancy. Labor induced with intravenous infusion of oxytocin at a rate of 2 mU. per minute. The record of amniotic fluid pressure shows the typical effect of the change of position on uterine contractility. On the bottom, the average values of the tonus, intensity, frequency, and uterine activity are shown for each position.

differences were found in uterine contractility between the right lateral position and the left lateral position (Fig. 5).

The variations of the intensity of the contractions tend to compensate those of the frequency in such a way that the product of both factors, i.e., the uterine activity, is approximately the same when the patient lies on her back or on her side (Figs. 1, 3, 4, and 5). Equal changes occur whether the posture is altered to the right or to the left side.

The changes in uterine contractility occur immediately after the change of position and last for as long as the new position is maintained. The changes of uterine contractility are reproduced every time the patient changes position (Fig. 1).

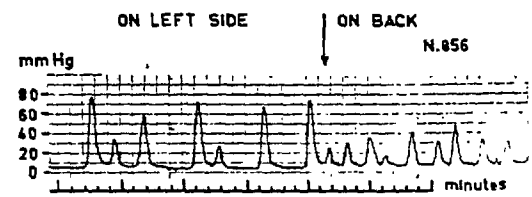
The law of the position. The facts described above are expressed in the following law: "when the patient lies on the side (right or left), uterine contractions have a greater intensity and a lower frequency than when the patient lies on the back."

The uterine tonus is higher in the dorsal position, possibly because when the patient lies on her side the frequency diminishes and there is thus more time for completing relaxation of the uterus. This factor is particularly significant in cases of too frequent contractions, where the tonus is likely to be elevated (Figs. 3 and 4). Excessive contractility and tonus in the patient who is supine may be lessened by turning her to the side, which represents a useful clinical application of these observations.

With the patient on her side, the contractions appear to be better coordinated than when the patient is supine. This is particularly true in prelabor (Fig. 5).

Quantitative study. Figs. 6 to 9 show the difference existing in the average values of intensity, frequency, and uterine activity between the dorsal and the lateral position in the 84 cases studied in the present work.

Intensity of the contractions. The average difference found in the mean intensity of the contractions between both positions (7.6 ± 2.1 mm. Hg) is in favor of the lateral posi-



TONUS	6.	7. mm Hg
INTENSITY	53.	23. mm Hg
FREQUENCY	3.2	5.2 cont. per 10 min.
UT. ACTIVITY	170.	120. Montevideo Units

Fig. 2. Full-term pregnancy. Normal spontaneous labor. Cervical dilatation 3 cm. The change of position has a marked effect on uterine contractions.

89

tion (confidence coefficient higher than 98.4 per cent). This difference is highly significant and indicates a definite relationship between the position change and the variations in the intensity of the contractions.

The average difference in the intensity of the contractions between both positions is greater in spontaneously beginning labor (11 to 12 mm. Hg) than in labor induced with intravenous infusion of oxytocin (6 to 7 mm. Hg) (Table I).

Table I. Average of the differences between the mean intensities in lateral and dorsal position

	Prelabor	*First stage*
Spontaneous	11.82 mm. Hg	11.50 mm. Hg
Induced	6.17 mm. Hg	6.54 mm. Hg

Table II. Average of the differences between the mean frequencies obtained in lateral and dorsal position

	Prelabor	*First stage*
Spontaneous	0.977	1.137
Induced	0.413	0.553

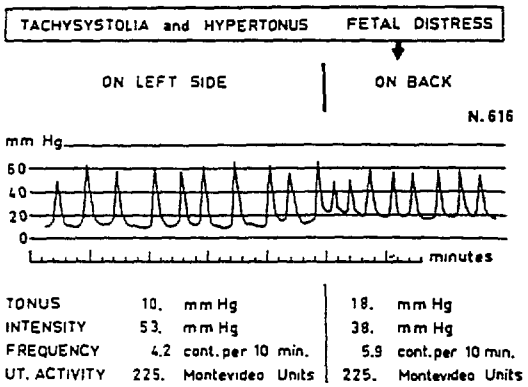


Fig. 3. Full-term pregnancy. Labor was induced with intravenous infusion of oxytocin at the rate of 2 mU. per minute. When the patient changes from the lateral to the dorsal position, the frequency of the contractions increases over 5 per 10 minutes (tachysystolia) and the tonus rises to abnormally high values. Tachysystolia and hypertonicity produce fetal distress. The condition was normalized when the patient returned to the lateral position.

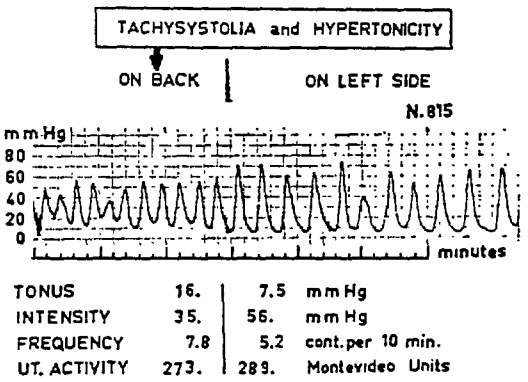


Fig. 4. Full-term pregnancy. Spontaneous labor. Cervical dilatation 6 cm. When the patient lies on her back tachysystolia and hypertonicity are present. When the patient lies on her side, the frequency of the contractions and the tonus descend to normal values.

The lower the intensity of the contractions in the supine position, the greater will be the difference of the intensity between both positions (Figs. 6 to 9).

Frequency of the contractions. The average difference found in the mean frequency of the contractions is 0.7 ± 0.2 contractions per 10 minutes in favor of the lateral position. The confidence coefficient is higher than 99.5 per cent.

The effects of position changes are greater in cases of spontaneous labor than in cases of labor induced with oxytocin infusion (Table II).

The higher the frequency existing in the dorsal position, the greater will be the difference of the frequency of the contractions between both positions (Figs. 6 to 9).

Uterine activity. No significant differences were found in the values of uterine activity between the dorsal and the lateral position (Figs. 6 to 9).

Comparison between prelabor and first stage of labor. The effects of position changes on uterine contractility are of the same order during the prelabor period (Figs. 7 and 9) and during the first stage of labor (Figs. 6 and 8). There is one exception, and this is

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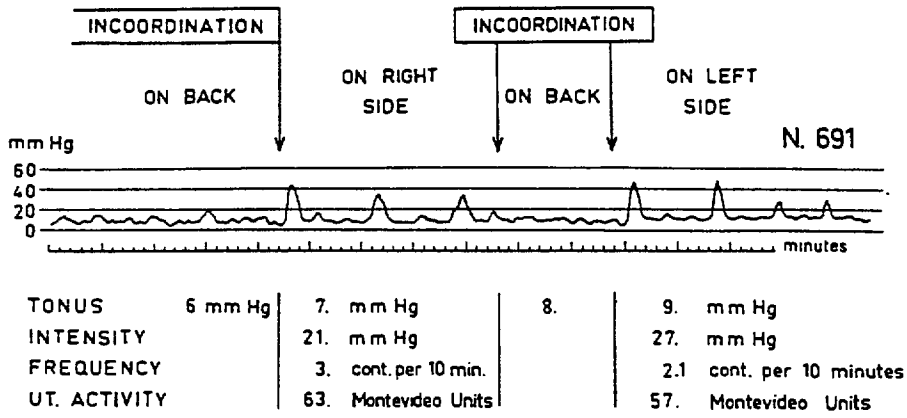

Fig. 5. Full-term pregnancy. Spontaneous labor. Cervical dilatation 1 cm. When the patient lies on her back uterine contractions are small and uncoordinated, whereas, when the patient lies on her side (right or left), the contractions become stronger and their coordination improves.

the frequency of the contractions in spontaneously beginning labor, which is much more influenced by position changes during the first stage than during the prelabor period (Table II).

The changes described were consistent. In prelabor. the changes were present in 93.6 per cent and 87.5 per cent for the frequency and intensity, respectively. In spontaneously beginning labor. they were present in 94 per cent (Table III). In oxytocin-induced labors the changes were present less consistently, ranging between 66 and 86 per cent, perhaps because of the uterine effects of oxytocin, which tend to mask the effects of postural change.

If the variations in the intensity and in the frequency are considered together for each case, and if only those cases where both factors change in the sense indicated by the law of position are accepted as full positives (Table IV), it is found that the percentage of full positives is somewhat smaller than when the frequency of the contractions and

Table III. Percentage of cases which fulfill the law of position*

	Prelabor			*First stage*		
	No. of cases	*Intensity (%)*	*Frequency (%)*	*No. of cases*	*Intensity (%)*	*Frequency (%)*
Spontaneous	18	87.5	93.6	24	94.4	94.4
Induced	15	86.6	80	27	77.7	66.6

*The intensity and the frequency of the contractions are considered independently.

Table IV. Percentage of cases which fulfill the law of position*

	Prelabor			*First stage*		
	Positives			*Positives*		
	Full positives (%)	*Weak positives (%)*	*Negatives (%)*	*Full positives (%)*	*Weak positives (%)*	*Negatives (%)*
Spontaneous	87.5	8.3	4.2	88.8	11.2	0
Induced	66.7	20	13.3	59.2	29.7	11.1

*The intensity and the frequency of the contractions are considered jointly.

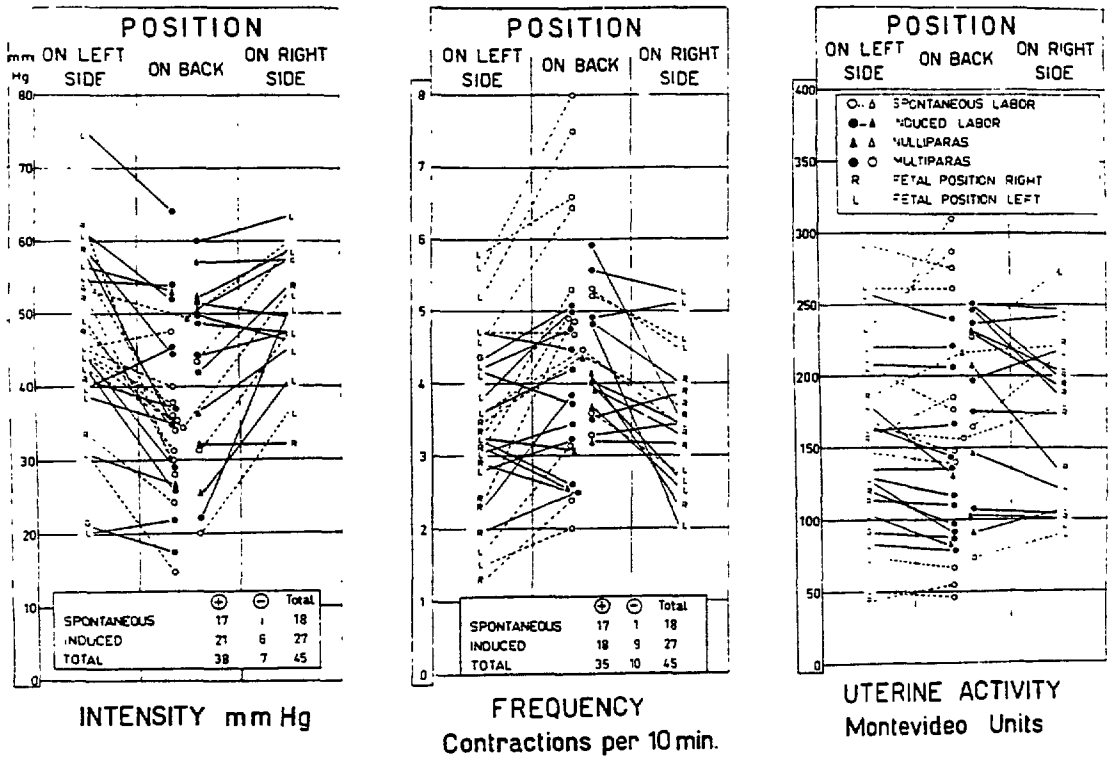

Fig. 6. Absolute values for the intensity, frequency, and uterine activity during the first stage of labor. Each line corresponds to one case and unites the two signs which indicate the values obtained in the dorsal and the lateral position.

the intensity are considered independently.

This difference is due to the fact that in a few cases only one of these factors (the intensity or the frequency) changes in the sense stated by the law, whereas the other factor does not change or shows a very small variation in the opposite sense. These last cases are indicated as weak positives in Table IV.

The above-described changes are not influenced by parity, status of the membranes, or fetal position.

Comment

The mechanisms by which the changes of position of the patient have such important effects on uterine contractility are completely unknown.

The characteristics of the contractions suggest that those produced when the patient lies on her side should be more efficient for the progress of labor than those produced when the patient is on her back.

Summary

The effects of the changes of position of pregnant women on uterine contractility during labor were studied by means of the recording of the pressure of the amniotic fluid in 42 spontaneous labors and in 42 labors induced with oxytocin infusion.

It is found that when the patient lies on her side (right or left), uterine contractions have a stronger intensity and a lower frequency than when the patient lies on her back (law of the position). The effects of the change of position on uterine contractility appear immediately and last for as long as the new position is maintained. The law of position is fulfilled by more than 90 per cent of spontaneous labors and 76 per cent of those induced with oxytocin infusion.

The average variations produced by the change of position are 7.6 mm. Hg for the intensity and 0.7 contractions per 10 minutes for the frequency. The confidence coefficient

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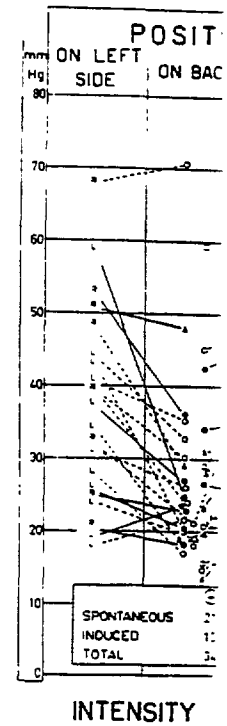

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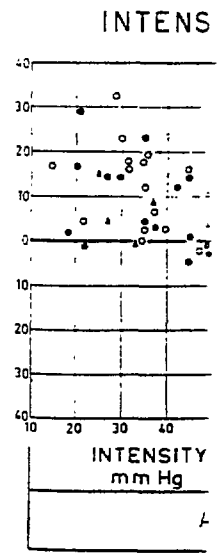

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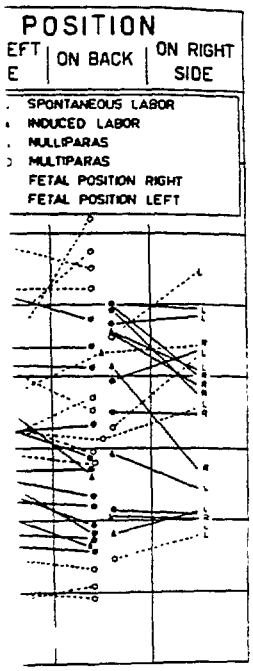

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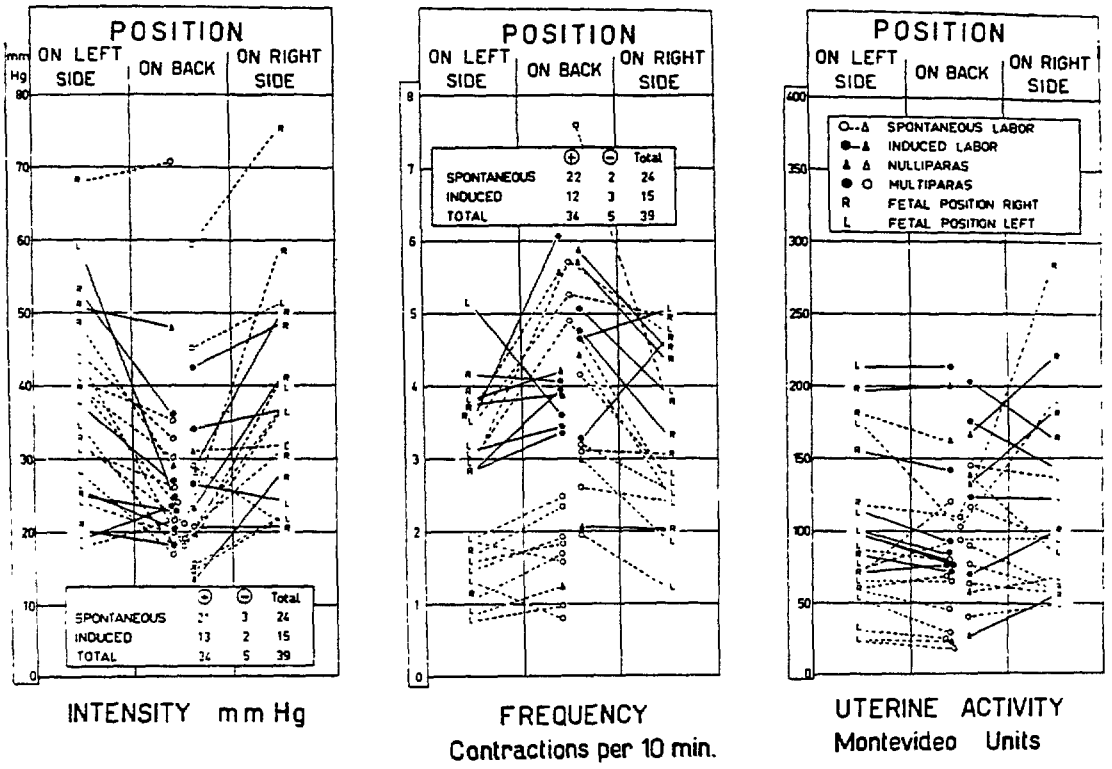

Fig. 7. Absolute values for the intensity, frequency, and uterine activity during the prelabor period. Each line corresponds to one case and unites the two signs which indicate the values obtained in the dorsal and the lateral position.

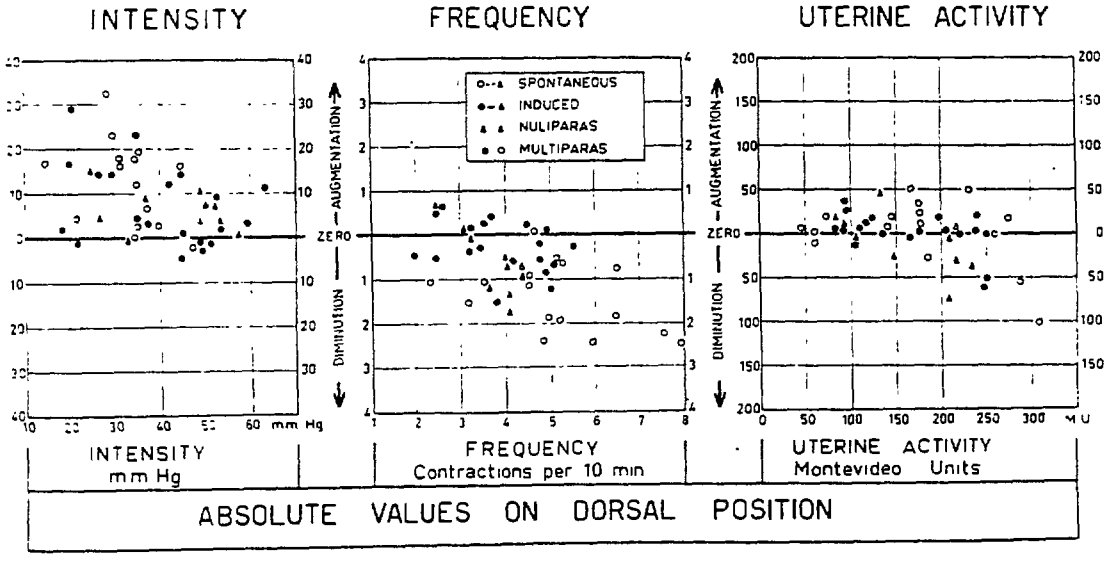

Fig. 8. Differences found between the dorsal and lateral positions in uterine contractility during the first stage. The zero of ordinates corresponds to the absolute values recorded in the dorsal position.

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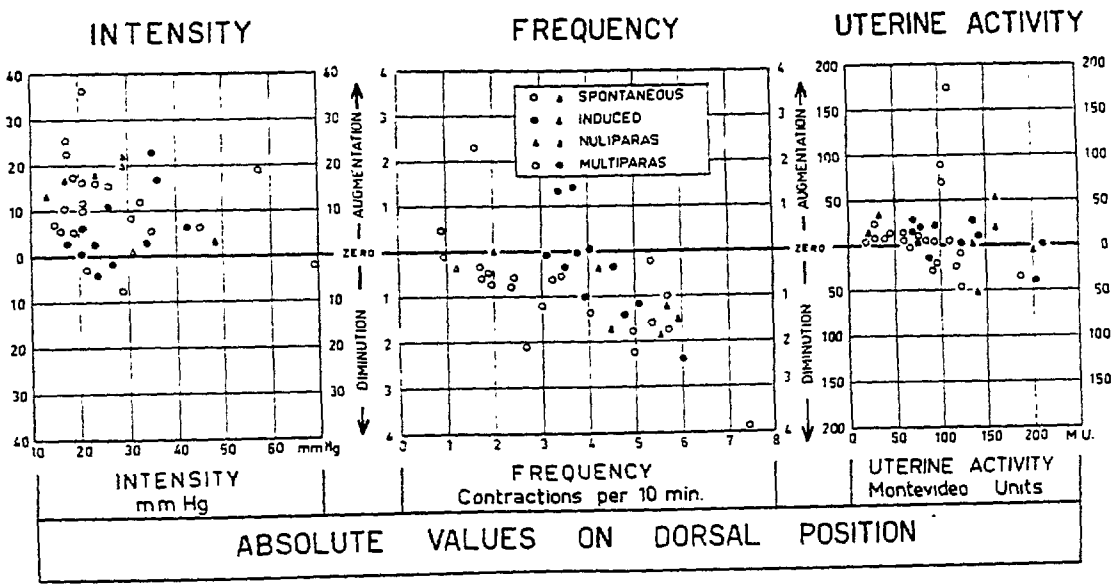

Fig. 9. Differences found between the dorsal and lateral positions in uterine contractility during the prelabor period. The zero of ordinates corresponds to the absolute values recorded in the dorsal position.

is close to 99 per cent. The effects of changes of position are more marked in spontaneous labor than in labor induced with oxytocin infusion. No differences were found in this respect between the prelabor period and the first stage of labor.

Neither parity, the status of the membranes, nor the position of the fetus had any influence on this phenomenon, the mechanism of which is completely unknown. Up to now, the most interesting clinical application is the treatment of tachysystolia and hypertonicity, which are markedly induced when the patient is changed from the dorsal to the lateral position. The characteristics of the contractions suggest that those produced when the patient lies on her side should be more efficient for the progress of labor than those produced when the patient lies on her back.

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WHO appropriate technology for birth revisited

In August 1985 *The Lancet* published the WHO recommendations for birth in an article entitled 'Appropriate technology for birth'. This publication followed the appearance, in the same year, of the WHO book, *Having a Baby in Europe*, which described the current status of childbirth care in Europe. Both these publications resulted in controversy as to their validity. In many, if not most, parts of Europe as well as in other regions this controversy continues.

Questions such as: How were the publications arrived at? How representative are their contents? Are these biased, 'liberal' views? And, most importantly, how well do these recommendations match up to research findings?

Development of the WHO recommendations for birth

The United Nations declared 1979 as the International Year of the Child. At the Regional Committee for Europe in that year, concern was expressed over a number of issues including: the rapidly expanding technology being applied to birth with its associated rising costs; the doubling or even tripling of the caesarean section rate which took place in the 1970s, the question of whether this was associated with the increasing use of electronic fetal heart rate monitoring; the increasing demands from women's groups to resume control over their birth experiences and the poorly understood inequities relating to perinatal mortality (Wagner, 1991).

The outcome of this debate was a decision by the WHO to undertake research into perinatal services and to develop recommendations for appropriate technology for birth.

A series of events followed. The first was the establishment of a multidisciplinary, 15-member, perinatal study group. This consisted of representatives from obstetrics, paediatrics, nursing, midwifery, epidemiology and statistics, health administration, sociology, psychology, anthropology, economics and consumer groups. Meeting at least once a year as a full group, and more frequently in subgroups, the team investigated the available literature, the perinatal services in 23 of the then 32 WHO–Europe member states, mother–infant contact practices in a detailed study of ten representative member states and alternate (meaning outside of the formal health care system) perinatal services in Europe, as well as in the USA and Canada (Wagner, 1991).

Debate and eventual consensus between the members of the team resulted in *Having a Baby in Europe* (WHO, 1985). This was directed towards lay readers; *Perinatal Health Services in Europe: Searching for Better Childbirth* (WHO, 1985) was aimed at the academic reader.

The second major step in the process followed: the organisation of Birth Conferences. These were national conferences designed to debate the applicability of the recommendations of the WHO books to a country. These conferences have almost always involved professionals and consumer groups as well as non-governmental organizations and the media. To date 43 conferences have been held in 23 European member states, as well as in the USA, Canada, Australia and China (Wagner, 1991).

The birth conference movement led to three major interregional meetings. These, combining in particular the WHO areas of Europe and America, covered appropriate technology for pregnancy, for birth and for after the birth. These conferences always involved multidisciplinary representation and required participants to submit their papers well in advance to enable translation and circulation before the meeting. At the conference issues were debated until consensus was reached. The outcome of these deliberations was published in the *Lancet* (WHO, 1985).

How valid are these recommendations?

There is no doubt that much deliberation, research and discussion went into the development of the WHO recommend-

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Table 1. WHO recommendations for birth classified according to Chalmers *et al.* (1989).

WHO Recommendations	Chalmers *et al.* (1989)
The well-being of the new mother must be ensured through free access of a chosen member of her family during birth and throughout the postnatal period. In addition, the health team must provide emotional support.	Enhanced social and psychological support from care givers reduces negative outcomes. Leaving women unattended during labour should be abandoned.
Women must participate in decisions about their birth experiences.	Failing to involve women in decisions about their care should be abandoned.
The healthy newborn must remain with the mother whenever possible.	Separating healthy mothers and babies routinely should be abandoned.
Immediate breast feeding should be encouraged even before the mother leaves the delivery room.	Unrestricted mother–infant contact after delivery and unrestricted breast feeding reduce breast feeding failure.
There is no justification to have a caesarean section rate of higher than 10–15%. Vaginal deliveries after a caesarean section should be encouraged.	Repeating caesarean section routinely after previous caesarean section should be abandoned. (There is little improvement in outcome with rates above 7%.)
Electronic fetal monitoring should not be routine.	Routine continuous monitoring of fetal heart rate without fetal scalp blood sampling should be abandoned.
There is no indication for shaving pubic hair before delivery.	Shaving the perineum routinely should be abandoned.
There is no indication for routine enemas before delivery.	Administering enemas or suppositories routinely should be abandoned.
The dorsal lithotomy position during labour and delivery is not recommended. Women must decide which position to adopt for delivery.	Restricted maternal position during labour and delivery should be abandoned. Upright versus recumbent position during first and second stage reduces negative outcome.
Systematic use of episiotomy is not justified.	Performing episiotomy routinely should be abandoned.
Induction of labour should be reserved for specific medical indications.	Inducing labour routinely at less than 42 weeks gestation should be abandoned.
The routine administration of analgesic or anaesthetic drugs should be avoided.	Prescribing sedatives or tranquilizers routinely should be abandoned.
Artificial early rupture of membranes, as a routine process, is not justifiable.	Amniotomy to augment spontaneous labour appears promising but requires further evaluation.

ations for appropriate technology at birth. Nevertheless, some questions persist. How valid are these recommendations? How representative were the participants in the various conferences and research teams? Is it not possible, if not probable, that individuals willing to participate in such meetings and activities would have an interest in 'changing the system' and would be biased? Most important, how well do the recommendations match up to research findings?

The recent publication by Chalmers, *et al.* (1989) encompassing a careful scrutiny of randomized control trials of perinatal technology allows these questions to be answered. This two volume tome contains many reviews of great value but of particular relevance here are the four appendices. These list the forms of perinatal technology that (a) reduce the negative outcomes of pregnancy and childbirth; (b) are promising but require further evaluation; (c) have unknown effects and require further evaluation; and (d) should be abandoned in the light of the available evidence.

The WHO recommendations for appropriate technology for birth are examined in Table 1 in terms of their classification by Chalmers *et al.* (1989). This appendix deals only with the specific birth technology recommendations and does not assess the general recommendations regarding perinatal health care policy and the setting of policy.

The recommendations of the WHO for appropriate technology at birth, developed through survey research, discussion and debate, are strongly endorsed by the findings of carefully controlled and critically evaluated randomized control trials. The recommendations provide sound guidance for those providing perinatal care.

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96

A COMPARISON OF SKIN-TO-SKIN CONTACT AND RADIANT HEATERS IN PROMOTING NEONATAL THERMOREGULATION

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ABSTRACT

This prospective study compared standard newborn care under radiant heat with two methods of warming babies that provided immediate parent–infant contact. Fifty-one mother–infant dyads were randomly assigned to three treatment groups. Control group babies had no skin-to-skin contact with their mothers during the study period. One group of experimental infants began skin-to-skin contact after completion of initial nursing care in a radiant heater. The second group of experimental babies had the earliest, most continuous skin-to-skin contact with their mothers and were never under radiant heat. Skin temperatures of all 51 newborns were noted every 3 minutes for 45 minutes using an electronic thermometer. Rectal temperatures were also taken at 21 and 45 minutes after birth. Results supported the hypothesis that body temperatures would be warmest in experimental babies given the earliest skin-to-skin contact, less warm in experimental infants beginning skin-to-skin contact after initial nursing care, and coolest in control babies given no skin-to-skin contact with their mothers ($p < 0.001$). Significantly more control than experimental newborns had skin and rectal temperatures below the neutral thermal range at 21 and 45 minutes of life. High delivery room temperature and drying babies well immediately after birth did not differ significantly among the three groups, but were found to be positively correlated with neonatal body temperature for the sample as a whole.

INTRODUCTION

Most expectant parents anticipate an emotionally satisfying and medically safe childbirth experience. Each family, nurse-midwife, and physician will have a unique perspective on the relative values of emotional and medical needs and the compromises necessary to attain them.

It is a premise of nurse-midwifery care that the two goals need not be mutually exclusive. Hence in a setting emphasizing high technology in perinatal care, the nurse-midwife is especially challenged in working with parents to achieve a safe and fulfilling birth which facilitates maternal and paternal attachment to the child.

One facet of the potential conflict between safety and emotional satisfaction is the manner of handling the infant immediately after birth. It is standard procedure at many hospitals to rapidly clamp and cut the umbilical cord in order to expedite the newborn's transfer to a radiant-heated crib. There, the baby will be dried and given the initial nursing care and evaluation. These procedures frequently take place beyond the range of vision of the mother on the delivery table and consume at least 5 to 10 minutes. Sometimes the snugly wrapped infant will then be held aloft or brought over so the mother can see her baby's face. Upon request, she may be allowed to hold her baby for a while. More often, the newborn is left in the radiant heater away from the delivery table while everyone is busy with the mother. Parents who request immediate and continuous skin-to-skin contact with their child from the moment of birth find themselves in conflict with medical and nursing personnel who feel it is their responsibility to protect the neonate from heat loss in the cold, drafty delivery room. The more relaxed atmosphere of birthing rooms may provide a solution for some, but for those who must or choose to use the delivery room, it is questionable whether the current method of minimizing neonatal heat loss is actually the most effective.

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97

Perhaps the mother's body would be an equally good heat source, as well as promoting maternal–infant bonding, even for those who have not been educated to seek this. The essential clinical problem is to develop ways to safely minimize newborn heat loss that optimize parent–infant contact. If there is no significant difference in temperatures of normal babies dried and given their initial nursing care while in skin-to-skin contact with their mothers compared with those cared for under radiant heat, then there would be justification for allowing mothers to hold their healthy babies immediately after birth.

NEONATAL THERMOREGULATION

Some decrease in temperature is an inevitable part of adjustment to extrauterine life. Under usual delivery room conditions, deep body temperature of the newborn falls two to three degrees centigrade. The decline is most rapid in the initial min-'es after birth and is about 0.1°C per .inute for core and 0.3°C per minute for skin temperature, corresponding to a heat loss of approximately 200 calones per kilogram of body weight each minute.[1]

The four pnncipal mechanisms by which heat loss occurs as the baby emerges from the warm intrauterine environment into the comparatively cold delivery room are evaporation, radiation, convection, and conduction. Evaporative losses occur rapidly as the newborn's wet skin is exposed to the dry, air-conditioned delivery room. Exhalation of amniotic fluid from the lungs and respiratory tract can also contribute to evaporative heat losses.[2] Radiant losses occur when heat transfers from the body surface to cooler objects not in actual contact with the baby, such as cold walls, windows, and incubator surfaces.[3] Convective losses are enhanced by air currents passing over the infant's skin. Air-conditioning, administration of cold oxygen, and movement of personnel in and out of the delivery room contribute to this form of heat loss. Finally, thermal energy is lost by conduction to cooler objects touching the baby's skin, such as cold towels, blankets, instruments, diapers, and weighing scales.[3]

Normal, full-term babies are true homeotherms who respond actively to changes in environmental temperature. They attempt to modify heat losses by several mechanisms: shivering and voluntary muscle activity to increase heat production,[4] changing posture to a more flexed position to decrease total exposed skin surface, constricting cutaneous vessels to prevent core body heat from reaching the skin through vascular channels,[3] and nonshivering thermogenesis.

Chemical or nonshivering thermogenesis is a metabolic process mediated by norepinephrine that allows oxygen consumption to be raised without increased muscular activity. Heat thus generated warms the blood circulating through deposits of brown fat and maintains temperature of the body core.[5] Heat is transferred along an internal gradient from the core to the body surface, modulated by vasoconstriction, and then along an external gradient from the skin to the environment, controlled largely by environmental conditions.[4]

In order for a drop in body temperature not to occur in the delivery room, the neonate would have to increase heat production by more than threefold.[6] It is unlikely that infants are able to defend themselves by added heat production during the first few minutes after birth because of the transient hypoxia accompanying even a perfectly normal birth. Any degree of hypoxia tends to depress the metabolic response to cold.[5] Healthy infants will recover from the relative birth asphyxia by increasing respiratory carbon dioxide elimination in order to compensate for metabolic acidosis. By 15' to 30 minutes after birth, normal newborns are able to increase oxygen consumption in response to cold stimuli and thereby utilize their primary heat-producing mechanism of nonshivering thermogenesis.[7]

A neutral thermal environment has been defined by several researchers [1,5,8–10] as the set of thermal conditions, including ambient air and radiating surface temperatures, relative humidity, and air flow, at which oxygen consumption and heat production are lowest, thus imposing minimal metabolic stress on the newborn. Criteria for a neutral thermal environment include: a core (esophageal, colonic, or deep rectal) temperature of 97.7 to 99.5°F (36.5–37.5°C), an abdominal skin temperature of 96.8 to 99.5°F (36.0–37.5°C), and a core-to-skin gradient not greater than 1.0°F (0.5°C). Environmental conditions allowing thermal neutrality are most easily appraised by measuring skin temperature over areas not noted for deposits of brown fat. Skin temperature receptor sites are the primary monitors of environmental temperature and regulators of endogenous energy production.[5] Core temperature is much slower to respond to environmental changes.

The lowest environmental temperature at which oxygen consumption remains within the minimal resting range is designated the critical temperature. Normal delivery room conditions are well below the critical temperature even for a healthy full-term neonate without clothes or blankets.[11]

All babies experience some drop in temperature immediately after birth. If cold stress is allowed to develop without intervention, the newborn's ability to compensate will begin to fail. A downward spiral of tachypnea,

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fatigue, bradycardia, deepening hypoxia and metabolic acidosis, hypoglycemia, hyperbilirubinemia, and interference with certain clotting factors may be set up. Premature babies are at much greater risk for developing these complications because of their larger body surface to mass ratio, thin skin, scanty subcutaneous tissue and fatty insulation, inability to shiver or perspire, and less active metabolic tissue mass.[12] Such a vicious cycle is unlikely to be set up in a normal term infant during the course of hospital care. Nevertheless, knowledge of such possible sequelae has prompted numerous attempts to find effective ways of minimizing cold stress after birth.

Current approaches to decreasing cold stress by blocking the four main avenues of loss include: 1) evaporation—drying the head and body of the baby as soon as possible after delivery; replacing wet towels with warm, dry ones; swaddling in plastic wrappers; 2) conduction—putting warmed blankets between the infant's body and cold surfaces; swaddling in warmed blankets or plastic wrappers; 3) convection—covering the baby with blankets or plastic; placing in an incubator out of drafts, especially during transportation between delivery room and nursery; warming oxygen before any needed administration; 4) radiation—placing the newborn under radiant heat lights; keeping cribs, incubators, and radiant warmers away from cold outside walls and windows; using double-walled incubators.[4]

Little published research has been done to evaluate whether skin-to-skin contact with a parent could provide the newborn in the delivery room with a neutral thermal environment. In an unpublished Master's study, Thomas[13] compared the temperatures of newborn babies receiving skin-to-skin contact with infants kept under radiant heat in the delivery room. Twelve mother–infant dyads were randomly assigned to each group. Results supported the hypothesis that experimental group babies would regain body temperature and stabilize in a neutral thermal environment at least as well as babies in the control group. An important finding of the study was that newborns given the earliest skin-to-skin contact with their mothers warmed at a significantly faster rate than babies who had not yet received the intervention.

A three-group after-only experiment, which partially replicated and extended Thomas's study, was designed to test the following hypothesis: There will be significant differences in body temperature among three groups of infants. Neonatal core and skin temperatures will be lowest in control group babies given no skin-to-skin contact with their mothers in the first 45 minutes after birth, significantly higher in Group I experimental babies given skin-to-skin contact with their mothers after completion of initial nursing care, and highest in Group II experimental infants given the earliest skin-to-skin contact with their mothers.

MATERIALS AND METHODS

The sample was a convenience sample of women expected to deliver their babies between May 15 and August 11, 1978, at Yale-New Haven Hospital under the care of a certified nurse-midwife, resident in obstetrics, or obstetrician in private practice. The population from which the sample was drawn included all prenatal patients of the following groups who deliver at Yale-New Haven Hospital: two clinics, Yale-New Haven Hospital Women's Clinic and Young Mothers' Program; one prepaid health plan; and eight private practices.

In addition to informed consent of the subject and clearance by the nurse-midwife or obstetrician, criteria for participation in the study included:

1. low-risk patient with an uncomplicated antenatal course; complications contraindicating participation in the study included maternal diabetes mellitus, thyroid disease, cardiac disease, hypertension, acute or severe chronic lung or renal disease, drug addiction, alcoholism, moderate to severe pre-eclampsia, Rh isoimmunization, poor obstetrical history with previous fetal demise or stillbirth, previous cesarean section, multiple gestation, vaginal bleeding, or a suspected growth-retarded fetus
2. term pregnancy between 38 and 42 weeks gestation, with a normal vaginal delivery anticipated
3. normal intrapartum course; contraindications to continued participation included fetal distress indicated by severe variable or late heart-rate decelerations, meconium-stained amniotic fluid, maternal oral temperature above 99.0°F, prolonged rupture of membranes greater than 18 hours at time of delivery
4. normal vaginal delivery with or without episiotomy or low forceps but excluding delivery by vacuum extraction or midforceps rotation
5. normal newborn with estimated weight of at least 2500 grams, spontaneous cry, and Apgar scores at 1 and 5 minutes of at least seven.

Fifty-one mother-baby dyads met all criteria for continuation in the project and constituted the final sample. There were 17 pairs in each experimental group.

When a patient meeting the prenatal criteria, by chart review and corroboration of the nurse-midwife or physician, was admitted to the labor and delivery unit of Yale-New Haven Hospital, she was contacted by the researcher about the study. If the woman gave informed consent to participate in the study, she and her baby were randomly assigned to either the control group or to one of the experimental groups by blind drawing of one of three numbers, with replacement. Both the couple and their caregiver were told how the baby would be handled after delivery

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during the temperature study to be certain there were no major conflicts in expectations.

The study was conducted primarily in the three delivery rooms of Yale-New Haven Hospital. Patients giving birth in the Birth Room or the cesarean-section delivery room were not included in the study.

Prior to each use, the Surg-a-Temp electronic thermometer was calibrated according to the manufacturer's instructions. A sterile, disposable Mon-a-Therm temperature sensor was attached to the electronic thermometer and then taped to the infant's left side, lateral to the umbilicus, as soon as possible after birth. An aluminum-backed, adhesive foam reflector was placed over the end of the temperature sensor to prevent interference with accurate readings from either the radiant lights or the mother's body heat. Skin temperature was read on the dial of the electronic thermometer by the researcher and recorded every 3 minutes for 36 minutes. At 21 and 45 minutes, in addition to skin temperature, a deep core temperature was obtained by inserting a standard mercury-filled glass thermometer into the infant's rectum for 3 minutes. Delivery room temperature was recorded from a wall-mounted thermometer as each subject entered the room.

The protocol for Group I (first experimental group) was to place the baby on the mother's abdomen immediately after delivery, head down on a sterile towel. The researcher dried the baby and applied the temperature sensor to the abdomen while the nurse-midwife or physician suctioned the baby's mouth and nose, if needed, with a bulb syringe and clamped and cut the umbilical cord. The neonate was then transferred by the researcher to the radiant-heated Kreiselman crib for the remainder of the initial nursing care, to be given by the staff nurse. This care consisted of further drying the skin and scalp as needed, 1 and 5 minute Apgar scoring, any needed oropharyngeal suctioning, final cord clamp application, securing of the identification bracelet, and taking footprints. The skin sensor frequently needed reinforcing with one or two additional strips of Derma-clear nonallergenic tape. After the 5 minute Apgar score, the nude infant was placed by the researcher on the mother's bare chest so that the temperature sensor did not rest against her. Both were covered with blankets previously warmed in the radiant heater: the baby's two cotton receiving blankets and a cotton bath blanket.

The procedure for Group II (second experimental group) was the same as in Group I except that instead of transfer to the radiant heater, the neonate was placed by the researcher directly on the mother's bare chest after the cord was cut. All initial nursing care was done by the staff nurse while the baby and mother were in skin-to-skin contact, covered as much as possible by warmed blankets.

Group III (control group) babies were carried directly to the radiant-heated crib as soon as the umbilical cord was cut without being placed on the mother's abdomen after birth. The temperature sensor was applied to the baby's left side as previously described. The staff nurse gave the initial nursing care, double-wrapped the baby in warm blankets, and showed the parents their child. If the mother or father requested to hold the swaddled baby, they could do so. Otherwise, the infant was kept under radiant heat lights until transfer from the delivery room.

Babies in all groups were transferred, wrapped in blankets and in bed with their mothers, from the delivery room to the recovery room at the completion of all repair and cleanup procedures after delivery.

RESULTS

There were no significant differences among the three groups on any of the following characteristics: the mother's age, race, marital status, gravidity, number of previous term pregnancies, premature babies, abortions, or living children; the number of weeks gestation or pediatrician's estimate of gestational age; length of the first, second, or third stage of labor; milligrams of Vistaril, Demerol, or Nisentil given to the mother for analgesia; type of anesthesia for delivery; mother's highest temperature in labor; delivery room temperature; length of time spent in the delivery room; whether or not an episiotomy was performed; sex, weight, or length of the baby; whether or not the baby was dried well; or Apgar scores of the baby at 1 and 5 minutes after birth.

The hypothesis that neonatal core and skin temperatures would be lowest in control group babies receiving no skin-to-skin contact, significantly higher in experimental babies given skin-to-skin contact with their mothers after initial nursing care, and highest in the group of experimental infants given the earliest skin-to-skin contact was supported. The repeated measures analysis of variance for both skin and rectal temperatures showed a significant main effect for the experimental variable. A Scheffé test showed that babies in the second experimental group (Group II) had significantly warmer skin temperatures than babies in Groups I and III. Group I babies were significantly warmer than control (Group III) infants on skin temperature measurements. The Scheffé test for differences in rectal temperature showed Groups I and II to be significantly warmer than the control group. There were no significant differences between the two experimental groups. Table 1 summarizes these data.

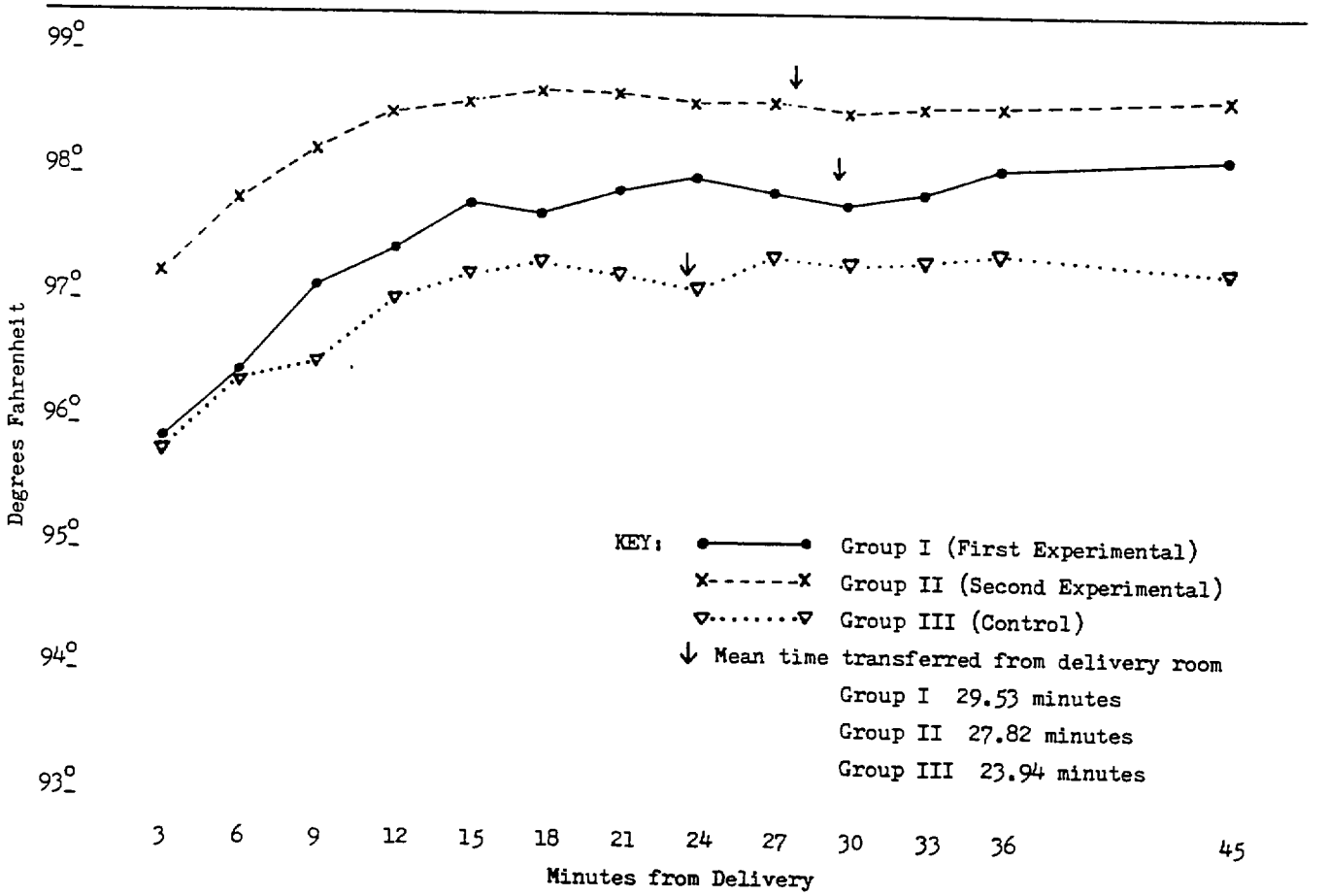
Figure 1 illustrates the mean skin temperatures of the treatment groups at 3-minute intervals from 3 to 45 minutes after birth. There was a consistent increase in temperature in all three groups until about 18 minutes of age, after which it tended to stabilize. Most babies (7/17 in

TABLE 1
Results of analysis of variance for repeated measures of skin and rectal temperatures for the three groups[a]

Means for the three groups (averaged over time)	*Results of the analysis of variance*					*Results of group comparisons*	
	Source	*Sum of squares*	*df*	*Mean square*	*F*		
Skin temperatures (in degrees Fahrenheit)	between groups	214.934	2	107.467	11.649***	I vs. II	0.837**
						I vs. III	0.547*
	error	442.813	48	9.225		II vs. III	1.384***
First experimental $\bar{X}_{(I)} = 97.551$	time	171.621	12	14.302	34.385***		
Second experimental $\bar{X}_{(II)} = 98.388$	group by time	11.100	24	0.463	1.112 n.s.		
Control $\bar{X}_{(III)} = 97.004$	time by error	239.575	576	0.416			
Rectal temperature (in degrees Fahrenheit)	between groups	36.597	2	18.298	18.940***	I vs. II	0.468 n.s.
						I vs. III	0.970*
	error	46.375	48	0.966		II vs. III	1.438**
First experimental $\bar{X}_{(I)} = 98.426$	time	0.795	1	0.795	10.167**		
Second experimental $\bar{X}_{(II)} = 98.894$	group by time	0.055	2	0.027	0.350 n.s.		
Control $\bar{X}_{(III)} = 97.456$	time by error	3.751	48	0.078			

[a] Note: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

FIGURE 1
Mean skin temperatures of Groups I, II, and III by time.



101

Group I, 10/17 in Group II, and 9/17 in Group III) experienced a drop in skin temperature during the period of transfer from the delivery room to the recovery room. The mean number of minutes after delivery at which this transfer occurred was 29.53 for Group I, 27.82 for Group II, and 23.94 for Group III.

An analysis of variance of the three groups was also done for each time frame at which temperatures were recorded. Significant differences were followed by Scheffé tests. Table 2 summarizes significant differences among mean skin temperature measurements for the groups at each of 13 times. Table 3 compares mean rectal temperatures of the three treatment groups at 21 and 45 minutes after delivery. When examined in this way, Group II was always significantly warmer than Group III. Babies in this second experimental group had significantly warmer skin temperatures than babies in the other experimental group (Group I) at 3, 6, 12, 18, and 30 minutes. The differences between the two experimental group means approached statistical significance at the 0.05 level for skin temperature measurements at 9, 15, 27 minutes. No significant differences in rectal temperatures were noted between the two experimental groups. Control group (Group III) infants were significantly cooler than Group I newborns for both rectal temperature measurements and for skin temperature measurements at 24 and 45 minutes after delivery. There was also a trend, approaching significance at the 0.05 level, for Group III babies to have cooler skin temperature measurements than those in Group I at 21, 27, 33, and 36 minutes.

There were no significant differences among the groups in core-to-skin gradient at either 21 or 45 minutes. Means for all three treatment groups were well under 1.0°F. At 21 minutes after birth, three babies in Group I, one in Group II, and four in Group III had a core-to-skin gradient greater than 1.0°F. When repeated at 45 minutes, one infant in Group I, none in Group II, and three in Group III had such a large core-to-skin gradient.

TABLE 2
Comparison of mean skin temperatures by time intervals for the three treatment groups[a]

Time (min after birth)	*Means for the three groups[b] (Fahrenheit)*				*Results of group comparisons*		
	$\bar{X}_{(I)}$	$\bar{X}_{(II)}$	$\bar{X}_{(III)}$	*F value*	*I vs. II*	*I vs. III*	*II vs III*
3	95.947	97.176	95.788	7.801**	1.229**	0.159 n.s.	1.388**
6	96 423	97.753	96.382	5.471**	1.329*	0.042 n.s.	1.371*
9	97 118	98.165	96.500	7.115**	1.047 n.s.	0.618 n.s.	1.665**
12	97.353	98.494	96.976	7.453**	1.141*	0.377 n s.	1.518**
15	97.753	98.565	97.188	6.864**	0.812 n.s.	0.565 n.s.	1.377**
18	97.712	98.653	97.318	7.042**	0.941*	0.394 n.s.	1.335**
21	97.941	98.647	97.182	10.027**	0.706 n.s.	0.759 n.s.	1.465***
24	98.012	98.576	97.118	12.026**	0.564 n.s.	0.894*	1.458***
27	97.912	98.618	97.276	10.667**	0.706 n.s.	0.636 n.s.	1.342***
30	97.788	98.547	97.312	9.587**	0.759*	0 476 n.s	1 235***
33	97.929	98.553	97.323	8.521**	0.624 n.s.	0.605 n.s.	1.229***
36	98 059	98.565	97.418	7.469**	0.506 n.s.	0.641 n.s.	1.147**
45	98.223	98 741	97.271	10.717**	0.517 n.s.	0 953*	1.470***

[a] Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
[b] $\bar{X}_{(I)}$ = first experimental group, $\bar{X}_{(II)}$ = second experimental group, $\bar{X}_{(III)}$ = control group

TABLE 3
Comparison of mean rectal temperatures by time intervals for the three treatment groups[a]

Time (min after delivery)	*Means for the three groups[b] (Fahrenheit)*	*Results of the analysis of variance*					*Results of group comparisons*	
		Source	*Sum of squares*	df	*Mean square*	F		
21	$\bar{X}_{(I)}$ = 98.547	total	42.987	50			I vs. II	0.424 n.s.
	$\bar{X}_{(II)}$ = 98.970	between groups	18.819	2	9.409	18.688**	I vs. III	1.023**
	$\bar{X}_{(III)}$ = 97 523	within groups	24.168	48	0.504		II vs. III	1.447***
45	$\bar{X}_{(I)}$ = 98.306	total	43.186	50			I vs. II	0.512 n.s.
	$\bar{X}_{(II)}$ = 98.818	between groups	17.834	2	8.917	16.883**	I vs. III	0.918**
	$\bar{X}_{(III)}$ = 97.388	within groups	25.352	48	0.528		II vs. III	1.430***

[a] Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
[b] $\bar{X}_{(I)}$ = first experimental group, $\bar{X}_{(II)}$ = second experimental group, $\bar{X}_{(III)}$ = control group.

102

Significant differences were noted among the groups regarding the number of babies having core and skin temperatures below the thermoneutral range at 21 and 45 minutes. Among Group I newborns, at 21 minutes only one had an abdominal skin temperature below the neutral range, and none had a rectal core temperature below 97.7°F; at 45 minutes one had a low skin temperature, and four had rectal temperatures lower than the thermoneutral zone. Only one baby in Group II had a temperature below the neutral thermal range at either time. He had a rectal temperature of 97.6°F at 45 minutes. All other measurements for babies in this second experimental group were above minimum levels for thermal neutrality at both 21 and 45 minutes after birth.

TABLE 4
Babies meeting minimum criteria for neutral thermal environment[a]

	Group I	*Group II*	*Group III*	χ^2
Skin temperatures at 21 min				
Neutral range	16	17	10	12.750**
Below neutral	1	0	7	
Skin temperatures at 45 min				
Neutral range	16	17	12	7.933*
Below neutral	1	0	5	
Rectal temperatures at 21 min				
Neutral range	17	17	5	31.385**
Below neutral	0	0	12	
Rectal temperatures at 45 min				
Neutral range	13	16	4	20.091**
Below neutral	4	1	13	

[a] Note *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

TABLE 5
Mean skin and rectal temperatures of babies dried well and not dried well after birth[a]

Time (min after delivery)	*Mean temperatures*		*Results of t tests*
	Dried well	*Not dried well*	
3	96.622	95.540	2.996**
6	97.208	96.000	2.811**
9	97.678	96.260	3.524***
12	98.014	96.633	3.773***
15	98.130	97.127	2.892**
18	98.150	97.280	2.508*
21 (skin)	98.230	97 187	3.344**
21 (rectal)	98.497	97.987	1.832 n.s.
24	98.153	97.300	2.819**
27	98.180	97.347	2.915**
30	98.147	97.247	3.344**
33	98.189	97.327	3.061**
36	98.272	97.393	3.201**
45 (skin)	98.330	97.473	2.668*
45 (rectal)	98.364	97.707	2.406*

[a] Note. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Among the 17 control group (Group III) infants, seven had low skin temperatures and 12 had rectal temperatures below neutral thermal levels at 21 minutes of age; by 45 minutes five remained less than 96.8°F for skin temperature, and 13 showed low rectal temperatures. See Table 4 for a summary of chi squares showing the significant differences among the groups.

In this sample of babies, the only intervening variable that was highly correlated with abdominal skin temperature was delivery room temperature. This was statistically significant for temperatures taken at 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30 minutes after delivery ($p < 0.05$). In these cases, a positive correlation existed between the warmth of the delivery room and the temperature of the baby. Delivery room temperature did not differ significantly among the three treatment groups (F value 2.133, n.s.) and thus did not covary with the main effect of the experimental intervention. Within each group and for the sample as a whole, however, a higher temperature in the delivery room was correlated with higher skin temperatures of babies in the first 30 minutes of life.

Although the protocols for all three groups called for the babies to be dried thoroughly, it quickly became apparent during conduct of the study that not all babies were well-dried during the first few minutes of life. This was due in large part to variations in style and priorities of the delivery room nurses who had charge of the drying of all Group III (control) infants and any Group I babies who needed further drying after being transferred from their mothers' abdomens to heated cribs for nursing care. The reluctance of the researcher to loosen the grip of admiring parents on their just-born offspring also accounted for some experimental babies not being thoroughly dried.

Babies were described on the data sheet as being either dried well or not dried well in the first 3 minutes of life.

103

Those considered "not dried well" still had wet heads or a body surface that had not been completely wiped off at the time of the first temperature reading. There was no significant difference among the three study groups regarding the proportion of babies dried well and not dried well. However, for the sample as a whole, babies who were dried well had significantly higher skin temperatures at all times than babies who were not dried well. The well-dried infants had significantly higher rectal temperature measurements at 45 minutes, but not at 21 minutes, than babies who were not thoroughly dried. Drying had an earlier and more pronounced impact on differences in skin temperature than rectal temperature measurements. Table 5 summarizes these data.

DISCUSSION

The findings of the study corroborate and strengthen the results of Thomas's 1978 investigation of newborn thermoregulation. The results of this clinical experiment clearly demonstrate that rapid drying of the neonate followed by skin-to-skin contact with the mother under a warm blanket can be a safe and effective way to provide normal babies with a neutral thermal environment in the delivery room. This is a simple protocol, requiring no special equipment, which could be implemented by any hospital.

In the present study, standard care in a radiant-heated crib did not provide the majority of control babies with a neutral thermal environment. Infants who received the earliest, most continuous skin-to-skin contact all had skin temperatures within limits for thermal neutrality, and all but one had a normal rectal temperature also. Newborns given skin-to-skin contact with their mothers had fewer negative fluctuations in skin temperature than control babies. The earlier skin-to-skin contact was initiated with the mother, and the more continuous it was, the warmer the neonate was maintained.

Infants in all three groups experienced a drop in skin temperature during transfer from the delivery room to the recovery room, despite being covered by blankets. Most babies' heads were exposed, allowing the sensitive thermal sensors of their faces to react to the strong convection currents generated by the rapid trip down the hall. Once settled again, most babies' temperatures rose. Infants in the second experimental group had a smaller loss of heat during this transfer and a quicker recovery of skin temperature than babies in the other groups.

The experimental protocol for promoting heat conservation in new borns was designed to minimize losses through four mechanisms. Evaporative losses were reduced by rapidly drying the infant after delivery, even before the umbilical cord was cut. Positioning the baby on the mother's bare chest provided a source of radiant heat from her body and decreased radiant losses from the baby to cold walls, windows, and the metal surfaces of the Kreiselman crib. Skin-to-skin contact with the mother also eliminated major heat losses through conduction to cold objects. The warmed blankets covering both mother and baby protected the infant well from convection currents. Neonates in the radiant heaters, even when wrapped in blankets, appeared much more vulnerable to cooling by convection currents in the drafty delivery room.

Skin-to-skin contact was demonstrated to be a physiologic method of warming newborns that avoided the risks of hypothermia, hyperthermia, and other potential hazards of radiant heaters. Further study of these heaters has been recommended to the Food and Drug Administration to establish whether or not routine use of such equipment in delivery rooms poses a serious risk of dehydration, burns, and cataracts or retinal lesions from emissions.[14] Skin-to-skin contact is a safe alternative, demonstrated to be more effective in the present study that radiant heaters in providing healthy term infants with a neutral thermal environment.

In addition to the thermal benefits of skin-to-skin contact, the close proximity of the baby to the parents gave them an early opportunity to become acquainted. A newborn's first physiologic reactivity period spans the initial 30 to 60 minutes after birth. With the mother holding the baby throughout this period, the parents were able to take advantage of their baby's heightened arousal and responsiveness to make eye contact, explore, and soothe the baby. Parents in the experimental groups expressed great appreciation for the chance to hold their baby closely so soon after birth. Bonding behavior was not systematically studied during the present experiment. Whether the attachment process between these mothers and their infants differs in any way from the control group remains to be examined in further research.

Although significant differences in newborn temperatures were shown in this series of 51 babies, replication of the study with even larger numbers would strengthen the findings. A postpartum study comparing skin-to-skin contact and incubators as methods of rewarming cool babies would be a logical extension of the research. Other methods of handling newborns, such as the LeBoyer bath and the use of an electric heating pad over mother and infant also merit study regarding effects on thermoregulation.

Skin-to-skin contact with the mother can provide a healthy, term baby with a highly effective way of maintaining body heat. Parents who desire immediate and continuous skin-to-skin contact with their baby in the delivery room can be supported in this request by nurse-midwives, physicians, and nurses without fear of causing the baby cold stress.

104

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105

TWELVE YEARS AND MORE THAN 30,000 NURSE-MIDWIFE–ATTENDED BIRTHS:

The Los Angeles County + University of Southern California Women's Hospital Birth Center Experience

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ABSTRACT

This article describes the setting, policies, practices, and outcomes of the nurse-managed in-hospital birth center at Los Angeles County + University of Southern California Women's Hospital, where women are selected upon admission for birth center care. A retrospective review of available data was made; when compared with hospital records, the primary data source was found to be 96% accurate. Results of the review indicated that from 1981 to 1992, there were 36,410 birth center admissions and 30,311 births, all attended by nurse-midwives; no intrapartum maternal or fetal deaths occurred among all admissions. The intrapartum transfer rate averaged 17%, and declined steadily from a high of 28% in 1982 to a low of 7% in 1990. More in-depth review showed an overall primary cesarean birthrate of 1.8% and an operative birthrate of 4% among the 25,890 admissions and 22,490 births from 1985 to 1992. Detailed postpartum and newborn outcomes from 1982 to 1986 showed a neonatal intensive care unit admission rate of 1.5% and a one-week newborn readmission rate of 1.3% among newborns discharged within 12 to 24 hours; 85% of all newborns returned for follow-up care. This large longitudinal experience demonstrates excellent outcomes that can be achieved when nurse-midwives, working cooperatively with a multidisciplinary health care team, provide in-hospital birth center care to a predominately low-income Hispanic population using a variety of less-traditional intrapartum management techniques. Broader implications for making alternative maternity care services available for low-income women with nurse-midwives and nurses playing a central role are discussed.

Certified nurse-midwives (CNMs) have been in the forefront of the movement to advance family-centered maternity care since the 1940s and have been successful in a wide variety of geographic settings, including the most underserved areas of the inner-city (1). More recently, nurse-midwives have been instrumental in the promotion and development of alternative birthing environments in response to consumer demands and desires (2).

A number of factors, including cost containment, overcrowding, and consumer demand for a more relaxed and family-centered environment, have led to the development of hospital-based alternative birth centers around the country (3–9). In 1989 the American Hospital Association conducted a survey of obstetric and newborn services in the United States and reported that nearly three quarters (1,769) of the 2,414 respondents with obstetric services had some type of single-room maternity care in their facility (10). Yet, not all settings have incorporated the services of certified nurse-midwives in their plans, and even fewer have

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considered a more central role for the nurse-midwife, especially as it relates to the selection of appropriate levels of care for women at medical and social risk.

The Normal Birth Center (NBC) at Los Angeles County (LAC) + University of Southern California (USC) Medical Center, Women's Hospital, was opened in 1981 as an in-hospital birth unit staffed by nurse-midwives, nurses, and pediatric nurse practitioners in response to an increasing demand for obstetric services within a confined traditional labor and delivery unit. Before the development of the NBC at Women's Hospital, however, CNMs were already an integral part of the high-risk labor and delivery unit. From 1979 to 1980, nurse-midwives attended 14% of all births at the hospital (3,677/26,532). Women were considered acceptable nurse-midwifery candidates if they had no known medical problems; prenatal care was not a prerequisite. The primary cesarean birth rate at the hospital in 1980 was 8.7% (1,161/13,292). Over the last six months of 1980, the primary cesarean section rate for women cared for by the nurse-midwife on the traditional labor and delivery unit was 2% (18/863); this low rate has been attributed to the selection process used to determine an appropriate caseload (11).

This article describes the setting, policies, and practices of the nurse managed in-hospital birth center at LAC + USC Women's Hospital and summarizes a retrospective analysis of available data on birth outcomes and selected intrapartum transfer, newborn, and postpartum outcomes for more than 30,000 nurse-midwife attended births from mid-1981 through 1992.

SERVICE BACKGROUND

Facility and Surroundings

Los Angeles County is a burgeoning megalopolis with approximately 9.3 million people. Hispanics, primarily originating from Mexico, comprise 35% of the population (12). Women's Hospital is located within 3 miles of downtown Los Angeles and provides care to a population that is predominantly Roman Catholic and 95% Hispanic. Ninety-one percent of the women who receive care at Women's Hospital pay for their hospitalization via government assistance; 8% are responsible for self-payment; and 1% have insurance or third-party reimbursement.

Women are referred to Women's Hospital from three comprehensive health centers as well as other smaller community clinics operated by the Los Angeles County Department of Health Services; the providers in these clinics are public health physicians, nurse-practitioners, and a few full-time clinic nurse-midwives who are not Women's Hospital staff. In addition, referrals are received from private clinics and practitioners throughout the county. Women who are on Medi-Cal (California's Medicaid program) can give birth in any hospital that has a Medi-Cal contract, irrespective of where they received their prenatal care. Approximately 10% of women admitted to the birth center have had no prenatal care.

The NBC is located on the eighth floor of Women's Hospital, three floors above the high-risk labor and delivery unit and four floors above the neonatal intensive care unit. The NBC consists of six birth rooms and three postpartum rooms. The birth rooms range in size from 186 to 325 square feet, with a private adjacent bathroom. Each birth room contains a birthing bed, rocker, fetal monitor, delivery equipment, and infant resuscitation unit. The postpartum rooms contain four beds. All babies "room-in" with the mother because there is no separate nursery. The sparsely decorated birth rooms are functional, although in dramatic contrast to the homelike atmosphere in many other hospitals (3, 9, 13).

Admission Practices

The NBC caseload could be described as "mixed risk." Mann used

107

this term to define a population that is exclusive of some risk states, yet at the same time inclusive of other risks (14). Women are examined by the nurse-midwife or the obstetric resident in the main admitting room. Women without identified problems are encouraged to remain at home during latent labor and are not admitted to the NBC until active labor is diagnosed—that is, regular uterine contractions have been established and the cervix is dilated at least 4 cm. After careful evaluation of their overall nsk status, women of all ages are admitted to the NBC if they meet selection criteria (Appendix A) and if bed availability and staffing permit. This may include women with class A-1 diabetes, a prior cesarean birth, grand multiparity, and anemia. It is estimated that another 5% to 10%, or 10 to 20 women a month would qualify for admission if all women who met selection criteria could be admitted. Whereas many alternative birth centers are chosen by women as a birth option (3, 6, 7, 9), women are admitted to the NBC simply because they fulfill the selection criteria. Therefore, most women in this setting do not have prior awareness of the special characteristics of the NBC.

Staffing

At present, there are 31 CNMs on staff, occupying 26 full-time equivalent positions. Half of the full-time staff has two years or less of experience; the other half ranges in experience from three to 17 years, with a median of nine years. From 1981 to 1992, 47 nurse-midwives completed a one- to three-month internship in this setting; 10 were eventually hired as staff. The nurse-midwife intern acts as an additional person on the shift and does not take the place of a staff CNM.

Two CNMs are on duty on the unit at all times working either 12- or 24-hour shifts. In addition to CNMs, there are five to six registered nurses per shift and ancillary support personnel. Two pediatric nurse practitioners are responsible for evaluating the newborns during the day. Generally, there are nine admissions and eight births per day on the NBC; the average number of postpartum mothers and newborns in the birth center is 12 per day.

Nurse-midwife students of the USC Education Program are present on the ward for 10 weeks each year. For the student's first two intrapartum clinical shifts, the faculty's sole responsibility is to precept the student; thereafter, the faculty works as the second nurse-midwife on duty while proctoring the student. Other students are present on the NBC, including an occasional advanced intrapartum student from another nurse-midwifery program, an occasional medical student for an observation experience, and more often, nursing students from six area schools who are assigned with the NBC nurses. The most experienced CNM serves as a resource person on the unit, but integral to the smooth functioning of the ward is the philosophy of team work and mutual responsibility among the nurse-midwifery and nursing staff.

Philosophy of Care and Clinical Practices

Women admitted to the NBC are encouraged to have the support person(s) of their choice present throughout labor and delivery. The support person is not required to attend childbirth education classes. Children may be present; those under five years of age must be accompanied by an adult other than the support person.

On admission, women have a 20-minute evaluation of fetal condition via electronic fetal monitoring. If maternal and fetal assessments are normal and labor status permits, the woman is encouraged to ambulate and monitoring is performed intermittently. Internal monitoring with a fetal scalp electrode and intrauterine pressure catheter is instituted only as indicated. Generally, if the woman is in bed, the fetal monitor is used continuously. Given the mixed-risk population and an intrapartum, postpartum, and neonatal caseload that could total 30 patients, intermittent auscultation throughout labor and delivery is impractical.

Oral fluids are permitted and encouraged throughout labor. Depending on labor status, fetal condition and patient desire, available hospital food may also be consumed. Intravenous fluids are not used routinely but are administered as fetal and maternal condition warrants. Analgesic and ataractic medications are available; however, they are not often used in this setting because of the nurse-midwifery management philosophy that promotes pain relief strategies such as showering, ambulation, position changes, and emotional support as primary interventions. Local or pudendal anesthesia is available on the NBC; women desiring or requiring regional anesthesia are transferred from the NBC to the high-risk unit. Oxytocin is not used for labor augmentation on the birth center; instead, alternative techniques such as ambulation, position changes, and breast stimulation with the electric pump are practiced.

After birth, mother and baby are stabilized in the birth room for approximately two hours. They are then moved to a postpartum room on the NBC, where the typical hospital stay is 12 to 24 hours. Newborns return two to three days after discharge for a routine examination by the pediatric nurse practitioners in the follow-up clinic located on the NBC. Phone calls are made as reminders, and the cord clamp is purposefully left in place by the newborn staff to encourage return visits. At this time, consultation with a neonatologist or referral to a pediatric specialty clinic is obtained if necessary; otherwise the newborn is given a routine appointment in two weeks at a Los Angeles County clinic. Women are instructed to return to the main admitting room of Women's Hospital

108

should problems develop after discharge. All postpartum mothers are given an appointment for a four-week family planning visit at either Women's Hospital or one of the county clinics. Visiting nurse and public health referrals are made if the social situation necessitates additional follow-up.

Complications and Emergencies

Women who develop complications of labor or require regional anesthesia or oxytocin are transferred to the traditional high-risk labor and delivery ward, where continuing care is provided by the resident team. Obstetric and pediatric residents can be summoned to the NBC via direct phone lines and are able to respond to any emergency within 3–5 minutes. An emergency elevator can be accessed if rapid transport is needed. About three to four times per week, when staffing permits, a CNM is assigned to a 12-hour shift in this high-volume, high-risk setting. While assigned there, the CNM may have a variety of roles, including providing care to women transferred from the NBC.

Criteria for transfer from the NBC to the high-risk labor and delivery unit are listed in Appendix B. These criteria have undergone only minor revisions over the past 12 years. In 1988, the selection criteria were expanded to allow women with intrapartum hematocrits of 28% to 30% to labor and deliver on the NBC. Previously, women with a hematocrit of < 30% were transferred to the high-risk unit. In 1989, the 2-hour time limit was deleted with regard to failure to progress during active labor as a sole reason for transfer. The time limit did not reflect the more liberal approach to labor management that was actually in practice at the time when nurse-midwives were more routinely instituting alternatives such as showers, ambulation, and breast stimulation to augment labor, rather than automatically transferring the woman to the high-risk floor. Diagnostic criteria for pregnancy-induced hypertension and preeclampsia were revised in 1989, increasing blood pressure and proteinuria baselines from 130/90 or > 1+ to 140/90 or > 2+. In 1991, when amnioinfusion was introduced to the birth center to dilute thick meconium, thick meconium was deleted as an automatic reason for transfer.

Data Collection

Data are manually recorded in the service delivery log book and later entered on computer by one of the nurse-midwifery staff members using a program specifically designed to record log book information. In 1990, when the computerized system was installed, the Nurse-Midwifery Clinical Data Set was evaluated for appropriateness in this setting (15). Because the Data Set is geared toward the comprehensive care model, it was determined to be less useful than the customized program in this episodic care setting.

METHODS

The method used to analyze selected outcomes in this descriptive report was a retrospective records review. Data were derived from a variety of hospital sources. Admission and transfer data, and labor and birth outcome data were found in the nurse-midwifery delivery log book, the annual reports of the nurse-midwifery service, the hospital delivery log book, and annual delivery statistics maintained by Women's Hospital's Medical Information Services; cesarean statistics were available from Women's Hospital's Division of Maternal-Fetal Medicine. Newborn outcome data were available in a data set previously collected by the pediatric nurse practitioner service. Admission, birth, and transfer frequency data were available from the annual reports of the nurse-midwifery service, as compiled from the delivery log book from 1981 to 1992; however, complete data were not available from other sources for the entire 12-year period. Transfer outcome data were available from 1985 to 1992; data about intrapartum transfer indications were available from 1988 to 1992; demographic information and labor and birth data were available from 1990 to 1991; and postpartum maternal transfer indications, neonatal transfer data, and newborn follow-up data were available from 1982 to 1986. Significance levels were considered but not determined because of the retrospective nature of the data and, therefore, the inability to statistically define causal factors.

An effort was made to address the reliability of the data recorded in the nurse-midwifery delivery log book, the primary data source for this study, because one of the main limitations of the retrospective design is data reliability. A systematic random sampling of 174 charts, 124 from 1991 and 50 from 1986, was made. Ten charts from 1991 (6.1%) and 16 charts from 1986 (32%) were not located by Medical Information Services: overall, 148 of the requested charts (85.1%) were located. The log book data for 34 variables were compared with the medical record. The 1991 log book data were also compared with data recorded in the nurse-midwifery computerized data base. Results indicated an overall log book accuracy rate of 96%. No attempt was made to verify the reliability of the data gathered by the medical or nurse-practitioner service.

RESULTS

Demographic characteristics of women who gave birth on the birth center in 1990 and 1991 are presented in Table 1. As presumed, the population was made up of primarily Hispanic women between the ages of 18 and 35, who had received some prenatal care; most had previously given birth and experienced a term pregnancy. Although the data pre-

TABLE 1
Selected Demographic and Clinical Characteristics of Women Whose Births Occurred on NBC, 1990–1991 (N = 6,109)

Demographics	n	*Percentage*
Age		
< 18	409	6.7
18–34	5,329	87.2
≥ 35	371	6.1
Race		
Hispanic	5,771	95
Asian	85	1.0
Black	59	1.0
White	62	1.0
Unknown	132	2.0
Parity		
0	1,681	28
1	1,784	29
2–4	2,334	38
≥ 5	310	5
No prenatal care	579	9.5
Gestational age		
< 38 wk	756	12.4
38–41 wk	5,021	82.2
≥ 42 wk	332	5.4

sented here comprise only 20% of all women who delivered on the NBC over the study years, there have been no major shifts in the birth center population over the last 12 years.

Table 2 summarizes the available NBC admission, delivery, and transfer data annually from 1981 to 1992. From June 1981 through December 1992, there were 36,410 intrapartum admissions and 30,311 births on the NBC. These births accounted for 15% of the 196,420 births in Women's Hospital during the same period. During all study years, the intrapartum transfer rate to the high-risk labor and delivery unit was 17%, and there were no intrapartum maternal or fetal deaths among all NBC admissions. The transfer rate for women admitted to the NBC from 1985 to 1992 was 13.1%, and the primary cesarean birth rate for all women admitted was 1.8% (469/25,890). This number does not include the six women (6/307) admitted to the birth center with a previous cesarean birth, who failed trial of labor and required a repeat cesarean birth. The overall operative birth rate (cesarean, forceps, and vacuum extraction births) for all NBC admissions was 4%. The hospital primary cesarean rate during these same years was 10%.

Tables 1 and 3 highlight some of the labor and birth outcomes of more than 6,000 women who gave birth on the NBC in 1990 and 1991. The highlights include the following: 28% of the births were from nulliparous women; most women experienced unmedicated labors: < 2% had perineal trauma beyond a second-degree laceration, and more than half had no perineal trauma at all; most infants were of normal birth weight; although over 20% of infants were exposed to meconium-stained amniotic fluid, Apgar scores of less than 8 at 5 minutes were rare. During these same 2 years, there were 526 women who were transferred from the NBC to the high-risk unit; 338 of the women transferred (64%) were nulliparas.

Newborn outcome data were systematically gathered by the pediatric nurse practitioners from January 1982 through December 1986. During those 5 years, 13,297 infants were managed by the pediatric nurse practitioners. Of these infants, 12,396 were born in the birth center, and 901 were born in the high-risk unit. When nurse-midwives attended labors and births in the high-risk unit, they had the option of transferring the mother and newborn to the NBC if they were deemed appropriate for early discharge. Of the 13,297 infants, 10,373 (78%) were discharged from the NBC, and 2,924 infants (22%) were transferred to the normal nurseries. Only one third (899) of the infants transferred to the normal nurseries had medical problems. The other two thirds (1,822) were transferred because the mother was not a candidate for early discharge. Indica-

TABLE 2
Women's Hospital (WOH) Births and Normal Birth Center (NBC) Admissions, Births, and Transfers from 1981 to 1992

			NBC Births		*Transfers from NBC*		*Cesarean Births*			*Forceps/Vacuum Extraction Births*		
Year	*WOH Births*	*NBC Admissions*	n	*% WOH Births*	n	*% NBC Admits*	n	*% NBC Transfers*	*% NBC Admits*	n	*% NBC Transfers*	*% NBC Admits*
1981	14,713	905	706	5	199	22						
1982	14,854	3,208	2,317	16	891	28						
1983	16,565	3,171	2,359	14	812	26						
1984	16,562	3,236	2,439	15	797	25						
1985	18,141	3,207	2,557	14	650	20	68	10.5	2.1	114	17.5	3.6
1986	17,147	3,103	2,514	15	589	19	59	10	1.9	81	14	2.6
1987	16,383	3,072	2,502	15	570	18.5	91	16	3	66	11.5	2.1
1988	16,462	3,064	2,658	16	406	13	70	17	2.3	62	15.5	2
1989	18,147	3,468	3,086	17	382	11	64	17	1.9	74	19	2.1
1990	18,094	3,475	3,224	18	251	7	46	18	1.3	66	27	1.9
1991	14,818	3,160	2,885	19.5	275	9	36	13	1.1	61	22	1.9
1992	14,544	3,341	3,064	21	277	8	41	15	1.2	66	24	2
Total	196,420	36,410	30,311	15	6,099	17	475	14	1.8	590	17.4	2.3

TABLE 3
Selected Labor and Birth Outcomes at NBC, 1990–1991 (N = 6,109)

Labor and Birth Outcomes	n	*Percentage*
Medications in labor		
None	5,683	93
Meperidine	259	4.3
Hydroxyzine	167	2.7
Perineum		
Intact	3,493	57.2
Episiotomy	311	5.1
1st- or 2nd-degree laceration	2,128	34.8
3rd- or 4th-degree laceration	109	1.8
Unknown	68	1.1
Meconium stained amniotic fluid		
None	4,684	77
Thin	870	14
Thick	514	8.3
Unknown	41	0.7
Apgar score		
< 8 at 5 min	27	0.4
Birth weight		
< 2,500 gm	61	1
2,500–4,000 gm	5,566	91
4,001–4,500 gm	445	7.3
> 4,500 gm	37	0.7

tions for maternal transfer to the routine postpartum ward are listed in Table 4. There were 203 newborns (1.5%) who required admission to the neonatal intensive care unit. The most frequently encountered problems were respiratory distress, severe congenital anomalies, meconium aspiration, and polycythemia. Table 5 summarizes the reasons for transfer of newborns from the birth center to the normal nurseries and neonatal intensive care unit.

After they were discharged from the NBC, 8,814 newborns (85%) returned for their appointment in the follow-up clinic. There were 173 newborns (1.3%) who required readmission to the hospital during the first week of life. Table 5 summarizes the reasons for readmission to the hospital, with jaundice as the primary indication for hospitalization. No readmitted newborn died.

TABLE 4
Indications for Maternal Transfers From NBC to Routine Postpartum Floors, 1982–1986 (Total N of NBC Postpartum Women = 13,297)

Indication	n *(1,822)*	*% Transfers*	*% Total Postpartum Women (13.7)*
Anemia	614	34	4.6
Bilateral tubal ligation	346	19	2.6
3rd- or 4th-degree laceration	278	12.5	1.7
Fever (≥ 101 anytime, or 100.4 × 2 after 24 h)	131	7.2	1.0
Postpartum hemorrhage	115	6.3	0.9
Pregnancy-induced hypertension	102	5.6	0.7
Positive syphilis serology	84	4.6	0.6
Medical problem	33	1.8	0.25
Substance-abusing mother	31	1.7	0.2
Other	136	7.5	1.0

As intrapartum transfers declined from 1985–1992 (see Table 2), there was a concomitant decrease in the proportion of NBC admissions who had cesarean births. Operative vaginal births surpassed cesarean births as the most frequent method of intervention in 1989. This trend continued through 1992. In addition, there was a steady increase in the proportion of women who experienced an operative birth after transfer from the NBC to the high-risk labor and delivery unit (Table 2). This comparison can be illustrated by looking at two 4-year periods. From 1985 through 1988, 18% of all women admitted to the NBC were transferred, and among all transfers 13% had cesarean births, and 15% had operative vaginal births. By contrast, from 1989 through 1992, 9% of all women admitted to the NBC were transferred, and among those transferred 16% had cesarean births, and 22.5% had operative vaginal births.

As previously noted, the intrapartum transfer rate to the high-risk labor and delivery unit from 1985 to 1992 was 13.1%. Three distinct declines were observed in the transfer rate. They occurred between 1984 and 1985, 1987 and 1988, and 1989 and 1990 (Figure 1). In 1985, when nurse-midwives began triaging obstetric patients in the main admitting room, the intrapartum transfer rate decreased from 25% to 20%, and the number of women discharged home undelivered from the NBC dropped from 0.9% to 0.5%. Before 1985, all laboring women were examined by the resident in the main admitting room and dispositioned for admission to the NBC or the high-risk unit, or discharged to home. The subsequent declines in intrapartum transfers that occurred between 1987 and 1988 and 1989 and 1990 cannot be attributed to a singular event; rather, they coincided with several changes in admission and transfer

TABLE 5
Indications for Neonatal Transfer from NBC to Neonatal Intensive Care Unit and Normal Nursery, and Newborn Readmissions, 1982–1986 (N = 13,297)

Reasons	n	% *Neonatal Transfers*	% *NBC + High-Risk Unit Births*
Total NBC + high-risk unit births	13,297		
NBC births	12,396		93
Infants admitted after birth in high-risk unit increase load	901		7
NBC to neonatal intensive care unit			
Respiratory distress	43	21	0.3
Congenital anomalies	39	19	0.3
Meconium aspiration	33	16	0.3
Polycythemia	30	15	0.2
Hyperbilirubinemia	20	10	0.15
Rule out sepsis	18	9	0.1
Low birth weight/small for gestational age; Depressed baby/low Apgar; Hypoglycemia; Prematurity; Hypothermia	20	10	0.15
Total	203		1.5
NBC to normal nursery for neonatal problem			
Hyperbilirubinemia	512	57	3.9
Cardiac murmurs	83	9.2	0.6
Respiratory distress symptoms	51	6.0	0.4
ABO incompatibility	48	5.3	0.35
Rule out sepsis	47	5.3	0.35
Poor feeder	38	4.2	0.3
Polycythemia	27	3.0	0.2
Other	89	10	0.7
Total	899		6.8
Infants discharged from NBC and readmitted to hospital within first week of life			
Jaundice	145	84	1.09
Rule out sepsis	12	7.0	0.09
Dehydration	8	4.5	0.06
Other	8	4.5	0.06
Total	173		1.3

criteria specifically regarding anemia, pregnancy-induced hypertension and preeclampsia, and failure to progress (see the preceding section on Complications and Emergencies).

Table 6 highlights reasons for intrapartum transfers from 1988 to 1992. The 2.2% decrease in rate for failure to progress accounted for 36% of the total decrease in transfers between 1988 and 1990, when transfers decreased from 13.3% to 7.2%. In addition, there was a 1.4% decrease in transfers for pregnancy-induced hypertension and a 1% decrease in transfers for abnormal fetal heart tracings and "other." Women are placed in the "other" category if they have historical, physical, laboratory, or diagnostic test results identified after admission that warrant transfer to the high-risk unit.

DISCUSSION

Lower cesarean birth rates are common among women who are of lower socioeconomic status (16), are of Hispanic ethnicity (17, 18), have no health insurance or are insured by Medicaid (17–19), give birth in a government-owned hospital (19), or receive nurse-midwifery care (20). Thus, a largely indigent, Hispanic population receiving care in an inner-city hospital birth center staffed by nurse-midwives would be expected to have a low cesarean birth rate. The literature also suggests that low operative intervention rates may occur as a result of selectively screening women for delivery (11, 21–23), something that has been practiced and perfected in this setting for more than 10 years. The characteristics of the client population and the delivery setting should be kept in mind when evaluating the reported outcomes. The findings are deserving of more in-depth discussion so that the practice characteristics in this nurse-managed care setting can be well un-

TABLE 6
NBC Admissions, Intrapartum Transfers, and Reasons for Transfers to High-Risk Unit, 1988–1992

				Reasons for Intrapartum Transfers									
		Intrapartum Transfers		Failure to Progress		Abnormal Fetal Heart Rate		Pregnancy Induced Hypertension		Fever		Other	
Year	NBC Admits	n	%	n	%	n	%	n	%	n	%	n	%
1988	3,064	406	13.3	184	6.0	89	2.9	54	1.8	20	0.7	59	1.9
1989	3,468	382	11.0	187	5.4	87	2.5	25	0.7	10	0.3	73	2.1
1990	3,475	251	7.2	133	3.8	66	1.9	14	0.4	9	0.3	29	0.8
1991	3,160	275	8.7	138	4.4	79	2.5	18	0.6	6	0.2	34	1.0
1992	3,341	277	8.3	115	3.4	81	2.4	11	0.3	10	0.3	60	1.8

derstood, especially in light of the size of this experience, which not only resulted in extremely low cesarean and operative birth rates, but also in no intrapartum maternal or fetal mortality, infrequent maternal or neonatal morbidity, infrequent use of technological intervention, and high accuracy in the selection of mothers and newborns who would experience normal labors and births.

When women are screened on admission in labor, two distinct nurse-midwifery caseloads emerge (22, 23), either a "comprehensive" caseload or an "episodic" one. A comprehensive caseload consists of women who have been followed prenatally and continue to be managed either solely by the nurse-midwife or in consultation with the physician during the intrapartal period. The episodic caseload consists of women who are screened on admission in labor, and the management of their care is assumed by the nurse-midwife if they are appropriate candidates. Most nurse-midwife services follow the comprehensive care model; but, in this setting, as in other similar high-volume settings, the episodic care model is more common.

By selectively screening women on admission in labor, the potential for, or the absence of, complications is taken into consideration, and the nurse-midwife can choose whether to manage a woman's care. Ordinarily, this choice does not exist in the comprehensive care model; the nurse-midwife remains with the client through birth, despite problems that may have been identified or anticipated on admission. When this occurs, an increased level of co-management with physicians is often available. This increased potential for intrapartum problems is reflected in birth outcomes of the comprehensive care group. Results of this study should be compared with data from similar 'episodic' care outcomes and not with other birth centers or services that practice under the comprehensive care model.

This episodic model of care has been examined and has been the subject of both descriptive and comparative studies. In a descriptive study of nurse-midwifery care in a tertiary setting at Jackson Memorial Hospital in Florida, Scupholme (22) found that the rate of cesarean births and outlet forceps was lower in the episodic group when compared with the comprehensive care group. Nurse-midwives provided care to both groups. The cesarean birth rate was 1.3% (73/5,623) and 8.2% (57/690), respectively: the rate of outlet forceps was 1.8% (101) and 3.8% (26) for the respective groups. The overall cesarean birth rate at Jackson Memorial was 17%. Sharp and Levis noted comparable birth outcomes among the episodic (n = 6,671) and comprehensive (n = 4,095) caseloads at Grady Memorial Hospital, where the cesarean rate was 0.2% and 8.1%, respectively (23). Because Grady, Jackson Memorial, and LAC+USC Women's Hospital are institutions that care for predominantly vulnerable populations, it is especially interesting to see the simi-

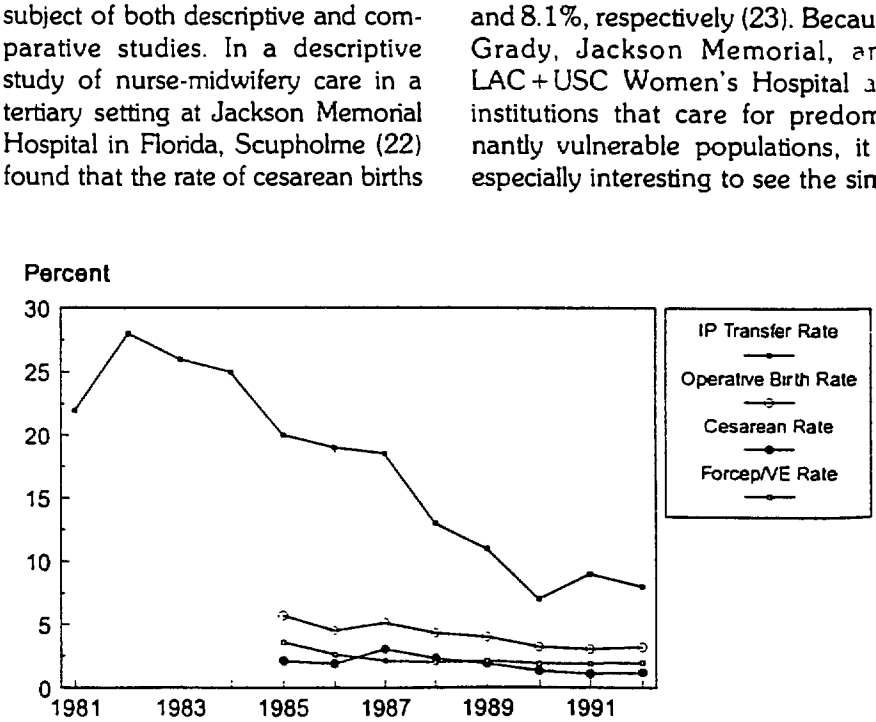

FIGURE 1.
Intrapartum transfer and operative birth rates among all NBC admissions, 1981–1992.

larity in birth outcomes for the episodic care groups managed by nurse-midwives at these institutions. The major differences between the groups are that Grady and Jackson Memorial serve a predominantly African-American population (84% and 46%, respectively), whereas the population at Women's Hospital is predominantly Hispanic.

The question remaining is whether the low operative birthrates associated with episodic care are due to selective screening, nurse-midwifery care, or both. Two prospective studies compared nurse-midwife and house-staff birth outcomes. Slome et al, addressing this issue in a study done in the early 1970s at the University of Mississippi Medical Center, found that low-risk women randomized to either nurse-midwifery or house-staff care had similar cesarean birth rates, but the rate of low-forceps births was three times higher ($P < .05$) in the housestaff group (24). The study by Chambliss et al, which took place at Women's Hospital in the early 1990s, randomized women who met NBC admission criteria to either midwifery or house-staff care (21). Results of their study verified that a low cesarean birthrate can be achieved by nurse-midwives or house-staff when very specific selection criteria are used. Chambliss et al also reported that there was no significant difference in cesarean birthrates (5/234 versus 1/253, respectively) between the two groups, but the total operative intervention rate was statistically significant ($P < .006$) primarily as a result of the number of forceps and vacuum births in the house-staff group (18 versus 0). Furthermore, this study reported a significantly higher rate of episiotomies, third- and fourth-degree lacerations, and use of analgesics and oxytocics in the house-staff group. Both studies suggested that the higher incidence of forceps births may have been attributable to teaching purposes. In addition, Slome et al noted that the application of forceps may be considered a more routine procedure by physicians than by nurse-midwives.

Even if the significantly higher operative vaginal birth rate among the house-staff group is attributed to teaching purposes, the significantly higher rate of episiotomies, third- and fourth-degree lacerations, and use of analgesics and oxytocics cannot be ignored. The greater incidence of these interventions in the cited study and the very low analgesic medication and episiotomy rates reported in this study suggest that there are philosophic differences between nurse-midwives and physicians. The American College of Nurse Midwives advocates the appropriate use of technology in childbirth by emphasizing in philosophy statements and clinical statements that childbirth is a normal process and that interventions should be used only when the benefits of such technology outweigh the risks (25). In this institution, these philosophic and clinical statements influence the nurse-midwives to incorporate into their practice alternatives such as showers, ambulation, position changes, and breast stimulation, rather than instituting oxytocics at the first sign of protraction or arrest of labor, or before analgesics are used. The statements also influence nurse-midwives to use expectant management in labor rather than strict adherence to time limits.

Another area in which nurse-midwifery practice differs from medical practice is the policy on ingestion of fluids and food for women selected for birth center care. Increasingly in the literature, the practice of restricting fluids and food in laboring women has been questioned. The policy of restricting fluids and food is particularly unreasonable for women who are at low risk for surgical intervention and have not received narcotics (26–30). Aspiration is most often associated with general anesthesia and improper anesthetic technique. Although many obstetricians and anesthesiologists advocate treating all laboring women as if they were at high risk for aspiration, it is clear from the literature that there are levels of risk. Withholding food and fluids on the NBC is unreasonable because the population is at negligible risk for aspiration for three reasons. First, the cesarean birth rate of the birth center over the last eight years has averaged only 1.8%; second, epidural anesthesia has significantly decreased the use of general anesthesia; and third, in the last 12 years there has never been an incident of aspiration among more than 36,000 women admitted to the birth center.

From 1985 to 1992, decreases in intrapartum transfers were associated with concomitant decreases in the rates of operative intervention. The assessment skills of the nurse-midwife working in the emergency room and the labor management decisions and interventions employed by the nurse-midwives working at the birth center undoubtedly influenced the decline in both transfers and operative interventions. A further drop in the transfer rate occurred when nurse-midwives exercised more latitude in prolonged labor management, along with other factors such as the posting of weekly statistics and increased experience of the nurse-midwifery staff.

The decrease in intrapartum transfers that occurred when nurse-midwives were primarily responsible for triaging laboring women in the main admitting room was attributed to their familiarity with admission criteria and greater selectiveness in whom they sent to the NBC. The decline in the number of women discharged home undelivered undoubtedly occurred because many nurse-midwives have prior experience as labor and delivery nurses, and are therefore more proficient at differentiating latent from active labor than are the residents. Posting of flow sheets that recorded the daily number of NBC admissions, births, and intrapartum transfers to the high-risk floor, as well as reasons for transfer

114

and the transfer rate, was initiated in 1988, and provided an opportunity for informal self- and peer evaluation and also provided the service with statistical information that could be used to critically evaluate care.

Additional contributing factors in the observed decline in intrapartum transfers may be improved skills among staff and the previously mentioned change in criteria for failure to progress. Failure to progress accounted for 48% of all intrapartum transfers from the birth center between 1988 and 1992 (Table 6). The most common indication for intrapartum transfer in this study and in similar settings where oxytocin, forceps, or vacuum extractors are not used, is labor dystocia (3, 5, 7, 26, 31). Although it is the most common reason for transfer, it is also the most responsive to alternative interventions and supportive, unhurried care.

Expectant management requires the practitioner to assess whether the woman is in latent or active labor. Although the preference is to admit women in active labor to the birth center, the diagnosis of active versus latent or false labor is often made over time. Peisner and Rosen found that 40% of women were still in latent labor at 4 cm cervical dilatation (32). To make a diagnosis of secondary arrest of dilation or failure to progress, the woman must be in active labor. Eliminating arbitrary time limits allowed nurse-midwives the freedom to await the onset of active labor and to try alternatives when labor became protracted or arrested, as long as mother and fetus were in good condition. It is likely that an expectant approach and adjunctive measures in nurse-midwifery management for failure to progress influenced the decline in transfer rates. In addition, because the proportion of cesarean and operative vaginal births increased by more than 10% among those transferred whereas the overall transfer rate decreased by 9%, the authors conclude that over time, the nurse-midwives became more adept at determining need for medical intervention (Table 2).

In the future, a prospective randomized study for failure to progress that compares nurse-midwifery interventions such as ambulation and breast stimulation versus oxytocin may be undertaken to increase understanding of the role of expectant management, safe time parameters for the use of expectant management, and the effects of oxytocin versus expectant management on neonatal and maternal outcomes and operative birthrates. Ongoing research projects include: assessing the effectiveness of breast stimulation for labor augmentation, use of amnioinfusion to improve abnormal fetal heart rate tracings, and birth outcomes of women admitted to the NBC with a history of a cesarean birth. These ongoing and future studies are part of a revised mission to include clinical research in this well-established nurse-midwifery service and education program—a mission that is shared with the other medical and nursing departments.

CONCLUSION

This article demonstrates the excellent outcomes that can be achieved when nurse-midwives, working collaboratively and cooperatively with obstetricians, neonatologists, resident physicians, pediatric nurse-practitioners, and nurses, provide episodic care in a birth center setting. Our data support the notion that nurse-midwives practicing in this episodic care setting are highly successful in selecting a population appropriate for birth-center care. Data presented here represent the largest reported longitudinal experience of nurse-midwifery care in a single setting, and indicate that both the selection process and the nature of the intrapartum management can result in low rates of intervention, intrapartum transfer, and operative birth without compromising outcomes.

At LAC + USC Women's Hospital, we have the opportunity to provide nurse-midwifery care to a select population in a tertiary setting where ordinarily only high-tech care is considered possible. Women get the level of care they need and deserve, from the provider most appropriate to render the care needed. Because many women experience normal labors and births, nurse-midwives, pediatric nurse-practitioners, and nurses are able to provide most of their care, while specialists and resident physicians focus on mothers and newborns with more complex medical needs. Our multidisciplinary experience with nurse-midwives and nurses providing substantial leadership in the delivery of maternity care services should serve as a model for those who are searching for a means to provide safe, alternative birth experiences and decrease the length of hospital in-patient stays for predominantly low-income mothers and infants in tertiary settings.

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Finally, to the 36,410 women who came to Women's Hospital for their labor and birth: It is to you we owe our greatest thanks. Together, we learned to believe in the normal process of birth—but it is you who were our most courageous teachers.

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116

APPENDIX A

Admission Criteria for the Normal Birth Center: September 1992

- Gestational age > 36 to < 42 completed weeks
- Gestational age ≥ 43 weeks with reactive nonstress test and amniotic fluid index ≥ 10 cm
- Estimated fetal weight 2,500 to 4,000 gm
- Low-risk class A-1 diabetes
  1. Regular attendance at clinic with normal fasting blood sugar (FBS < 105) documented in prenatal records within last month
  2. Without history of overt diabetes, antepartum stillbirth, or traumatic delivery due to macrosomia
- One prior cesarean section (C/S) with:
  1. Documented low transverse uterine scar and patient desire for trial of labor in NBC
  2. Undocumented uterine scar with history of uncomplicated vaginal birth after cesarean

Exclusions: Clients with the Following Are Ineligible for Admission

- Anemia (hematocrit < 28%)
- Parity > 8
- Previous C/S with the following:
  1. Undocumented uterine scar, no prior vaginal birth after cesarean
  2. Low vertical or classical uterine scar
  3. More than one C/S
- Previous difficult delivery
- Weight > 225 lb
- Hypertension 140/90
- Proteinuria > 2+
- Positive syphilis serology, untreated
- Client in custody
- Spontaneous rupture of membranes
  1. Not in labor
  2. Signs or symptoms of amnionitis
- At-risk class A-1 diabetics including history of:
  1. Previous overt diabetes
  2. Prior antepartum stillbirth
  3. Traumatic delivery due to macrosomia
- Abnormal vaginal bleeding
- Multiple gestation
- Temperature > 99.6°F
- Unidentifiable presenting part
- Station > −3 for multiparas; > −2 for primiparas
- Thick meconium
- Acute or chronic medical condition
- Nonvertex presentation

APPENDIX B

Intrapartum and Postpartum Transfer Criteria: 1992

Fetal:

- Abnormal fetal heart rate pattern indicative of fetal distress that is unresponsive to alleviating interventions

Maternal:

- Evidence of amnionitis
- Development of pregnancy-induced hypertension/preeclampsia
- Request or need for regional anesthesia
- Hematocrit < 28% on admission
- Hemorrhage prior to delivery
- Excessive blood loss at delivery or fourth stage—and symptomatic
- Prolonged second stage (more than 2 or 3 hours)
- Failure to progress during active labor
- Clients who, after evaluation, do not comply with admission criteria
- Client request for medical management

Exclusion Criteria for 12-Hour Discharge

- Abnormal physical examination
- Medical, surgical, or psychiatric problem
- Estimated blood loss > 750 mL
- Hematocrit < 30%
- Marked episiotomy discomfort; severe bruising or edema
- Temperature > 100.4°F during hospitalization or > 99.4°F at 12 hours
- Unable to ambulate easily and/or care for self and infant
- Inability to void
- Third- or fourth-degree laceration

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Companionship to modify the clinical birth environment: effects on progress and perceptions of labour, and breastfeeding

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WENDY-LYNNE WOLMAN, BEVERLEY E. CHALMERS, TAMI KRAMER

Abstract

Objective—To measure the effects of supportive companionship on labour and various aspects of adaptation to parenthood, and thus by inference the adverse effects of a clinically orientated labour environment on these processes.
Design—Randomized controlled trial.
Setting—A community hospital familiar to most of the participants, with a conventional, clinically-orientated labour ward.
Subjects—Nulliparous women in uncomplicated labour.
Intervention—Supportive companionship from volunteers from the community with no medical nor nursing experience, concentrating on comfort, reassurance and praise.
Main outcome measures—Duration of labour, use of analgesia, perceptions of labour and breastfeeding success.
Results—Companionship had no measurable effect on the progress of labour. Diastolic blood pressure and use of analgesia were modestly but significantly reduced. The support group were more likely to report that they felt that they had coped well during labour (60 *vs* 24%, $P<0{\cdot}00001$). Their mean labour pain scores (26·0 *vs* 44·2, $P<0{\cdot}00001$) and state anxiety scores (28·2 *vs* 37·8, $P<0{\cdot}00001$) were lower than those of the control group. Compared with the control group ($n = 75$), at 6 weeks women in the support group ($n = 74$) were more likely to be breastfeeding exclusively (51 *vs* 29%, $P<0{\cdot}01$); and to be feeding at flexible intervals (81 *vs* 47%, $P<0{\cdot}0001$).
Conclusions—Labour in a clinical environment may undermine women's feelings of competence, perceptions of labour, confidence in adapting to parenthood and initiation of successful breastfeeding. These effects may be reduced by the provision of additional companionship during labour aimed to promote self-esteem.

There is increasing recognition of the impact of social factors on health (Editorial 1988; Schwarzer & Leppin 1989). Modern obstetrics has tended to isolate labouring women from the community contacts that were a feature of childbirth in preindustrialized societies (Kennell &

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Klaus 1988). In recent years, policies in many hospitals have been revised and companions, usually male partners, have been encouraged to be present during labour. There is little well-controlled evidence that the presence of male partners has a favourable effect on the progress of labour or its outcome (Keirse *et al.* 1989). The observable support given by first-time fathers has been unfavourably compared with that provided by female labour companions or 'doulas' (Bertsch *et al.* 1990).

The provision of medical care for childbearing women has been associated with improvements in the immediate outcome of pregnancy for mothers and their babies. At the same time, problems following childbirth such as failure to breastfeed successfully, failure to cope well as a mother and postnatal depression are widespread. It is important to question the extent to which modern-day obstetric practices contribute to either the positive or the negative features of contemporary childbirth (Oakley 1980).

Klaus *et al.* (1986) have shown that women from a rural background admitted to a large, western style hospital in Guatemala experienced considerably shorter labours and fewer complications when randomly assigned to receive continuous support from a female companion during labour. The extent of the improvements observed may be viewed as a measure of the extent to which those without the companionship were failing to achieve their biological potential and, therefore, as an indication of the adverse effects of the clinical environment on the labour process. Similar results have been reported from a public hospital in Houston serving a low-income population, with high use of technology and rates of intervention (Kennell *et al.* 1988). The potential for physiologically improved labour function may be less in environments in which the sense of isolation and unfamiliarity is less extreme than that described in the Guatemala study, or where medical interventions are less frequent than in the Houston study. On the other hand, there may be less obvious adverse effects of the conventional clinical environment on the process of labour and adaptation to parenthood.

Studies of general social support during pregnancy in industrialized communities have tended to show positive psychosocial benefits but a lack of demonstrable physiological improvements (Oakley 1989). In an affluent, low-risk North American population with high rates of obstetric intervention, intrapartum professional support was associated with significantly reduced use of analgesia and rate of episiotomy, but not reduced labour length nor rate of caesarean section (Hodnett & Osborn 1989).

We have investigated the hypothesis that during labour women may be uniquely vulnerable to environmental influences; that modern obstetric care may have an adverse effect on the progress of labour and on the development of feelings of competence and confidence; that this may in turn impair adjustment to parenthood and establishment of breastfeeding; and that this process may to some extent be reversed by the provision of positive support and companionship during labour.

Subjects and methods

The study was conducted at Coronation Hospital, a community hospital serving a low-income urban population. Advertisements were placed in the hospital and local churches asking for help from women prepared to act as labour supporters. The work was to be voluntary, though a nominal allowance to help with expenses would be paid (about £3 sterling per day). Twenty women responded and were interviewed by two of the authors (W-L.W. and G.J.H.). They were asked about their reasons for volunteering and their attitudes to childbirth and the need for emotional support during labour. Role-play was used to assess their ability to express empathy. Three were selected to act as labour companions. They were asked simply to stay with those labouring women to whom they were allocated as continuously as possible, and using touch and speech to concentrate on three primary functions: comfort, reassurance and praise.

Nulliparous women in established labour without significant obstetric complications whose cervices were less than 6 cm dilated and who had no supportive companion with them were asked to participate in the study. The details of the study were explained, in particular that participants would have only a one in two chance of being accompanied during the rest of the labour by a companion. Baseline clinical details of the participants were recorded and a brief questionnaire completed. Blood pressure and pulse were measured using a non-invasive monitor (Dinamap, Critikon, Johnson & Johnson Ltd). Blood samples were collected from the

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intravenous line that was routinely employed to ensure adequate hydration in nulliparous women in the labour ward.

Participants were then allocated by means of randomly ordered cards in sealed opaque envelopes to a study and a control group. Those in the study group were introduced to one of the supporters who stayed with her at least for several hours, and in most cases until her baby was born. Participants were enrolled in the mornings only, as the supporters were not expected to stay at the hospital after dark. In all other respects, the care received by both groups was identical. Clinical care was provided by the resident medical and nursing staff. The time nursing staff could spend with women in both groups was limited by the relatively small nursing complement in our busy labour ward.

One hour after enrolment, venous blood was again collected and the blood pressure and pulse measurements repeated. When possible, cord and maternal blood are collected at delivery. Details of the labour and delivery were obtained from the hospital notes.

The next morning, within 24 h of delivery, a structured interview was conducted by a clinical psychologist (W-L.W.). For all but the last few questions, which related to the support received in labour, the interviewer was blind to the allocation of each woman.

Letters were written to the participants reminding them to attend the 6 week postnatal clinic and, if they failed to do so, further letters were sent and telephone calls made. At the postnatal visit, a further interview was conducted. It was not possible to ensure that the interviewer was always blind to the group allocation, as sometimes the participants volunteered information which identified them as belonging to one or other group.

Statistical comparisons of continuous data were by the Mann-Whitney *U* test. Proportions were compared by means of the 95% confidence intervals (CI) of the odds ratios and the χ^2-test.

The protocol was approved by the committee for research on human subjects of the University of the Witwatersrand.

Results

Of the 190 women approached, 189 agreed to participate in the study and 92 were randomly allocated to the support and 97 to the control group.

The randomization process succeeded in producing groups which were very well matched for all the baseline data recorded, except for a slight imbalance in the racial composition. This discrepancy was considered too small to have materially altered the results (Table 1). Similar proportions were unmarried (support 79%, control 81%), Protestant (64%, 64%), Catholic (16%, 15%), Moslem or Hindu (14%, 13%), previously employed (45%, 44%), scholars (9%, 13%), had household monthly incomes below £200 Sterling (73%, 64%) and had completed more than 10 years of education (63%, 64%). Similar proportions strongly acknowledged that they felt excited (46%, 47%), worried (43%, 38%), sad (15%, 8%), afraid (46%, 43%), in pain (78%, 84%) and anxious (41%, 42%), and appeared to be moderately (46%, 53%) or severely (12%, 12%) distressed.

One woman in the control group left the hospital before completing the 24-h questionnaire, and could not be traced.

The biochemical results and psychosocial follow-up of the mothers and their babies will be considered elsewhere. This report is concerned with the comparisons between the two groups relating to labour and its perception, and breastfeeding.

Labour companionship had no measurable effect on the frequency of uterine contractions 1 h after entry to the study, the rate of cervical dilatation in the first 4 h, the use of oxytocics and amniotomy, or the duration of labour (Table 2). One hour after enrolment the blood pressures in the control group were somewhat lower than in the support group, the difference between diastolic pressures being statistically significant. The fetal heart rate was also slightly but not quite significantly, lower.

The overall number who required analgesia with pethidine and hydroxyzine (Aterax) was not different, but the first dose after enrolment was required earlier in the control group, and there was a trend towards more in the control group needing a subsequent dose.

The rate of operative deliveries was similar in the two groups. Meconium-staining of the amniotic fluid at the time of spontaneous or artificial rupture of the membranes tended to be more common in the support group. All other measures of neonatal well being tended to favour the support group, but none of the differences was statistically significant.

In contrast to the modest measurable effects

Table 1. Baseline inforr

Variable
Age (years)
Gestation (weeks)
Labour induced
Draining amniotic fluid
Occipito-anterior
Blood pressure (mmHg
Systolic
Diastolic
Pulse (/min)
Cervix dilated (cm)
Contractions (/10 min)
Fetal heart rate (/min)
Low variability
Decelerations
Previous analgesia
Oxytocin augmentation
Race: Asian
Black
Coloured

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Table 1. Baseline information expressed as mean (SE) values or proportions (%)

Variable	*n*	Support	*n*	Control
Age (years)	91	20·5 (0·36)	97	20·3 (0·28)
Gestation (weeks)	92	39·4 (0·16)	97	39·6 (0·13)
Labour induced	92	6 (6·5%)	97	4 (4·1%)
Draining amniotic fluid	92	75 (82%)	97	75 (77%)
Occipito-anterior	84	63 (75%)	91	61 (67%)
Blood pressure (mmHg)				
Systolic	92	130·7 (1·66)	92	128·0 (1·55)
Diastolic	92	75·5 (1·24)	97	75·6 (1·08)
Pulse (/min)	91	83·9 (1·34)	97	85·9 (1·57)
Cervix dilated (cm)	92	4·0 (0·13)	96	3·9 (0·11)
Contractions (/10 min)	92	3·4 (0·09)	95	3·5 (0·10)
Fetal heart rate (/min)	92	136 (1·37)	96	135 (1·14)
Low variability	92	9 (9·8%)	96	10 (10%)
Decelerations	92	13 (14%)	96	13 (13%)
Previous analgesia	92	41 (45%)	97	41 (42%)
Oxytocin augmentation	92	8 (8.7%)	97	10 (10%)
Race: Asian	92	12 (13%)	97	13 (13%)
Black	92	7 (7.6%)	97	1 (1.0%)
Coloured	92	73 (79%)	97	83 (86%)

on the physiological progress of labour, the psychological responses and perceptions of the groups were strikingly different (Table 3). The day after delivery the trait anxiety score (Spielberger 1983) and the self-esteem score (Coopersmith 1967), which measure stable personality characteristics and should not be influenced by recent events, were the same in the two groups. The state (current) anxiety score was significantly reduced in the support group. Fewer in the support group described their labour pain as 'severe', and the McGill pain rating index for labour pain (Melzack, 1975) was about half that of the control group. Fewer described their pain at the time of questioning as 'moderate' or 'severe'. Fewer described the labour as 'very difficult' or 'much worse than they had imagined it would be', or felt that they had been 'very tense', while more felt that they had coped well with the labour.

At 6 weeks after delivery, women in the support group were significantly more likely to be breastfeeding their babies exclusively (Table 4). They were about four times less likely to report having experienced feeding problems, three times less likely to have started foods other than breast or bottled milk, and almost twice as likely to be feeding at flexible intervals rather than by schedule.

Comparison of the main reasons given for stopping breastfeeding showed that what distinguished the groups was the greater number in the control group who had stopped because of a perception of having inadequate breast milk.

To investigate the possibility that participation in the study without being allocated to receive support may have had an adverse effect on the control group, 30 women who were not enroled prospectively in the study because they had been admitted in labour over a weekend or in the evening, but whose records showed that they would have met the criteria for enrolment, were approached the day after delivery, and all agreed to complete the 24-h questionnaire. The results in Table 5 show that their responses were very similar to those of the randomized control group, and different to those of the support group.

Discussion

The contribution of modern obstetric care to improved perinatal outcome must be accounted for by the benefits of effective medical interventions in those women with complications of pregnancy. What has been unique in the field of childbirth has been the application of clinically orientated care on a wide scale to healthy individuals. Labour in particular has been defined as a high-risk situation *de facto*, justifying the imposition of the restrictions of clinical care on a routine basis. It is important to question whether

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Table 2. Details of labour outcome expressed as mean (SE) values or proportions (%)

Variable	n	Support	n	Control	P	Odds ratio (95% CI)
1 h after entry to study						
Blood pressure (mmHg)						
Systolic	87	129·3 (1·83)	95	132·1 (1·64)	0·19	
Diastolic	87	73·6 (1·15)	95	76·6 (1·16)	0·03	
Pulse	85	82·2 (1·57)	95	80·9 (1·55)	0·88	
Contractions/10 m	87	3·61 (0·10)	93	3·78 (0·12)	0·63	
Irregular	87	6 (6·9%)	93	4 (4·3%)	0·66	1·64 (0·46–5·8)
Fetal heart rate	87	134·5 (1·31)	94	136·8 (1·23)	0·052	
Low variability	87	8 (9·2%)	94	12 (12·8%)	0·28	0·70 (0·28–1·8)
Decelerations	87	17 (19·5%)	94	19 (20·2)	0·94	0·96 (0·46–2·0)
Amniotomy (total)	92	66 (71·7%)	96	69 (71·9%)	0·89	0·99 (0·53–1·9)
Hours after entry	16	2·2 (0·35)	22	2·5 (0·45)	0·92	
Cervix change (cm/h)	90	1·03 (0·09)	93	1·02 (0·10)	0·64	
Analgesia	92	52 (57%)	97	56 (58%)	0·98	0·98 (0·55–1·7)
Next analgesia (h)	52	2·33 (0·26)	56	1·67 (0·27)	0·03	
Analgesia >once	92	6 (6·5%)	97	13 (13·4%)	0·18	0·47 (0·18–1·2)
Oxytocin used	92	16 (17%)	97	17 (18%)	0·88	0·99 (0·47–2·1)
Hours after entry	16	4·43 (0·61)	17	3·92 (0·43)	0·65	
Labour duration (h)	92	9·6 (0·41)	97	10·2 (0·50)	0·63	
Entry-delivery (h)	92	5·18 (0·33)	97	5·24 (0·31)	0·94	
Assisted delivery	92	7 (7·6%)	97	7 (7·2%)	0·86	1·06 (0·36–3·1)
Caesarean section	92	11 (12·0%)	97	14 (14·4%)	0·77	0·81 (0·35–1·9)
Meconium-staining	92	18 (19·6%)	97	10 (10·3%)	0·11	2·07 (0·93–4·6)
Birthweight (g)	92	3093 (45·5)	97	3116 (42·5)	0·66	
1-min Apgar <7	87	12 (13·8%)	91	22 (24·2%)	0·08	0·50 (0·24–1·0)
5-min Apgar <7	89	4 (4·5%)	96	6 (6·2%)	0·42	0·71 (0·20–2·5)
Oxygen required	92	24 (26·1%)	97	27 (27·8%)	0·92	0·92 (0·48–1·7)
Baby intubated	92	0 (0%)	97	1 (1·0%)	0·51	0·14 (0·003–7)
Cord pH	74	7·23 (0·01)	75	7·23 (0·01)	0·80	
Cord base excess	75	9·21 (0·42)	74	9·09 (0·44)	0·61	

such profound manipulations of the childbirth environment might have unsuspected adverse effects on the process of birth and adaptation to parenthood.

Table 3. Questionnaire responses within 24 h of birth expressed as mean (SE) values or proportions (%)

Variable	n	Support	n	Control	P	Odds ratio (95% CI)
Trait anxiety score	92	40·2 (0·94)	96	39·8 (0·90)	0·86	
State anxiety score	92	28·2 (0·85)	96	37·8 (1·10)	0·00001	
Self-esteem score	92	65·3 (1·80)	96	65·9 (2·01)	0·63	
Labour pain severe	92	53 (57·6%)	96	76 (79·2%)	0·002	0·37 (0·2–0·67)
Pain rating index	92	26·0 (1·42)	96	44·2 (1·52)	0·00001	
Pain at time of questioning						
Moderate	92	19 (20·7%)	96	33 (34·4%)	0·05	0·51 (0·3–0·96)
Severe	92	3 (3·3%)	96	23 (24·0%)	0·0001	0·18 (0·08–0·4)
Mothers' perceptions of labour						
Very difficult	92	32 (34·8%)	96	57 (59·4%)	0·002	0·37 (0·2–0·66)
Coped well	92	54 (58·7%)	96	23 (24·0%)	0·00001	4·17 (2·3–7·5)
Felt very tense	92	28 (30·4%)	96	62 (64·6%)	0·00001	0·26 (0·14–0·5)
Much worse than imagined	92	34 (37·0%)	96	62 (64·6%)	0·0003	0·33 (0·2–0·59)

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Table 4. Questionnaire

Variable
Found becoming a mo
Managing well with ba
Breastfeeding only
Not breastfeeding at all
On food other than mi
Has had feeding proble
Baby has poor appetite
Flexible feeding interv
Main reason for startin
Return to work
Believes bottle bette
Baby not satisfied or
Breast milk insufficie
Breastfeeding proble
Other

Results are expressed a

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Table 5. Comparison of
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1. Baseline data
Age (years)
Gestation (weeks)
Unmarried
Race: Asian
Black
Coloured
Education >10 years
2. Outcome
Labour duration (h)
Birthweight (g)
Trait anxiety score
State anxiety score
Labour pain severe

122

Table 4. Questionnaire responses at 6 weeks postpartum

Variable	Support (n = 74)	Control (n = 75)	$P<$	Odds ratio (95% CI)
Found becoming a mother easy	33 (44·6%)	8 (10·7%)	0·001	5·42 (2·6–11·1)
Managing well with baby	67 (90·5%)	49 (65·3%)	0·001	4·27 (2·0–9·2)
Breastfeeding only	38 (51·4%)	22 (29·3%)	0·01	2·48 (1·3–4·8)
Not breastfeeding at all	16 (21·6%)	24 (32·0%)	0·21	0·59 (0·3–1·2)
On food other than milk	13 (17·6%)	40 (53·3%)	0·0001	0·21 (0·1–0·4)
Has had feeding problems	12 (16·2%)	47 (62·7%)	0·0001	0·15 (0·08–0·3)
Baby has poor appetite	0 (–)	19 (25·3%)	0·001	0·10 (0·04–0·3)
Flexible feeding intervals	60 (81·1%)	35 (46·7%)	0·0001	4·39 (2·3–8·5)
Main reason for starting bottle-feeding				
Return to work	3 (4·1%)	7 (9·3%)	0·34	0·43 (0·1–1·6)
Believes bottle better	8 (10·8%)	5 (6·7%)	0·54	1·68 (0·5–5·2)
Baby not satisfied or ill	4 (5·4%)	4 (5·3%)	0·73	1·01 (0·24–4·2)
Breast milk insufficient	10 (13·5%)	24 (32·0%)	0·01	0·35 (0·2–0·76)
Breastfeeding problems	10 (13·5%)	11 (14·7%)	0·97	0·91 (0·4–2·3)
Other	1 (1·4%)	2 (2·7%)	0·99	0·51 (0·05–5·0)

Results are expressed as proportions (%).

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The dramatic effects on the physiological progress of labour found in the study of Klaus *et al.* (1986) did not occur in this study. This might be because the companionship provided was less effective, medical intervention was less frequent, or because the adverse environmental effects were less intense, creating less scope for improvement. The latter explanation is most likely, as the participants differed from those in the Guatemala study in that they were Western, educated urban working-class women in a familiar community hospital. On the other hand, the reduction in labour duration and complications in a high-technology environment demonstrated in the study of Kennell *et al.* (1988) may in part have been related to the lower rate of medical interventions, particularly epidural analgesia, in their support group. Epidural analgesia was not available to our patients.

The direction of blood pressure changes in our study was consistent with reduced anxiety in the supported group, but these changes were small.

Companionship, however, had a striking effect on the way that the participants reported

Table 5. Comparison of randomized groups with retrospectively selected control group. Data expressed as mean (SE) values or proportions (%)

	Randomized groups					Retrospective control group
	n	Support	n	Control	n	
1. Baseline data						
Age (years)	91	20·5 (0·36)	97	20·3 (0·28)	30	20·4 (0·47)
Gestation (weeks)	92	39·4 (0·16)	97	39·6 (0·13)	30	39·5 (0·18)
Unmarried	92	73 (79%)	96	78 (81%)	30	25 (83%)
Race: Asian	92	12 (13%)	97	13 (13%)	30	3 (10%)
Black	92	7 (7·6%)	97	1 (1·0%)	30	0 (–)
Coloured	92	73 (79%)	97	83 (86%)	30	27 (90%)
Education >10 years	92	58 (63%)	95	61 (64%)	30	21 (70%)
2. Outcome						
Labour duration (h)	92	9·6 (0·41)	97	10·2 (0·50)	30	12·2 (0·97)
Birthweight (g)	92	3093 (45·5)	97	3116 (42·5)	30	3250 (67·6)
Trait anxiety score	92	40·2 (0·94)	96	39·8 (0·90)	29	38·2 (2·1)
State anxiety score	92	28·2 (0·85)	96	37·8 (1·10)	30	36·7 (1·92)
Labour pain severe	92	53 (57·6%)	96	76 (79·2%)	29	23 (79·3%)

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experiencing labour. The various measures of labour pain were significantly reduced in the support group, and analgesia was needed significantly later after entry to the study. Supported women reported far more frequently feeling that they themselves had coped well during labour. If feelings of competence initiated during labour, a time of intense emotional impressionability, are of importance to a woman's ongoing sense of competence as a mother and ability to breastfeed successfully, then this finding is of considerable importance.

In recent years, the direct benefits of breastfeeding for the physical health of babies have been increasingly recognized (Inch 1989). The possible contribution of successful breastfeeding to factors such as satisfaction and happiness in motherhood, the development of positive mother-infant relationships and the emotional development of babies are more difficult to measure; but may also be of importance. In communities without access to safe alternative feeding methods, breastfeeding success is literally a matter of life or death. The main cause of the high infant mortality rate in many such communities is gastroenteritis resulting directly from bottle-feeding (Irwig & Ingle 1984). If the provision of modern obstetric care for such communities has contributed to a significant increase in bottle-feeding, then the contribution to infant mortality may in fact outweigh any beneficial effects on perinatal mortality rates.

Breastfeeding success appears to be vulnerable to a number of direct and indirect factors. Review of the available evidence from randomized trials (Inch & Garforth 1989) has shown that breastfeeding success is adversely affected by restricted breastfeeding, giving free formula samples to breastfeeding mothers, combined oestrogen/progesterone contraception, and restricted mother-infant contact after birth (Thomson & Westreich 1989). It is promoted by general social support during pregnancy (Elbourne *et al.* 1989), antenatal breastfeeding education (Inch 1989) and postnatal support for breastfeeding mothers (Inch & Garforth 1989). Randomized trials of procedures not directly linked to breastfeeding but which depart from the conventional restrictions of the clinical environment have also been shown to have positive effects on breastfeeding success. These include ambulation during labour (Broadhurst *et al.* 1979) and early discharge from hospital (Hellman *et al.* 1962). These results indicate that conventional hospital care may interfere with the development of the confidence needed to breastfeed successfully.

In our study, women in the support group experienced significantly greater breastfeeding success and fewer feeding problems, and were more likely to use a flexible approach to feeding times.

The possibility that factors other than the labour companionship could have accounted for these differences needs to be explored. The labour companions were not aware that breastfeeding was one of the end-points of the study, and it was confirmed in retrospect that they on no occasion discussed breastfeeding nor helped with the first feed after birth. They did not visit the participants in the postnatal wards. Occasionally participants would seek them out in the hospital and on one occasion at home, but only to show them how the baby was progressing, and breastfeeding advice was not given at this time either.

Differences in the progress of and interventions in labour might also have affected breastfeeding success. In fact, these were very small, except for slightly less use of analgesia in the support group.

The possibility must be considered that those who had received the labour support replied more positively to the subjective questions out of a desire to please the researchers. A good test of validity of the interview is given by the trait anxiety questionnaire, which is designed to measure long-term anxiety and should not be much affected by recent events. The consistency of these scores indicates that subjective bias between the groups is most unlikely.

To explain the pronounced and persistent effects on feelings, perceptions and behaviour of a relatively short-lived intervention, we need to accept the premise that labour is a time of unique sensitivity to environmental factors, and that events and interactions during labour may have far-reaching and powerful psychological consequences. Given the fact that very few human experiences approach in intensity the levels of stress, anxiety, pain, exertion and emotional tumult which occur during labour, this is not surprising.

We have attempted to analyse the characteristics of the labour support provided in this study. It was not informative except to the extent of simple advice derived from personal experience, as the companions had no medical, nursing

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nor traditional midwifery experience, but all had children of their own. The factors we think were of importance are as follows: Firstly, the companions were not part of the hospital medical or nursing hierarchy, and therefore may have been seen as an ally without a vested interest in the hospital establishment. Secondly, they were drawn from the same community and would be able to communicate easily with and share common values with the participants. Thirdly, they were not known personally to the participants and this might have avoided feelings of having to meet expectations or keep up appearances which may occur when women are supported during labour by a friend, family member or known midwife or antenatal educator. Fourthly, the specific elements on which the companions were repeatedly reminded to concentrate were comfort, reassurance and praise. The last was emphasised because of our hypothesis that an important way in which the clinical environment might impair the process of birth and adaptation to parenthood might be by undermining women's sense of achievement and development of confidence as mothers. Fifthly, the emotional support given seemed to be genuine. The companions worked as volunteers (though the small expense allowance might have been a motive) and were selected on the basis of appearing to have a genuine desire to help women in labour. They showed a remarkable ability to maintain a commitment to their vocation, with the exception of one supporter who after some weeks became distracted by personal problems and was withdrawn from her supporting role. She was asked to help with clerical work instead. An illustration of the extent to which the support and praise given was genuine is provided by the response of one of the supporters to the one occasion on which a participant visited her at home and brought her a gift. She said that she felt guilty as she had really done nothing; it was the woman herself and the nursing staff who had done everything. And finally, quite apart from anything the companions did or said, the fact that someone with no other function whatsoever was allocated on a full-time basis to be with the women in labour may have conveyed a message of concern for and value of them as individuals.

How applicable are these results to other hospital situations? The participants were nulliparous and on the whole young, urban working-class women who were politically and socially disadvantaged. Many were single, and most were from a community with a conventional Christian ethic. It would be expected that the results would be directly applicable at least to urban working-class women giving birth in a hospital setting in most parts of the world. How best to adapt the principles established in this study to more affluent communities, and those with very different cultural mores, will need further assessment. Further research will also be necessary to determine whether similar effects result from support by other categories of companions, particularly if differing from those in this study by being non-voluntary workers, part of the hospital hierarchy or an associate of the women in labour. The role of male partners, in particular, involves complex and variable relationship factors that are difficult to assess.

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125

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126

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Maternal Assistance and Support in Labor: Father, Nurse, Midwife, or Doula?

MARSHALL KLAUS, MD, JOHN KENNELL, MD, GALE BERKOWITZ, PhD, PHYLLIS KLAUS, MEd

CASE REPORT

Two months before the birth of their first child, a couple considered having a doula present for the labor. Initially, the father, an electronics engineer, felt that a doula might take away from the intimate experience of having the baby. However, his wife disagreed. The father's decision changed during a childbirth class when they both viewed the last 10 minutes of the birth of six infants. They chose an experienced doula in her early fifties who has a 19-year-old son and works as a private certified public accountant.

The doula visited the couple three times before the delivery, going over their plans, relaxation techniques, and birth positions. On one visit, the mother had many questions and found it especially helpful to talk with an experienced woman about her concerns. In the last visit, they toured the hospital together.

The active labor began within a few days of term with rupture of the membranes. The doula met the mother and father when they arrived at the hospital, where the mother's cervix was effaced and dilated 3 cm. Early in the labor the nurse suggested on several occasions that the mother have an epidural because she thought her labor would be long; however, the mother felt she didn't need it. The mother spent the first hours walking, taking a shower, and receiving strong support from the doula and her husband. Approximately 3.5 hours after admission the doula noted the mother was flushed and her legs were shaking. She suggested to the nurse that she might be farther along in transition. The nurse didn't fully agree but felt she was making progress. She again suggested an epidural for an easier birth. The mother again refused. But 15 minutes later, an examination by the same nurse found the mother was dilated 9 cm. One hour later, the mother delivered an 8.5 lb. healthy girl with the help of her obstetrician without an episiotomy.

The mother felt the doula was most valuable. The father noted, "It was especially helpful to have an experienced doula since I was able to be more relaxed since the pressure was off me. We also needed her physically to help my wife and emotionally because the nurse was good but pessimistic." The next day the doula reviewed the course of the labor with the couple, explaining how strong the mother appeared and how the labor evolved.

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127

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INTRODUCTION

In this case, the continuous emotional support was provided by a caring, experienced woman we have called a childbirth doula. In looking for a word to stress the value of a woman companion who is continually supportive and comforting, we chose the Greek word "doula," which means a woman caregiver of another woman. Dana Raphael[1] first used the word to describe experienced women who after birth help mothers with breast-feeding. All childbirth doulas have a short (2 to 3 weeks) but intensive training period to be able to give the laboring woman and her partner both emotional and physical support throughout labor, as well as information about the delivery.

When birth locations shifted from home to hospital (60 to 70 years ago), many childbirth practices that had evolved over the centuries were lost or altered, including birth position, obstetric medication, and companionship during labor. In the past, it was common for a woman in labor to be supported by other women.[2]

The present birth environment can be lonely and has many elements that can increase the stress of labor. These include the routine use of intravenous lines, limitation of food intake, regular vaginal examinations, restriction of movement, fetal monitoring, the use of oxytocin, and possibly more importantly, the strange location and unfamiliar personnel.

What is the evidence that continuous emotional support of the mother during labor has a significant effect on reducing the stress of this experience and improving maternal and neonatal morbidity? To date, five separate randomized trials have evaluated the effectiveness of a doula in reducing the stress of the "modern" birth environment.[3-7] Table 1 lists the details of these five studies.

In all five studies, the mothers were healthy and primiparous women at term who had a normal pregnancy. The "intervention" was the introduction of a doula, or trained lay person who would provide emotional support consisting of praise, reassurance, measures to improve the

Table 1. Effect of Social Support on Perinatal Outcomes: Meta-Evaluation of Five Randomized Clinical Trials

Author, Year, and Location	Sample Size	Selection Criteria	Primary Outcome Indicators	Findings Exp. vs. Control (significant results only)
Sosa et al[3] (1980) Guatemala	n = 127 Exp = 32 Control = 95	Women aged 13-34; nulliparous women; single gestation term; uncomplicated pregnancy; 1-2 cm cervical dilatation at entry	Duration of labor; oxytocin augmentation; cesarean section; forceps; meconium staining; use of analgesia; responsiveness to infant	Decreased perinatal problems; decreased length of labor; increased responsiveness to infant
Klaus et al[4] (1986) Guatemala	n = 417 Exp = 168 Control = 249	Women ages 13-34; nulliparous women; single gestation term; uncomplicated pregnancy; 3-4 cm cervical dilatation at entry	Duration of labor; oxytocin augmentation; cesarean section; forceps; meconium staining; use of analgesia	Decreased cesarean section rate; decreased length of labor; decreased oxytocin; decreased perinatal problems
Hodnett and Osborn[5] (1989) Canada/urban	n = 103 Exp = 49 Control = 54	No age specified; uncomplicated pregnancy; Women enrolled in childbirth classes with partner	Duration of labor; oxytocin augmentation; cesarean section; forceps; use of analgesia; meconium staining; perceived control; trait anxiety	Increased oxytocin use; decreased need for epidural
Kennell et al[6] (1991) USA/urban	n = 416 Exp = 212 Control = 204	Women ages 16-36; nulliparous women; single gestation term; uncomplicated pregnancy; 3-4 cm cervical dilatation at entry	Duration of labor; oxytocin augmentation; cesarean section; forceps; use of analgesia; epidural use; average length of hospital stay; maternal fever	Decreased cesarean section rate; decreased need for epidural; decreased oxytocin; decreased use of forceps; less maternal fever; decreased length of labor
Hofmeyr et al[7] (1991) South Africa	n = 189 Exp = 92 Control = 97	No age specified; nulliparous women; single gestation term; uncomplicated pregnancy; less than 6 cm cervical dilatation at entry;	Duration of labor; oxytocin augmentation; cesarean section; forceps; use of analgesia; meconium staining	Increased coping during labor; increased breastfeeding; lower perceptions of pain; decreased state anxiety and depression after 6 weeks

Abbreviation: Exp, experiment.

comfort of the mother, physical contact (eg, rubbing the mother's back and holding her), an explanation of what was happening during the labor, as well as the continuous presence of the friendly doula.

Since the design of these studies was nearly identical and the role and responsibilities of the supportive companion similar, we have summed their results using a meta-analysis, a statistical technique for summarizing the results of several independent research studies.[8] The meta-analysis is a way to determine the overall effect, size, and significance level of different studies. This technique yields an odds ratio, or the odds of having some outcome (eg, a cesarean section), given exposure to an intervention (eg, a doula) compared to women not "exposed" to a doula.[9] An odds radio equal to 1 would signify that the doula had no effect on a given obstetrical outcome. An odds ratio of less than 1 would describe a protective effect. The range noted in Figs 1 and 2 denotes the 95% confidence interval for the odds ratio. That is, the actual odds of needing a certain intervention is somewhere within that range for 95% of the population. For example, in Fig 1, when the four studies reporting cesarean sections are combined, 95 of 100 women who have a doula would have a reduction in their cesarean section rate ranging from 34% to 67%. If the upper limit of the odds ratio is <1, then the P value for the odds ratio is <.05. It can be surmised that the doula would significantly alter this aspect of care for the better, thereby decreasing the odds of needing a given obstetrical intervention. The meta-analyses were performed using True Epistat software on a personal computer using data available from published manuscripts.[10]

Figures 1 and 2 summarize the effect of the doula on the need for a cesarean section, analgesia, oxytocin, and forceps. When all of these studies are combined, the results of the meta-

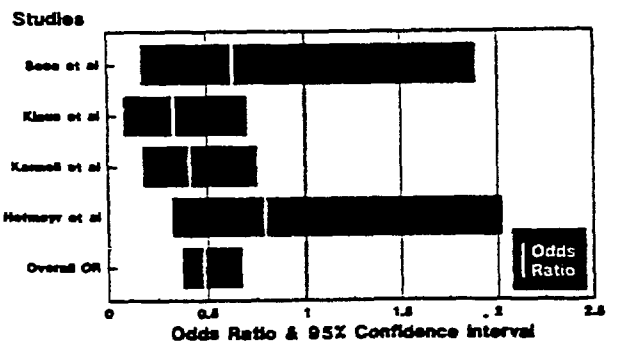

Figure 1. Effect of social support on cesarean section rate.

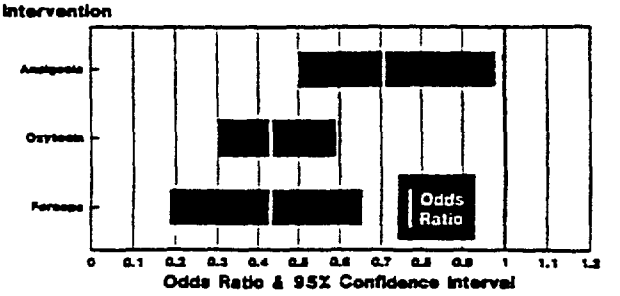

Figure 2. Overall odds ratio and 95% confidence intervals for interventions in labor and delivery.

analysis of these trials are similar and compelling. The analysis of the overall effect on duration of labor found that the presence of the doula significantly reduced the length of labor by 25% ($P < .00001$). The presence of an emotionally supportive companion during labor resulted overall in a remarkable and significant decrease in all of these outcomes. The odds of having a cesarean section for those having a doula were significantly reduced by 34% to 67% (Fig 1). The presence of a doula reduced the odds of needing analgesia by 1% to 47%, for oxytocin by 43% to 68%, and forceps by 35% to 82%. In one of the hospitals that reported the use of epidurals, 11% of mothers with a doula requested an epidural compared with 64% of the control group.

THE EFFECTS OF THE DOULA ON THE POSTPARTUM HEALTH OF THE MOTHER

In the South African study, the results revealed favorable effects of constant support on the subsequent psychological health of the women and infants in the doula group. At 24 hours, the mothers in the doula group had significantly less anxiety compared with the no-doula group, and fewer doula-supported mothers considered the labor and delivery to have been difficult. At 6 weeks' postpartum, there was a significantly greater proportion of women breast-feeding in the doula group (51% compared with 29%), and those demand feeding (81% compared with 47%), and feeding problems were significantly less in the doula group (16% vs 63% in the no-doula group). Mothers in the doula group said that during the first 6 weeks after delivery they spent 1.7 hours a week away from their baby in contrast to those in the no-doula group, who spent 6.6 hours away.

The doula mothers noted that it took an average of 2.9 days for them to develop a relationship with their baby compared with 9.8 days for the

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no-doula mothers. These results suggest that support during labor expedited the doula group mothers' readiness to bond with their babies and require less time away from them. In other studies, mothers in the doula group were again significantly less anxious, had scores on the depression scale that were significantly lower than the control group, and had higher levels of self-esteem at 6 weeks postpartum. They also felt significantly more satisfied with their partner 6 weeks postterm (71% compared with 30%) and felt their baby was better than the standard baby, more beautiful, clever, and easier to manage than the control mothers, who perceived that their baby was slightly less attractive than a standard infant.

THE ROLE OF THE FATHER

Unfortunately, similar randomized trials in which fathers were the main supportive companion compared with women who had no support or a doula, are not available. It was not until the 1970s that the majority of hospitals began to permit fathers to be present during the mothers' labor and delivery. In 1973, only 27% of fathers were present at delivery, compared to 79% by 1983. Unfortunately, the only studies available on the effect of fathers on the birth process are limited in that they compared samples of couples that had chosen to attend childbirth classes with those who had not.[11] Though these studies have shown that the presence of the father significantly reduces the need for analgesia, no randomized trial has reported a significant decrease in the length of labor, the incidence of forceps use, the rate of cesarean sections, epidural anesthesia, or the use of oxytocin. Given that in most United States maternity units fathers are expected to provide for their partner during labor, randomized trials are imperative.

A number of experienced observers have questioned the effectiveness of the father during labor and delivery. O'Driscoll and Meagher[12] have noted, "Women, in general, have more to gain from the presence of a female companion," while Odent[13] writes, "Men sometimes find it hard to observe, accept, and understand a woman's instinctive behavior during childbirth." It is our experience that many male partners are limited in their ability to meet both his and the mother's needs at this intense time, because of his close emotional ties to the mother. Dr. Martin Greenberg[14] noted, "I didn't realize until later how frightened and angry I felt at the staff for being left alone with my wife when having our first baby." He wisely noted, "The mother has a biologically based task which is driven by a time clock, while the father feels like he's floating in air without a connection, uncertain about his tasks."

The presence of a doula frees the father from being the sole support for his wife with the associated anxiety of that responsibility. The woman's partner or close friend can provide encouragement and the loving, emotional support that every woman needs during labor; however, they, in general, do not have the training or experience to help the mother evaluate, understand, and manage her labor in the way a doula can. Often the couple may worry that the outside support person will take over and control the experience, as initially noted in this case. What is different about a doula from other support people is that she does not take over or attempt to control the birth. The doula is there to help parents have the type of birthing experience they want. As noted in this case, the doula moved in concert with the mother's and father's wishes. In asking fathers to be the main support, our society created very difficult expectations for fathers to fill. There is sometimes the mistaken impression from childbirth classes that by seeing a few exercises the husband can be the main source of support and knowledge for the entire labor when the nurse is unavailable. While this may be true for some fathers, many may lack the skill to be an effective source of support during labor and delivery.

We suggest a different but equally important role for the father. A support person during labor can reach out to the mother and her male partner, decreasing the father's anxiety, giving him support and encouragement, and teaching him specific tasks, allowing him to interact with his wife in a more caring and nurturing fashion.

In line with this role of the father is the observation that almost all women find the presence of their husbands supportive. The doula allows the fathers to experience the birth, support his wife to his capacity, but not be the sole support to meet his wife's many needs. The presence of the doula during the labor separates the medical care from the supportive function and would be appropriate where the nurse or midwife cares for more than one patient at a time. If, however, the delivery unit is reorganized, and the midwife or nurse is assigned only one patient, they could care for both the medical and supportive needs of the mother. A unit using this procedure and providing a nurse or midwife to remain contin-

uously with the mother has been in existence for the past 25 years at the National Maternity Hospital in Dublin, Ireland.

THE MIDWIFE AS THE SUPPORTIVE COMPANION

The Active Management of Labor, created by Kierin O'Driscoll and Declan Meagher,[12] was initially developed to prevent prolonged labor and its complications. A key part of the approach was the accurate diagnosis of labor. They developed definite criteria for whether a mother was in labor or not. In this unit labor is rarely induced. If a mother arrives with contractions every 8 minutes and 1 cm dilation with slight effacement of the cervix, she is sent to the ward and discharged in the morning if there is not adequate progression.

The Active Management of Labor is a comprehensive way of thinking about and facilitating the entire labor and delivery experience. It involves understanding the progression of labor, the woman and her family, and then organizing the mother's experiences in the hospital. Education of the mother is also important so that she understands what is happening in labor and how it can be managed. The emphasis is on transmitting to the mother that her labor should not last longer than 12 hours, that she will never be left alone in labor, and that everything is geared to that goal.

When the diagnosis of labor is made, each woman is assigned her personal nurse-midwife (usually a nurse in training to become a midwife), who will remain with her throughout her labor, providing one to one care. Since the continuous care by the midwife appears to be one of the critical elements of this method and has often been left out of the procedure when it is transferred to another obstetrical unit, we quote O'Driscoll and Meagher. "Mere physical presence is not enough. The nurse-midwife must appreciate that her primary duty to the mother is to provide the emotional support so badly needed at this critical time and not simply to record vital signs in a detached manner. A guarantee is given to every expectant woman who attends this hospital that she will have a personal nurse through the labor from the time of her admission to after her birth without regard to the hour of the day or night the baby is born."

The nurse-midwife is trained to touch the mother, to have eye-to-eye contact, hand contact, and to use "en face" position. To permit one-to-one care, the organization of the unit had to be changed. Each shift, night and day, has the same number of midwives. Because there is a remarkable shortening of labor, every midwife now delivers 225 babies per year (whereas before The Active Management of Labor [AML], they delivered 95 babies per year).

Another aspect of AML includes rupturing the membranes when the head is engaged if they do not rupture spontaneously. If the cervix is not dilating at a rate of one centimeter per hour, primiparous mothers will be given oxytocin. Still, only 30% of women require augmentation of labor.

OUTCOME

The results of AML in primiparous mothers at the National Maternity Hospital Dublin are of special interest as shown in Table 2.

After visiting the unit for one week and observing 40 deliveries, several comments are appropriate. We have never before observed a whole system geared for supporting the mother and father through their baby's birth without anxiety, with such gentle care and warmth. It was clear that great respect was afforded the laboring woman, and the absence of angry or impatient tones by staff was apparent.

Because rupturing the membranes appears to shorten labor by only 20 to 30 minutes and only about 30% of mothers received oxytocin, it is fair to conclude that the one to one midwifery support appears to account for a major part of the good results.

MECHANISM OF ACTION OF SUPPORT OF WOMAN

As stress and anxiety are known to increase catecholamine secretion, which makes uterine contractions less effective and labor longer, continuous support by reducing anxiety would shorten labor, thus reducing the time for a complication to occur and therefore the need for a cesarean section.[15,16] In animal studies, emo-

Table 2. Obstetrical Outcome at the National Maternity Hospital in Dublin

Cesarean section rate 1980-1990	5-6.5%
Length of labor (mean)	5.9 hours
50% deliver in <5 hours	
90% deliver in <8 hours	
2% deliver around 12 hours	
Neonatal mortality and morbidity are appropriately low	

131

tional stress to the mother monkey has been shown in many cases to effect fetal heart rate by decreasing placental blood flow.[17,18] It is possible that emotional support to the mother might also reduce fetal heart rate abnormalities, however, no human data as yet supports this hypothesis.

DOULA TRAINING

Doula courses have been designed to specify minimum support standards to encourage personalized care and to provide the trainee with a wide variety of care procedures. Basic information about pregnancy, labor and delivery is also included in most 24 to 30 hour courses. In addition, it is especially important for the doula trainee to work with an experienced doula for seven to eight deliveries before working on her own. Fortunately, there are now many cities where doulas are available. A book by three of the authors illustrates and further describes the role of the doula, her training, care at the National Maternity Hospital in Ireland, how to find a doula, as well as details of the randomized trials is in press.[14]

DISCUSSION

Once an obstetrical unit decides to provide continuous support to women in labor, it must decide if this is to be accomplished with one to one nursing or midwifery care or with a doula. In one to one care, both the emotional support and the medical care procedures for the mother are managed by the same person. Though there are obvious medical benefits for the family to spur a change in our present practices, there are also additional financial savings. Given these preliminary findings from the meta-analysis, a doula is likely to be a highly cost-effective strategy. The presence of a doula is likely to decrease length of labor, use of oxytocin and analgesia, forceps, and cesarean section rates. They have also been associated with positive social outcomes such as decreased maternal anxiety and depression, increased breast-feeding and increased satisfaction with interpersonal relations with partners.

Using the data from the Houston study[6] as a specific example where cesarean sections were reduced by 10% and epidurals by 75%, assuming that the average cost of a doula is $200, maternity health care costs would be reduced by more than $2 billion if every woman in the United States had a supportive woman with her continuously throughout labor. Interestingly, continuous social support by women has been a birth practice in most cultures but has not been routinely provided in the West. In 126 of 127 representative non-industrialized societies from which data are available, it is an established practice that a woman is present with the mother during the entire labor.[19]

SUMMARY POINTS

1. It would appear that continuous support during labor is an essential ingredient of the labor that has unfortunately been left out when maternity care moved from home to hospital in the early 1930s.
2. Randomized trials of continuous emotional and physical support during labor have resulted in multiple benefits, which include a shorter labor, significantly less medication and fewer medical interventions, including cesarean section, forceps, and epidural anesthesia.
3. The results of these studies strongly suggest that we must reevaluate present-day obstetrical practices.

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SPECIAL ARTICLES

A PROSPECTIVE COMPARISON OF SELECTIVE AND UNIVERSAL ELECTRONIC FETAL MONITORING IN 34,995 PREGNANCIES

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Abstract We investigated the effects of using intrapartum electronic fetal monitoring in all pregnancies, as compared with using it only in cases in which the fetus is judged to be at high risk. Predominant risk factors included oxytocin stimulation of labor, dysfunctional labor, abnor- l fetal heart rate, or meconium-stained amniotic fluid. .nis prospective alternate-month clinical trial took place over a 36-month period during which 34,995 women gave birth. In alternate months, either 7 (for "selective monitoring") or 19 (for "universal monitoring") fetal monitors were made available in the labor and delivery unit. During the "selective" months, 6420 of 17,409 women (37 percent) were electronically monitored, as compared with 13,956 of 17,586 women (79 percent) during the "universal months."

Universal monitoring was associated with a small but significant increase in the incidence of delivery by cesarean section because of fetal distress, but perinatal outcomes as assessed by intrapartum stillbirths, low Apgar scores, a need for assisted ventilation of the newborn, admission to the intensive care nursery, or neonatal seizures were not significantly different.

We conclude that not all pregnancies, and particularly not those considered at low risk of perinatal complications, need continuous electronic fetal monitoring during labor. (N Engl J Med 1986; 315:615-9.)

CONTINUOUS intrapartum electronic monitor- ing of the fetal heart rate is considered by many ians to be superior to intermittent auscultation. rincipal benefit claimed for continuous surveil- is earlier detection of fetal distress, which can reduce the frequency and severity of perinatal asphyx- When electronic fetal monitoring was first introduced into clinical practice, it was typically reserved for use in pregnancies with complications.[1] More recently, the use of such continuous monitoring during labor has been advocated for all pregnancies, including those at low risk for perinatal complications.[2,3] Indeed, in 1978 it was estimated that at least two thirds of pregnancies in the United States were electronically monitored during labor.[4] However, not all researchers agree that electronic monitoring is beneficial.[5-8] This study was designed to ascertain whether the introduction of universal electronic monitoring at a hospital would improve perinatal results, as compared with those obtained under its prevailing policy of monitoring only in high-risk pregnancies. During this three-year investigation, an alternate-month study design was used to compare the differences in perinatal outcome between universal and selective electronic fetal monitoring in 34,995 deliveries.

METHODS

Parkland Memorial Hospital in Dallas is a tax-supported institution whose obstetrics department serves indigent women. The near- 60 obstetrics–gynecology house officers are supervised by the ty of the Department of Obstetrics and Gynecology of the ity of Texas Southwestern Medical School.

tudy of universal electronic fetal monitoring which was approved by the institutional review board, began October 1, 1982. Nurses attending each delivery completed a perinatal data sheet, and research nurses assessed the data for consistency and completeness before electronic storage. The prevailing policy of using monitoring only in high-risk pregnancies (selective monitoring) was determined before the study, and the indications for use (in descending order of importance) were induction or augmentation of labor with oxytocin; dysfunctional labor; abnormal fetal heart rate; the presence of meconium in the amniotic fluid; and other complications of pregnancy, including hypertension, vaginal bleeding, prolonged pregnancy, diabetes, the presence of twins, breech presentation, and preterm labor. Women with complications were transferred into a five-bed labor intensive care unit, where most electronic fetal monitoring was employed. Throughout the investigation, a maximum of seven portable electronic monitors were available during the selective-monitoring months.

During the alternate universal-monitoring months, 12 additional monitors were installed in routine labor rooms (these monitors were stored in a locked room during the selective-monitoring months). Thus, a total of 19 monitors were available in alternate months for the 20-bed labor unit. During the universal-monitoring months, the policy was to use a monitor for every pregnancy in which the fetus was considered viable.

Other than monitor placement, there were no differences in the standards of care during the alternate months. In the labor intensive care unit, nursing personnel were constantly in attendance, at a patient:nurse ratio of 2:1. Oxytocin was given by nurses according to a written protocol. Women assigned to single-bed labor rooms were visited by nurses at least every 30 minutes to review the progress of labor and to measure the fetal heart rate by intermittent auscultation with a hand-held Doppler device or by visual inspection of the monitor tracing. During the universal-monitoring months, women with pregnancy complications that would, in the absence of a clinical trial, have resulted in transfer to the labor intensive care unit continued to be transferred.

Statistical Analysis

Statistical analyses were performed with the chi-square test or Fisher's exact test of probability, two-tailed P values of 0.05 or less were considered significant.

RESULTS

Selected demographic characteristics of the 34,995 mothers and their infants are summarized in Table 1.

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During the 18 selective-monitoring months, 17,409 women gave birth to 17,571 infants (162 sets of twins). A total of 6420 pregnancies (37 percent) were considered to involve a high risk and were thus electronically monitored. During the 18 months in which universal monitoring was employed, 17,586 women gave birth to 17,759 infants (173 sets of twins), and 13,956 of the pregnancies (79 percent) were monitored. Pregnancies that were not electronically monitored during the universal-monitoring months were analyzed for protocol variance. After the exclusion of pregnancies in which fetal death occurred before the arrival of the mother at the labor unit, cesarean sections had been scheduled, or birth occurred within 60 minutes of admission, there were 14,913 eligible pregnancies, of which 94 percent received continuous monitoring. The mean patient:nurse ratios during the selective-monitoring months (2.12:1) and the universal-monitoring months (2.16:1) were similar, and the ranges of those ratios (1.8 to 2.5) were identical.

Table 1. Demographic Factors in 34,995 Pregnancies Resulting in Deliveries at Parkland Memorial Hospital during the 36-Month Study.*

Factor	Alternate-Month Monitoring Group	
	Selective	Universal
	% of pregnancies	
Ethnic group		
White	27	28
Black	39	38
Hispanic	31	31
Other	3	3
Age (yr)		
<19	35	35
20–24	38	39
25–29	19	17
≥30	8	9
Parity		
Nulliparous	39	40
Multiparous	61	60
Prenatal care	81	82
Birth weight (g)		
500–999	0.8	0.8
1000–1500	1.2	1.1
1501–2000	2.3	2.5
2001–2500	7.2	7.2
≥2501	88.5	88.4

*There were no significant demographic differences between the selective-monitoring and the universal-monitoring study groups.

Obstetrical Complications and Practices

The two arms of the study had nearly equal and not significantly different proportions of pregnancies with complications, including maternal hypertension (12 and 13 percent, respectively, in the selective-monitoring and universal-monitoring groups), breech presentation (3 percent in each group), twins (1 percent in each group), and birth weight less than 2500 g (11 percent in each group). Fewer women were transferred to the labor intensive care unit during the universal-monitoring months than during selective-monitoring months (30 vs. 32 percent; P<0.01); however, abnormalities in fetal heart rate were detected more frequently during universal monitoring (12 vs. 10 percent; P<0.01).

Table 2. Indications for Primary Cesarean Sections

Indication	Study Group		P Value†
	Selective Monitoring (n = 17,409)	Universal Monitoring (n = 17,586)	
	no. (%) of cases		
Fetal distress†	369 (2.1)	454 (2.6)	<0.01
Labor problems‡	854 (4.9)	848 (4.8)	NS
Breech	297 (1.7)	364 (2.1)	<0.02
Multiple gestation	80 (0.1)	93 (0.1)	NS
Other	177 (1)	174 (1)	NS
Total	1777 (10.2)	1933 (11)	<0.05

*NS denotes not significant.

†Denotes fetal distress in single fetuses with cephalic presentations.

‡Includes cephalopelvic disproportion, failure to progress, failure of forceps procedure, failure of induction attempt.

The incidences of induction (7 percent in both groups) or augmentation (7 percent in both) of labor with oxytocin, forceps delivery (4 percent), and repeat cesarean sections (7 vs. 8 percent in the selective- vs. the universal-monitoring months) were not significantly different in the two groups. As Table 2 shows, the total number of first cesarean sections increased during the universal-monitoring months. This was due principally to an increase in the number of procedures performed because of cephalic presentations with fetal distress and because of breech presentations.

Perinatal Outcome

As Table 3 shows, the neonatal and perinatal mortality rates in the two study groups were not significantly different. The stillbirth rate was significantly lower during the universal-monitoring months but this was because more fetuses were found to be dead when the mother arrived in the labor and delivery unit. Specifically, these fetuses had no detectable heart activity, as confirmed by real-time sonog

Table 3. Comparison of Perinatal Mortality during Selective and Universal Monitoring.

Category	Selective Monitoring	Universal Monitoring	P Value
	no. (rate)		
Total births	17,571	17,759	—
Total stillbirths	186 (10.6/1000)	148 (8.3/1000)	<0.01*
Fetuses dead before arrival at labor and delivery unit	161	118	<0.01
Live births	17,385	17,611	—
Neonatal deaths	113 (6.5/1000)	114 (6.5/1000)	NS
Perinatal deaths	299 (17/1000)	262 (14.8/1000)	NS

*NS denotes not significant.

134

Table 4. Comparison of Types of Outcome That Suggested Fetal Asphyxia in Selective-Monitoring Months and Universal-Monitoring Months.

Outcome	Selective Monitoring	Universal Monitoring	P Value*
	no. of cases (% or rate)		
Fetuses alive upon admission to labor and delivery unit	17,410	17,641	—
Fetal deaths in labor and delivery (≥500 g)	25 (1.4/1000)	30 (1.7/1000)	NS
Assisted ventilation of neonate	1259 (7.2%)	1315 (7.5%)	NS
Five-minute Apgar score ≥5	293 (1.7%)	296 (1.7%)	NS
Neonates admitted to intensive care nursery	428 (2.5%)	460 (2.6%)	NS
Neonates with seizures	45 (2.6/1000)	53 (3/1000)	NS

*NS denotes not significant

raphy if there was any question about the time of death.

Types of infant outcome that may have reflected fetal asphyxia are listed in Table 4. These were identified in fetuses who were alive on arrival at the labor and delivery unit and thus reflected at-risk fetuses. The incidence of fetal deaths was not significantly dif- in the two study groups, and there were no cant differences in the other types of outcome d.

Table 5 contains information on fetuses who died in the labor and delivery unit and who weighed more than 700 g and had no malformations. In these cases, fetal heart activity was detected on arrival at the labor and delivery unit, but such activity was absent at birth. There were eight such stillbirths during the selective-monitoring months: three of the fetuses had been monitored, and four were delivered by cesarean tion because of fetal distress. In 6 of 12 cases of stillbirths that occurred during the universal-monitoring months, labor was not monitored because the fetuses were considered too immature to survive. All six weighed less than 900 g. In the remaining six cases, monitoring was performed, and five of the stillborn infants were delivered by cesarean section because of fetal distress. In the sixth case, fetal distress was diagnosed but the mother refused to give permission for a cesarean section.

Effects of Universal Monitoring in Low-Risk Pregnancies

During both the selective-moni- g and the universal-monitor- onths, 42 percent of the preg- s were considered to have a low risk; a low-risk pregnancy was defined as involving a single fetus in a cephalic presentation; spontaneous, uncomplicated labor; and a birth weight that exceeded 2500 g.

As Table 6 shows, abnormalities in the fetal heart rate were identified almost three times more frequently during the universal-monitoring months. Although universal fetal monitoring was associated with a twofold increase in cesarean sections performed because of fetal distress, the measures of infant outcome were not significantly different from those observed during selective monitoring. These results were unchanged when recalculations were done after exclusion of the 408 women (5.6 percent) who were not monitored during the universal-monitoring months.

Discussion

The establishment of a pathophysiologic basis for the interpretation of the fetal heart rate,[9] coupled with a concern that conventional auscultation was less than ideal in detecting fetal distress, stimulated great interest in electronic monitoring. In 1968, the first clinical electronic monitor became available, and in 1970 Paul and Hon reported that such monitoring reduced both cesarean sections for fetal distress and perinatal asphyxia.[10] Numerous investigators have since cited the advantages and disadvantages of the procedure, and by 1978, nearly two thirds of the women in labor in the United States were being electronically monitored, although there was still no proof that the practice was either beneficial or harmful.[11] For example, although some investigators[1,12,13] have reported decreases in the number of intrapartum stillbirths with the use of electronic monitoring, others[5-8] have not observed such a reduction. In 1980, the National Institutes of Health concluded that, although few randomized studies had been conducted, high-risk pregnancies should be monitored but that monitoring may not be necessary for those at low risk.[14]

Since 1974, we have conducted electronic monitoring in high-risk pregnancies, and we wish to empha-

Table 5. Stillbirths during Labor and Delivery in Which the Birth Weight Exceeded 700 g and There Were No Malformations, According to Monitoring Period.

Selective-Monitoring Months				Universal-Monitoring Months			
Birth Weight	Monitor	Cesarean Section	Findings*	Birth Weight	Monitor	Cesarean Section	Findings*
g				*g*			
835	No	Yes	Unexplained	760	No	No	EGA, 22 wk
1100	No	No	EGA, 25 wk	780	No	No	Abruption
1140	Yes	No	Cord accident	830	No	No	EGA, 24 wk
2430	Yes	Yes	Abruption	850	No	No	EGA, 25 wk
2835	No	Yes	Uterine rupture	870	No	No	EGA, 23 wk
3285	Yes	Yes	Abruption	880	No	No	EGA, 24 wk
3310	No	No	Postmaturity	980	Yes	Yes	Cord accident
3640	No	No	Ketoacidosis, no labor	1350	Yes	No†	Cord accident
				2010	Yes	Yes	Cord accident
				2500	Yes	Yes	Hydrops
				3200	Yes	Yes	Diabetes
				4030	Yes	Yes	Unexplained

*EGA denotes estimated obstetrical gestational age in cases in which the fetus was considered too immature to survive

†Permission to perform a cesarean section was refused

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Table 6. Effects of Selective versus Universal Monitoring in 14,618 Low-Risk Pregnancies.*

Outcome	Selective Monitoring (N = 7330)	Universal Monitoring (N = 7288)	P Value†
	no. (%) of cases		
Abnormal fetal heart rate	196 (2.7)	551 (7.6)	<0.01
Cesarean section for fetal distress	28 (0.4)	64 (0.9)	<0.01
Intrapartum fetal deaths	0 (0)	0 (0)	NS
Neonatal deaths	5 (0.1)	4 (0.1)	NS
Assisted ventilation of newborn	102 (1.4)	119 (1.6)	NS
Five-minute Apgar score ≤5	14 (0.2)	18 (0.2)	NS
Admission to intensive care nursery	17 (0.2)	25 (0.3)	NS
Neonates with seizures	3 (0.04)	1 (0.01)	NS

*The difference in the number of pregnancies in each monitoring group was not significant.
†NS denotes not significant.

size that many pregnancies that were considered to have a low risk at the onset of labor were subsequently assigned to a high-risk category and electronically monitored. Since monitoring of some type during labor is imperative in all patients, intermittent monitoring is, in effect, a "screening" procedure for fetuses considered to be at low risk, and the purpose of this study was to determine whether continuous monitoring was superior. The introduction of universal monitoring had no significant effect on infant outcome at our hospital. Specifically, the incidence of intrapartum stillbirth was not significantly reduced, and other factors that reflect fetal welfare, including five-minute Apgar scores, assisted ventilation at birth, the need for neonatal intensive care, death, and seizures, were not significantly different. We realize, of course, that it is impossible to identify all the infants who will have neurologic handicaps on the basis of only the perinatal factors that we assessed.

Electronic monitoring has been reported both to increase[15,16] the frequency of cesarean sections and to have no effect on it.[17,18] In the current study, universal monitoring was associated with a more frequent identification of abnormalities in fetal heart rate and a small but significantly increased number of cesarean sections that were performed because of fetal distress. At Parkland Hospital, the diagnosis of fetal distress tends to be made on clinical grounds. For example, any abnormalities in the heart rate in the presence of thick meconium or in the presence of known fetal risks, such as post-term status or fetal growth retardation, are considered evidence of fetal distress or jeopardy. However, abnormal fetal heart rates, although predictive of perinatal asphyxia, do not preclude the birth of a healthy infant.[19,20]

Another impetus for this investigation was concern about the medicolegal implications[21] of our prevailing policy of selective monitoring. In an extensive review of the legal issues involved, Gilfix[22] concluded that "physicians who employ auscultation may not be ble for failure to use electronic fetal monitoring" the results of our investigation support this view least in low-risk pregnancies.

Our policy before this study was to transfer wom with high-risk pregnancies, including those in wh abnormalities in the fetal heart rate were found sites where personnel were in constant attendan During the universal-monitoring months, more abn malities of fetal heart rate were detected, but few women (30 vs. 32 percent) were transferred to labor intensive care unit. Although this difference w small (only 2 percent, or 215 women), we cannot pr clude the possibility that the potential advantages universal monitoring may have been diminished this change in obstetrical management.

In conclusion, the results of this clinical trial ind cate that universal fetal monitoring changed obstet cal practices but did not significantly improve per natal outcome. Abnormalities in fetal heart rate were observed more frequently in low-risk pregnancies dur ing universal monitoring, and this observation was associated with the performance of more cesarean se tions because of fetal distress. Our policy of providing constant nursing atttendance during labor in selected high-risk pregnancies tended to be contravened by universal monitoring. We conclude that not all pre nancies, particularly not those at low risk of compli tions, need continuous electronic fetal monitoring du ing labor.

We are indebted to Dr. Ron Anderson, chief executive officer Parkland Memorial Hospital, for his support; to the many n and house officers whose diligence and cooperation made this in tigation possible; to Dr. Norman F. Gant, who was instrumenta facilitating the study; and to Ms. Lynne McDonnell for expert rial assistance.

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RELATION OF PRIVATE OR CLINIC CARE TO THE CESAREAN BIRTH RATE

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Abstract The rising rate of cesarean births in the United States has been the focus of academic attention as well as attention from the media during the past decade. Although there is a consensus about the indications for cesarean delivery that have led to the increased rate (dystocia, malpresentation, fetal distress, and previous cesarean delivery), the influence of other key factors, such as whether the patient received care from a private physician or through a hospital clinic, has not been established. In a review of 65,647 deliveries in four Brooklyn hospitals between 1977 and 1982, we found that private physicians performed significantly more cesarean sections than house officers and attending physicians. Private patients giving birth to their first child were significantly more likely than clinic patients to undergo cesarean delivery if dystocia, malpresentation, or fetal distress was diagnosed, and private patients with one or more previous deliveries were significantly more likely to undergo cesarean delivery if dystocia or malpresentation was diagnosed. Private patients had fewer perinatal deaths, which were concentrated among infants with birth weights under 2000 g, but the infants of private patients had a significantly higher rate of low Apgar scores and birth injuries than the infants of clinic patients. (N Engl J Med 1986; 315:619-24.)

THE cesarean birth rate in the United States tripled during the 1970s, reaching a nationwide average of 15.2 percent in 1978 and continuing to rise thereafter The Consensus Development Conference of the National Institute of Child Health,[1] along with several studies,[2-7] have identified four indications as responsible for most of the increase in operative deliveries: dystocia, malpresentation, fetal distress, and previous cesarean delivery.

Although changing protocols,[8-11] as well as geographic,[12,13] social,[14,15] and demographic factors,[5,16] have been mentioned as contributing to the increasing rate of cesarean births, few studies have focused on the influence of whether the patient receives care from a private physician or through a hospital clinic. Although some investigators have noted a higher rate of cesarean deliveries among private patients and have suggested that differences in the cesarean birth rate between private and clinic patients are related to socioeconomic status,[15-18] others have reported comparable rates for private and clinic patients.[16]

No cause has been established for any differences in the cesarean birth rate between private and clinic patients The need to investigate the influence of "service status" — that is, whether patients are cared for by private physicians or in hospital clinics and by house officers — on the cesarean birth rate was stated by Phillips,[14] who noted that "studies into the significance of other causes for physician bias [concerning choosing a mode of delivery] . . . are urgently needed. . . . Such further studies . . . could benefit from a separation of data between private and service [clinic] patients."

Because a difference has been found in the rates of operative delivery for private and clinic patients within our own institution, we performed a retrospective review of deliveries occurring over a period of six years at four Brooklyn hospitals, looking specifically for differences between private and clinic patients in cesarean birth rate, demographic characteristics, indications for surgery, management protocols, and neonatal outcome.

METHODS

All deliveries of single infants weighing more than 500 g at four Brooklyn hospitals participating in the Obstetrical Statistical Cooperative between 1977 and 1982 were reviewed The numbers of deliveries in these hospitals were as follows Downstate Medical Center 11,112, Maimonides Medical Center, 24,016, Brooklyn Cumberland Hospital, 24,989, and Coney Island Hospital, 5530 Copies of all 65,647 obstetrical charts from the participating institutions were reviewed by investigators at the institutions after the patients were discharged The information extracted from these records included demographic data, such as age and race, and medical data such as medical history, course of labor, and whether patients

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EATING AND DRINKING IN LABOR
A Literature Review

Leslie M. Ludka, CNM, MSN, and Catherine C. Roberts, CNM, MSN

ABSTRACT

This literature review questions the routine practice of denying food and fluids to women in labor. Fasting in labor, an established practice throughout the United States since the 1940s, is now under careful scrutiny. Many clinical practices, especially those that offer midwifery services, are currently instituting policies to allow and encourage eating and drinking in normal labor. To date, there have been no reported rises in maternal mortality with this policy change; neither have there been any reports of detrimental outcomes for mother or infant.

The policy of nothing by mouth (NPO) in labor has become a well-established routine in many hospitals throughout the United States. The NPO policy is a curious phenomenon because it is based largely on anecdotal misinformation and has not been supported by research data. Many researchers are now questioning the practice of routine fasting in labor (1–5). This literature review will discuss the historical basis of withholding food and drink during labor, maternal mortality statistics, risk factors for anesthesia-related complications, the myth of the empty stomach, antacids, fasting and energy utilization, intravenous substitution for food and fluids, stress related to food and fluid deprivation, and current research and clinical implications.

HISTORICAL OVERVIEW

Until the 1940s, parturient women in the United States were encouraged to eat and drink as a means of maintaining their stamina for the work of labor and delivery. Dr. Joseph DeLee (6) warned that food must be encouraged throughout labor to avoid general weakness, delayed labor, and serious postpartum hemorrhage. By the mid-1940s, however, the practice of feeding laboring women was viewed as clinically unsound, and it was virtually abandoned. The change can be traced to obstetric anesthesiologists' fear of maternal mortality due to aspiration of stomach contents.

In the 1940s, Mendelson (7), an obstetrician from Cornell, hypothesized that postanesthetic pneumonia was caused not solely by infected material but rather by stomach contents aspirated into the lungs. He believed that gastric emptying time was delayed in labor. Mendelson noted that it was not uncommon for a patient to vomit food ingested 24–48 hours previously (7). He reviewed charts of 44,016 pregnancies from 1932–1945 and found that aspiration of stomach contents into the lungs occurred in 0.15% (N = 66). In 1945, Mendelson conducted a series of experiments that examined the effects of aspiration of stomach materials into lungs of rabbits. The stomach contents consisted of solid material, neutral fluids, and gastric fluids. In his animal studies, there were no deaths due to aspiration of neutral liquids; death only occurred with aspirate that contained hydrochloric acid. Aspiration of undigested solids caused obstruction. Suffocation occurred only with complete obstruction. Based on these findings, Mendelson suggested that women be prohibited from eating and drinking during labor. He believed that this policy would reduce the stomach volume, thereby decreasing the risk of morbidity and mortality from acid aspiration while under general anesthesia.

During this same time period, general anesthesia was being administered with greater frequency for labor and delivery. Gases were given with a face mask, often opaque in color, which obscured the anesthetist's view of the woman's airway. Intubation and cricoid pressure were not routinely in-

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138

corporated into anesthesia practice. In addition, skilled anesthetists were quite rare. Often, the administration of gases was left in the hands of the most junior member of the anesthetic team. These factors led to anesthesia-related cases of aspiration pneumonia in the parturient.

Expanding on Mendelson's research, further studies on aspiration pneumonia found two key factors that predicted an increased risk of maternal mortality and morbidity: the combination of an aspirate with a volume of 25 mL or more and—the more lethal factor—a pH less than 2.5 (8–12). The clinical manifestations of pulmonary aspiration, which is now commonly referred to as "Mendelson's syndrome," includes intense bronchospasm, pulmonic congestion, and exudate production (13).

In 1956, Parker (14) undertook a study to determine why there had been no maternal deaths while using general anesthesia at home. In Birmingham, England, 100,000 births took place in the home between 1943 and 1952. During that period, 3,048 forceps deliveries were completed with no deaths from aspiration pneumonia. These operative deliveries were done under general anesthesia with an open face mask. The women at home were commonly harnessed down in the lithotomy position and given anesthesia with no reported fatalities. At the same time, in the Birmingham Maternity Hospital, 2,200 operative deliveries were performed with four maternal deaths due to aspiration. Speculation was that the anesthesia machine in the hospital was less safe than the open mask. Recommendations included that local anesthesia be used for simple forceps delivery, and if general anesthesia had to be used, it should be provided by an experienced anesthetist using a cuffed endotracheal tube.

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MATERNAL MORTALITY

Fasting in labor is believed by many members of the medical community to reduce the risk of maternal morbidity and mortality by reducing stomach contents, thereby eliminating products for pulmonary aspiration (7, 11, 13, 15). However, detailed analysis of overall maternal mortality statistics in the United States reveals inadequate and inconsistent methods of collecting, categorizing, and reporting information. Unlike England, where the specific cause of the maternal death is reported, here in the United States aspiration pneumonia is grouped under the broad category of "complications of the administration of anesthetic or other sedation in labor/delivery." It is one of four subgroups related to the obstetric anesthetic problem (16, 17).

In 1950, the incidence of maternal deaths was 83 per 100,000 live births. In 1960, it was 37.1 per 100,000 live births. The latest statistics for overall maternal mortality in 1988 is 8.4 per 100,000 live births, which is a statistically significant increase from 6.6 per 100,000 live births in 1987. In 1989, 320 women died, for a maternal mortality rate of 7.9 per 100,000 live births (16). Maternal mortality is a rare occurrence. Maternal deaths related to anesthesia do occur but it is impossible to pinpoint the exact nature of the complication.

A more detailed study, done in Michigan from 1972–1984, showed that failure to secure a patent [illegible] was the primary cause of [illegible] related maternal deaths. The [illegible] no deaths related to regional anesthesia (18). Out of 15 deaths (0.82 per 100,000 live births), one was listed as having been from aspiration of stomach contents.

A study done in New York City from 1981–1983 revealed the maternal mortality ratio to be [illegible] deaths per 100,000 live births (19). Anesthesia-related deaths ranked as the third cause, with 13 cases (11%). Four were associated with legally induced abortions and one with ectopic pregnancy. There was no specific breakdown for the cause of the remaining eight anesthesia-related cases.

A recent study by Ro[illegible] and colleagues (20) looked at freestanding birth centers, with regard to different variables. They reviewed cases from 11,814 women who ate and drank at will. There was no reported mortality or morbidity from aspiration pneumonia even though there were w[illegible] who required emergency ce[illegible] sections. Twenty-two per[illegible] had eaten solid foods, yet they had no aspiration complications.

RISK FACTORS FOR ANESTHESIA-RELATED COMPLICATIONS

Failed Intubation

The occurrence of aspiration is directly related to difficult intubation during general anesthesia regardless of the patient's oral intake. Expected rates of intubation failure are reported as one failure out of every 300 cases requiring general anesthetics. Difficult intubation was a key factor in approximately one-half [illegible] anesthesia-related deaths reported by the Confidential Enquiry 1976–1978 (21). Endler and coworkers (18) speculate that a high rate of failed intubation results from the increasing number of cesarean sections, many of which done with general anesthesia

In order to avoid failed intubation, experts agree that correct anesthetic care for general anesthesia should be undertaken This includes preoperative assessment, rapid and safe induction, awake extubation, and postoperative monitoring. The interval from safe induction of general anesthesia to complete control of the airway by cuffed endotracheal intubation presents the greatest risk for aspiration and death (22). Cricoid pressure, when properly applied by a trained assistant, has proven to be a safe, reliable method of preventing aspiration during induction of general anesthesia (22–24). Repeated attempts at intubation should be abandoned, because they are rarely successful (21–24).

Inadequate Anticipation of Abdominal Deliveries

Proper assessment and preparation of the obstetric patient by anesthesia personnel is imperative for the prevention of anesthesia problems. This assessment might begin antenatally with the primary provider notifying the anesthetist that a particular patient is at high risk for abdominal delivery (23–25). It has been suggested that anesthesiologists should routinely go on rounds to assess potential difficulties in the event of abdominal delivery with general anesthesia. A clinical history, focusing on signs and symptoms of gastroesophageal reflux and laryngeal edema associated with preeclampsia, is crucial in the care of the obstetric patient (23, 25).

Substandard Management

There is considerable agreement among experts in anesthesiology that substandard management of anesthesia care is a primary cause of pulmonary aspiration (7, 11, 14, 22–33). If intubation cannot be completed, the obstetrician and anesthetist should have a "failed intubation drill" in place. Endler et al (18) suggest allowing the patient to regain consciousness and then proceeding with an awake intubation or administration of a regional block. If there is an emergency, then general anesthesia with a mask and cricoid pressure should be employed. A cricothyroidotomy is used as a last resort (18, 21)

Emergency Cesarean Sections and Regional Anesthesia

The need for general anesthesia in an emergency situation has been estimated to range from 3.5% to 13% (25, 34). In their prospective observation study of 360 consecutive patients delivered by emergency cesarean section, Morgan et al (25, 34) found that 87% of the cesarean sections could have been anticipated and that general anesthesia was only needed in 13% of the subjects. Conklin (35) states that unless there is an absolute contraindication, a regional block for cesarean section is appropriate in most emergency situations. He reasons that, in this way, the parturient can protect her own airway from pulmonary aspiration (35). Marx et al (36) have clearly shown that newborn outcomes after an emergency cesarean section were better when regional anesthesia was used. Haste is a well-known factor in critical anesthetic incidents, and it is the parturient's well-being that should be the first concern, because fetal distress is sometimes misdiagnosed (18, 21, 25, 33, 37).

Many authors concede that regional anesthesia has little effect on gastric emptying (14, 30, 32, 38–40). Crawford (39), an English physician who has researched the topic of potential aspiration in labor, stated that "a mother undergoing a comfortable labor, with the aid of an epidural analgesia, does welcome refreshment, and all other things being equal, we offer her a lemon sorbet, or a cup of tea and a slice of toast. . . ." Roberts and Shirley (32) state that regional anesthesia dramatically reduces the risk of aspiration pneumonia.

THE MYTH OF THE EMPTY STOMACH

Gastric Emptying Physiology

Gastric emptying is governed by two factors: 1) the volume of gastric contents, and 2) the influence of chemical and physical properties of chyme in the duodenum and jejunum (41). The rate of emptying depends on the volume of the meal, osmotic pressure, and chemical properties. Gastric emptying is greatest and fastest at the beginning of digestion, when the volume of the stomach contents is the largest. Fat is the most powerful chemical agent in the digested diet that slows gastric motility (41, 42). Gastric motility is adversely affected by massive sympathetic discharges such as pain, nausea, and emotional disturbances (43). Heavy exercise does not impede emptying of liquids; they are emptied almost immediately. Solids, on the other hand, must be less than 1 mm in diameter to pass through the pyloric canal. Large lumps can remain in the stomach as long as nine hours, continuing to stimulate gastric secretion (41)

Effect of Gestation and Labor on Gastric Emptying

Gastric emptying time in the laboring woman varies according to individual reports. According to *Anesthesia for Obstetrics* (15), aspiration risk factors related to delayed gastric emptying include gestational age greater than 34 weeks, labor, heartburn (which is indicative of gastroesophageal reflux), stress, narcotics, and sedatives. Other studies show a decreased gastric emptying time in labor, but the delay was related to the administration of narcotics and sedatives (10, 40, 44, 45).

According to obstetric anesthesiologists, it is the gastric contents that

140

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put the parturient at risk for aspiration pneumonia in the event of general anesthesia (15). As stated, the routine policy of NPO in labor was initiated in the hope of decreasing or eliminating stomach contents, thereby leaving little or nothing to aspirate. Yet, studies have repeatedly shown that there is no such thing as an empty stomach, regardless of the time of the last meal (10, 44, 46–49). Laboring women who have taken nothing orally have been found to secrete varying amounts of gastric juices containing hydrochloric acid with dangerously low pH values (32, 47). Fasting does not eliminate stomach contents, it only increases the concentration of hydrochloric acid (50). Therefore, depriving the mother of food and fluids during labor may actually increase the risk of maternal mortality and morbidity from acid aspiration.

Hirsheimer et al's (51) serial x-ray studies after a barium meal showed that there was no constant or characteristic alteration of gastric evacuation in primigravidas during labor. Changes that did occur were attributed to functional and neuromuscular rather than mechanical causes. However, Davison et al (52) concluded, based on gastric fluids that were aspirated from a nasal gastric tube inserted early in labor, that gastric emptying time was delayed in labor. Each parturient had 750 mL inserted into the stomach; at 10-minute intervals, the stomach contents were aspirated and assessed. They found that each patient had rapid emptying over the first 10 minutes and then the volume decreased by almost one-third. They acknowledged that the depressant effect on gastric mobility might be due to anxiety and excitement.

Simpson and Stakes (43) looked at gastric emptying in relation to anxiety levels in patients undergoing elective gynecologic procedures. They found that gastric emptying was slower in patients who had a low predisposition to anxiety. Patients with a tendency toward high anxiety did not show a delay in gastric emptying.

Taylor et al (48) investigated the pH and volume of gastric contents in emergency obstetric patients and the effects of antacids on the pH. They found that the volume of gastric contents varied markedly. They concluded that every parturient should be assumed to have a full stomach of highly acid fluid contents.

Hester and Heath (53) noted that 32% of patients who had been NPO for prolonged periods had greater than 40 mL of gastric contents. Over half of them had a gastric aspirate of less than pH 2.5.

A study by Roberts and Shirley (11) showed that the interval since the last meal to delivery did not guarantee a low volume of gastric juice in the stomach. They concluded that all patients should be assumed to have a full stomach, regardless of the interval since their last oral intake.

ANTACIDS

As cited earlier, Mendelson's study (7) reported that anesthesia deaths were due to hydrochloric acid aspiration and not to neutral aspirates. In an effort to make the stomach contents less acidic, antacids (30 mL) have routinely been administered. Particulate antacids such as magnesium hydroxide and magnesium trisilicate were given at first, but they have now been shown to cause severe pulmonary damage when aspirated (22, 54, 55). Cohen's study (54) showed that there is no evidence that administration of any antacid lowers maternal mortality or morbidity.

Today, sodium citrate, which contains no particulate matter, is often used for rapid neutralization of the stomach contents. It has an immediate onset of antacid action, but it also has a wide variation in efficacy and duration of action. Sodium citrate neutralizes acid immediately, but the critical factor that influences its duration of action is the gastric emptying rates (56). Therefore, analgesics that prolong gastric emptying also prolong the antacid's efficiency. Ormezzano et al (56) found that so[illegible] citrate was not always efficient [illegible] creasing gastric pH to greater [illegible] 2.5 especially by the time of extubation. They demonstrated that effervescent cimetidine–sodium citrate is effective in increasing gastric pH to more than 2.5 at intubation and extubation. Cimitidine, which is an H[illegible] receptor blocker, increases gastric pH by inhibiting gastric acid production for four to eight hours. However, it must be noted that the volume [illegible] mL) of antacid used is above the critical volume predictive of increased risk of maternal mortality should aspiration occur.

FASTING, NUTRITION, AND ENERGY UTILIZATION

The hydration and energy needs of the woman in labor have been compared to the needs of the athlete in competition (4). Food and fluid deprivation during this critical time may impact directly on labor progress and outcome.

Blood glucose and muscle glycogen, major sources of energy for the mother and the fetus, are compromised in the pregnant woman during fasting. Animal studies have shown that there is an immediate and continuous decline in maternal and fetal blood glucose levels during fasting (57). A direct relationship has been found between maternal glucose levels and fetal well-being as indicated by fetal breathing movements and general fetal activity (58, 59). Fetuses of fasted mothers show less overall activity than fetuses of fed mothers. Stimulating fetal activity during fetal nonstress tests is often accomplished by feeding the mothers (59).

When blood glucose is not available to the mother for energy use, the body draws on its fat supplies. As a result, large quantities of free fatty acids are oxidized, ultimately increasing the quantities of ketone in the blood and tissues. This accumulation of ketones (β-hydroxybutyric acid, aminoacetic acid) in the body is known as ketosis.

141

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Excessive production of ketone may lead to their excretion in the urine referred to as ketonuria. Ketosis may progress to ketoacidosis, which is an accumulation of ketone in the body, accompanied by a metabolic acidosis. Ketoacidosis can be life threatening. However, ketonuria and ketosis are not the same as ketoacidosis. It is uncertain whether either ketosis or ketonuria is actually harmful to the pregnant or laboring women or her fetus. Ketosis occurs in the normal adult human body in response to exertion and fasting, both of which may be experienced by the laboring woman. Pregnant women in general are more prone to ketosis due to increased fetal demands, increased fat utilization, and pregnancy-induced hormone changes (4, 60).

Studies have shown that pregnancy exaggerates and accelerates the body's response to fasting (61, 62). During delivery, blood levels of ketone, free fatty acids, and glycerol rise to meet energy demands. Ketone bodies and free fatty acids significantly increase in the blood after only 12 to 18 hours of fasting in the third trimester (63). According to Hazle (4), "In labor this tendency toward ketosis is accentuated by increased muscular activity and imposed limitation of oral intake." It is interesting to note that the amount of ketone in the blood of mothers who consumed food during labor has been shown to be significantly below that of fasted mothers (64, 65).

Ketonuria may be a misleading guide to the need for fluid and carbohydrate replacement. Ketonuria has been shown to occur in normal labor as well as in the normal antepartum patient (59, 60, 63, 66). It is often determined by a ketostix, which has been shown to report a high false-positive reading when the blood acetoacetate level is within normal range (67). Ketone bodies, when excreted in the urine, take large quantities of sodium and potassium with them, which may decrease the blood pH. There does seem to be some relationship between marked ketonuria and prolonged labor, but which comes first is unclear (60).

Some researchers state that as ketone bodies increase in the mother, they cross the placental barrier and increase in the fetus (64, 65, 68). Others disagree, stating that free fatty acids and ketone bodies do not readily cross the placenta (69).

Glucose is the principal fuel of the fetus, but the medical literature supports the belief that ketone bodies may serve as alternative fuel during fetal life (70, 71). Animal studies have shown ketone bodies to be precursors to lipid synthesis, as well as fuel for the fetal brain, liver, and lung in vitro (71).

As mentioned earlier, ketone and lactic acid do lower the blood pH. Lowered pH in the fetus during labor has been cause for alarm. It has been related to cardiac arrhythmias and considered to be an indication of fetal anoxia. However, in a recent study, 72% of infants whose cord pH indicated they were severely acidotic were born in a vigorous state, with an Apgar score of greater than 7 at one minute (72).

Essential amino acids gradually decline when the pregnant woman is deprived of food. After only 12 hours of food deprivation, 10 out of 19 maternal amino acid levels were significantly below nonpregnant levels (62). Amino acids readily cross the placental barrier, and levels in the amniotic fluid are affected during maternal fasting. A decrease in the essential amino acid alanine is shown to be of primary pathologic significance in ketotic hypoglycemia of infancy (62). This is important to both the fetus and the newborn because glucagon, a hormone that stimulates the conversion of glycogen to glucose in the liver, cannot permeate the placenta in the presence of hypoglycemia; however, administration of alanine to women in labor increases the glucagon levels of cord blood in the human fetus, thereby decreasing the risk of neonatal ketotic hypoglycemia (62).

INTRAVENOUS THERAPY

[illegible] administration of [illegible] venous infusion to prevent [illegible] dehydration, ketosis, and [illegible] lyte imbalance can be considered a completely [illegible] for food and fluids [illegible] 74).

Intravenous glucose [illegible] partunent has been shown to [illegible] hyperglycemia in the fetus [illegible] by hypoglycemia in the newborn. Hyperglycemia is potentially [illegible] to the rapidly developing [illegible] fetus and the newborn. Fetal [illegible] effects may include an increased carbon dioxide [illegible] increased lactic acid levels [illegible] natal jaundice (75, 76).

Hypoglycemia [illegible] manifestations of [illegible] cyanosis and seizures [illegible] (79) reported that term [illegible] mothers who received intravenous glucose therapy during the course of spontaneous or oxytocin-induced labor showed a significant lowering of muscle tone and delayed habituation to various stimuli at one and [illegible] of age. Study infants had a [illegible] times higher incidence of hypoglycemia (79). Avoiding excessive intravenous glucose infusion will reduce maternal and fetal hyperglycemia [illegible]

In another study, Singh et al. [illegible] reported that infusing 5% glucose to the laboring woman resulted in a significant increase in the incidence of hyponatremia and subsequent transient tachypnea in the newborn infant. There is a relationship between cord serum sodium levels in newborn infants and maternal intravenous therapy during labor (81). The sodium levels of infants whose mothers had 5% dextrose was significantly lower than that of mothers who had oral hydration. Also, infants of mothers who had dextrose infusion had significantly more weight loss in the first 48 hours than those infants of mothers who had oral hydration (82). Sodium levels in the mothers and infants were very similar. When hyponatremia is

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142

induced in the mother, it will affect the baby by a net transfer of fluid to the infant.

Fluid overload and hyponatremia can be serious complications for mother and infant (74, 81). Morton et al (74) state, "It seems illogical to suppress the concentration of ketoacids at the expense of increasing other organic acids which place a greater strain on the buffering capacity of the blood."

Maternal hyponatremia may cause cerebral edema, coma, convulsions, headache, vomiting, lethargy, confusion, mood changes, and postpartal psychosis (60, 81). Hyponatremia in infants may cause convulsions, apnea, cyanotic spells, neonatal jaundice, respiratory distress, feeding difficulties, and possible excess water loss after birth (60, 80, 81).

Intravenous therapy, oxytoxics, tocolytic drugs, and endotracheal intubation have all been seen to adversely affect pulmonary fluid balance, which is already altered by pregnancy (73, 82). A normal healthy woman at term already has an abundance of body water, with at least 2 L stored in the extravascular spaces. Dumoulin et al (60) state that intravenous therapy is not routinely needed, especially in the first 12 hours of labor. A study by Cotton et al (83) showed that the ordered rate of intravenous fluids was often exceeded by twice the amount. If intravenous therapy is clinically warranted because of the woman's high-risk status, then meticulous intake and output monitoring should be maintained.

STRESS

Reduction of stress in labor may be associated with less pain, less anxiety, shorter labors, and fewer perinatal problems (84–86). Stress during labor increases the production of maternal catecholamines. Increased catecholamines may affect labor by shunting blood away from the uterus and the placenta, and by lengthening labor. These effects may lead to prolonged fetal hypoxia, as evidenced by abnormal fetal heart tracings and abnormal scalp pH samples (84, 87).

Laboring women are often subjected to procedures that contribute to their stress level. Stressors imposed during labor may cause complications and may contribute to the need for aggressive interventions (88). Fasting is a known stressor. Simpkin (88), in assessing stressful childbirth events, reported that 27% of women rated restriction of food in labor to be moderately to most stressful. Fifty-seven percent of women found restriction of fluids in labor to be moderately to most stressful (88).

The stress response of the fetus is to increase the production of catecholamines in order to increase norepinephrine. This response does not manifest itself with an increase in blood flow or an increase in heart rate as seen in the adult. Instead, stress in the fetus initiates a vagus nerve response that causes a drop in fetal heart rate in order to conserve oxygen (84, 85, 89). Some fetal catecholamine production, however, is normal. Fetal catecholamines have been shown to contribute to prostaglandin synthesis, preparing for onset of labor (86)

CURRENT STUDIES

Available literature on the oral intake of the laboring woman focuses primarily on why the woman should be kept NPO. Many authors consider fasting as a means of reducing maternal mortality. Most studies focus on interventions used to replenish hydration and energy needs of the laboring woman.

However, a recent study at Jubilee Maternity Hospital in Belfast, Northern Ireland, conducted by midwife Angela Flanagan, in association with Dr. Kieran Fitzpatrick, an anesthetist, looked at outcomes of infants and length of labor among women who ate and drank during labor (90). Forty-four laboring women were encouraged to take light foods such as eggs, toast, sandwiches, ice cream, yogurt, jellies, and fresh fruit. As a control group, 22 women were permitted intake according to the usual policy of toast and tea in very early labor with sips of water thereafter. Ms. Flanagan reported the following results. Women who ate required less pain relief and less Pitocin, and the length of labor was shortened on the average by about 90 minutes. In addition, Apgar scores of babies in the fed group were higher than in the control group. As a direct result of this study, intake restrictions have been overturned in Jubilee Maternity Hospital, and Ms. Flanagan is currently undertaking a replication study with 1,000 expected subjects (personal communication, Angela Flanagan, February 21, 1993).

We studied the eating and drinking patterns of laboring women (unpublished master's thesis, Yale University, 1991). The sample consisted of 76 women who were observed until they delivered or until they received medication or intravenous therapy. Women were neither encouraged nor discouraged from oral intake but were simply observed in settings that permitted self-selection of intake. All of the women drank at some point in their labor and 85.5% ate. More women ate larger portions earlier in their labors, tapering off in active phase to negligible amounts by second stage. Drinking also decreased as cervical dilation increased, with sips dominating in late active and second stage. It was also noted that the peak incidence of nausea and vomiting occurred from 6 to 8 cm rather than 9 to 10 cm as commonly thought. Women continued to eat and drink after an episode of nausea, although they only drank after vomiting. Women tended to eat at common mealtimes.

DISCUSSION

Literature from anesthesia and obstetrics have repeatedly shown that there is no compelling scientific rationale for the maintenance of routine institutional NPO policies. These pol-

143

icies are based on tradition rather than on current scientific research. Elkington (3) points out that "these policies may persist on the basis of anecdotal experience, institutional inertia to policy changes begun in the 1940s, compromise with anesthesia departmental policy to ensure adequate coverage, exaggerated notions of risk, or fears of litigation."

Researchers agree that every parturient should be regarded as having a full stomach with highly acidic fluid regardless of how long she has been NPO. With this in mind, why limit their intake? We found that laboring women self-regulated intake. Once active labor began, women usually preferred liquids.

Several studies looked at the effects of stress on labor, finding that labor might be prolonged and could invite intervention. Intravenous fluids are not a reasonable substitute for oral fluids for the healthy parturient. Finally, it is worthwhile to consider the psychological importance of food and fluids to the laboring woman. Food and drink not only provide hydration, nutrition, and increased comfort, but also give the woman a feeling of control in labor. Choices have been integral in the movement of modern obstetrics. Institutional policies regarding eating and drinking in labor should be reexamined in the light of current research data.

CLINICAL IMPLICATIONS

This literature review lends support to giving women the choice to eat and drink in normal labor. There is no such thing as an empty stomach, regardless of time from the last intake, and to assume so could be deadly. In most cases, Mendelson's syndrome can be prevented by appropriate anesthesia technique. General anesthesia should be avoided and regional anesthesia substituted as much as possible. Women should be encouraged to eat and drink as they see fit. If a woman is laboring in the early morning hours, however, she may need extra encouragement to prevent dehydration and provide the calories needed to meet the strenuous demands of labor and delivery. Nausea and vomiting are part of labor for a certain percentage of women. Women can continue with their intake after being nauseated without incurring further episodes.

FUTURE RESEARCH

What is the best diet for the laboring woman? Would food and fluids during a serial induction help with labor progression? Should a woman who is comfortable with an epidural analgesia be permitted to eat and drink? Does ingestion of food and fluids speed labor? To answer these questions, randomized clinical studies should be undertaken whereby women admitted to labor and delivery are assigned to one of two groups: an eating/drinking group and an NPO group. Anesthesia, obstetrics, midwifery, and nursing departments should be included in the design of the study from the start.

American women and fetuses are being subjected to policies based on a belief system plagued with inaccuracies, outdated research, and misinformation. The current policy of routine fasting in normal labor must be reevaluated. It is based on anecdotal misinformation, institutional inertia, compromise, and fear. Eating and drinking in normal labor should be reintroduced to the medical community and the consumer based on current sound scientific research.

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144

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HOME STUDY PROGRAM UPDATES

JNM's 1992 Home Study Program, which features "The Newborn" (March/April 1992 Supplement), will be valid for 0.9 CEUs through April 30, 1994. The fee is $100. Please note the following change: Payment and study materials should be sent directly to Mary Ann Shah, JNM Editor, 67 Tarry Hill Road, Tarrytown, NY 10591.

JNM's 1993 Home Study Program, which features "Advanced Nurse-Midwifery Practice" (March/April 1993 Supplement), will be valid for 1.0 CEUs through April 30, 1995. The fee is $75 for submissions postmarked by August 31, 1993, and $100 thereafter. Please note the following corrections:

Page 7-S: Post-test question # 18 should be left blank on the Answer Sheet.

Page 33-S: Column 1, paragraph 2, sentence # 8—"The Pipelle is gently introduced through the cervical os and up into the uterine fundus, much like the technique used to sound the uterus prior to intrauterine device insertion."—should have been typeset two sentences earlier; it is hoped that no reader was confused by this misprint.

JNM's 1994 Home Study Program, which will feature "Obstetric Complications," is well underway. It will be published as a Spring Supplement and will offer 1.0 CEUs to participants.

Preliminary preparations are beginning for the 1995 Home Study Program. It is anticipated that its focus will be "Comprehensive Health Assessment." Please watch the Journal for further information and for "A Call for Abstracts."

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146

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Routines

Series editors: Charles S. Mahan, MD, and Susan McKay, RN, PhD

Preps and enemas—keep or discard?

By Charles S. Mahan, MD, and Susan McKay, RN, PhD

Shaving and purging are hallowed ob procedures, but are they really useful? The authors declare it's time to jettison the first and severely restrict the second.

Because of widespread use, social custom, esthetics, or convenience, many ob practices have become so deeply entrenched, so "traditional," so easy a substitute for the stress of decision-making, that seldom is their necessity questioned. The result has been irrational, possibly hazardous, medical care and increased costs and discomfort for the patient.[1] In this new series of articles, we will examine the origins of certain of these practices and consider whether their continued routine use is justified.

By the early 1900s, vigorous disease-prevention measures had been instituted in most maternity hospitals. Proponents of these measures were zealous in dealing a death blow to the germs of puerperal fever. Drawing on the experience of military hospitals during the US Civil War, they saw to it that wards were aired and washed with carbolic acid at regular intervals, and that nurses bathed and changed uniforms on schedule. At the same time, mothers-to-be were treated in assembly-line style. Personal belongings were removed, and cleansing, shaving, and enemas made routine—the last because doctors thought accidental bowel movements might be the contaminating cause of childbirth fever.

On admission to Sloane Maternity Hospital in New York City, women were given an enema followed by a vaginal douche with bichloride of mercury. Their heads were cleansed with kerosene, ether, or ammonia, and their nipples, and navels doused with ether. Charity patients, who were assumed to harbor an abundance of germs, had their pubic hair shaved, whereas that of private patients was merely clipped. Women in labor were given an enema every 12 hours, and douching continued during and after labor.[2]

Not all physicians, however, attacked the germs of puerperal fever with such zest. Warren, who considered cleansing more as a thorough bath than an attempt at sterilization, stopped at using green soap to wash the perineum and the inner thighs, and only clipped the pubic hair, although he noted that some obstetric nurses advised shaving it.[3]

Historical basis of use

A survey of obstetric texts from about 1850 to 1900 offers an interesting assortment of medical rationalizations for the use of preps and enemas. A midwifery textbook of 1869 asserts the widespread view that bowel evacuation is necessary to remove obstacles to the downward movement of the fetal head and prevent

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147

Shaving and enemas—outmoded routines?

development of intestinal gas. Another reason given—and still heard in some quarters today—was that an enema offered "the advantage of sparing the woman the shame and disgust which involuntary expulsion of the feces during the last moments of labor would necessarily cause and also of preventing the accoucheur's hand from being soiled while it supports the perineum."[4] There seems little doubt that Victorian prudishness about sexuality influenced the desire to make birth an asexual event, not only through enemas, but also by washing, shaving, and draping.

Advocacy of predelivery shaving and enemas has continued into the present, even after evidence of adverse effects has emerged. During a period when enemas were bestowed wholesale under inspiration of the motto "high, hot, and a hell of a lot," a 1962 text stressed the importance of emptying the large bowel early in labor.[5] Whether or not a woman's bowels had moved spontaneously, a warm soap and water or plain water enema was recommended, and nurses diligently mixed enema solutions and administered them with gusto. In doing this, caution was exercised to shave the woman before giving the enema, because its heat was believed sufficiently stimulating to either markedly accelerate labor or, even worse, precipitate birth before the enema could empty the bowel.

Similarly, prepping has retained much of its late-Victorian prestige. Elaborate shaving and cleansing procedures were described in the texts of Baird in 1962[5] and of Eastman and Hellman in 1966,[6] and nursing texts of the day parroted their advice. In 1971, Danforth's *Textbook of Obstetrics and Gynecology* asserted that long pubic or perineal hair "makes it impossible to maintain asepsis during vaginal examinations and delivery and complicates the repair of tears or episiotomy."[7] Also recommended was an enema for the purpose of avoiding contamination and stimulating uterine contractions. Some concession to changing practices appeared in Greenhill and Friedman's 1974 text, which noted that shaving of the perineum was slowly vanishing and that its lack of benefit in preventing infection had been proved.[8] Nonetheless, shaving and clipping procedures were described, and enemas recommended as routine practice.

Prepping realities

Shaving unnecessary. In 1922, Johnston and Sidall, who studied both shaved and unshaved

148

women, found puerperal fever in 12.4% of those unshaved and in 16.3% of those shaved, results that favored the elimination of shaving.[9] In 1963, Sweeney found that in 424 patients undergoing curettage or completion of an incomplete abortion, the omission of perineal shaving had no effect whatsoever on subsequent development of urinary, skin, or pelvic infections.[10]

Burchell, in 1964, described a procedure, used in more than 7,600 women, in which the vulva was prepped by cleansing with gauze sponges and spraying with a 1:750 aqueous solution of benzalkonium chloride, with no shaving or clipping.[11] He reported that any differences in complication rates favored this simpler approach. The same year, after studying 75 parturients, Kantor and associates concluded that shaving did not result in more effective perineal sterilization. Instead, they recommended merely clipping hair around the episiotomy area, to avoid the irritation caused by shaving and hair regrowth.[12]

A few years later, Long instructed a group of 50 women to scrub the perineum daily with pHisoHex from the 36th week of pregnancy, a procedure that was repeated on hospital admission and just before delivery.[13] Later he compared them with 50 controls who had been shaved and washed only on admission and before delivery. He concluded that pHisoHex had been as effective for decreasing bacterial flora as the traditional shave and single local application of a chemical antibacterial agent. In Adeleye's study in 1977, 74 Nigerian women, most of low socioeconomic status, were randomly divided into experimental and control groups. All had the same routine perineal, vulval, and vaginal swabbing during the first stage of labor, but 40 were shaved and 34 were not. No increased puerperal morbidity was found in the unshaved group.[14]

Adeleye's results, while contradicting Long's implication that extensive scrubbing procedures prior to labor are necessary, confirm the earlier study's antishaving findings. These were further reinforced by a recent British study. Romney followed 693 parturients: 228 had their pubic hair shaved completely, 240 had their perineal hair shaved, and 225 were not shaved at all.[15] Romney's conclusion was that shaving did not affect the incidence of infection and was associated with discomfort and itching in a high percentage of women, something also noted in other studies. Ninety-eight percent of those shaved expressed their disappointment that this had been done. One, voicing an opinion we consider highly atypical among women, said she would be upset if she hadn't been shaved because it helped her recall what she looked like before puberty.

Romney also commented on how difficult it is, even for a skilled person, to perform an atraumatic shave, without multiple small abrasions. Confirmation of his observation comes from Seropian and Reynolds, who studied wound infection rates in 406 preoperative patients in whom hair removal was either by depilatories or shaving.[16] They reported an infection rate of 5.6% after shaving, 0.6% after depilation, and 0.6% after no preparation. Especially applicable to the question of predelivery shaving is the finding that the infection rate was 3.1% if shaving was done just before surgery, 7.1% if done 24 hours before surgery, and a striking 20% if done more than 24 hours before surgery. The authors drew the clear conclusion that shaving has an adverse effect on wound infection rates.

Cruse reported that microscopic examination of the skin of patients shaved just before surgery revealed many small cuts and scratches that could serve as excellent breeding grounds for bacteria.[17] His observation led to elimination of much of the routine preoperative shaving at Foothills Hospital, Calgary, Alberta, Canada. After this, a follow-up study of 55,000 surgical wounds showed an infection rate of 2.7% in shaved patients, 1.7% in

149

clipped patients, and 0.9% in patients neither clipped nor shaved.

This evidence from many sources has convinced us that shaving pubic hair to prevent infection cannot be justified. Shaving compromises the integrity of the skin by inflicting multiple small abrasions, and it is humiliating for women, as well as a cause of itching and burning when the hair grows back. If episiotomy repair is necessary and perineal hair proves troublesome, it can be clipped.

True value of enemas

Routine use of enemas has been even less adequately scrutinized than predelivery shaving. Common reasons for giving an enema during labor include maintaining a sterile field at the time of birth, preventing hard fecal matter in the rectum from compressing the birth canal, stimulating labor progress, and, as already noted, avoiding embarrassment for the woman if she expels stool when she is pushing.

Although castor oil, laudanum, miel mercuriale (a syrup made of honey and plant juice), and similar substances have been used during the last century to effect bowel evacuation, the enema has retained its popularity as the quickest and most effective means for accomplishing this. Plain water and other solutions have been used, but by far the most common has been the soapsuds enema. Soap, however, often causes rectal irritation, serosanguineous fluid loss secondary to acute colitis, and gangrene.[18,19] Soapsuds enema can also be damaging if introduced under high pressure, if there is a history of allergic reactions, or if there is a preexisting local infection—in which case bowel perforation may result. Repeat soapsuds enemas can cause mucosal damage, particularly if a portion of the first enema is retained.[20]

Smith reported a severe anaphylactic reaction in a woman in labor on administration of a soapsuds enema.[20] Immediately after the solution was run, her mouth became swollen and she had a "pins and needles" sensation in her limbs and tightness in her chest. She was unable to swallow and felt as though she were choking. When she tried to rise, she collapsed and lost consciousness. Her pulse and blood pressure could not be recorded, and the fetal heart rate dropped to 40 bpm. Treatment had to be instituted to reverse the effects of the enema. In a similar case cited by Pike, a woman in labor developed soap colitis shortly after receiving a soapsuds enema.[21] Although the woman eventually recovered, regaining normal bowel function 2½ months later, the fetus was stillborn.

Some of the problems of soapsuds enemas stem from inaccurate soap measurement and the type of soap used. Lewis quoted instances when different kinds of hospital soap were collected in a jar and diluted quite arbitrarily with 200 to 2,000 mL of water.[22] Pike also noted that the method used to prepare soap enemas in his hospital was remarkably casual: The standard preparation contained an unmeasured amount of concentrated soap solution obtained from a gallon jug and mixed with water in an enema bag.[21] Current availability of prepackaged enema kits (Table 1) should make the soap's chemical composition and the strength of the solution less problematic. However, women can still be sensitive to soap's irritating effects, and insufficient dilution can easily happen. According to Smith, the recommended dilution of soft soap is one teaspoonful in a quart (1,140 mL) of warm water.[20]

What, then, are the benefits of enemas? Avoidance of fecal contamination, with its potential for infections, is frequently cited as an advantage. Whitley and Mack, who studied the incidence of fecal contamination during second-stage labor reported contamination in 59% of the no-enema group and 38% of the enema group; women assigned to the "no-enema" group because of diarrhea within 24 hours before hospital admission had the lowest

150

TABLE 1
Current costs of prep and enema kits

	Hospital cost*	Patient charge
Prep kit	$1.02	$4.70
Enema kit	$0.70	$4.70

*Shands Hospital, Gainesville, Fla., March 1983.

incidence of contamination (15%).[23] From this report, it appears that fecal contamination is fairly common regardless of whether or not an enema is given.

Moreover, according to a recent British study, fecal contamination does not seem to increase infection rates.[24] When 274 women were randomly assigned to enema or no-enema groups, no difference was found in degree of fecal contamination during the first and second stages of labor, and the incidence of gross contamination was similar (34% for the enema group, 38% for no-enemas). Ironically, contamination after enemas was especially difficult to control, since it was more likely to be fluid. Seven neonates from each group showed signs of infection; bowel organisms were isolated from four in the no-enema group and two in the enema group. In brief, results showed that although fecal contamination often occurred whether or not an enema was given, risk of neonatal infection from bowel organisms was remote. Another finding, that the two groups had a similar duration of labor, contradicted the notion that enemas shorten labor.

To determine the necessity for enemas, we investigated the incidence of bowel elimination without enemas during spontaneous labor. As Table 2 shows, bowel eliminations were most frequent during prelabor, early first-stage labor, and second-stage labor. This is not surprising. It is well known that increased bowel activity is common in spontaneous early labor, probably as a result of prostaglandin stimulation of the intestinal tract. During second-stage labor, pressure from the descending fetal head and relaxation of pelvic floor muscles forces elimination of any stool remaining in the lower bowel.

Our investigation showed that a substantial proportion of women in labor will have bowel movements, whether or not enemas are given. The next question is whether aggressive management is needed to avoid uncontrolled occurrence of bowel movements. Many physicians and nurses assume that women will be embarrassed and afraid to push if spontaneous bowel elimination occurs during second-stage labor. This belief is usually grounded in their personal feelings and in their own preference for cleanliness and maintenance of a sterile field. Our experience, however, is that most women cite the enema as the worst part of labor, find it uncomfortable and demeaning, and wish to avoid it.

We feel that women can be *offered* enemas to avoid the embarrassment of spontaneous

151

TABLE 2
Bowel elimination without enemas during spontaneous labor

Women having stools	No. of stools*
Prelabor, 10	1 (8)
	2 (2)
First stage	
0–4 cm, 9	1 (3)
	2 (3)
	3 (3)
4–7 cm, 5	1 (3)
	2 (2)
7–10 cm, 2	1 (2)
Second stage, 13	1 (13)

*(No.) indicates number of women

bowel movements during labor, but that continued routine use of enemas cannot be justified except when circumstances clearly indicate a need. Romney and Gordon recommend enemas be reserved for patients who have not had a bowel movement in the past 24 hours and who have an obviously loaded rectum at the time of initial examination in labor.[24] The following guidelines seem reasonable:

- Stimulate bowel elimination, if necessary, by methods other than a soapsuds enema. Laxatives, suppositories, or a Fleet enema can be administered by the patient herself in early labor. Metamucil, milk of magnesia, or Dulcolax may be indicated when stools are hard.
- Consider a Fleet enema if the woman, on entry to the birth facility, has not had a bowel movement in the previous 24 hours, or if a fecal mass can be felt in the rectum.

In conclusion

Giving up favorite routines is always difficult. However, when there is evidence that clearly indicates both lack of any real benefits and potential for injury, continued use of such procedures is poor medical practice. Therefore, predelivery shaving should be abandoned and the unrequested enema reserved for specific circumstances when it will obviously help improve bowel function. □

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152

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PERSPECTIVES OF USERS OF THE SERVICES

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Abstract

This article draws on social science evidence concerning the views and experiences of those using the antenatal services. It identifies several important themes in this evidence, including the need to consider pregnancy a normal process, to provide care that is sensitive to individual circumstances and that offers continuity of care throughout the antenatal period, and the obligation on providers to assess scientifically the effectiveness of the care they give.

We often speak these days as though babies are products of the health services—of the institutions where health care is provided and to those whose professional training fits them to act as if they *are* indeed the deliverers of children. In reality, however, the person who produces the baby is the mother. For this, if for no other reason, women's views and experiences of antenatal care are important. What kind of evidence do we have on these important issues, and what are the implications of this evidence for the way in which antenatal care is provided, both now and in the future?

Much of the literature that needs to be drawn on to address these questions is British and North American. An equivalent literature of what is often called "consumer dissatisfaction" is apparently not found in Scandinavia. Two explanations are possible. Either the services provided for childbearing women in Scandinavian countries are genuinely more satisfying, or women's opinions have not been asked for to the same extent as they have elsewhere. Both these explanations probably have some truth to them. Nonetheless, there are important messages that come out of British and North American research that apply to the provision of antenatal care in all developed countries.

A second problem that confronts anyone trying to address the issue of women's views of antenatal care concerns the status of the scientific evidence on this point. Women's opinions of antenatal care have not (with a few notable recent exceptions) been assessed in large multicenter randomized controlled trials; and they have certainly not tended to be assessed in uncontrolled experiments either as applied to routine or innovative forms of care. For the most part, soliciting the views of those who use the services has been the job of social scientists on short-term contract funding, or of the voluntary organizations who, though equipped with missionary enthusiasm for their task, have unfortunately often lacked a systematic approach to the kind of evaluation that is needed. To answer the question, what is the evidence on the user perspective

153

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in antenatal care, one is therefore inevitably drawing on a partial and selective universe of knowledge.

Yet a third problem is methodological. The recurrent question asked of the users of antenatal care has been "are women satisfied?" (or, more usually, why *aren't* women satisfied?). The problem with this is that most surveys find that a majority of women say they are satisfied; this finding is then taken as evidence that everything in the garden is lovely, and nothing needs to be done. In fact human beings are conservative creatures and most people (not just women) when asked if they are satisfied with something—whatever it is—will tend to say yes (6). Similarly, people when asked to compare two different options will usually prefer the one they have already experienced over the one they have not (1). To show that most women are satisfied with a particular regime of antenatal care does not therefore prove its success. Mothers' experiences of the health services cannot adequately be reduced to the question of satisfaction; other features, such as knowledge of alternatives available, feelings of control, types of staff-patient communication, and the extent to which women feel their own social situations and choices are respected must also be considered.

REMEMBERING THE 6 Ds

A British government report on the perinatal health services published a decade ago summarized one of the main issues under the heading of "consumer views" when it said that

> It is not enough (in our survey of perinatal and neonatal mortality) to concentrate solely on the physical wellbeing of the mother and her baby. The emotional support provided by the maternity services, although more difficult to define, is also of major importance. We would regard a mother who has produced a healthy baby but looks back on her pregnancy as an experience she does not wish to repeat as evidence of a failure on the part of the maternity services.

There are, in other words, the 6 Ds to consider: death, disease, disability, distress, discomfort, and dissatisfaction. The same report went on to describe the general picture emerging from many studies of women's experiences of antenatal care as

> . . . the cattle-truck atmosphere of antenatal clinics where there is little privacy, little dignity . . . long waiting times, difficult access to clinics, lack of continuity of care, lack of opportunity to discuss things that women themselves are worried about, and the feeling that they are going through a rather mechanistic process and are not getting as much out of it as they feel they should. (12)

The following quotations are taken from a London-based study of social support and pregnancy (9). Many of the women who took part in this study compared the value of research midwife-provided social support with what normally happens. Their comments are especially relevant to the treatment of high-risk women, as all the women in the study had a history of LBW delivery. One said:

> You didn't ask about the doctors, most of them treated you like nobody, they didn't want to take the time to explain anything to you. I was in hospital six times and each time I saw different doctors, and when I did see the same doctor twice, he said, what are you doing here again—and he didn't mean it as a joke . . . they just don't know how you feel inside . . . sick with worry. I had a small premature baby, then my second pregnancy ended in miscarriage, so it's no wonder

154

that I was worried when I was carrying this one. But it makes you feel worse when the doctors don't understand or don't want to understand the fear that you feel for your unborn baby.

According to another,

I felt having someone to talk to helped me relax. . . . Hospitals treat you like a conveyor belt, they should tell you what's going on, you shouldn't have to ask.

and

I felt more confident having a breech baby because of the information from the midwife. It was the only information I had, and the research midwife seemed to listen and didn't make me feel guilty like the others.

What seemed to be particularly appreciated was the focus on the mother as an individual:

. . . when you said I'd been picked to be in this whatsit I was quite pleased about it actually. Because you don't get a chance to talk to anybody about your pregnancy and everything. . . . It makes you feel as if you are something and your pregnancy is something and not just . . . I know it's an everyday occurrence, but it's something special to you . . . being in this study makes you think, well your pregnancy is special, whereas normally you just go into the antenatal and you are just another person . . .

There is also the important question of the effect on women of being stigmatized as "high risk"—the extra clinical monitoring and advice that is a product of risk-prediction schemes:

I hope this information will lead to some kind of service being offered to mothers of prospective small babies. Why people have small babies in the first place is obviously the object of this survey and I hope this question is answered. However, I do think the attitudes of medical and other persons to a second pregnancy do not help in the prevention of another small baby. Being told to rest, not to garden, iron, hoover, carry shopping etc., having extra scans booked when 3 months pregnant and generally being made to feel a failure as a pregnant woman must, I am sure, go a long way to producing further small babies. . . . Perhaps a survey of larger than average babies would produce some interesting results.

The point this mother is making about the psychological and social impact of being treated as at risk is a very important one. Few studies have compared health professionals' and mothers' views of risk in childbearing. As Table 1 shows, not all mothers classed as high risk by health professionals agree with this definition. But the dominant assumption is that where a discrepancy between mothers' and health professionals' views on risk exists, this is because women are ignorant about the dangers of reproduction and need to be educated by health professionals. The converse may also be true; health professionals need to be educated by mothers' views concerning risk, especially in view of the evidence of the failure of risk scoring systems to adequately pick up real problems.

The views expressed by the women in the social support and pregnancy study are echoed many times in other studies. For example, it was found in a study of women having their first babies that only 37% enjoyed their antenatal care and only 25% felt they learned from it (Table 2) (5).

A review of research in this area carried out by Garcia (4) in 1982 concluded that

155

Table 1. Beliefs about Low Birth Weight among Women with a History of Low Birthweight Delivery

	% of total (n = 413)
Low birthweight is a problem	37
Low birthweight is not a problem	63

Source: Social Support and Pregnancy Outcome Study.

Table 2. Attitudes toward Antenatal Care

	Enjoyed checkups		Learned from checkups	
	%	(n)	%	(n)
Yes	37	(73)	25	(50)
No	47	(94)	73	(145)
Do not know/mixed	17	(33)	3	(5)

Source: Graham and McKee (5).

three main areas of concern are highlighted in it: the discrepancy between women's expectations of antenatal care and their experience of it; dissatisfactions expressed about the timing, siting, and organization of antenatal clinics; and problems with the quality of staff–patient communication.

Great Expectations

Much of the advice literature available for pregnant women depicts antenatal care as the receipt of sensitive and specialist attention from a group of experts the mother gets to know well. The reality can be very different, with women seeing a different person at almost every visit. In addition, most women encountering the maternity services for the first time may have had no previous experience of hospitals, and little of doctors. In one British study (5), 43% of first-time mothers had their first internal examination in the antenatal clinic. Few health professionals realize how distressing this routine procedure can be to many women for whom it is an experience not only of invasion of privacy but of actual physical assault. In a recent study carried out in Leeds, England (7), 45% of women said that anticipation of the vaginal examination routinely done at booking might cause them to delay offering themselves for antenatal care: 55% regarded it as unpleasant, and 18% thought it a cause of possible miscarriage. The same study showed that routine vaginal examination at booking had no clinical value.

Similar issues arise in relation to other antenatal procedures: along with the question, how effective is the procedure in terms of the prevention of adverse physical outcome, must go the question, what is the incidence of adverse psychosocial effects? Table 3 shows findings from a study by a social scientist of women's reactions to amniocentesis (3). The table shows the differences between women who had amniocentesis because of raised AFP at routine blood tests and those who had amniocentesis because of some other indication—for example, the previous birth of an abnormal child. There are quite large differences in emotional reactions between the two groups, with women who had a *specific* indication for the test generally reacting better than those without such an indication. Of particular interest is the fact that forms of behavior

156

Table 3. Emotional Reaction to the Experience of Waiting for Amniocentesis

	High AFP (n = 31) %	Other (n = 55) %
Depressed mood	71	24
Crying	71	9
Irritability	57	20
Poor concentration	53	7
Headache	35	16
Sleep disturbance	61	16
Loss of appetite	65	5
>3 of the above	71	9

Source: Farrant (3).
All differences between groups are significant at $p < 0.001$ level.

not medically recommended in pregnancy and not shown in this table—smoking and drinking—were also increased in the women in the high AFP group.

The proper evaluation of women's views of procedures such as routine ultrasound scanning is not a simple matter. Studies show that many women do enjoy seeing their fetuses on the ultrasound screen, perhaps in part because so many important cultural experiences these days are transmitted via one screen or another. On the other hand, visual perception of the fetus may increase anxiety by highlighting fetal vulnerability. It is important also to consider the status of women's knowledge about ultrasound. It is widely believed that routine scanning is of value clinically and it is in this context that women's positive evaluations of the procedure must be interpreted. If ultrasound were commonly said to be of value only in certain cases, and if the unknown long-term consequences of scanning were emphasized in the information available to mothers, then positive evaluations would be reported less often in the research studies.

Systems of Care

Organizational features of antenatal care have been singled out as important in the user perspective in many studies. These show overwhelmingly that continuity of care is valued where it exists and desired where it does not exist. Table 4 gives the findings of one British study comparing hospital and community antenatal care (13). This study shows that satisfaction is higher in both types of setting when care is provided by one or two people rather than a larger group. This finding of a preference for the formation of *relationships* within the experience of antenatal care is often cited as an example of a rather superficial interest on women's part in *psychologically pleasing* care, rather than a more proper concern with forms of care that are *clinically effective*. However, the Aberdeen study of antenatal care (6) showed that along with the preference for community-based care because of its "niceness" went the evaluation of this care as superior in content. What women like in other words (and insofar as it is safe to generalize about this) is antenatal care that is both satisfying *and* effective.

Talking to One Another

So far as communication in antenatal care is concerned, there is unfortunately a wealth of evidence that health professionals still have a lot to learn. In 1982 Macintyre concluded that four unproductive stereotypes were rife in antenatal care: firstly, that lower class women do not want information or explanation; secondly, that women do not

157

Table 4. Women's Attitudes toward Antenatal Care, by Extent of Continuity of Care Within the Hospital and General Practice

	Hospital care		General practitioner care	
	From 1 to 2 people (n = 516) %	From different people (n = 836) %	From 1 to 2 people (n = 1,622) %	From different people (n = 109) %
Care "very good"	75	57	72	50
Treatment as a person "very good"	68	48	80	49
Explanations "very good"	58	37	62	35
Felt able to discuss things	76	52	82	60

Source: Zander et al. (13).

Table 5. Effects on Mothers of Access to Antenatal Information

	Case notes		Cooperation cards		
	%	(*n*)	%	(*n*)	*p*
Felt in control					
Newbury	50	(66/132)	35	(41/119)	<.05
St. Thomas	22	(21/97)	11	(11/102)	<.05
Easier communication with staff					
Newbury	36	(48/132)	21	(25/119)	<.01
St. Thomas	9	(9/97)	9	(9/102)	

Source: Elbourne et al. (2).

understand technical terms; thirdly, that the best reply to questions is reassurance; and fourthly, that no news is good news.

The value of information in antenatal care is well documented in two recent studies of the effect of women holding their own case notes in pregnancy, results from which are shown in Table 5.

It is important that the information women receive should be consistent. Much of it is not. One example concerns advice about sex and pregnancy, which is a common topic of women's questions. Expert advice varies from idealizing sexual intercourse in pregnancy as an affirmation of couple intimacy, to defining it as a fetal hazard akin to alcohol use or cigarette smoking (8).

Where sex is prohibited, the health professional may be called upon to give additional practical advice rather than to reiterate conventional stereotypes:

Doctor: "By the way, once you've had the stitch put in your cervix you can't have sex until after the birth."
Woman: "Well, what are we supposed to do?"
Doctor: "Your husband can always go to a massage parlour." (8)

As this example shows, women appreciate being listened to. Not listening means not hearing the question. Not regarding women as knowledgeable about reproduction means wasting a certain amount of time claiming to have an alternative knowledge:

Doctor: "I see you have a boy and a girl."
Woman: "No, two girls."
Doctor: "Really? Are you sure?" (10)

Not Only a Patient

Finally, there is a very significant mismatch between the perspective of the health care system and the perspective of society on the matter of women's role in antenatal care and in reproduction. To the health care system, pregnant women are patients, but in the broader social context they are mothers, wives, workers, carers, and most importantly individuals. The effects of ignoring this may be profound. For example, Romito (11) has shown in a French study that pregnant women on sick leave because of the risk of preterm birth may actually do more physical labor when instructed to rest at home than when they are not on sick leave and out at work. This is because women's domestic responsibilities cannot simply be dropped because they are pregnant; measures

159

Table 6. Social Class, Smoking, and Birthweight

	Smoker		Nonsmoker			Total	
	Mean BW[a] (g)	(*n*)	Mean BW (g)	(*n*)	Smokers vs. nonsmokers	Mean BW (g)	(*n*)
Middle class	2,890	(33)	2,975	(86)	−85 g	2,952	(119)
Working class	2,853	(146)	3,014	(169)	−161 g	2,939	(315)

Source: Social Support and Pregnancy Outcome Study.
[a] BW = birthweight.

Table 7. Smoking and Stress

	Nonsmoker (*n* = 267) %	Smoker (*n* = 195) %	*p*
Life events in pregnancy			
0–2	63	55	
3+	37	45	<.09
Depression in pregnancy			
No	88	80	
Yes	12	20	<.02
Control over life			
A lot	70	62	
Not enough	30	38	<.05

Source: Social Support and Pregnancy Outcome Study.

such as maternity leave or sick leave are based on the assumption that holds for male workers of the home being a place of relaxation, but the same assumption cannot be made of women.

The Example of Smoking

One particular example of the interface between social and medical factors that illustrates the importance of listening to women on the subject of how the antenatal health services may best contribute to a healthy outcome is smoking. Smoking during pregnancy has been considered for some time a very important factor contributing to adverse outcome, particularly in populations where other obstetric risks have been reduced. In view of this, the question is often asked, how can we stop pregnant women from smoking? An enormous number of anti-smoking interventions in pregnancy have been launched, with varying degrees of success (8). What is striking about all this effort is how much of it has not been based on knowledge about why pregnant women smoke. What it has assumed instead is that women smoke because they are ignorant of the harmful effects of smoking, though again there is no evidence that women are ignorant.

Why do pregnant women smoke? In our United Kingdom-based social support and pregnancy study, we found the well-documented pattern of an association between smoking and birthweight apparently mediated by the "effect" of social class (Table 6). Looking more closely at the link between class and smoking, however, we found: firstly, that smoking was associated with social stress (Table 7); secondly, it was as-

160

Table 8. Smoking and Social Factors

	Nonsmoker (n = 267) %	Smoker (n = 195) %	p
Income			
High	28	14	
Medium	46	42	
In poverty	26	44	<.0001
"Marital status"			
Married and living with baby's father	90	70	
Other	10	30	<.0001
Unemployed			
No	90	70	
Yes	10	30	<.0002
No. of children			
0	2	10	
1–2	67	59	
3+	31	40	<.03

Source: Social Support and Pregnancy Outcome Study.

Table 9. Smoking and Social Support

	Nonsmoker (n = 267) %	Smoker (n = 195) %	p
"Marital status": married and living with baby's father	88	70	<.0001
Partner's interest in baby: lot/some	91	87	<.09
Partner helped with other children[a]	77	69	<.06

Source: Social Support and Pregnancy Outcome Study.
[a] Women with other children only.

sociated with a range of social factors (Table 8); and thirdly, it was linked with the social support available to pregnant women (Table 9). Most paradoxically, we found that the women at the highest risk were the most likely to be smoking (Table 10).

CONCLUSION

One major lesson to be drawn from this brief summary of themes in women's experiences of antenatal care is that the social support that can be provided by antenatal care is one of its most valuable, but least valued, aspects. Antenatal care in the future should aim to provide more of this. The best way to ensure that the antenatal services are supportive is to provide continuity of care within the community, to be sensitive to pregnant women's social needs and responsibilities, and to attend both to women's need to be listened to and for information—real information rather than fake reassurance—about their own welfare and the status of many antenatal surveillance procedures. Particular attention should be paid to the tendency of some antenatal care routines to increase women's anxiety.

There is no need to duplicate existing research concerning these points by undertaking further studies. However, it is important to ensure that women's views are included in all evaluations of care. There is no problem about including mothers' opinions

161

Table 10. Smoking, Low Birthweight, and Women's Anxiety

	Nonsmoker (n = 267) %	Smoker (n = 195) %	p
History of low birthweight			
1	90	82	
2+	10	18	<.001
Worried about repeat low birthweight			
No	38	26	
Slightly	39	37	
A lot	23	37	<.01
Worried about baby after birth			
No	82	73	
Yes	18	27	<.02

Source: Social Support and Pregnancy Outcome Study.

in RCTs of different procedures: it should be mandatory to do so, and ethics committees have an important role to play here in rejecting as unethical any research that does not have such a component. Users' views may also be solicited as part of the routine monitoring of the operation of the maternity services (4).

The substance of the consumer criticisms may be summed up as being (a) that pregnancy is not an illness; (b) that women are human beings; (c) that obstetrics should be scientific; and (d) that happiness is an important measure of good obstetrics care. The last of these is extremely important—the imperative to make antenatal medicine scientific. There should be no disagreements between professionals and patients here. Women's experiences of using the antenatal system and health professionals' experiences in providing it are gained in a culture infected by five "myths of the machine age": that valuation equals evaluation; that innovation equals progress; that technology is chosen; that technological problems need technological solutions; and that all problems are technological in nature.

On the contrary, many problems are social. In view of this, perhaps the question we ought to be asking is a different one. The relevant question is not what women think about antenatal care, or why they sometimes "fail" to attend as early or as often as care providers would like, but why they attend for antenatal "care" at all.

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162

Strategies and Techniques For The Nurse Change Agent

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This article defines and describes the change agent and discusses necessary knowledge and potential strategies for utilization of the change process in general. Functions of the change agent within the three frameworks of Lewin, Reinkemeyer, and Smoyak are also presented, as well as techniques for dealing with resistance and conflict.

CHARACTERISTICS OF THE CHANGE AGENT

Brooten, Hayman, and Naylor describe the change agent as a professional who relies on a systematic body of knowledge about change to guide the process.[2] They further state that this agent has been given a mandate to help plan and accomplish change. A mandate clearly received from another party is not essential to the role of the nurse change agent. It may come from within the nurse who is interested in improving the delivery of health care.

The nurse as a change agent must be socially aware, people-oriented, and competent in interpersonal relationships. Since change does not occur in a vacuum and involves dealing with people and congruent feelings, these skills are essential. An awareness of her attitudes and behaviors, of her approach to other people, and of her feelings about change is also essential to the success of the nurse change agent. This self-knowledge will enable her to utilize her strengths during the change process and attempt to minimize her identified weaknesses. By examining her feelings and thoughts about the change process, the nurse can

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163

apply these insights to the realities of the process of change and change theory.

It is well to remember that change has both constructive and destructive effects.[10] One example is transferring the function of patient scheduling for diagnostic tests from a central scheduling service to the nursing service department. The positive effect of this change is that the nursing staff would more effectively coordinate diagnostic examinations for patients through assessing and considering individual client needs. However, this change may eventually result in the diminishment of the number of personnel in the central scheduling service. The old must give way to the new, and this is seldom achieved without some destruction.

Inaction and frustration are inevitable during the change process. In order to meet the realities of the situation, persistence and flexibility are essential attributes for the nurse change agent. She must be realistic about what she can accomplish. Persistence is essential, for if the identified change fails, she must try again. In the end, it is likely that the nurse change agent will not take or be given any credit for an effective change. An essential ingredient of effective change is that the change agent makes people feel that the change is theirs. This means actively involving key people and fostering the feeling of "we did it ourselves." The reward for improving the health care delivery system is internal satisfaction. The role of the change agent is then truly an art.

STRATEGIES TO ENHANCE CHANGE

What should be changed? Three broad categories can be identified: (1) dysfunction in an organization, (2) expansion of the capabilities of an existing organization, or (3) recognition of a missing function.[10] There are different approaches appropriate for each.

An example of dysfunction in an organization is the situation in which team nursing in a particular hospital is no longer meeting the nurses' or patients' need for comprehensive nursing care. If the desired change is assessed as a dysfunction, the nurse change agent needs to create a desire for the change. This may be difficult because this type of change implies that things have not been running smoothly.

Incorporating a High Risk Clinic into the framework of an Outpatient Department in an acute care hospital is an example of expansion of the organization's function. In this situation, the nurse change agent has to be acutely aware of the effects the change will have on the total organization. She should realize that change in one part of the organization has an impact on other parts of the same organization. A clear need for change is important. Appropriate resources, such as educating staff or finding space, will also need to be examined.

The recognition of a missing function in an organization requires foresight on the part of the nurse change agent. At times it is difficult to see what more an organization can offer. An example of this type of change is a staff nurse in a community health agency realizing that its services do not include diabetic screening of the elderly client. Stating the ideal of what is possible in optimum health care is often a helpful strategy in this situation. It is also necessary to mobilize forces or resources, as the case may be. Experience has demonstrated that in this situation, the nurse change agent will need the help of at least one other person who believes that the change is a good idea.

Insider vs. Outsider Role

The nurse change agent should know if she is functioning as an insider or outsider relative to the organization, and she should understand the advantages and disadvantages of each position. It is obvious who an insider is; an outsider is usually a consultant who is called upon to solve a particular problem.

Advantages of the role of the insider are that she:

1. knows the system;
2. speaks the language, both literally and figuratively;
3. understands the norms;
4. identifies with the system's needs and aspirations;
5. is a familiar figure.

On the other hand, the disadvantages of the insider are that she may:

1. lack perspective and not see the "whole";
2. not have special knowledge or skill relevant to the change;
3. not have an adequate power base;
4. have to live down past failures;
5. not have independence of movement, often required to be effective.

The outsider may find the following factors advantageous:

1. starting fresh;
2. having perspective;
3. being independent of the power structure;
4. being in a position to bring in something generally new.

Disadvantages of the role of the outsider are:

1. being a stranger;
2. lacking the knowledge of the insider;
3. not caring enough.[5]

Insight into the advantages and disadvantages of the roles of the insider and the outsider will help the nurse change agent to overcome the disadvantages and augment the advantages.

While the outsider may not find it easy to "get in the door," she may

165

use certain helpful strategies to facilitate change. These include working with an insider, being a politician, and gaining knowledge of the movers in the organization. Working with an insider will eliminate some of the disadvantages of the outsider role, as will the knowledge and assistance of the organization's movers. The art of effectively dealing with people by being sensitive to feelings and reactions can not be overemphasized.

Guidelines for Change

For those working from below, rather than from positions of top power, the following guidelines may be of assistance.

1. Diagram the organization as a system. Ask the related questions: What are its goals, key subsystems, and key people? Knowledge of the organization's goals and norms will aid in ascertaining specifics about the orientation and philosophy of the system. Key people will be utilized to facilitate the change process.

2. Look for allies and potential allies either inside or outside the organization. It is generally more effective to initiate change by enlarging the group in favor of the change.

3. Know your change inside and out, including strengths and weaknesses. Also, know what evaluations have been done and what objections might be raised. Try diligently to have answers to these objections; resistance is decreased when people perceive that the change agent is aware of the ramifications of the proposed change.

4. If you have an adversary, analyze the situation from her point of view. This provides a better perspective and therefore should give greater insight into ways of coping.

5. Develop a sense of timing; act strategically and only when forces are in your favor.[5] Remember that there is a limit to the extent of assimilation of change for an organization and/or a group. An example of too much change in a situation is when a new head nurse tries to change the pattern of patient care, the patient admission procedure, and the format for writing nursing care plans all at the same time. So many changes at once are impractical and create an impossible situation for the staff.

A crisis, real or perceived, is an impetus to change.[2] However, the change agent has a moral responsibility not to raise false expectations. She must be sensitive to what is possible and what is not possible. Also, she must decide beforehand what parts of the change she is unwilling to give up and what she will modify.

Some people believe that the change agent should get early visibility.[2] It is important that she sells herself first. Although she may be presenting a program, people are responding to her as a person.

The process of change takes time. When dealing with behaviors and attitudes, one must increase the allotted time rather than trying to

change the knowledge base. The change agent would be wise not to focus on an attitude change, but rather to attempt to change behavior. Change in behavior is generally followed by an attitude change. One should also decide on a time line for the completion of the change process and specific dates when related tasks are to be accomplished.

Various meetings will ordinarily be required to accomplish change. All identified key people or principals should be involved. At the appointed meetings, the ground rules should be: (1) do not criticize others; (2) the speaker must be brief and to the point; and (3) do not interrupt others. Also, all agreements should be recorded and circulated. In addition, all those involved should consider one of the inherent difficulties in communication — you will not be understood the first time around.[10]

CHANGE TECHNIQUES WITHIN A FRAMEWORK

Lewin's Stages of Change

Unfreezing

The nurse change agent, in assisting the client system to get into Lewin's Stage 1 (unfreezing), can use certain techniques. However, she must be prepared for the ramifications or consequences of any individual strategy used. For example, the nurse change agent may hold up an ideal by taking a group to another institution that is currently having success practicing the change she wants to implement. The reaction to this visit may be "That change is fine for that organization, but not for ours." The change agent should therefore have thought through exactly how the change can be implemented in her particular organizational structure.

Another tactic may be to ask volunteers to try the change on a trial basis. This volunteer group may get more attention than the nonvolunteers. In this event, the nurse should deal with the "out" group by providing a support system to prevent hostility and resistance.

The purpose of this phase is to create disequilibrium. However, the change agent must avoid techniques that will make the client system completely defensive. Strategies of an extreme nature will be destructive because they will block or impede change.

Moving

In Lewin's Stage 2, moving, the nurse change agent may find that the client system is having trouble providing rewards for new behaviors. The change agent should then provide an environment that is conducive to behavioral change, and a structure in which to practice the new behaviors. Rewards, either external or internal, need to be provided.

Here, identifying something meaningful as a reward, such as the enhancement of patient care, will be important. An environment for behavioral change should be supportive, nonthreatening, and educational. Disadvantages of these actions are that this is not always realistic, and that the client system may become too dependent on the support system.

Refreezing

Refreezing, Lewin's Stage 3, involves stabilizing the change and integrating the new responses. Positive feedback and constructive criticism are strategies that can be used in this phase. A plan for ongoing evaluation can be built into this process. Likely disadvantages are the same as those for the strategies used in Stage 2.

In this stage, the nurse change agent may have difficulty providing a support system while she is, at the same time, in the process of withdrawing from the situation. Another problem to be considered is that of stabilizing this particular change without preventing future change.

Driving and Restraining Forces

Driving and restraining forces are part of Lewin's model. The status-quo equilibrium can be distributed by altering either set of forces. Maintaining the balance between the driving and restraining forces tends to keep the situation "as it is." The nurse change agent must identify the possible driving and restraining forces accompanying the change. For example, the introduction of ward managers into the organization of nursing units in a hospital setting might produce the following driving forces:

1. It will release the nurse from doing paperwork.
2. Nurses resent "administrative work."
3. It will upgrade the quality of patient care.
4. It is more economical.

In the same situation, the possible restraining forces are:

1. The head nurse will not "let go."
2. Personnel will have difficulty accepting supervision from non-nurses.
3. Department heads may have problems communicating with unit managers.
4. Recruitment may be difficult.
5. The training will be expensive.
6. The turnover will increase.
7. Physicians may resent relating to the managers.
8. Some nurses may find more gratification from administrative affairs than from patient care.

Change can occur by increasing the driving forces and at the same time decreasing the restraining forces; decreasing the restraining forces only; or increasing the driving forces only. (These are listed in order of effectiveness.) The danger of increasing only the driving forces is that this tends to increase drastically the restraining forces.[1]

Factors that will increase the strength of the driving forces are:

1. Using a "model" on one nursing unit.
2. Giving support and guidance.
3. Using the change as an example when it is working well.

An added risk involved in increasing only the driving forces is that when the vigilance and pressure are removed, the old situation may gradually return.

The following techniques can be used to decrease the strength and the number of the restraining forces:

1. Hold meetings with open discussion.
2. Participate in conferences to gather necessary information.
3. Use the problem-solving process.

As indicated previously, the nurse change agent will tend to use a combination of these approaches.

Reinkemeyer's Stages of Planned Change

Seven phases of planned change have been identified by Reinkemeyer.[7] (The reader is referred to Miller's paper for a specific, in-depth application of this model.) To reiterate, the phases are:

1. Development of a felt need and desire for the change.
2. Development of a change relationship between the agent and the client system.
3. Clarification or diagnosis of the client system's problem, need, or objective.
4. Examination of alternative routes and tentative goals and intentions of actions.
5. Transformation of intentions into actual change behavior.
6. Stabilization.
7. Termination of the relationship between the change agent and the client system.[7]

These phases may not follow in orderly fashion, and there may be movement back and forth. The *"felt need"* phase is similar to Lewin's unfreezing phase. Therefore, the nurse change agent can utilize the strategies discussed previously.

Phase 2, *developing the relationship with the client system,* is indeed an extremely important phase. The nurse change agent first has to identify the client system. When she initially encounters the client system, she should be friendly and demonstrate responsiveness. Familiarity, either

by appearing similar to the client or by actually being similar, is also important.[5] Early in this relationship, the client system should be made aware of the degree and kind of effect that must be put forth.

The nurse change agent trying to implement care plans written by nurses may find a reluctance on their part to do so. This may be because either the nurses feel unprepared to write effective plans or they believe they will be exposed to criticism. This is an example of the outcome of the process in Phase 3 of this model. When trying to identify the problem, one must be aware of the obvious ramifications as well as the less obvious ones. The nurse change agent must *uncover the real problem* by interpreting evidence and inferring underlying causes.[5]

Determining alternate routes may be accomplished through such techniques as deriving implications from research and brainstorming. In this phase, the identification and acquisition of relevant resources is an important element.[5] It is at this time that the client system should develop the intention to change in specific ways.

In the phase of *transforming intentions into action*, the nurse change agent can promote acceptance by individuals through such strategies as instilling curiosity (in any attempt to create a motivation for the change) and encouraging active information-seeking. Since new behaviors are tentative, practice sessions may also be used.

Stabilization of the change has occurred when the change has spread throughout the entire system. At this time, there is no extra effort being exerted to keep the change going.

After stabilization, the nurse change agent must decide when to *terminate her relationship*. She will look for signs of internalization of the change. Good evidence of this is that the originally diagnosed problem is well on its way to solution. Another sign of internalization is that the change has been accepted by the leadership and is beginning to diffuse rapidly.[5]

The nurse change agent should terminate her participation gradually. She should also remain available or provide a support system to be used in case of emergency situations.

Smoyak's Confrontation Model

Shirley Smoyak has set forth three phases of a confrontation model to implement change. Confrontation is the use of the direct approach.[9] This model will prove useful when there is a clearly identified issue, such as the expanded role of the nurse practitioner, that necessitates change.

Phase 1 involves *planning the confrontation*. In this phase, the nurse change agent identifies the issue and gathers facts and ideas. She plans strategies for confronting the opposition within a planned time dimen-

sion. Each change agent "confronter" should encounter one member of the opposition. The individual assignment is determined by such factors as status and power levels. Repetition of the message and use of physical presence and body language are techniques that the change agent will find useful in this phase.[9]

During Phase 2 (*confronting the system*), the processes of initiation, progress review, evaluation, and sharing with others take place. Regular review meetings that have been preplanned are held. At all times, the nurse change agent focuses on the issue and "keeping cool."[9]

Strengthening new images and relationships following the confrontation is Phase 3. After successful use of this model and resolution of the issue, people have insight into new roles and interrelationships. Successful confrontation should be shared with others by a variety of methods.[9]

The nurse change agent must decide if confrontation is in order. There should be a consensus by the group members to use confrontation. Feeling comfortable with the use of this technique is also important if the nurse is to implement this model effectively.

Another factor to be considered is the health or illness of the client system, be it a person or an organization. The confrontation model has limited benefit in an unhealthy situation. However, Smoyak warns that nurses have a tendency to overclassify people as being sick; therefore, one must clearly identify the problem.[9] Physical and psychologic parameters can be used to ascertain the health status of an individual. With regard to an organization's health, the nurse change agent can look to the answers to certain questions. Some of these are: (1) Are the short- and long-term goals clearly stated? (2) Does the organizational structure allow for accountability and flexibility? (3) Is the organization actively engaged in goal achievement? One should always remember that conflict in an organization does not necessarily mean that it lacks health.

RESISTANCE TO CHANGE

Behavior intended to protect the individual or group from the effects of real or imagined change is *resistance.*[1] In general, the nurse change agent should realize the values of resistance, differentiate between resistance and interference, and attempt to prevent resistance to change. Also, she should know techniques for effectively managing resistance.

Resistance has value in that it can force the leadership to clarify the purpose and results of the change. Inadequate communication processes and insufficient information flow can be revealed as causes of resistance. In addition, resistance may indicate inadequate problem-solving and decision-making processes. When the nurse change agent encounters resistance, she should therefore examine the factors mentioned and, if the cause is identified, correct the situation. The nurse change agent

171

should treat resistance as a diagnostic symptom to get at its cause. However, logical and practical resistance may mean that the change is needless and useless.

Interference occurs when other matters take priority. People in this situation are interfering with the change process not because they are resistant, but because the change is not a priority item to them. In this case, the nurse change agent must wait until the timing is more suitable. It may be difficult to differentiate between resistance and interference. Resistance will be more forceful and will tend to take on a defensive posture in the form of hostility or aggression. When interference is operating in a situation, people may react favorably to the change but will not actively participate in its implementation.

Experience has demonstrated that people tend to resist change under the following conditions:

1. When the nature of the change and its effects are not clear to those involved. However, merely giving full information may not by itself eliminate resistance.
2. When information is distorted, especially if people have felt uncomfortable and threatened in past work situations.
3. When the change is made on personal grounds rather than according to the impersonal requirements of the group or organization.
4. When change ignores the established norms or customs of the group.
5. When excessive work pressure is involved in the change.
6. When the planning of change fails to consider in detail exactly how the change will be brought about.
7. When there is little consideration given to problems that are likely to arise and how to deal with them.
8. When there is fear of failure, or when the change is seen as inadequate or ineptly managed.
9. When no provision is made for adequate two-way communication.[1]

On the other hand, resistant forces are decreased when:

1. The project has support from top officials.
2. Participants are involved.
3. There is consensual group decision.
4. There is provision for feedback.
5. There is an open feeling about revisions and reconsideration.[1]

The nurse change agent will use this data base to build in strategies to prevent resistance.

Reasons for Resistance

The reasons for resistance are many. Some common ones include clinging to existing satisfactions, cost, time investment, threat (from

either the change or the change agent), selective perception and retention, vested interests, and fear of failure or disorganization.

Clinging to existing satisfactions might be dealt with by creating disequilibrium and a desire for change through strategies mentioned previously.

Cost may, indeed, be a real factor in preventing the implementation of change. However, the nurse change agent is advised to be cautious about money matters. Cost can be used as an easy excuse to prevent the change from proceeding. If the change is thought to be worthwhile, however, monies will usually be found.

Some persons may say that "this change takes too much *time*." Again, the nurse should examine this reason for reluctance to change; it may be a "cop out." If time is truly a problem, someone who is not too busy should be located to be a key person in facilitating change.

If *threat* is occurring because of the change agent herself, and a particular rational reason is identified as the cause, the nurse change agent can make efforts to rectify the problem. However, some problems, such as an anti-educational bias, are very difficult to overcome. In such a case, the change agent may have to enlist another person to assume the major responsibilities of the role of change agent. Threat from the change itself must be dealt with by determining the cause and getting at the root of the problem. If the threat is due to a particular insecurity, the nurse change agent should provide avenues, such as educational sessions, to increase personal security.

Selective perception and retention is a universal problem. People tend to hear only what they wish, and to retain that particular perception. To prevent this, the nurse change agent can clarify communication by rephrasing statements and asking for feedback on the meaning of the message.

When a person's power and status are tied to the existing situation and change means personal loss, this is an example of *vested interest.* As a source of resistance, this is a particularly difficult one to handle. The nurse change agent will have to provide a new power base and status associated with the change.

Fear of failure or disorganization, or both, can be dealt with by the nurse change agent by using strategies that will decrease fear and anxiety. The agent can provide experiences that have a low risk of failure. Fear or disorganization will be dealt with by providing thorough, specific information about how the change will affect those involved.

If resistance is present, this generally means that the change agent has not considered something. The reasons given for resistance, however, are rarely the cause. The nurse change agent has to find out the real reason in order to manage it effectively. Developing meaningful relationships will be most important. Helpful tactics in combating resistance are: (1) never to identify it as opposition but rather a problem or a

173

concern to be solved, and (2) not to personalize the opposition or criticism. (If the criticism is personal, one should pretend that it is not.)[10]

The nurse change agent will be wise not to use ineffective responses to resistance. She should not be defensive, for this does not aid in the expression of feelings. Premature persuasion as a response is likely to result in repression of feelings. Censoring, controlling, and punishing are also not helpful techniques in dealing with resistance.

CONFLICT RESOLUTION

Conflict is a clash or a struggle due to the harmony and balance among thoughts, feelings, and behavior being threatened.[3] A conflict situation can occur within a person or a group. Conflicts are a reflection of the value systems of involved parties.[6] Whenever a nurse attempts to initiate change, conflict in some form is likely to occur. The conflict can take a destructive or a constructive route. In this paper, emphasis is placed on techniques to insure a constructive outcome.

Constructive Conflict Resolution

Constructive conflict resolution leads to individual growth and enhances change in values.[3, 6] Creativity and increased communication can, in addition, be outcomes of this process.[8]

Lack of clarity concerning goals, tasks, and procedures predispose to conflict. Essentially, conflict stems from differences or disagreements. The nurse change agent should be apprised that differences may occur in the following areas:

1. Information or beliefs.
2. Interests, desires, or values.
3. Competition, rivalry, or scarcity of resources.

Disagreements leading to conflict usually involve one or more of the following:

1. Means and ends.
2. Power and control issues.
3. Competitive and cooperative approaches.
4. Rationality and irrationality.
5. Subjectivity and objective reality.
6. Cognitive and affective aspects.[3]

The nurse can see that there are many potential areas of conflict. She should identify the underlying cause of the conflict and should focus on that area. The nurse change agent should be aware that four primary factors operate in a conflict situation to determine the outcome: (1) the issue, (2) power, (3) responsivity to needs, and (4) communication. In

constructive conflict resolution, the issue is kept in focus and held at a manageable size. Peripheral issues should be considered only as they relate to the main point. The process of choice should be action rather than reaction.[6]

In addition, participants in the conflict should use compromise to mediate differences. These participants can create a new solution through the use of the problem-solving approach. During a constructive conflict, no party uses power to impose her needs or her view.[6] It is therefore not a win–lose situation.

Responsiveness to needs takes into account the importance of solutions to answer the needs of all the conflict's participants. Detachment from one's own point of view and a commitment to whatever solution answers everyone's needs are essential ingredients and therefore should be encouraged by the nurse change agent.[6]

Effective communication characterized by open and honest dialogue can not be overemphasized as a guideline for the nurse change agent in the process of constructive conflict resolution. Getting the problem into the open so that it can be dealt with is the main concern.

Confrontation Meetings

The nurse change agent may initiate or participate in a "confrontation meeting" to deal with the conflict. The foci of such a meeting should be to: (1) clarify problems and procedures; (2) guide the group to areas needing attention; (3) generate open communication; (4) create dialogue; and (5) involve group members in the "ownership" of the problem.[2] The major goal is to fix the problem, not the blame.[4] Some basic rules used in mediation/arbitration procedures may be helpful in this situation. This process insures that no one feels threatened, humiliated, alone, or overwhelmed.[4] Therefore, the nurse change agent should use the techniques mentioned and should encourage a real expression of interest and readiness to listen in order to resolve the conflict associated with change.

SUMMARY

The nurse engaging in the process of change should be armed with the knowledge and skills necessary to implement change. She should also be guided by the various frameworks that have proved helpful in promoting the change process and by a variety of effective strategies and techniques. The nurse change agent should attempt to prevent resistance, but if it does occur, she must deal with it appropriately. Conflict must be anticipated by the nurse and managed in a constructive manner.

175

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Randomized Trial of Epidural Versus Intravenous Analgesia During Labor

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Objective: To compare the effects of epidural analgesia with intravenous (IV) analgesia on the outcome of labor.

Methods: Thirteen hundred thirty women with uncomplicated term pregnancies and in spontaneous labor were randomized to be offered epidural bupivacaine-fentanyl or IV meperidine analgesia during labor.

Results: Comparison of the allocation groups by intent to treat revealed a significant association between epidural allocation and operative delivery for dystocia. However, only 65% of each randomization group accepted the allocated treatment. Four hundred thirty-seven women accepted and received meperidine as allocated, and they were compared with 432 women accepting epidural allocation. Significant associations resulted between epidural administration and prolongation of labor, increased rate of oxytocin administration, chorioamnionitis, low forceps, and cesarean delivery. Because of the high rate of noncompliance with treatment allocation, a multifactorial regression analysis was performed on the entire cohort, and a twofold relative risk of cesarean delivery persisted in association with epidural treatment. The impact of epidural treatment on cesarean delivery was significant for both nulliparous and parous women (risk ratios 2.55 and 3.81, respectively). Epidural analgesia provided significantly better pain relief in labor than did parenteral meperidine.

Conclusion: Although labor epidural analgesia is superior to meperidine for pain relief, labor is prolonged, uterine infection is increased, and the number of operative deliveries are increased. A two- to fourfold increased risk of cesarean delivery is associated with epidural treatment in both nulliparous and parous women. *(Obstet Gynecol 1995; 86:783–9)*

For more than 150 years, relief of pain during childbirth has been both a priority and controversy in the industrialized world.[1] Drugs such as inhalational anesthetics, opioids, barbiturates and other sedatives, tranquilizers, and amnestics have all been used during parturition. Over the past 20 years, administration of local anesthetics and opioids via the epidural route has emerged as an increasingly popular approach to pain relief during labor. Indeed, in some medical centers, virtually all parturients receive epidural analgesia. This widespread practice has begun to receive scrutiny because of reports indicating that epidural analgesia interferes with labor.[1–4] However, randomized studies designed to examine the effects of epidural analgesia on labor are rare and include few patients.

Beginning in 1991, it was our intention to develop a large labor epidural service at our hospital. Because of the emerging concerns about the effects of epidural analgesia during labor,[1] we believed it prudent to measure the impact of such analgesia on our patients. We report the results of a large randomized investigation of epidural analgesia and its effects on labor. Epidural analgesia was compared with parenteral meperidine, a popular method of pain relief during childbirth in the United States.

Materials and Methods

The study protocol was developed by investigators from the Departments of Obstetrics and Gynecology and Anesthesiology and Pain Management, with advice from and approval of the Institutional Review Board of the University of Texas Southwestern Medical Center at Dallas. Women with normal term pregnancies presenting in spontaneous active labor to Parkland Memorial Hospital were offered participation in this randomized investigation. Women with an identified pregnancy complication, cervical dilation greater than 5 cm, or other than singleton cephalic gestations were excluded. Labor was diagnosed in the presence of uterine contractions and cervical dilation of at least 3 cm. All the pregnancies reported were managed in a low-risk labor unit by certified nurse-midwives using written proto-

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177

cols and directly supervised by obstetric faculty and house officers. Nurse-midwives are integrated with and practice by the same protocols as the medical staff.

The study protocol was initiated on November 1, 1993, and ended April 30, 1994. To maximize participation, the consent was an agreement to be randomly offered either epidural or intravenous (IV) meperidine analgesia for initial treatment of labor pain. The option of refusing the designated treatment or of electing the alternative during labor was emphasized explicitly. Participation was offered to eligible women by the nurse practitioner staff in the triage area adjacent to the labor and delivery areas. Women giving written consent were randomly assigned, using numbered, sealed opaque envelopes, to receive epidural bupivacaine-fentanyl or IV meperidine analgesia during labor. The randomization sequence was computer-derived in blocks of 20 subjects. After allocation, preprinted admission orders accompanied the patient to the labor and delivery unit. These orders specified either an anesthesia consult or meperidine treatment at first complaint of pain. To minimize the potential for post-randomization selection bias, the anesthesiologist offered epidural analgesia to all women randomized to that group and did not consult with the meperidine group unless requested by the patient. Routine intrapartum management of all women enrolled in this investigation included IV fluid administration and periodic auscultation with Doppler or continuous electronic fetal heart rate (FHR) surveillance. Women were confined to bed and permitted their choice of position during labor and delivery.

All staff followed a written procedural manual that prescribed the usual management strategies, including operative deliveries (forceps or cesarean) for nulliparous and multiparous women admitted to the low-risk labor unit. Our policy of labor management encourages amniotomy as early in active labor as is judged safe with respect to application of the fetal head to the lower uterine segment and cervix. At the time of amniotomy, it is our policy to insert intrauterine pressure catheters and apply scalp electrodes for FHR monitoring. The management guidelines stipulated that pelvic examinations were to be performed approximately every 2 hours to evaluate the progress of labor. Ineffective labor was diagnosed when the cervix did not dilate progressively in 2–4 hours and was at least 3–4 cm dilated.

All oxytocin administration was in the form of augmentation, not induction of labor. Oxytocin stimulation of labor was based on a combination of less than 1 cm/hour cervical change coincidental with a recorded hypotonic contraction pattern. In both first and second stages of labor, oxytocin stimulation was predicated on contraction frequency, duration, and intensity. Nursing staff administered the oxytocin using a written protocol, which has been described previously.[5] The starting dosage for oxytocin was 6 mU/minute, with incremental increases of 6 mU/minute at 40 minute intervals, up to a maximum of 42 mU/minute. Uterine activity of 200–250 Montevideo units for 2–4 hours was used as a threshold for adequacy of contractions.[6] Dystocia was diagnosed when adequate uterine activity did not result in progressive cervical dilation or descent of the fetal head. The elective use of forceps was not permitted by protocol. Indications for the use of low forceps was limited to inadequate descent of the fetal head attributable to inadequate voluntary pushing. This was assessed at the bedside, and if good descent was observed when effort was made (and, conversely, if no descent was observed if little effort was made), then lack of descent due to inadequate maternal expulsive efforts was diagnosed. Clinically suspected cephalopelvic disproportion was a contraindication to forceps application. Umbilical artery blood was obtained at all births from a doubly clamped cord segment for analysis of blood gases.

Those women allocated to epidural analgesia received an IV fluid bolus of at least 500 mL Ringer's lactate solution and were positioned to avoid uterine aorta-caval compression. Following a written protocol, lumbar epidural analgesia was achieved using an indwelling catheter inserted via a 17-gauge Tuohy needle. At the patient's first request for pain relief, a 3-mL test dose of 0.25% bupivacaine was given, followed by further 3-mL increments to achieve a bilateral T-10 sensory level. This was followed by a continuous epidural infusion of 0.125% bupivacaine with 2 μg/mL fentanyl at 8–10 mL/hr. The infusion was titrated to achieve a maximum T-8 sensory level. Additional boluses of fentanyl and/or bupivacaine were injected to overcome inadequate analgesia. If required, the epidural catheter was replaced. Continuous external electronic fetal monitoring was used for 30 minutes after the test dose. Such monitoring was discontinued if the FHR pattern was normal.

Maternal blood pressure (BP) was recorded every 5 minutes for 30 minutes, then every 30 minutes until delivery. Intravenous fluids were given to treat hypotension, defined as systolic BP less than 100 mmHg. Persistent hypotension was treated with ephedrine 5 mg IV as needed. The epidural infusion was maintained throughout labor until complete cervical dilation, after which the dosage was halved. The infusion was discontinued to restore maternal expulsive efforts if the progress of the second stage of labor was inadequate after 1 hour.

Women offered and accepting initial treatment with meperidine were given 50 mg with 25 mg of prometh-

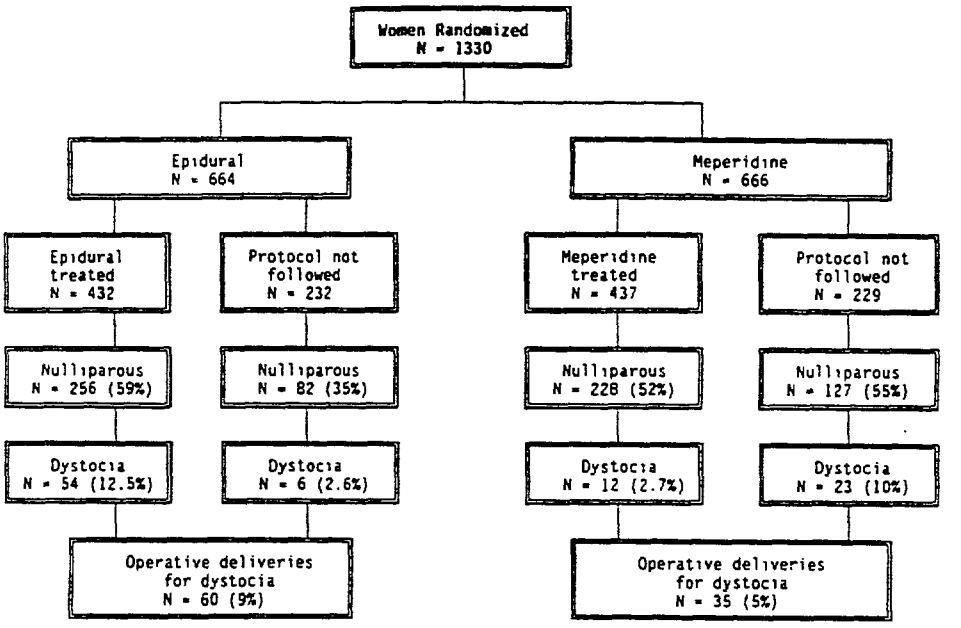

Figure 1. Distribution of women randomized to receive epidural or meperidine analgesia during labor. Dystocia was defined by low forceps or cesarean delivery for dystocia and represents the experience of each group, irrespective of parity.

azine hydrochloride IV at first request for pain relief. Additional 50-mg doses of meperidine were given on request, to a maximum of 200 mg in 4 hours. When pain relief was inadequate, epidural analgesia was administered on patient request.

A linear 10-cm visual analogue pain scale score[7] was used in all women at their first request for analgesia; this was repeated hourly until delivery. A visual analogue pain scale score of 10 represents the worst pain, and 0 signifies no pain. In addition, satisfaction with labor pain relief was determined within 24 hours after delivery using a five-point descriptive scale of excellent, very good, good, fair, or poor.

Staff nurses attended each delivery and completed an obstetric data sheet. Additional information was abstracted from the maternal and neonatal discharge charts by research nurses. The data were assessed for completeness and consistency before electronic storage in an on-line perinatal data system.

A power analysis was performed using a one-tailed test to demonstrate a five-percentage point difference in the cesarean delivery rate between labor analgesia study groups. Assuming an 8% cesarean delivery rate and based on a power of 80% and probability of .05 or less, it was estimated that 920 women needed to be enrolled in this study. The use of the one-tailed test was only for purposes of the a priori power analysis to estimate the minimum number needed to demonstrate a difference.

All other tests of significance used two-tailed tests. Statistical analyses of results were performed using Fisher exact test, χ^2 contingency table analysis, and analysis of variance. Bonferroni multiple comparison procedures were used in the comparisons of the two groups that remained within their treatment assignment until delivery. Multiple logistic regression was used to evaluate the contribution of risk factors related to obstetric outcome. Two-tailed P values of .05 or less were considered significant.

Results

In this study, 2608 women were offered participation and 1330 (51%) accepted. The 1278 who did not consent to participate were demographically similar to those accepting participation. Of the 1330 participants, 664 women were randomized to an offer of epidural analgesia, but 232 (35%) of these women never received the allocated treatment. Roughly half this group refused the offer of epidural analgesia; the remainder progressed to delivery before epidural analgesia could be initiated. Similarly, 666 women were randomized to meperidine treatment, but 229 (34%) of this group were not treated according to the allocated protocol during labor. One hundred three women in this latter group requested and received epidural analgesia after finding meperidine to be inadequate. The magnitude of this lack of acceptance of allocated treatment was unanticipated and was the result of the consent which emphasized participant freedom of choice. Thus, the study design was successful in maximizing enrollment but at the expense of a high rate of patient self-selection.

As can be seen in Figure 1, parity was significantly related to treatment acceptance. Nulliparous women

179

Table 1. Demographic Characteristics of Study Patients

Characteristic	Epidural (N = 432)	Meperidine (N = 437)	P
Race			
Black	106 (25%)	132 (30%)	NS
Hispanic	258 (60%)	268 (61%)	NS
White	52 (12%)	28 (6%)	.004
Other	16 (4%)	9 (2%)	NS
Age (y)			
≤19	155 (36%)	142 (32%)	NS
≥35	6 (1%)	3	NS
Height (cm)	155 ± 8	156 ± 7	NS
Weight (kg)	72 ± 14	74 ± 15	NS
Nulliparous	256 (59%)	229 (52%)	.05

NS = not significant.
Data are presented as n (%) or mean ± standard deviation.

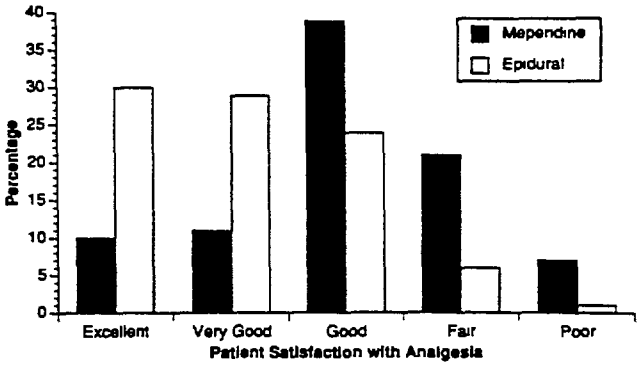

Figure 2. Satisfaction with labor pain relief determined within 24 hours of delivery using a five-point descriptive scale (excellent, very good, good, fair, and poor). Significantly more epidural patients rated their satisfaction excellent or very good (P < .05).

were significantly less likely to decline allocated treatment in the epidural group (P < .05). Because parity is also related to the risk of operative delivery, the post-randomization selection significantly confounds the relationships between treatment and outcome within allocation groups. Although there was a statistically significant difference in operative delivery for dystocia when comparing the two groups on an intent-to-treat basis (9 versus 5%, P = .008), it is difficult to be sure that this difference accurately reflects an effect of treatment. To evaluate treatment effects more precisely, a detailed comparison was made of the two allocation-compliant groups, and a multivariate analysis of the entire cohort was performed to control for confounding effects of other variables, particularly parity.

Of those randomized to the labor epidural analgesia group, 432 women completed the study as allocated. Similarly, 437 women randomized to the meperidine analgesia group received meperidine as the sole analgesic during labor. The demographic characteristics of women in each of these two labor analgesia study groups are shown in Table 1. There were no demographic differences between the groups except for white race and nulliparity. Both of the latter factors were significantly increased in those women who were randomized to epidural analgesia and completed the study as randomized. Cervical dilation at admission and within 60 minutes of initial analgesia was not different between groups. Specifically, the mean (± standard deviation [SD]) cervical dilation at admission was 4 ± 0.8 cm, and dilation was 5 ± 1.7 cm at initial analgesia. The mean gestational age at delivery was 40 weeks for both groups.

Although the pre-analgesic visual analogue pain scale scores were similar (mean 9) in the two groups, women who received labor epidural analgesia subsequently reported significantly less discomfort throughout labor than did women treated with meperidine alone (3 ± 2 versus 8 ± 2, respectively; P < .001). When queried within 24 hours of delivery, the majority (60%) of women who received epidural analgesia subjectively rated their satisfaction as excellent or very good, compared with 22% of those who received meperidine alone (P < .05) (Figure 2). The incidence of hypotension was 22% in women who received epidural analgesia, but only 2% overall required ephedrine.

The duration of labor was significantly prolonged for the group treated with epidural analgesia (Table 2). Specifically, the interval from admission to delivery was approximately 1.5 hours longer in women given epidural analgesia than in those given meperidine (P = .001). Similarly, time from admission to delivery exceeding 10 hours occurred in 21% of the epidural group, compared with 9% when meperidine alone was used (P = .001). Second stages of labor in excess of 2 hours were significantly increased with epidural analgesia (7 versus 3%, P = .001).

Amniotomy was performed during labor in approximately 70% of women in each of the groups. Augmentation of labor using oxytocin was required in 30% of

Table 2. Duration of Labor and Complications in Relation to Type of Analgesia

Labor complications	Epidural (N = 432)	Meperidine (N = 437)	P
Interval from admission to delivery			
Mean ± SD (h)	7.2 ± 3.9	5.7 ± 3.3	.001
≥10 h	89 (21%)	39 (9%)	<.001
2-h or longer second stage	31 (7%)	11 (3%)	.001
Oxytocin augmentation	139 (32%)	102 (23%)	.004
Chorioamnionitis*	98 (23%)	21 (5%)	<.001

SD = standard deviation.
Data are presented as mean ± SD or n (%).
* Chorioamnionitis: fever of 38C or greater in labor.

Table 3. Route of Delivery and Complications in Relation to Type of Labor Analgesia

Delivery complications	Epidural (N = 432)	Meperidine (N = 437)	P
Vaginal delivery			
Spontaneous	352 (81%)	407 (93%)	<.001
Outlet forceps*	8 (2%)	8 (2%)	NS
Low forceps†	33 (8%)	5 (1%)	<.001
Shoulder dystocia	2	2	NS
Cesarean delivery	39 (9%)	17 (4%)	.002
Dystocia	21 (5%)	7 (1.6%)	.007
Fetal distress	18 (4%)	10 (2.3%)	NS

NS = not significant.
Data are presented as n (%).
* Outlet forceps: fetal head at the perineum.[8]
† Low forceps: +2 cm to +4 cm below the ischial spines.[8]

women with epidural analgesia alone and in 23% when meperidine alone was used (P = .004). There was no relationship between the timing of augmentation and the initiation of analgesia. Fever in labor (chorioamnionitis) was significantly increased in women who received epidural analgesia (23 versus 5%, P < .001).

Spontaneous delivery (Table 3) was achieved in 93% of women treated with meperidine alone and in 82% when epidural analgesia alone was used (P < .001). Low forceps deliveries were more frequent in those women who received epidural analgesia (P < .001). However, the incidence of outlet forceps was similar between the two study groups, and shoulder dystocia was not associated with either method of analgesia. The rate of cesarean delivery was significantly increased in the labor epidural study group compared with the meperidine group (P = .002). As shown in Table 3, most of this increase was attributable to cesarean deliveries for dystocia.

Approximately 20% of women in each group had meconium-stained amniotic fluid. As summarized in Table 4, immediate infant outcomes were analyzed with no evidence that the type of analgesia had any deleterious effect on Apgar scores or fetal acid-base condition. There were no neonatal deaths and no infants suffered seizures within 24 hours of birth. Three infants required intubation in the delivery room, but this was unrelated to the type of maternal analgesia. Group B streptococcal sepsis was diagnosed in one infant delivered of a mother who received meperidine analgesia.

Table 4. Neonatal Outcomes in Relation to Type of Labor Analgesia

Outcome	Epidural (N = 432)	Meperidine (N = 437)	P
Apgar score			
≤3 at 1 min	2	5 (1%)	NS
≤3 at 5 min	0	0	NS
≤6 at 5 min	0	1	NS
Umbilical artery blood pH			
<7.20	63 (15%)	79 (18%)	NS
≤6.99	1	1	NS
Birth weight			
Mean ± SD (g)	3368 ± 430	3324 ± 426	NS
≥4001 g	31 (7%)	25 (6%)	NS

NS = not significant; SD = standard deviation.
Data are presented as n (%) or mean ± SD.

To evaluate the effects of patient-directed crossovers, we analyzed the entire cohort according to a number of independent variables. Statistically significant associations were found between cesarean delivery and parity, race, maternal age, neonatal weight, and admission to delivery interval. Estimated gestational age at delivery and cervical dilation at admission were added to these risk factors for a multiple logistic regression analysis. In the entire cohort, the crude odds ratio (OR) for cesarean delivery if a woman received labor epidural analgesia was 3.68 (95% confidence interval [CI] 2.27–6.20). The multivariate logistic regression analysis reduced the OR estimate to 1.98 (95% CI 1.14–3.51). Thus, although factors other than the type of labor analgesia are related to risk of operative delivery, there appears to be an attributable twofold risk of cesarean delivery due to epidural analgesia. The impact of epidural treatment on cesarean delivery was significant for both nulliparous (risk ratio 2.55, 95% CI 1.50–4.32) and parous women (risk ratio 3.81, 95% CI 1.32–11.0). The epidural treatment risk ratios for operative delivery for dystocia were higher for both groups, 3.87 and 6.35 for nulliparous and parous women, respectively. The results of this cohort analysis are consistent with the labor outcome differences observed between the two allocation-compliant treatment groups.

Discussion

This study compares the obstetric impact of two methods of analgesia for labor pain. There is no doubt that epidural analgesia is superior to IV meperidine for pain relief during labor. Our results indicate that women receiving epidural anesthesia experienced less pain during labor and were more satisfied when questioned during the immediate puerperium. However, there are trade-offs for such pain relief. Although there were no untoward neonatal effects of epidural analgesia, there were several maternal consequences. The association between treatment with epidural analgesia and prolonged labor is clear. The mean length of labor increased by 1.5 hours with epidural analgesia, and this was associated with increased use of oxytocin augmentation of labor.

The most striking association of labor and epidural analgesia was with the mode of delivery. Specifically,

more women in the epidural analgesia group required low forceps or cesarean to effect delivery. However, it is important that we emphasize that these results may not be applicable to all obstetric patients because we studied only women at term with uncomplicated pregnancies and in spontaneous active labor. This study group was selected because of their low risk of cesarean delivery (about 5% at our hospital) in order to remove as many potentially confounding indications for operative delivery. Our overall hospital cesarean delivery rate is 18%, which reflects a large number of complicated pregnancies often requiring cesarean delivery.

In this study, we prioritized enrollment and control over intervention on the part of involved obstetric and anesthesia practitioners. The randomization effectively created two comparable groups of women and obviated potential introduction of investigator or provider selection bias. Anesthesiologists were only allowed to offer epidural analgesia to the allocated group or in response to patient request. Obstetric intervention was defined by preexisting labor management protocols in which indications for oxytocin administration and application of forceps were clearly defined. Elective forceps deliveries were disallowed. Adherence to the protocol is evidenced by the equality of outlet forceps application in both allocation and treatment groups, and the fact that no increase in shoulder dystocia was observed with low forceps applications.

The emphasis on enrollment had consequences on the study design, results, and analysis. We were successful in enrolling 50% of eligible women over a short time period. This volume was achieved by simplifying the consent for the participants to consider, not necessarily accept, a random offer of analgesia method. An ethical requirement for Institutional Review Board approval of the protocol was that a participant's freedom to choose alternate methods or refuse the allocated offer at any time was emphasized explicitly. An unexpected result of this aspect of the design was the large number of participants that refused the allocated treatment method. It seems that we failed to achieve the epidural administration rate described by some obstetric units precisely because of the emphasis on choice: It may be that women are not routinely informed of available alternative methods of analgesia. We know this was the historic case regarding meperidine treatment at our hospital; before the increase in anesthesia staffing that enabled this study, only about 5% of women in labor received epidural analgesia because it was offered only when meperidine treatment was inadequate.

The large number of patient crossovers in each group complicated the analysis. Because it is generally acknowledged that analysis by intention to treat is preferred for a randomized intervention trial, we anticipate that our cohort analysis of a randomized trial will be questioned. Although it is obvious that analysis by intention to treat is inappropriate when 35% of each treatment group did not receive the intended treatment, the actual proportion or threshold at which such an analysis becomes invalid is not well defined.[9] Even if the single most appropriate method of analysis of this type of study is arguable, the consistency of the results by all methods of analysis is remarkable. The results indicate an effect of treatment within each allocation group and within both parous and nulliparous groups of women. This latter finding is consistent with a recent review[10] describing an increased risk of cesarean delivery for dystocia in nulliparous women treated with labor epidural analgesia. Parous women also seem to be at risk with such treatment.

Our results agree with other reports that epidural analgesia has significant effects on the duration of labor and, consequently, on the method of delivery.[2–4,11] The mechanism(s) by which epidural analgesia might interfere with labor is unknown. It has been postulated that neurologic blockade may inhibit myometrium contractility or that a similar result might occur indirectly from decreased uteroplacental perfusion.[4,12–14] Inhibition of voluntary skeletal muscle function may be related to prolonged or arrested labor in the second stage. Our results suggest that some mechanism of interference with labor exists, and we are currently studying the relationship between epidural administration, level of motor blockade, uterine contractility pattern, and response to oxytocin stimulation in order to elucidate this mechanism.

The consequences of prolonged labor—infection and operative deliveries—were significantly increased in women who received epidural analgesia. We attributed the intrapartum fevers to presumed chorioamnionitis, an infection resulting from prolonged labor. Although temperature elevation has been attributed to noninfectious effects of epidural analgesia,[15–17] this is clinically indistinguishable from infection. Moreover, the magnitude of maternal pyrexia reported to be due to epidural analgesia[15–17] usually has been less than the 38C threshold that we used to define maternal fever during labor.

We conclude that epidural analgesia has significant undesirable effects on the outcome of labor, despite the superior pain relief provided. What should parturient women and their caregivers conclude from this study? Pain relief during labor is of paramount importance, and in most circumstances the two- to fourfold increased risk of cesarean delivery associated with epidural analgesia is a secondary consideration. Even with this magnitude of relative risk, it remains highly improbable that epidural analgesia treatment in labor will result in an operative delivery. However, this increased

risk of operative delivery might not be elected in circumstances of well-tolerated labor or discomfort adequately relieved by less consequential treatment. It seems appropriate that women should be informed of these trade-offs and involved in the choices.

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ALTERNATIVE POSITIONS FOR CHILDBIRTH—Part I: First Stage of Labor*

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ABSTRACT

A contemporary theme in maternity care is the provision of alternatives for childbirth. This paper focuses on alternative positions during the first stage of labor. The variation in positions used through history are examined. Empirical observations of the influence of positions on labor and various physiological considerations are also discussed. The paper includes recent research findings of the effect of specific positions on labor. Maternal position is viewed as a feature in the conduct of labor that must be considered within the context of a variety of factors influencing both a safe and satisfying labor outcome.

INTRODUCTION

Along with consumers[1,2] and health professionals,[3–7] nurses and nurse-midwives are questioning the positions that have characterized the care of women in contemporary maternity care settings.[8–14] The specific practice that has been criticized is the nearly exclusive use of recumbent positions for childbirth, i.e., supine, dorsal recumbent, and lithotomy. Cross-cultural and historical reviews indicate that 81% of non-European societies have used upright positions for labor and for delivery, i.e., kneeling, sitting, squatting, and standing.[15–33] Why, then, have contemporary practitioners adopted such a unique approach?

Rather matter-of-factly, Beard,[24] a British obstetrician, observes that "The supine position is commonly adopted during the first stage so that the midwife can listen to the fetal heart and in the second stage to facilitate delivery." Newton and Mead,[21] however, describe a variety of cultural patterns that they believe influence childbirth practices including position during labor and birth. The matter of position for childbirth should, therefore, be examined within its social, institutional, and scientific context. Custom, convenience, and social attitudes have long been recognized as influencing this care practice; it is really not a new issue. In 1857 Rigby asked "What is the natural position of woman during labor?" His conclusion was ". . . it appears to depend in great measure on accidental circumstances which determine what position an unassisted woman assumes when seized upon with violent pains. . . . She will in great measure be guided by the arrangements which are made for her confinement and will assume that posture for which they are specially adapted."[25] Clarke, writing in the *Journal of the American Medical Association* in 1891, raises further issues:

> Inquiry into the purpose for which any of the various positions which women have from time to time assumed while in labor, will show that the choice has been made more from the force of custom, from caprice, ignorance, and from a blind submission to authority—exercised by those who make unwarrantable pretensions to skill in midwifery—than from knowledge deduced from facts gained by careful study and close observations.[26]

Clarke was critical of the practice of confining the woman to one position during labor and not letting her change positions. A. F. A. King was also critical of the recumbent position and described practices in 1909 in this way in the *New York Medical Journal:*

> My chief contention is that the recumbent posture during labor is much

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overdone; that it is often persisted in—either by custom or by direct order of the obstetrician—when it does positive harm, by prolonging labor, by exhausting the woman, and sometimes leading to the persistence of faulty presentations, as well as increasing the duration and intensity of the woman's suffering.[27]

The contemporary practice of utilizing a supine position has been condemned by Caldeyro-Barcia as "the worst position during labor and delivery."[3] Dunn, a pediatrician, also charges that the use of the dorsal position in modern obstetric practice carries with it a variety of potential adverse effects including discomfort, hypotension, delay in labor, and fetal compromise.[4] In a recent (1977) commentary on the topic of "posture in labour," the editor of the *South African Medical Journal* observed:

> There seems to be a useful field for research here, and for a study taking into account the interplay of physiological, cultural and psychological factors in parturition postures.[5]

The matter of maternal position during labor is, therefore, a contemporary as well as a past issue in obstetric practice.

CURRENT PRACTICE

Historical review of nursing practices that pertain to the posture of women for childbirth indicates that during the 20th century two major factors seem to have influenced the position women assume during labor. These are:

1. Concomitant obstetrical practices, including hospitalization for birth, medication for pain relief, fetal monitoring.
2. Prerogative of the physician in determining the nature of obstetrical practices and influencing the role and actions of nurses.[13]

The role of the nurse in maternity care has been primarily supportive and in accordance with the conduct of labor prescribed by the physician. More recently, nurses and nurse-midwives have questioned specific practices pertaining to the position women assume for childbirth which has brought out this feature of care as an issue to be examined in considering alternative positions for labor and delivery as well as in considering the nurse's responsibility for providing or promoting such alternatives for labor.

By definition, the word "alternative" means choosing among two or more things, courses of action, or propositions. This implies that there should be an element of choice. In my opinion there are three critical considerations in this choice. The first is that it be a knowledgeable choice based upon what is known about the influence of maternal position on critical parameters of labor. These parameters include:

1. uterine contractions and labor progress;
2. fetal status;
3. maternal comfort.[28]

The influence of maternal position on these variables will be described shortly.

A second consideration pertains to the need to retain a circumspect orientation regarding positions that are feasible for childbirth. This choice should be made from a knowledge base regarding the influence of position per se. In addition, the relative benefits of a particular position needs to be weighed against the relative risks or benefits derived from other existing factors in the woman's situation or features of her care. Such factors to be considered are:

1. whether you are trying to suppress or promote labor;
2. whether there is a need for medication that would make some positions, such as walking, less safe; or
3. whether a condition exists that could be aggravated by walking about, such as bleeding, a footling breech, or a high presenting part and ruptured membranes.

Caution has prevailed, and in these situations women are usually kept in bed. Also, if there is a need to closely monitor fetal status or labor progress, this may more easily be accomplished with the woman in bed. This concern, however, is related to the third consideration in choosing a position for labor, which is that one potentially beneficial feature of care should not necessarily disallow another potentially beneficial feature of care. If an upright position or ambulation is advantageous and if fetal monitoring is needed, then, ideally, both should be feasible. So an understanding not only of the influence of position on labor, but of the concomitant factors that contribute in an overall manner to optimal labor outcome needs to influence the selection of alternative positions.

What is known about positions that can be used for labor? The positions that are most criticized are the supine position during labor and the dorsal lithotomy position for delivery. These positions are associated with adverse hemodynamic effects, adverse fetal effects, and potential delay in labor progress.

PHYSIOLOGICAL ALTERATIONS ASSOCIATED WITH POSITION

Most clinicians are familiar with the supine hypotensive syndrome that occurs in 10–20% of gravid women when they are in a supine position.[3,4,9,29–33] Not only does the mother feel dizzy and nauseated when she becomes hypotensive, but the resultant reduction in cardiac output from occlusion of the inferior

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185

vena cava diminishes uterine blood flow. Fetal oxygenation is dependent on uterine blood flow. The fetus can become hypoxic from the hypotension and reduced availability of oxygen. Bradycardia and acidosis have been shown to develop in association with a supine or dorsal maternal position.[30,34-38] In addition to vena caval compression, however, the descending aorta and iliac arteries are compressed in the supine and dorsal positions especially with uterine contractions.[39] While vena caval compression may manifest itself in maternal hypotension, some women have adequate collateral circulation to maintain adequate venous return. Other women who do not develop symptoms may have an increase in sympathetic tone that promotes peripheral vasoconstriction (at the expense of uterine perfusion).[40,41] This type of concealed caval occlusion is potentially more hazardous to the fetus since there are no indications of maternal distress while placental perfusion is being compromised.[41,42] Neither is maternal hypotension associated with aortic compression which is aggravated by contractions and maternal bearing-down efforts in a dorsal or supine position. Nor is there any means for the uterus to compensate for a reduction in flow. Uterine vessels are maximally dilated. A fetus may, therefore, be compromised by a reduction in uterine blood flow from aortic compression without any adverse maternal symptoms. In order to avoid fetal compromise from aorto-caval occlusion, a lateral position in labor is strongly advocated.

In addition to a lateral versus a supine position having a significant effect on maternal hemodynamics, the lateral position is associated with uterine contractions of increased intensity, decreased frequency, and potentially of greater efficiency for labor.[43-46] Therefore, a lateral recumbent position during labor has the physiological advantages of promoting more adequate venous return, cardiac output, uterine perfusion, and more optimal uterine contractions and fetal oxygenation. For some women the lateral position may also be more restful and comfortable than a supine position.

EMPIRICAL OBSERVATIONS REGARDING POSITION DURING LABOR

As indicated, upright positions have been widely utilized during labor. This is because of the potential gravitational advantage of being upright and because of the potential benefit of the fetal presenting part pressing against the cervix. Even the famous French obstetrician, Francois Mauriceau, who is credited with promoting a recumbent position for delivery which was a departure from the use of the obstetric chair in the mid-17th century,[19,47,48] recommended that the woman be up and about during the early part of labor.[49] He thought that the duration of labor would be shortened because the weight of the child helped dilate the cervix and contractions were stronger and more frequent. Smellie,[50] the British master of midwifery, had observed earlier:

> In almost all countries, the woman is allowed either to sit, walk about, or rest upon a bed, until the os uteri is pretty much dilated by the gravitation of the waters, or (when they are in small quantity) by the head of the fetus, so that delivery is soon expected; then she is put in such position as is judged most safe, easy, and convenient for that purpose.

Edgar[51] in his 1907 American obstetric text offered a similar rationale for walking or sitting in early labor.

In Merriman's[52] 1816 book on difficult labor he encouraged movement during the first stage. He said ". . . the patient may be allowed to sit, stand, kneel or walk about as her inclination may prompt her; if fatigued, she should repose occasionally upon the bed or couch, but it is not expedient during (this) stage that she should remain very long at a time in a recumbent posture." Similarly, Porteous[53] in 1892 recognized that walking during first stage increased uterine action but cautioned that "careful watch be kept, in order that she may not be fatigued." In 1891 Clarke[26] advocated position change in order to avoid inertia, as did Rhodes[54] in 1967. Rhodes observed that the restlessness of labor led to frequent changes in position and that the practice of using a recumbent position was a "compromise" between the needs of the patient and those of her attendants. Observations in the early 20th century by King,[27] Markoe,[55] and Jarcho[18] also prompted them to endorse an upright position in opposition to a recumbent. They encouraged walking, sitting, and occasionally lying down, and adopted the use of a rocking chair.

Contemporary nursing practice has included the use of a Taylor-sitting position in bed with legs drawn up and crossed in early labor. Davis and Rubin[56] showed this position with a woman sitting up in bed and also indicated that a woman's preference often was to "move about her room during first stage" and she was "frequently more comfortable in a chair than in bed." Eastman[57] expressed the same opinion in his medical obstetric text. Brookmiller et al.[58] in another nursing text described the beneficial effect of changing position on labor from their observations, and identified some of the factors that limited the more general use of upright positions in contemporary practice including sedation, the status of the membranes, aseptic practices, and conventional modesty.

EXPERIMENTAL STUDIES OF POSITION DURING LABOR

While constraining or conflicting factors still influence the use of predominately recumbent positions during labor, recent experimental work has added additional insight to what is known about position during labor. The most popular approach used by clinical investigators has

186

been to establish a control and experimental group. This has usually required that a control group remain supine or in some recumbent position in bed (the usual practice) and that an experimental group assume an upright position, semirecumbent in bed, sitting in a chair, or standing up throughout labor (the experimental approach). Most studies have included only primigravidas as subjects. Because of the difficulty in this research design of controlling for variables that could exert an influence on labor along with maternal position, the findings from these studies are mixed. In 1963 Chan[59] alternately assigned 101 primigravidae to an "erect" group and 100 to a "reclined" group. No advantage could be identified with the erect position. In fact, Chan reports that it was difficult to ensure that the women in the erect group maintained this position throughout first stage. Most women in labor preferred to lie down in the latter part of first stage.

In 1974 Mitre[60] randomly assigned 100 nulliparae to either a supine position or sitting position in bed. In contrast to Chan's study, more control was exercised in the criteria used to select subjects prior to their random assignment, and there seemed to be less variation in the management of their labors. In addition, the women in the sitting group were permitted to lie down if they desired. Although details are lacking regarding the use of medication and birth outcomes other than Apgar score and labor duration, the total duration of labor was "significantly" shorter in the group that was asked to sit; and the women who were permitted to sit "tolerated" labor better. Although this study indicated an advantage to the progression of labor in an upright position, it is not clear if the women were sitting in a semirecumbent position or sitting straight, as in a chair. They apparently were allowed to change positions.

Liu[11] conducted a study similar to Mitre's, reported in the same year, in which 60 primigravida were alternately assigned to an upright (semirecumbent) or supine group for the first and second stages of labor. She used more precise measurements of uterine contractility and examined the length of the first and second stages of labor and infant outcome. Although there was no difference between the infants' Apgar scores in the two groups, the intensity of contractions was greater in the group that labored in a semirecumbent position, and the mean duration of first stage for that group was 85.73 min shorter than for the supine parturients. Second stage also was an average of 40.67 min shorter in an upright position. In a study with a very similar research design, Carpenter[35] found a difference in infant status when she measured the cord pH at the time of birth. The duration of first and second stage was not influenced by an upright position in her study, although the sample size of 20 subjects in the upright and recumbent groups was smaller in contrast to Liu's 60. Carpenter's finding of a lower pH in the recumbent group is consistent with a more acidotic pH at birth identified earlier by Humphrey and Wood in infants of women who were in a dorsal or supine position for delivery.[38,61,62]

McManus and Calder[63] in 1978 used the control—experimental group design to prospectively contrast a lateral recumbent position with an upright position—either sitting in bed or up-and-about. Although 20 subjects were randomly assigned to posed of primigravida and multigravida. They were matched for gestational age, height, weight, and cervical status. However, the influence of maternal position may have been seriously confounded by the induction of labor in all of the subjects, the use of narcotic as well as epidural analgesia/anesthesia during labor, and the presence of obstetrical factors supposedly requiring induction. Position was considered to have no important influence on the efficiency of labor. There was no difference in the "induction-delivery" interval nor in the Apgar scores between these two groups. The validity of these findings is uncertain because of the limitations in the design, the extraneous variables, and sample size.[64–66]

Mendez-Bauer[28] avoided the problems of uncontrolled extraneous variables by using 20 subjects as their own control and asking them to alternate every 30 min between two positions—standing and supine—during the first stage of labor. Primigravidas were studied because of the longer duration of their first stage in contrast to multiparas. The duration of labor for these subjects, however, who were permitted to alternate between lying down and standing, was an average of 3 hr, and 55 min. This is very similar to the mean duration of a multipara's labor according to Cibils and Hendricks criteria.[28,67] By using an intra- or extraamniotic catheter the quality of the uterine contractions was measured and compared between these two positions. Contractions were found to be more intense and more efficient in dilating the cervix in the standing as opposed to the supine position.[28]

This design involving the use of subjects as their own control has also been used by Mendez-Bauer to contrast other potential alternative positions during the first stage of labor. In contrast to the supine position, sitting had higher efficiency in dilating the cervix.[68] In contrast to standing, however, sitting was less efficient.[70] In a contrast of the sitting position with a lateral recumbent position by Roberts, the intensity of contractions while the woman was sitting was consistently of lower intensity than when the woman was on her side.[71] Previous observers have thought that the gravitational advantage of an upright position resulted in more efficient labor and that sitting should have this advantage.[25,27,49,50,51–55] Standing does have this advantage, and there is greater pressure exerted against the cervix by the fetal head as demonstrated by Mendez-Bauer.[68] Compared to the lateral recumbent

187

TABLE 1
Dilatation in centimeters

Position	*Before*	*After*	*Time*	*Change*	*UE*
Sitting	3 cm	3 cm	30′	0 cm	0
Side	3	4	30′	1	579.71
Sitting	4	4	20′	0	0
Side	4	4.5	25′	0.5	229.88
Sitting	4.5	4.5	30′	0	0
Side	4.5	4.5	30′	0	0
Sit/walk/stand	4.5	5.0	40′	0.5	160.0
Side	5	5.5	25′	0.5	129.03
Sit/walk/stand	5.5	7.0	30′	1.5	295.57
Side	7 cm →		Complete	→	Delivery

position, however, sitting in a chair does not seem to facilitate the progression of labor. In the study contrasting sitting and lying on the side, the efficiency of contractions in the sitting position was significantly less than the side. Unless labor was well established, the parturient's progress was less when she was sitting than when she was on her side. The efficiency of contractions in alternated positions for approximately 30-min time periods was calculated from the change in dilatation per time period divided by the sum of the intensities of the contractions for that period of time according to the following formula:

$$UE = \frac{\Delta \text{ cm cervical dilitation}}{\text{Sum of the intensities of the UCs for that time period (Uterine Work)}} \times 10^5$$

That value is multipled by 10^5 to eliminate the decimal points of a very small number. The answer is a quantity referred to as the Uterine Efficiency (UE) for that time period. An example of the uterine efficiency of the contractions in these two positions for a single parturient provides an interesting contrast of the efficiency of the contractions in the sitting and side positions and of the comparable periods of time when this woman was permitted to walk, sit, and stand (see Table 1). As labor advanced this woman found sitting uncomfortable. Lying on her side was more comfortable, but provided inadequate relief. She asked if she could get up and walk. During the time she was up she changed between sitting, standing, leaning over, and walking. The efficiency of the contractions during those periods of time for this woman was greater than the subsequent period of time in the lateral position, although in contrast to the sitting position, the side position was more efficient.

In the most recent Latin American Collaborative Study [72,73] on maternal position during labor, a homogeneous sample was selected and the women were randomly assigned to an upright position during labor—walking, standing, and sitting with the opportunity to lie down—or a recumbent position in bed. The control (recumbent) and experimental (upright) groups were carefully matched to assure that no other factor other than maternal position was influencing labor progression. There was a significant difference in the duration of labor for primigravidas ($p = .006$) as well as for women of mixed parity ($p = .002$) with labor being shorter in the upright positions by 78 min and 45 min, respectively.[72,73] In a randomized prospective study by Flynn et al.[74] in 1978, 68 women in spontaneous labor were assigned to either an ambulant or a recumbent group. The ambulant parturients were monitored by the use of radiotelemetry and were found to have better uterine activity than the recumbent group reflected in a shorter duration of labor and stronger, less-frequent contractions. The ambulant patients also needed less oxytocin augmentation of their labors.

There are, then, several factors that are influenced by maternal position during labor. Duration of labor, quality of uterine contractions, and maternal hemodynamics have been the primary focus of most observers and investigators. Fetal status and outcome and maternal comfort are the other major considerations.

FETAL STATUS

As indicated earlier, maternal hypotension, fetal hypoxia, bradycardia, and acidosis have been associated with the supine or dorsal positions. Fetal status has also been examined in the upright positions. Mendez-Bauer[68,69] reported the fetal heart rate of women in the standing and supine positions as measured by direct recording by the FHR. Tracings were analyzed for the incidence of Type I dips (early decelerations), Type II dips (late decelerations), and Type I + II (variable decelerations). There was no difference in the incidence of these decelerations in these two positions even though there is greater pressure exerted between the fetal head and the cervix in the standing position compared with the supine. In comparing the fetal heart rates in the lateral recumbent and sitting positions, Roberts[71] also found no difference in the incidence of decelerations. The finding of a lower incidence of Type I dips in the standing position when there is greater pressure against the fetal head raises a question regarding head compression as the only or primary mechanism of Type I dips.[75]

In examining the extent of molding and caput succedaneum in neonates of mothers who labored in upright positions compared to infants of mothers who were confined to bed, Caldeyro-Barcia[73] and Diaz[72] also reported that there was no difference. Flynn[74] found that there was a beneficial effect of ambulation on the fetus and newborn. In contrast to the recumbent group in their study, there

were significantly less fetal heart rate decelerations, greater beat-to-beat variability, and higher 1- and 5-min Apgar scores in the ambulant group. These findings demonstrate the benefits of ambulation during labor and combine this alternative to recumbency with fetal and uterine monitoring. This potential for freedom of movement along with monitoring has been advocated by proponents of telemetric monitoring.[70,76–80] Thus, it is technologically feasible to combine the advantages of ambulation and monitoring during labor.

MATERNAL COMFORT

The findings from the different studies are mixed regarding maternal comfort in an upright position. Chan[59] and McManus and Calder[63] reported that women in their studies did not prefer to remain upright as labor progressed. Mitre[60] and Liu[11] indicated that the women in their studies tolerated labor better when allowed to be semirecumbent in bed. In these studies, however, comfort assessment was not an explicit feature in the research design, and their comments are based on the investigators' impressions and the reports of the clinical staff involved in caring for the women during labor. Mendez-Bauer[28,68–70] did assess comfort as a specific variable in his contrast of the standing and supine positions. Despite the more intense contractions in the standing position, the women reported more comfort when standing than when supine.

Diaz[72] and Caldeyro-Barcia[73] also examined maternal comfort and found that when women were allowed to be in different positions during labor, they reported less or equal pain and greater comfort in the lateral, sitting, and standing positions than in the supine. The ambulant group in Flynn's[74] study required less medication for pain relief than the recumbent group. The mean dose in patients who did need analgesic was also smaller among those who were ambulant.

In Roberts'[71] study the women were asked to contrast their contractions and their comfort as they alternated between sitting in a chair and lying on their side in bed. There was a significant difference and shift in their preference from sitting in early labor to lying on their side in late labor. As indicated, however, the efficiency of uterine contractions was significantly less in the sitting position, especially in early labor, prior to 6-cm dilatation.

While some women are more comfortable in a sitting position in contrast to a lateral recumbent, their less intense contractions may not be favorable for adequate labor progress. How much of a guide to optimal position in labor should maternal comfort be? It seems as though a variety of factors must be considered in selecting an optimal position or in alternating among positions for labor. As Clarke[26] advocated, position *change* may be more important than a single "best" position. It is unlikely that a woman would elect to remain in one position throughout labor. The difference in the woman's preference to sit or move about in early labor and lie down in late labor has been noted by others.[51,54,56–58,81–83] More specifically, Thoms[84] described a point during labor when women may desire to lie down. He wrote:

> They are often up and about or sitting in a rocking chair, relaxing between contractions until the cervix is about three-fifths dilated (6 cm—Robert's study). However, if contractions are vigorous and frequent the woman will find relaxation easier and more effectual while resting in bed.

Some practitioners have required that the woman remain in bed when the cervix is 5–6-cm dilated in order to more closely follow advancing labor.[85,86] While this may be a guideline for safe practice, it would be even better to know how specific positions influence the late as well as early portion of labor. Edgar[51] observed that women assumed various postures at different stages of labor "such as harmonize with the mechanism of labor." These women may also have been guided by their efforts to achieve the least amount of discomfort. It seems desirable to have a valid basis for using positions during labor that are conducive to the progression of labor, to the well-being of both mother and fetus, as well as to maternal comfort.

SUMMARY

The findings of recent research regarding the influence of maternal position during labor is consistent with some historical observations regarding the advantages of upright positions during early labor. Merriman's[52] observation in 1816 that a woman should not remain recumbent—especially supine—for prolonged periods of time seems especially relevant today in light of the adverse effects of supine recumbency on maternal hemodynamics, uterine contractility, and fetal status. The contemporary obstetrical practices of medicating and monitoring women during labor have contributed to recumbency during labor. However, the ability to monitor women with telemetry and the finding that women who are ambulatory require less medication for pain relief will contribute to the use of alternate positions during labor. This requires that we understand more about how specific positions influence labor in order that the selection of alternative position be most conducive to optimal labor progress and fetal outcome and that maternal position also be compatible with the care needs of women in labor.

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189

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190

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191

ALTERNATIVE POSITIONS FOR CHILDBIRTH—
Part II: Second Stage of Labor*

Joyce Roberts, C.N.M., Ph.D.

ABSTRACT

While the lithotomy position is used extensively in American obstetrical settings, it has been criticized because of the physiological and anatomical compromises it imposes on the mother and her fetus at the time of birth. This paper reviews the variety of positions that may be considered as alternatives to the lithotomy position. It also considers the nature of the parturient's expulsive efforts as an additional factor related to maternal position and influencing the duration of second stage as well as fetal/neonatal and maternal status. As in the first stage of labor, a variety of factors are associated with maternal position in contributing to labor outcome.

CONTEMPORARY ALTERNATIVE POSITIONS FOR DELIVERY

Historically, a variety of positions have been used for delivery including standing, kneeling, squatting, semisitting, and lying dorsal or supine. Atwood[1] has reviewed the rationale behind these various positions. Naroll et al.[2] and Newton et al.[3,4] have reviewed the cross cultural preferences for upright positions. Housholder[5] has provided a fascinating historical review of the use of the obstetric chair including the dynamics of role conflicts between midwives and medical practitioners and the influence of social customs.

In a contemporary perspective, there are four basic positions that are utilized for delivery—lithotomy, lateral, semisitting, and dorsal (or modified lithotomy).[6–10] Kneeling is also reported in some circumstances.[11] Since the development of the maternity bed[12] or obstetric table[13] in the 1920's and 1930's, the lithotomy position has been predominantly utilized because it provides easier access to the perineum for obstetrical intervention, enables the nurse or obstetrician to listen to the fetal heart rate (FHR) at frequent intervals, makes the maintenance of asepsis easier, and is a more comfortable position for the person conducting the delivery.[10,14–20] With the use of general or regional anesthesia, the lithotomy position was more conducive to the completion of delivery as well as to the care of an anesthetized parturient. Rovinsky[19] points out that this position is not physiological and may even interfere with the woman's expulsive efforts. However, Danforth[15] maintains that the advantages of the lithotomy position "more than compensate for the somewhat unphysiologic posture and the discomfort of the position itself." While Rhodes[18] acknowledges that the recumbent position used for delivery as well as during labor "is a compromise between the needs of the patient and those of her attendants," the use of the dorsal or lithotomy positions has been criticized because of the adverse effects on maternal hemodynamics and fetal status[1–5,10,17,18,21–29] and the difficulty it imposes for the women who wants to participate more actively in the birth of her infant.

The lateral or Sims position has the advantage of correcting or avoiding the adverse hemodynamic effects of the dorsal or supine position. Some practitioners consider delivery in this position awkward.[6,14,19,30] Others find it conducive to a more controlled delivery and to preservation of the perineum.[7,8,31–36] The lateral position has been preferred by the British for birth[1,5,6,7,9,27,35,36] although British midwifery texts also identify advantages of the dorsal position. Recently, Irwin,[37] an American obstetrician, has advocated the lateral position as an alternative to the supine position for birth. He found this position appro-

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priate for all but difficult forceps delivery or deep episiotomies. In contemporary home births in the absence of anesthesia and obstetrical intervention a variety of positions are utilized for delivery. Mehl[11] reports that home births include the use of the following positions for delivery and the percentage they represent out of the total number of births:

Hands and knees	33.9%
Back (dorsal)	23.1%
Lamaze (semisitting)	19.0%
Lithotomy	15.7%
Side	5.8%
Squatting	1.7%
Standing	0.8%

EMPIRICAL OBSERVATIONS

Many investigators, whose work was reviewed in the previous paper (*JNM* July/August), have examined first and second stage concurrently and attempted to implement an upright or recumbent position throughout labor and for delivery. The findings are inconsistent, and the absence of control of obstetrical variables in some of these studies makes even the conflicting impressions uncertain as to the specific influence of maternal position during second stage. However, an upright, semisitting position, is associated with a shorter, more comfortable second stage[38–41] and with a less acidotic newborn[42] than delivery in supine lithotomy position.

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Not only does there seem to be an advantage and maternal preference to change positions during first stage and between first and second stage, but the descent and expulsion of the fetus during second stage involves different considerations for maternal position at this time. The analyses and studies pertaining primarily to the delivery phase of labor have two major considerations. The first is the optimal alignment of the fetal presenting part for descent, and the use of various postures that favor descent or maximize the capacity of the pelvis. The second consideration is efficient maternal expulsive efforts.

In regards to the first consideration, the Walcher, or hanging leg position, was described in the 10th century and promoted during the 1800's and early 1900's as a position to enlarge the antero–posterior diameter of the inlet and facilitate delivery in obese women.[1,32,43–46] It is no longer used since it is questionable that the inlet of the pelvis is increased and it is difficult for women to maintain a position with their buttocks elevated and their legs hanging at the edge of a table for more than 10–15 min. The squatting position, however, has been shown radiologically to enhance the antero–posterior diameter of the pelvic outlet by 0.5–2.0 cn.[46–49] In addition, the thigh pressure against the abdomen in this position has been associated with the promotion of fetal descent and the correction of unfavorable fetal positions.[43,50–52] The sitting, semisitting, and exaggerated lithotomy position with legs flexed back on the abdomen have been advocated because they retain some of the mechanical advantages of squatting.[7,43,51–53]

F. H. Howard sought to promote a "physiological position" for delivery that approached the squatting position by devising a delivery table that permitted the woman to be tilted up to a 90° angle for delivery.[54–58] He elaborated Newtonian laws of physics as the rationale for this approach; but his reports were observations for his own practice, not experimental studies.

RESEARCH FINDINGS

Studies of maternal position in second stage have been limited by the difficulty of establishing an equivalent control group. Many of the reports, as the recent one on the lateral Sims position by Irwin[37] are a description of a single practitioners experience from his own practice. In 1917, Markoe[52] "experimented" with an obstetric chair. He compared the duration and outcome of nearly 200 deliveries with the number of operations, stillbirths, maternal deaths, or "accidents" in delivery which "might have" occurred in his practice. He endorsed the use of an obstetric chair for achieving a more favorable outcome.

One of the first experimental investigations of position with implications for delivery was carried out by Mengert and Murphy.[59] Their work pertained to the second consideration during this stage of labor, that of efficient maternal expulsive efforts. The experimental design used five nonpregnant women as their own control and intraabdominal pressure created by voluntary muscular effort was measured in seven different positions—squatting, standing, sitting, lateral prone, knee–elbow, recumbent and semirecumbent. Intraabdominal pressure was measured by a vaginal balloon. The average pressures were ranked and a rank order correlation and individual cross correlations were used to compare the positions. In terms of "postural efficiency," the sitting position was considered to be the most efficient for expulsive efforts, and the lateral prone the least. The implications of these findings on nonpregnant women have been inferred to the expulsive efforts required for delivery, and they concur with the measurement of intrauterine pressure

193

achieved by a parturient bearing-down in different positions as reported by Bonica.[60]

Maternal Position	*Intrauterine Pressure*
Lateral	120 mmHg
Supine	125 mmHg
Semirecumbent	135 mmHg
Sitting	150 mmHg

On the basis that an upright position was more conducive to labor progress from Mengert and Murphy's and Howard's work, the Newtons[18,61] studied aspects of second stage in two groups of women, one which delivered their babies propped up with a Fitzhugh[62] backrest, and the other control group which delivered in the lithotomy position. It was found that women in the propped, experimental, group were able to "push" more effectively and that they had a more "positive" "active" part in their deliveries than those who were flat. They further observed that women who delivered in an upright position were more interested in and more responsive to their infants at birth.[18,61–63] This difference in mother–infant interaction associated with a propped position persisted at least 48 hr postpartum as observed by Witek[64] in an experimental thesis study.

The semisitting position has been characterized as the optimum position for childbirth today because it combines some of the advantages of squatting and efficient expulsive efforts with enhanced maternal cooperation and potential comfort. It also allows access to the perineum and abdomen for obstetrical assessment and intervention,[20,26,29,65,66] and eye contact between the parturient and the birth attendants. For these reasons contemporary maternity units are utilizing labor/delivery beds, backrests, or cushions that permit an upright, and even a squatting position, for delivery.[26,29,67–70]

BEARING DOWN DURING THE SECOND STAGE

While an upright position may provide several advantages for delivery, it may not be correct to assume that because an upright position allows for more "efficient" expulsive efforts, that strenuous bearing-down efforts are essential or desirable for optimal delivery outcome. Even though contemporary practice is characterized by long sustained efforts,[8,71] not all practitioners view long strong expulsive efforts as indicated or needed for a timely or efficient delivery.[7,32,72–77]

In 1957, Beynon[78] made a plea to reform this feature of attempting to "speed-up" second stage. In her experience as an obstetrician and in a comparison of conducting second stage with and without bearing down in an aggressive fashion, she observed that bearing down did not shorten second stage and was accompanied by more episiotomies and the use of outlet forceps. Recently, Noble has advocated an approach to maternal "pushing" that combines coordinated expulsive efforts when the urge to push is involuntary with controlled exhaling.[66] This technique was also described by Witzig-Boldt[79] as retarded exhaling as opposed to breathholding. The adverse effects of the Valsalva Maneuver on maternal hemodynamics have been well-documented.[60,80,81] The abrupt and repetitive alterations in venous return, cardiac output, and blood pressure with repeated and prolonged bearing down and breathholding may be stressful for some women, especially a woman with marginal cardiac reserve. In addition, Caldeyro-Barcia[82] has identified hypoxic effects in the fetus in conjunction with the Valsalva phenomena. Weaver et al.[83] also identified that fetal acidosis develops more rapidly if the mother pushes in a supine position and after an epidural block. Hypotension is more pronounced in a supine position after an epidural because in this position maternal bearing down efforts markedly aggravate aortic compression.[84] On the other hand, Pearson[85] found that when maternal expulsive efforts were abolished during second stage by the use of epidural anesthesia, no maternal metabolic acidosis occurred. Bearing-down and the Valsalva maneuver are also known to provoke sympathetic discharge and catecholamine release, along with any concomitant maternal discomfort.[86] The subsequent reduction in uterine blood flow from alpha-adrenergic-mediated uterine vasoconstriction, and from the reduction in cardiac output that results from sustained breathholding, along with maternal acidosis resulting from exertion, may all contribute to fetal compromise. Maternal acidosis and catecholamine release may also diminish uterine activity (beta-adrenergic mediated), and adversely effect labor progression.[87] For these reasons, Caldeyro-Barcia's recommendation that women "push" only in accordance with an involuntary urge and then with short, 6–7 sec pushes, seems physiologically sound; although further study in this aspect of second stage is management is needed.

DURATION OF THE SECOND STAGE IN VERTEX PRESENTATION

Another consideration in the conduct of second stage management is the duration. Traditionally, it has been thought that the upper limits of normal second stage were 2 hr in primigravidae and 1 hr in multigravidae,[88] although the mean values of Friedman were 57 min and 14 min.[89] This is similar to the 41 min and 17 min respectively reported by Studd.[90] In their study of different racial groups 83% of normal primigravidae and 98.5% of normal multigravidae had a second stage of less than 1 hr. Table 1 summarizes the duration of second stage as reported by various investigators. The duration of the

TABLE 1
Duration of the Second Stage

Investigator	Primigravida Mean	Primigravida Median (in Minutes)	Primigravida Mode	Multigravida Mean	Multigravida Median (in Minutes)	Multigravida Mode
Hellman and Prystowsky[88] (1952)		57			20	
Friedman[94,95] (1955)	57	48	36	14	12	6
Cragin[93] (1916)	85			70		
Niswander and Gordon[96] (1972)		30–60			<30	
Studd[90] (1975)	41			17		
Abgoola and Agobe[91] (1976)	25.5	20.4	10.3	14.5	12.5	8.6
Sokol[99] (1977)	44.2	33	20	14.8	8.5	5.0
Roemer[97,98] (1977)		33			13.7	
Bergsio, Bakketey, and Eikhom[92] (1979)		16			10	

true length of second stage is of considerable clinical interest because fetal acidosis has been shown to become more pronounced the longer the time between complete dilatation and delivery.[96–98,100–103]

While some authorities[10,16,20,88] recommend termination of the second stage after a 30 min to 2 hr time period, others[97,104] maintained that an arbitrary termination of second stage is not necessary. Based on infant outcome at birth as reflected in the Apgar score and cord pH, these practitioners indicate that maternal status, fetal status and rate of descent should be the basis of individualizing delivery management rather than employing operative intervention to prevent asphyxia. Abnormal descent and fetal distress, however, are indications for intervention. As indicated earlier, descent may be influenced by maternal position. Maternal position at birth also influences the condition of the fetus and the infant at birth. Analyses of fetal scalp[105,106] and cord pH[42] indicated that in a dorsal or lithotomy position the infant was more acidotic than in a semisitting or lateral-tilt position.

A factor in fetal and newborn acidosis may not only be the duration of second stage and maternal position, but also the duration of strenuous bearing down by the parturient. The German and Swiss obstetricians[97,98,107] who have studied fetal response to the second stage of labor differentiate the period of complete dilatation to delivery from the "press period" or "final stage" of labor. This period of time is when the mother is bearing down during contractions. Not only is it recognized by European and British practitioners that bearing down does not usually accompany nor characterize the entire second stage, but that the duration of the "bearing-down period" plays a more important role in influencing fetal outcome than the duration of the whole second stage of labor.[98]

It is not certain how the type of bearing down, i.e., long or short pushes, breathholding or exhalation, influences the duration of second stage, although Beyron's[78] observations suggest that involuntary pushing with minimal "straining" was accompanied by fewer episiotomies and forcep deliveries. Apparently there was no increase in the duration of second stage. Caldeyro-Barcia[82] reported that second stage was longer when women in his study pushed only in response to an involuntary urge for 4–7 sec duration, but that the infants were less acidotic at birth. He thought that the slower descent of the fetus may also be beneficial in allowing gradual distention of the perineum and thereby minimizing the incidence of lacerations and need for episiotomy. Therefore, the nature and duration of the woman's bearing-down efforts are important to consider in the conduct of second stage.

CONCLUSIONS

As in first stage, a variety of factors converge on second stage along with maternal position as factors that need to be considered in achieving an optimal delivery outcome. This review has focused on the parturient's position and on her bearing-down efforts. From what is known, a semirecumbent position and bearing-down efforts that are short and in accordance with an involuntary urge are most conducive to a favorable delivery outcome. In addition, some circumstances may find a lateral, Sims, position or hands and knees more comfortable or convenient for delivery. These two positions have the advantage of avoiding fetal compromise from aortocaval compression. In addition, fetal position is an important consideration which has not been examined scientifically in conjunction with maternal position and labor progression although posterior positions have been shown to prolong labor.[89,108] Maternal comfort, fetal well-being, and the woman's need for any other therapeutic measure also interact to influence maternal position and achieve a delivery outcome that is both safe and satisfying.

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GUIDELINES FOR A STATE LEVEL APPROACH FOR OBTAINING THIRD PARTY REIMBURSEMENT

1. Obtain state insurance laws and ascertain current state insurance commission language governing eligible professionals. (Probably will need assistance of legal counsel in obtaining or interpreting laws and regulations, and in representing you in hearings). Include state medicaid reimbursement mechanisms in your research.
2. Devise an action plan with assistance from local counsel, Professional Affairs Committee, and Legislation Committee.
   A. Open language
      1. Request a hearing before State Insurance Commission to present credentials (ACNM definitions; F, S, & Q, State licensure laws, practice information as approved policies, organization charts, hospital privileges, medical backup).
      2. Provide suggested language or participate in formulating language. (Professional Affairs can provide copies of Utah and Arizona language, as well as suggestions).
   B. Prohibitive Language
      1. Request a hearing with State Insurance Commission to ascertain:
         a. Other interpretations of existing language, support for that interpretation and implementation.
         b. Support by the Commission for new legislation.
      2. Examine licensing provision
         a. Will existing language permit CNMs to function in a compensable manner?
         b. Do you function independently in a way which supports your claim, i.e., legally provide full service with qualified medical back-up, sign birth certificates & orders, etc.? (Again, Professional Affairs and Legislation Committees can assist in evaluation of existing laws).
      3. Identify supportive groups and form a coalition to support new insurance legislation (and licensure legislation changes, if necessary).
         a. Professional groups or individuals—obstetricians, nurses, nurse practitioners, health centers, hospitals.
         b. Consumer groups—Local NOW, Womens's Health Networks, ACNM Ad Hoc Committee on Consumer Affairs, etc.
         c. Regional Health Systems Agencies
      4. Find a sponsor for new legislation and work for passage.
   C. Keep records of activities for future documentation and membership education.
   D. Keep Professional Affairs and Legislation Committees apprised of activities.
   E. Apply for reimbursement under existing or new legislation and inform Professional Affairs of denials for further help.

Developed by the ACNM Legislation and Professional Affairs Committees
Approved by ACNM Board of Directors, February, 1980

198

SPECIAL ARTICLE

OUTCOMES OF CARE IN BIRTH CENTERS

The National Birth Center Study*

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Abstract We studied 11,814 women admitted for labor and delivery to 84 free-standing birth centers in the United States and followed their course and that of their infants through delivery or transfer to a hospital and for at least four weeks thereafter. The women were at lower-than-average risk of a poor outcome of pregnancy, according to many but not all of the recognized demographic and behavioral risk factors.

Among the women, 70.7 percent had only minor complications or none; 7.9 percent had serious emergency complications during labor and delivery or soon thereafter, such as thick meconium or severe shoulder dystocia. One woman in six (15.8 percent) was transferred to a hospital; 2.4 percent had emergency transfers. Twenty-nine percent of nulliparous women and only 7 pe cent of parous women were transferred, but the frequenc of emergency transfers was the same. The rate of cesa ean section was 4.4 percent. There were no matern deaths.

The overall intrapartum and neonatal mortality rate wa 1.3 per 1000 births. The rates of infant mortality and lo Apgar scores were similar to those reported in large stuc ies of low-risk hospital births.

We conclude that birth centers offer a safe and accep able alternative to hospital confinement for selected preg nant women, particularly those who have previously ha children, and that such care leads to relatively few cesa ean sections. (N Engl J Med 1989; 321:1804-11.)

BIRTH centers are nonhospital facilities organized to provide family-centered maternity care for women judged to be at low risk of obstetrical complications. The first birth centers were developed to serve rural communities. In 1975, the Maternity Center Association established the first urban birth center in New York City.[1] As of 1987, at least 240 other centers had opened, although many subsequently closed, primarily because of the liability-insurance crisis. Most states now regulate birth centers by licensure, a program of accreditation has been established, and the services of birth centers are covered by most health care insurance plans.

Safety is the major concern. Previous studies of birth centers have been retrospective and relatively small.[2-14] In 1982 an Institute of Medicine committee concluded that reliable information about the relative safety and efficacy of all birth settings was lacking. It recommended research to include "well-conducted prospective descriptive and observational studies."[15] Statements from the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists discouraged the use of birth centers unti better data were available.[16] Because few poor out comes would be expected among women who hac been screened to exclude those with recognizabl high-risk conditions, a large study was needed to describe the outcomes of birth-center care accurately The National Birth Center Study was designed to respond to the recommendations of the Institute o Medicine committee and to address the concerns o the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics. It is a nationwide prospective descriptive study of the care provided in free-standing birth centers. This report examines the labor, delivery, follow-up care, and outcomes of 11,814 women who were admitted in labor to 84 birth centers from mid-1985 through 1987.

METHODS

Recruitment of Birth Centers

The National Association of Childbearing Centers maintains a master list of U.S. birth centers known to its staff. In early 1985, the association invited all 134 centers on its list to participate in the study, which was due to begin in June of that year. Six centers tha opened or became known to the association during the remainder o 1985 or during 1986 were also asked to join the study. Of the 140 centers invited to participate, 89 centers in 35 states actually did so Between November 1986 and July 1987, 80 of these centers were visited in order to evaluate their data-collection procedures and the completeness and reliability of their data. The remaining nine centers either had not yet entered the study or had closed before the site visits were completed. Data from these nine centers were included in the analyses. Five centers were excluded from the study before the analysis of data because the site visits showed that either they had not enrolled all their patients or the data from their clinical records were not sufficiently consistent with recorded observations. Thus, this study is based on data from 84 birth centers.

In early 1987, we obtained lists of all birth centers known to the health authorities of 45 states. Before obtaining these lists, the National Association of Childbearing Centers knew of 140 centers, of which only 8 were located in the five states that did not provide the information requested. The state authorities listed 20 free-standing birth centers not previously included on the association's master

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199

list. Of the combined total of 160 centers known to either the state authorities or the association, 84 (52.5 percent) were included in this study.

Sixty of the 84 centers were operated by certified nurse-midwives, 11 by obstetrician-gynecologists, 6 by family practitioners or other physicians, 3 by licensed or lay midwives, 3 by obstetrician-gynecologists and certified nurse-midwives, and 1 by a team of certified nurse-midwives and lay midwives. As compared with the centers studied, other birth centers known to be in operation from 1985 through 1987 were more likely to be located in Western states, to be run by lay midwives or physicians other than obstetricians, to serve many low-income clients, and to be unaccredited and unlicensed by the state.

Data Collection and Analysis

The staff members at the participating centers told each prospective patient about the study and indicated that although the patient would not be identified personally, data about her pregnancy and care would be included. If a woman did not want information about her pregnancy to be so used, she was free to terminate her relation with the birth center. However, none did so. The procedure used to protect the privacy of the study subjects was approved by the research committee of the Maternity Center Association.

Data on each woman in the study were recorded on a prenumbered four-part form. Each participating center was given enough forms to serve the total number of clients it anticipated over a one-year period. Part I was used to collect demographic data and information on risk factors and was completed after the first prenatal visit. Part II, which included information about prenatal care and complications, was completed either when the woman was admitted to the birth center for intrapartum care or when she discontinued her care before such admission. Part III asked for information on care and complications during labor and birth and immediately afterward, the circumstances of and reasons for any transfer to a hospital, and care received during hospitalization by those transferred; it was completed at discharge from the hospital or birth center. Part IV covered care and complications during the postpartum and neonatal periods and the mother's evaluation of her own care at the birth center; it was completed when she returned at four to six weeks for her postpartum examination. Of the women who were transferred to hospitals during or immediately after labor and delivery, 60 percent returned to the birth centers for a postpartum visit. Information about the time required to transport women or their infants to a hospital was collected for a sample of 20 percent of the women who were transferred (387 women). The centers made special efforts to follow the care of infants who were in fair or poor condition at discharge from the birth center.

Information was gathered on the occurrence and severity of 29 specific intrapartum and immediate postpartum and neonatal complications. Each complication was assigned a score of 1 to 3 to indicate its seriousness with respect to the risk of death or permanent damage. The complications were also scored from 1 to 3 to reflect the need for an urgent transfer to hospital care. Complications that received a score of 3 on both scales, such as the presence of thick meconium or sustained fetal distress, were regarded in this analysis as serious emergencies that occurred in the birth center. The scoring system (available on request) was based on current literature and the advice of the study's advisory committee and other experienced clinicians.

The collection of data in each center was supervised by a designated staff member who had been trained in regional group meetings and with whom frequent contact was maintained by telephone. The forms were completed by the care providers. The completed forms were returned monthly, read by optical scanning, edited for inconsistency or incompleteness, and updated after the centers were contacted for corrections. Selected data from the five excluded centers were examined to determine whether the exclusions had influenced the major results of the study.

Study Subjects

Initial and ongoing screening and triage are an underlying principle of care in free-standing birth centers. A cohort of 17,856 women was enrolled in the study, but 6042 of the women (33.8 percent) were never admitted to birth centers for intrapartum care. Referral to a hospital for prenatal complications was the main reason (in 2557 women) for the discontinuation of birth-center care. Other women discontinued such care because their centers closed or the women moved, changed their minds, were not pregnant, abortions. This paper describes the results in the remaining women (66.2 percent of those initially enrolled) who were [illegible] admitted to birth centers for intrapartum care. All health [illegible] reported include those of the women and infants who were transferred from the birth centers to hospitals during or soon after labor and delivery, as well as those of the women who gave birth in the centers.

Results

Prenatal Screening and Referral

The women who received intrapartum care in the 84 birth centers made an average of 11.3 prenatal visits to the centers. All but 2.6 percent had at least four visits. Twenty-nine percent had complications of some type during prenatal care. The most common complications were urinary tract infections, anemia, and transient hypertension.

Characteristics of the Women

Table 1 compares the women admitted to the birth centers for labor with all women who gave birth in the United States in 1986, according to nine demographic and behavioral variables associated with perinatal risk, as well as the gestational age and birth weight of their infants. The women who used birth centers were less likely than their counterparts in the general population to smoke, drink alcohol, or be black, unmarried, poorly educated, or under 18 years of age, although a higher proportion of the birth-center patients [illegible] Hispanic. (Four centers accounted for more [illegible] percent of the Hispanic women.) The patient[illegible] the birth centers were more likely to have finished college and somewhat less likely to be poor or in a parity grouping associated with high risk — that is, with [illegible] first baby or a sixth or subsequent pregnancy. The birth-center patients were less likely to have started prenatal care during the first trimester but were also less likely to have waited until the last trimester. Almost all the women had adequate diets during pregnancy; 1.5 percent reported the use of marijuana or other illegal drugs.

Birth Weight and Gestational Age

The birth-center patients had fewer preterm or low-birth-weight babies and a higher proportion of large infants than their counterparts in the general population. Most birth-center patients who had preterm labor or intrauterine growth retardation had been referred directly to hospitals and therefore were not included among the women in this report. Thus, the low incidence of low birth weight in this study cannot be interpreted to result from the prenatal care at the birth centers.

Type of Practitioner

Certified nurse-midwives or students of nurse-midwifery provided care during 78.6 percent of the [illegible] and 80.6 percent of the births that occurred [illegible] centers. Physicians, primarily obstetricians, p[illegible]ded

Tab'e 1. Characteristics of 11,814 Women Admitted to Birth Centers in Labor, 1985 to 1987, and of All U.S. Women Who Gave Birth in 1986.

Characteristic	Women in Birth Centers	All Women Who Gave Birth*
	percent	
Age (yr)		
<18	2.3	4.7
18–34	89.9	88.3
≥35	7.8	7.0
Years of education†		
<12	12.4	15.5
12	32.3	43.7
13–15	23.5	22.1
≥16	31.8	18.7
Unmarried	12.3	23.4
Race or ethnicity‡		
Non-Hispanic white	78.4	68.1
Black	3.9	16.5
Hispanic	16.3	11.0
Other	1.3	4.4
Low economic status§	24.9	27.0
Parity		
0	39.3	41.6
1	33.4	33.0
2–4	25.8	23.7
5–10	1.5	1.7
Trimester of first prenatal care¶		
1st	61.7	75.9
2nd	34.9	18.1
3rd or no care	3.4	6.0
Cigarettes/day during pregnancy‖		
None	90.3	74.5
1–10	5.9	12.0
≥11	3.8	13.5
Drinks/wk during pregnancy‖		
None	88.7	60.9
<3	10.8	35.9
≥3	0.5	3.2
Gestational age of infants (wk)		
<37	2.4	10.0
38–41	86.2	76.3
≥42	11.4	13.7
Birth weight of infants (g)**		
<2501	0.8	6.8
2501–4000	82.8	82.1
>4000	16.4	11.1

*Data are from the National Center for Health Statistics.[17]

†Among women over 18 years of age.

‡Estimated for all U.S. women who gave birth from the 1980 and 1986 U.S. Census and vital-registration data (and Ventura S, National Center for Health Statistics: personal communication).

§Data on all U.S. women who gave birth are from the *Federal Register*.[18]

¶Data on women in birth centers exclude women who transferred to birth-center care after receiving some antepartum care through another provider.

‖Data refer to 1980 birth cohort as studied by Prager et al.[19]

**The distribution of U.S. births includes births <2500 g in the low-birth-weight category, whereas the birth-center data are divided to include birth weights <2501 g in the lowest category.

care during 9.9 percent of the labors and 16.0 percent of the deliveries at the birth centers. Midwives who were not certified nurse-midwives cared for 3.8 percent of the women in labor and 3.0 percent during birth. Registered nurses managed 7.7 percent of the labors and 0.4 percent of the births.

Intrapartum Care

Only 1.3 percent of the women had artificial rupture of membranes or were given oxytocin to induce labor. Forty-two percent were given some treatment to augment the forces of labor; 32.4 percent had artificial rupture of membranes before 5 cm of cervical dilatation, 7.7 percent had nipple stimulation, and 1.4 percent received oxytocin. However, 10.5 percent of al women in labor were diagnosed as having "failure tc progress"; instead of stimulating their labors with ox ytocin, the centers transferred 83.3 percent of thes women to hospital care.

Fifty-two percent of the women had fewer thar four vaginal examinations, 14.7 percent had intrave nous infusions, and 9.3 percent had enemas. The feta heart rate was monitored by portable Doppler ultraso nography in 87.2 percent of the women; in 7.5 per cent the fetus was monitored electronically (inter nally in 1.1 percent). All but 5.0 percent drank or at while in labor at the birth center; 43.4 percent too showers, baths, or both, and 34.6 percent were giver body massage. Ninety-seven percent were accompa nied by friends or family members, often includin young children.

Twenty-four percent of the nulliparous women anc 6.2 percent of the parous women received an analge sic, tranquilizer, or sedative during labor. Three per cent of the women were given anesthetics other thar local infiltration for an episiotomy or for repair of lac eration. Pain relief was inadequate in 2.4 percent o the women, 66.2 percent of whom were transferred tc hospitals.

Of the women who gave birth in the centers, 99.- percent had spontaneous vaginal deliveries. Vacuum extractors were used to assist delivery in 0.4 percent and forceps were used in 0.2 percent. Forty-three per cent of the women were in an upright or semiuprigh position for delivery (37.8 percent sitting, 3.6 percen squatting, and 0.8 percent standing), 29.0 percen were on their sides, and 21.3 percent were supine or i the lithotomy position.

More than a third of the women (34.2 percent) de livered with an intact perineum, and 17.6 percent ha an episiotomy without a laceration. The remainin women had lacerations: 45.7 percent had first- or sec ond-degree, 1.6 percent had third-degree, and 0.8 per cent had fourth-degree lacerations.

Complications in the Birth Centers

Twenty percent of the women and their babies ha no complications during labor, delivery, or the imme diate postpartum and neonatal period. Another 50. percent had complications that posed no inherent ris of death or permanent damage, such as transien fet distress, failure to progress, maternal temperature be low 37.8°C, less than fourth-degree perineal lace ations, and minor congenital anomalies. Somewha more serious complications, such as maternal tem perature above 37.8°C, birth weight above 4499 g moderate shoulder dystocia, retained placenta, an hypertension, occurred during labor and delivery i 21.3 percent of the women.

One or more serious emergency complications oc curred in the birth centers in 7.9 percent of the moth ers or their infants. Table 2 shows the frequency c these serious emergency complications and the pe centages of the women or infants with each type c complication who were transferred to hospitals. Eac complication was categorized as "usually requirin

201

Table 2. Incidence of Serious Emergency Complications in Birth Centers and Transfer Rate for Women and Infants with Each Complication.

Complication	Incidence	Transfers to Hospitals
	no. (%)*	no. (%)
Labor		
Thick meconium	484 (4.1)	210 (43.4)
Sustained fetal distress	211 (1.8)	132 (62.6)
Abruptio placentae	24 (0.2)	5 (20.8)
Prolapsed cord	4 (0.03)	4 (100.0)
Delivery or immediate postpartum		
Postpartum hemorrhage requiring transfer	50 (0.5)	50 (100.0)
Severe shoulder dystocia	15 (0.15)	2 (13.3)
Nonvertex presentation diagnosed at birth	6 (0.06)	1 (16.7)
Multiple gestation diagnosed at birth	4 (0.04)	1 (25.0)
Postpartum eclampsia	1 (0.01)	1 (100.0)
Immediate neonatal		
Cyanosis	66 (0.7)	25 (37.9)
Intrauterine pneumonia or other infection	57 (0.6)	32 (56.1)
5-Minute Apgar score <7	55 (0.5)	27 (49.1)
Great effort required to establish respirations	38 (0.4)	10 (26.3)
Serious congenital anomaly	38 (0.4)	17 (44.7)
Suspected aspiration of meconium	21 (0.2)	17 (81.0)
Birth weight <2001 g	6 (0.06)	1 (16.7)
Total†	928 (7.9)	437 (47.1)

*For complications during labor, percentages are based on data for all 11,814 women admitted to birth centers in labor, minus small but varying numbers of women for whom information was missing. For complications during delivery and the immediate postpartum and neonatal periods, percentages are based on the 10,350 births that occurred in or on the way to birth centers or on the way to hospitals, minus small but varying numbers of women for whom information was missing.

†The total number of mothers or infants with emergency complications is less than the sum of the incidence rates for each complication because 119 women had two or more serious emergency complications.

immediate hospital care for optimal treatment" according to the scoring system developed for this analysis. However, only 47.1 percent of the women or infants were actually transferred. When serious complications occur close to the time of birth, there may not be enough time to transfer the patient until after the crisis has passed; then, if the complication has been managed successfully, there may be no need for transfer. The numbers and percentages shown in the table include only complications that occurred in the birth centers and thus do not include the low Apgar scores of infants born in hospitals after a transfer.

We looked for associations between the occurrence of serious emergency complications and the presence of either recognized demographic and behavioral risk factors or specific prenatal complications. None of these factors were predictive of complications in this population, which had already been screened during prenatal care.

Intrapartum, Immediate Postpartum, and Newborn Transfers

Of the 11,814 women admitted to birth centers for intrapartum care, 15.8 percent were transferred to hospitals during or soon after labor and birth. Table 3 shows data on these transfers according to subject (mother or infant), timing of the transfer, and urgency. Three fourths of the transfers took place before delivery (11.9 percent of the women admitted to birth centers for intrapartum care): 57.5 percent of the transfers before delivery were attributed to failure to progress, 13.4 percent to the presence of meconium in the amniotic fluid, and 10.0 percent to fetal distress. In addition, 0.8 percent of the postpartum mothers and 1.7 percent of the newborn infants were transferred. Hemorrhage and a retained placenta were the two most frequent reasons for the transfers of postpartum mothers; respiratory distress was the usual reason for the transfers of newborns. Of the total number of mothers and infants, 2.4 percent were transferred under circumstances that the care provider considered to constitute an emergency. Among the sample of 387 women and newborns for whom information was collected on the time required to complete a transfer, 39.7 percent of those considered to have emergency complications were in transit for fewer than 6 minutes, and 13.7 percent were in transit for more than 15 minutes.

Nulliparity was associated with an increased likelihood of transfer: 28.9 percent of the nulliparous women or their infants were transferred, but only 7.3 percent of the parous women. The transfer rates were similar among parous women of higher or lower parity. Failure to progress accounted for 52.0 percent of the transfers of nulliparous women and 20.9 percent of the transfers of parous women. Fifteen percent of 4610 nulliparous women were transferred for this reason, as compared with 1.5 percent of 7121 parous women.

Cesarean Sections

The overall rate of cesarean section was 4.4 percent. The most common reasons for performing a cesarean section were failure to progress (64.8 percent), fetal distress or the presence of meconium in the amniotic fluid (16.5 percent), and a nonvertex presentation (4.6 percent). The percentage of nulliparous women who had cesarean sections was 9.9 percent: 8.2 percent for failure to progress and 1.7 percent for other reasons. Among the parous women, 0.6 percent had cesarean sections because of failure to progress and 0.2 percent for other reasons. Among 1405 women trans-

Table 3. Transfers among 11,814 Women Admitted to Birth Centers for Intrapartum Care, According to Timing, Subject (Mother or Infant), and Determination of Emergency Status.

Timing and Subject	No. (%) of Transfers*	
	Emergency	All
Before delivery	177 (1.5)	1405 (11.9)
1st Stage of labor	111 (0.9)	1119 (9.5)
2nd Stage of labor	66 (0.6)	263 (2.2)
Stage unknown	0 (0.0)	23 (0.2)
After delivery	83 (0.7)	294 (2.5)
Maternal transfers	42 (0.4)	100 (0.8)
Newborn transfers	41 (0.4)	194 (1.7)
Timing unknown	24 (0.2)	170 (1.4)
All	284 (2.4)	1869 (15.8)

*Percentages refer to all 11,814 subjects.

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ferred to hospitals before delivery, 37.1 percent had cesarean sections.

Among the women who had cesarean sections, 115 (22 percent) had eaten solid food during labor. None of them aspirated the contents of the stomach while under anesthesia. The expected incidence of such aspiration (about 1 per 2000 in patients who underwent general anesthesia[20]) is such that the practice of eating during labor must still be questioned, despite the absence of complications observed in this sample.

Patient Satisfaction

Of the women who received intrapartum care in birth centers and were not transferred, 75.7 percent completed evaluations of their care. Of these, 98.8 percent stated that they would recommend the center to friends, and 94.0 percent indicated that they would use the birth center in another pregnancy. Of the women who were transferred, 54.1 percent completed evaluations; 96.9 percent said they would recommend the birth center, and 83.3 percent said they would return to the center for a subsequent birth.

Follow-up

Eighty-three percent of the women had a postpartum examination or other visit at the center four to six weeks after the birth. Among the 2046 women who did not make such a visit (17.3 percent), all but 26 had babies who were in good condition at discharge from the birth center or hospital. We tried to determine whether any of these 26 infants had died but were unable to obtain at least a part of the necessary information about each infant, in most instances because the birth center had closed, key staff members had moved, and the log book linking the study numbers to the records of the individual mothers could not be located. However, staff members at the seven centers that had cared for the mothers of 14 of these infants certified that their centers had never had an intrapartum stillbirth or a maternal or neonatal death. Five of the remaining 12 infants were born in hospitals after the mothers had been transferred because the labor failed to progress; 3 others were transferred as neonates for respiratory distress but had normal birth weights and five-minute Apgar scores of 7 or higher. Although the lack of identifying information precluded a review of their hospital records, it is unlikely that any of these eight infants died. Four infants remain for whom a safe neonatal outcome cannot be demonstrated: one whose mother was transferred to the hospital during labor because of thick meconium but not as an emergency; two born in birth centers and not transferred; and one born in a birth center and then transferred to a hospital.

Outcomes

Apgar scores and mortality rates were used as measures of final outcome. There were 11,814 mothers and no maternal deaths. Among the babies, 0.6 percent had five-minute Apgar scores below 7. There were 11,826 births and a total of 15 intrapartum or neonatal deaths, of which 7 were due to the presence of lethal congenital anomalies (Table 4). The rate of intrapartum death (stillbirth) was 0.4 per 1000 births (0.3 if the deaths from lethal congenital anomalies are excluded) (Table 5). The neonatal mortality rate was 0.8 per 1000 births (0.3 if the lethal congenital anomalies are excluded). The overall mortality rate, including intrapartum and neonatal deaths, was 1.3 per 1000 births (0.7 if the lethal anomalies are excluded). The circumstances leading to the eight deaths not associated with lethal congenital anomalies are shown in Table 4.

Discussion

We believe that despite the lack of a control group, this descriptive study provides meaningful results in the context of historical data on low-risk hospital birth. The difficulties of obtaining an appropriate control group for a large prospective study of alternative birth settings are discussed in the 1982 report of the Institute of Medicine, "Research Issues in the Assessment of Birth Settings."[15]

Table 5 shows the outcomes in this study and in five earlier studies of low-risk hospital deliveries.[21-25] Although the studies span a period of 17 years, no time trend is apparent. Most of the reduction in neonatal mortality during this period has been due to the improved survival of preterm infants with low birth weight,[26] who were excluded from each of the hospital studies. Although no group of hospital patients is completely comparable to the women in our study, the other studies excluded not only low-birth-weight infants but also twins, nonvertex presentations, repeat cesarean sections, and women with ma-

Table 4. Intrapartum and Neonatal Deaths among 11,826 Infants (Including 12 Sets of Twins) of Mothers Receiving Intrapartum Care at Birth Centers.

Category of Death	Number
Total intrapartum and neonatal	**15**
From lethal congenital anomalies (1 intrapartum, 6 neonatal)	7
From other causes	8
Intrapartum	4
Term pregnancy, partial placenta previa, abruption (died in birth center)	
Term pregnancy, transfer during first stage of labor because of thick meconium and sustained fetal distress (died in hospital)	
Post-term pregnancy, placental abruption (died in birth center)	
Post-term pregnancy, mother had low-grade fever and preeclampsia during labor (died in birth center)	
Neonatal	4
Term pregnancy, sustained fetal distress, transferred during first stage of labor, born in hospital with intrauterine pneumonia and pneumothorax (died in hospital)	
Term pregnancy, prolonged rupture of membranes, born in birth center, developed respiratory distress, transferred, pneumonia with hyaline membrane disease (died in hospital)	
Post-term pregnancy, thick meconium and sustained fetal distress, transferred during first stage of labor, born in hospital, five-minute Apgar score of 3 (died in hospital)	
Term pregnancy, uncomplicated labor, born in birth center, five-minute Apgar score of 10, death at one week of age, autopsy revealed no cause of death (died at home)	

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Table 5. Outcomes in Five Studies of Low-Risk Hospital Births and in the National Birth Center Study.

Source of Data*	No. of Births	No. of Deaths per 1000 Births†			Infants with Five-Minute Apgar Scores <7	Births by Primary Cesarean Section
		Intrapartum	Neonatal	Total		
					percent	
Beth Israel Hospital, Boston, 1969–1975[21]	12,055					
Lowest-risk women						
With monitoring		Unreported	1.1	Unavailable	—	—
Without monitoring		Unreported	0.5	Unavailable	—	—
Community hospital, Cincinnati, 1974–1975[22]						
Normal pregnancies						
All	4,144	1	3.4	4.3	—	—
With monitoring	2,293	0	0.9	0.9	—	—
National Natality Survey, 1980 (low-risk births)[23]	2,935	Unreported	2.5	Unavailable	1	8.4
University of Illinois and 11 surrounding hospitals, 1982–1985[24]						
Uncomplicated term births						
All	8,135	0	2.1	2.1	0.8	8.3
Without anomalies		0	1.9	1.9		
Uncomplicated post-term births						
All	3,457	0	2.6	2.6	1.7	17.6
Without anomalies		0	2.1	2.1		
Parkland Memorial Hospital, Dallas, 1982–1985[25]	14,618	0	1	1	0.2	—
84 U.S. birth centers, 1985–1987‡						
Infants of women admitted for intrapartum care						
All	11,826	0.4 (5)	0.8 (10)	1.3 (15)	0.6	4.4
Without anomalies		0.3 (4)	0.3 (4)	0.7 (8)		
Term births						
All	9,871	0.2 (2)	0.7 (7)	0.9 (9)	0.6	4.1
Without anomalies		0.2 (2)	0.3 (3)	0.5 (5)		
Post-term births§						
All	1,306	1.5 (2)	2.3 (3)	3.8 (5)	1.2	7.3
Without anomalies		1.5 (2)	0.8 (1)	2.3 (3)		

*Monitoring denotes electronic fetal monitoring, and anomalies denotes lethal congenital anomalies

†Values in parentheses are actual numbers of deaths.

‡The number of term and post-term births shown for the birth centers is less than the total number of births because gestational age was unknown for 649 infants. The number of term and post-[illegible] deaths is also less than the total number of deaths because one preterm infant died of a congenital anomaly

§Births after 42 or more weeks of gestation.

jor medical or prenatal complications. Neutra et al. stratified 15,846 live births at Beth Israel Hospital in Boston into five categories of risk.[21] The data shown are for the group at lowest risk and exclude deaths from congenital abnormalities. Amato's 4144 "normal" patients included only 57 percent of the maternity patients at a community hospital in Cincinnati.[22] He also excluded women with meconium-stained amniotic fluid or a postmature infant and those who had had stimulation with oxytocin or prolonged rupture of the membranes. The National Natality Survey conducted in 1980 by the National Center for Health Statistics was based on a probability sample of 9941 live births in the United States during that year.[23] Besides the exclusions listed earlier, the survey file was culled to exclude mothers who smoked more than 10 cigarettes per day, had more than three alcoholic drinks per week, had fewer than four prenatal visits, or were unmarried, black, or under 18 years old (Keppel K, National Center for Health Statistics, personal communication). Eden et al. screened 60,456 births at 12 hospitals in a midwestern perinatal-referral network to identify 11,592 uncomplicated term and post-term pregnancies in women between 16 and 39 years of age.[24] Leveno et al. identified 42 percent of 34,995 births at Parkland Memorial Hospital, in Dallas, as low risk.[25]

The proportion of low Apgar scores and the total mortality rate among infants born to women attending birth centers were in the same range as those in the five earlier studies. Our findings differed in two ways. The rate of cesarean section in the birth-center patients was roughly half that in the two studies that reported such information, and half the deaths in our study that were not caused by congenital anomalies occurred intrapartum, whereas there was only one intrapartum death in the three other studies that reported on this outcome. The higher incidence of intrapartum stillbirth at the birth centers was offset by a lower incidence of neonatal death, and the overall likelihood of a poor outcome was not higher among the infants of birth-center patients. It is possible that in a hospital the ability to deliver rapidly a fetus that is in distress during labor shifts some deaths from the intrapartum to the neonatal period.

We examined several sources of error that could have biased our findings. We do not know the outcomes of four infants and cannot exclude the possibility that one or more of them may have died. If all f[illegible] died, the total mortality rate would increase by 0.3

204

deaths per 1000 births. The mortality rate at the 5 centers that were excluded because they did not conform to study standards was 7.2 per 1000, much higher than the rate at the other 84 centers. If these five centers had been retained in the study, the total mortality rate would have increased by another 0.3 per 1000 births. If in addition the four infants were assumed to have died, the total mortality rate would have reached 1.9 per 1000 births — still within the range reported for low-risk hospital births.

The birth centers included in this study may be safer than those not included. Centers not known to the National Association of Childbearing Centers have less access to continuing education relevant to the safety of birth-center care and may be less influenced by national standards. Fewer of the nonparticipating centers were licensed or accredited. Although the majority of birth centers in the United States participated in this study, they are probably unrepresentative of all birth centers in the same way that academic medical centers are unrepresentative of all hospitals. Among the five studies of low-risk hospital births, the lowest mortality rates were reported by the two academic medical centers.

As in most other multicenter studies, the data were collected by the care providers. Although this procedure creates a potential for bias, the findings during the site visits, the congruence between the study data and information from sample clinical records from each center, and the internal consistency of the data suggest that the data are reliable.

We found the neonatal mortality rate to be lower than that reported in previous multicenter studies of birth centers. Bennetts and Lubic reported a neonatal mortality rate of 4.6 per 1000 births among 1938 women cared for in 11 nurse-midwifery centers from 1972 through 1979.[12] Eakins and Richwald found 4 neonatal deaths per 1000 births among 2002 admissions to 16 birth centers in California in 1984.[13] The National Association of Childbearing Centers calculated a neonatal mortality rate of 2.5 per 1000 deliveries from reports of births at 102 birth centers in 1983.[14] The lower rate in our study may indicate a trend toward greater safety, reflecting the implementation of state regulation and licensure, accreditation, peer review, and programs of continuing education within the past five years.

The birth centers used few invasive, uncomfortable, or restrictive procedures and took many measures to provide comfort and support to the women during labor. Although in individual cases specific procedures and treatments are beneficial or necessary, each carries potential risk.[27-53] Further study is needed to evaluate the effect of the birth-center approach on health outcome, cost, and patient satisfaction.

The combination of good outcomes and few cesarean sections found in this study is not unique and has been reported in studies of hospital-based nurse-midwifery care[5-6] and at the National Maternity Hospital in Dublin, Ireland.[62-64] The latter has achieved these outcomes through the implementation of a uniform protocol for the use of oxytocin whenever the rate of cervical dilatation is less than 1 cm per hour in a nulliparous woman. In our study, the outcomes were achieved in free-standing birth centers.

Birth centers offer a savings in cost[65,66] and minimize the rate of cesarean section. Some centers serve rural populations that are too small to support a hospital obstetrical unit. They may be located in residential areas and can be designed to suit the needs of particular communities. Because they are small and generally nonbureaucratic, they may overcome social and emotional barriers that contribute to the poor use of care facilities by some groups of women.[26,67,68]

Few innovations in health service promise lower cost, greater availability, and a high degree of satisfaction with a comparable degree of safety. The results of this study suggest that modern birth centers can identify women who are at low risk for obstetrical complications and can care for them in a way that provides these benefits.

We are indebted to Dr. Anita Barbey Bennetts, who helped design the data-collection forms; to Mr. Michael Putnick and Mr. John Santamaria of Vector Systems Corporation, Philadelphia, where the data were computerized and edited; and to the midwives, physicians, nurses, and others at the birth centers, who collected the data, assisted in the site visits, and provided additional information in response to our many requests.

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205

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206

Reducing Pain and Enhancing Progress in Labor: A Guide to Nonpharmacologic Methods for Maternity Caregivers

Penny Simkin, PT

ABSTRACT: *Many simple, effective, low-cost methods to relieve labor pain can be initiated by nurses, midwives, or physicians with the potential benefits of improved labor progress, reduction in use of riskier medications, patient satisfaction, and lower costs. These nonpharmacologic methods are categorized by the mechanisms through which they reduce pain or improve labor progress: diminishing the painful stimulus at the source; providing alternate stimuli to inhibit pain awareness; and reducing the woman's negative reaction to the pain. This is a review of numerous pain relief techniques and a guide for maternity caregivers. (BIRTH 22:3, September 1995)*

Labor is very painful for most women. The degree of pain and each woman's ability to cope with it are influenced by numerous factors, including ethnic and cultural beliefs and practices, psychological factors, the quality and frequency of contractions, the size and position of the fetus, and the use of painful obstetric interventions (1). Controlling the pain without harm to mother, fetus, or labor progress remains a major focus in maternity care.

Despite vast improvements in pharmacologic methods of pain relief, the so-called gold standard, the epidural block in its myriad forms, requires highly trained staff, an elaborate procedure, and numerous safeguards. Even if the procedure had no risks, the cost alone should encourage the search for simpler alternatives. The option of intravenous or intramuscular narcotics is available, but such analgesia is transient, incomplete, and accompanied by undesirable side effects.

Numerous simple, nonpharmacologic methods of pain relief can be initiated during labor by a nurse, midwife, or physician. Some are as effective as narcotics and provide adequate pain relief to the well-supported woman who experiences a reasonably normal labor. They may be used either instead of or as an adjunct to narcotics or an epidural, and when combined with these agents, may reduce the total dosage of narcotics or postpone the epidural until active labor, both of which reduce undesired effects (2–4). Many of these comfort measures employ movement, positioning, and gravity, and have the added benefit of speeding slow progress in labor. Others, by promoting relaxation and a sense of well-being, may mitigate the fight-or-flight response, which is known to slow labor (5). The techniques presented here are divided into three categories: measures that remove or diminish the painful stimulus at the source; measures that provide powerful alternate stimuli to compete with and inhibit pain awareness; and measures that reduce the woman's negative mental, emotional, and physical reaction to pain.

Many expectant parents will have learned some self-help comfort measures in childbirth classes, but during labor they may have to be reminded or encouraged to apply them. Others who have not taken classes will have to be shown or taught some self-comforting techniques. In addition, high-skill interventions, such as intracutaneous injections of sterile water and maternal positioning to correct specific problems, must be initiated and carried out by the nurse, midwife, or physician.

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Measures to Reduce Painful Stimuli at the Source

Labor pain is sometimes increased by factors that are controllable. Knowing these factors and modifying them will make the woman more comfortable.

Maternal Position and Movement

Most laboring women expect to and are expected to labor mostly in bed; this expectation is reinforced by the use of intravenous drips, electronic fetal monitors, and drugs that make moving out of bed inconvenient or unsafe. Despite these constraints, women seem to prefer freedom of movement if it is allowed, presumably because they are more comfortable (6–9). Rarely do they choose to lie flat in bed, especially on their backs. Nurses should encourage women to move about, even if continuous electronic monitoring and an intravenous drip are in place. Table 1 describes a variety of positions and movements in and out of bed that women find comforting. Figure 1 illustrates many of these positions. It is best to alternate among several, especially if labor progress is slow.

The positions and movements contribute to both comfort and labor progress. When progress is normal, women should be encouraged to adopt whatever position is most comfortable. If progress slows, a change of position and movement will often aid it without causing excessive pain. Sometimes, a particular position or a lack of movement actually increases pain without improving progress. The nurse can help the woman assume different positions and show the woman's partner what to do, so the nurse does not have to be in the birthing room all the time.

Localized Pressure to Reduce Back Pain

Three techniques for back pain involve steady pressure throughout the contraction. The nurse should show the partner how and when to do them.

Counterpressure

Steady pressure in one spot applied with the fist or heel of the hand reduces back pain, possibly by easing the strain on the sacroiliac joint caused by the fetal occiput posterior position. The mother designates the spot where the pressure feels best and the amount of pressure she wants. To help her keep her balance, the partner's other hand is placed in front over her hip bone (anterior superior iliac spine) to offset the pressure on her back (Fig. 2). The partner rests between contractions.

Bilateral Hip Pressure, or the Double Hip Squeeze

With the woman in a position with her hip joints flexed (hands and knees, standing and leaning forward), the partner places his or her hands over the gluteal muscles (the "meatiest" part of the buttocks) (Figs. 3 and 4). Steady pressure with the whole palms of the hands (not the heels of the hands) should be directed diagonally toward the center of her pelvis.

Knee Press

The woman sits upright in a chair with good support behind her low back, her knees a few inches apart, her feet flat. Her partner kneels in front of her, and cups one of the mother's knees with each hand. The heel of each hand is placed on the top of her tibia. The partner steadily presses the knees straight back toward the woman's hip joints by leaning toward her throughout the contraction (Fig. 5).

The knee press can also be done with the woman lying on her side. Her upper hip and knee are flexed to 90 degrees. One person presses on her sacrum. Another cups the woman's top knee only in one hand and leans so that the knee is pressed directly back toward the hip joint.

These measures have not been scientifically evaluated for effectiveness, but are based on understanding the nature of sacroiliac pain in labor and physical ways to reduce strain on the sacroiliac ligaments. The test of whether or not to perform a technique is the woman's reaction. If it is soothing, it should be done. If not, it should be modified (different spot, different amount of pressure) or discontinued.

Techniques to Provide Stimuli to Compete with and Inhibit Pain Awareness

Superficial Heat and Cold

Hot compresses applied on abdomen, groins, or perineum; a warm blanket over the entire body; and ice packs on the low back, anus, or perineum all relieve pain in labor. Heat and cold are widely accepted therapies and are associated with a low frequency of harmful side effects when applied properly, that is, at safe temperatures that cause neither burns nor frost damage. Although no randomized controlled trials of the pain-relieving effects of heat and cold have been conducted, much is understood about their physiologic effects (Table 2) (10).

Superficial heat is generated from hot or cold objects, such as hot water bottles, hot moist towels, electric heating pads, heated silica gel packs, heated rice-filled packs, warm blankets, baths, and showers.

Illustrations by Shanna Finger (© 1994 Ruth Anchetz) from the upcoming book on nursing interventions to prevent or correct dystocia in labor, by Ruth Anchetz and Penny Simkin

Figure 1. Maternal positions for labor and birth. Top row, upright positions; second row, sitting positions; third row, kneeling positions; fourth row, second-stage positions. See Table 1 for explanations.

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Table 1. Physiologic Positions and Movements for Labor and Birth (see Figure 1 for illustrations)

Positions	*Contributions of the Position*
Standing	Takes advantage of gravity during and between contractions. Contractions less painful and more productive. Fetus well aligned with angle of pelvis. May speed labor if woman has been recumbent. May increase urge to push in second stage.
Walking	Same as standing, plus movement causes changes in pelvic joints, encouraging rotation and descent.
Standing and leaning forward on partner, bed, or "birth ball"	Same as standing, plus Relieves backache. Good position for back rub. May be more restful than standing. Can be used with electronic fetal monitor (stand by bed).
Slow dancing: mother embraces partner around neck, rests head on his/her chest or shoulder. Partner's arms around mother's trunk, interlocking fingers at her low back. She drops arms, rests against partner. They sway to music, breathing in same rhythm.	Same as standing, plus Movement causes changes in pelvic joints, encouraging rotation and descent. Being embraced by loved one increases sense of well-being. Rhythm and music add comfort. Partner gives back pressure to relieve back pain.
The lunge: mother stands facing forward beside a straight chair, places one foot on chair seat, with knee and foot to side. Bending raised knee and hip, mother lunges sideways repeatedly during a contraction, 5 seconds at a time. She should feel stretch in inner thighs. Lunge in direction of fetal occiput, if known; otherwise in more comfortable direction. Partner secures chair, helps with balance.	Widens one side of pelvis (side toward which she lunges). Encourages rotation of occipitoposterior fetus. Can also be done in kneeling position.
Sitting upright	Good resting position. Some gravity advantage. Can be used with electronic fetal monitor.
Sitting on toilet or commode	Same as sitting upright, plus May help relax perineum for effective bearing down.
Semisitting	Same as sitting upright, plus Vaginal examination possible. Easy position to get into on bed or delivery table.
Sitting, rocking in chair	Same as sitting upright, plus Rocking movement may speed labor.
Sitting, leaning forward with support	Same as sitting upright, plus Relieves backache. Good position for back rub.
Hands and knees	Helps relieve backache. Assists rotation of baby in occipitoposterior fetus. Allows for pelvic rocking and body movements. Vaginal examinations possible. Takes pressure off hemorrhoids.
Kneeling, leaning forward with support on a chair seat, the raised head of the bed, or a "birth ball"	Same as hands and knees, plus Less strain on wrists and hands than hands-and-knees position.
Side-lying	Very good resting position. Convenient for many interventions. Helps lower elevated blood pressure. Safe if pain medications have been used. May promote progress of labor when alternated with walking. Gravity neutral. Useful to slow a very rapid second stage. Takes pressure off hemorrhoids. Easier to relax between pushing efforts. Allows posterior sacral movement in second stage.

Table 1. *(Continued)*

Positions	*Contributions of the Position*
Squatting	May relieve backache. Takes advantage of gravity. Widens pelvic outlet. Requires less bearing-down effort. May enhance rotation and descent in a difficult birth. Helpful if mother does not feel an urge to push. Allows freedom to shift weight for comfort. Mechanical advantage—upper trunk presses on fundus.
Supported squat: mother leans with back against partner, who holds her under the arms and takes all her weight. She stands between contractions.	Lengthens mother's trunk, allowing more room for asynclitic fetus to maneuver into position. Eliminates restriction of pelvic joint mobility that can be caused by external pressure (from bed, chair, etc.) or passive stretching (from squatting, pulling legs back, etc.), thus allowing more "molding" of pelvis by the rotating descending fetus. Gravity advantage. Requires great strength in partner.
Dangle: partner sits on high bed or counter, feet supported on chairs or footrests, with thighs spread. Mother backs between legs and places flexed arms over thighs. Partner grips woman's sides with thighs. She lowers herself, allowing partner to support her full weight. She stands between contractions.	Same as supported squat, except it is much easier on the partner.

Table 2. Physiologic Effects of Heat and Cold

Heat	*Cold*
Increased local blood flow	Decreased local blood flow
Increased local skin and muscle temperature	Decreased local skin and muscle temperature
Increased tissue metabolism	Decreased tissue metabolism
Decreased muscle spasm	Decreased muscle spasm (longer lasting than heat)
Relaxation of tiny muscles in skin (capillaries, hair follicles)	
Elevated pain threshold	Slowed transmission of impulses over afferent neurones, leading to decreased sensation, numbing effects

Superficial cold is generated from ice bags, rubber gloves filled with crushed ice, frozen gel packs, towels soaked in cool or ice water, and other cold objects.

Heat

The application of heat as described is widely accepted for its soothing, pain-relieving effects. Less well known is the value of heat in mitigating some of the autonomic responses to fear or stress (fight-or-flight response). One effect of stress is contraction of tiny muscles in the skin, causing the familiar goose pimples or hair standing on end. A warm bath, shower, or blanket causes these tiny muscles to relax. A woman who has been unable to tolerate a stroking form of massage often eagerly accepts it after her skin has been warmed.

Heat has also been shown to increase uterine activity. In a study of 15 multiparas in active labor, the local application of heat on the abdominal wall over the upper uterine segment increased uterine activity without causing abnormal fetal heart rate changes or low Apgar scores (11). The study did not investigate overall length of labor, but this modality may be a useful low-risk, low-cost alternative to try before administering oxytocin.

Local application of hot compresses (hot, moist washcloths) over the perineum during the second stage is comforting. One precaution, however: the temperature of the hot pack must never exceed the tolerance of the person applying it. The laboring woman may not notice if the pack is too hot, because her pain threshold may be altered to the point at which a burn could occur without her being aware of it.

Cold

Cold packs are particularly useful for musculoskeletal and joint pain; thus, back pain in labor usually responds

Figure 2. Counterpressure.

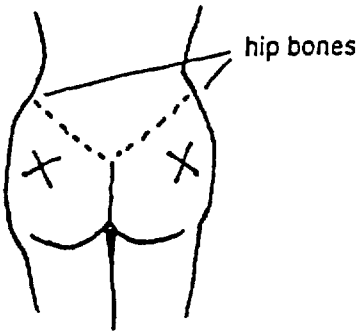

Figure 3. Xs mark places for the hands in the double hip squeeze.

Figure 4. Double hip squeeze.

Figure 5. Knee press.

particularly well to cold therapy. The numbing effect can be explained by the fact that cold on the skin slows the transmission of impulses over sensory neurons, leading to decreased sensation, including pain awareness. Particularly useful are frozen gel packs that strap around the woman's body (two elastic straps, one above her uterus, the other below) and attach with Velcro tape. (For information on cold packs, see Resources.) These provide not only pain relief, but also some support to the low back. The woman can continue to walk, since the pack is strapped on. Ice packs applied to the perineum as soon as possible after birth relieve swelling and pain.

Precautions: A protective layer or two should be placed between the woman's skin and the source of cold to allow for a gradual increase in cold sensation from pleasant coolness to cold. Do not place a cold pack on a woman if she is already chilled. If she is shivering, or if her hands, feet, or nose are cold, warm her with a bath, shower, or blanket before applying the cold.

It is important to remember that many cultures observe a strong avoidance of cold (cold water, drafts, cold packs). The caregiver should always ask permission before doing anything that might chill the woman.

Hydrotherapy

Baths and showers are ancient treatments for many painful ailments and are rapidly growing in acceptance as palliative in labor. As hospitals remodel their birthing facilities, they are remiss if they do not install tubs and showers in their birthing rooms. In 1992, in the United Kingdom, the House of Commons Health Committee urged that all hospitals offer women "the option of a birthing pool where this is practicable" (12). Now, almost all hospitals in the United Kingdom have birthing pools (S. Kitzinger, personal communication, March 1995).

Studies of hydrotherapy in labor investigated only

immersion, not showers. Reported benefits of bathing in labor include lowering elevated blood pressure, relief of pain, less use of supplementary analgesia, relaxation, stress reduction, improved efficiency of contractions, and high patient satisfaction (13–21). These early hydrotherapy studies were either descriptions of results from series of self-selected subjects (women who chose to use the tub during labor) or comparisons of results between women who chose and those who chose not to use the tub during labor.

In the only randomized, controlled trial comparing a bath group and a control group that has been published to date, pain increased more slowly in the former than in the latter (20). In addition, the cervix changed significantly more (as measured by the Bishop score) in the bath group. Half as many of those women required labor augmentation (22% vs 47% in the control group), and patient satisfaction in the bath group was very high. Other randomized trials, as yet unpublished, will include larger groups and will provide necessary information on benefits and risks of immersion during labor (21).

Questions about Bathing in Labor

At what stage of cervical dilatation should the woman enter the tub? If she is in prelabor or the latent phase, it is likely that immersion will slow her contractions or stop them temporarily because plasma volume expands when one is immersed in water. The weight of the water (hydrostatic pressure) moves tissue fluid into the intravascular space, increasing plasma volume and diluting circulating oxytocin (22). Because of this effect, immersion in water is sometimes recommended to relieve edema in pregnancy and to stop preterm contractions. In active labor this effect no longer persists. Thus, unless there is reason to stop contractions, the woman should wait until active labor before entering the tub.

How long should the woman remain in the tub? Her choice can safely be the deciding factor unless a clinical reason exists for her to leave the tub, such as fetal distress, bleeding, and imminent delivery in institutions where water birth is disallowed.

What temperature should the water be? Keeping the water temperature at 98° to 100°F, or 36.6° to 37.8°C, prevents elevation of the woman's body temperature while affording comfort. Of course, it will be important for the caregiver to continue taking the mother's temperature.

How does one monitor the fetal heart rate? If a hand-held Doppler is used, the mother merely lifts her abdomen out of the water. Waterproof hand-held Doppler units are also available. Some of the standard electronic monitor's ultrasound devices are safe to use under water. The hospital engineering department can evaluate.

Do maternal and newborn infections increase, especially if the bath is used when the woman has ruptured membranes? None of the studies cited here found an increase in maternal or infant infection comparing bath with no bath groups, even when comparing only women with ruptured membranes. One unpublished study specifically addressed this question by means of a chart review of all 1337 patients giving birth vaginally in a Seattle hospital in 1989 (23). Of the 732 women who used the tub during labor, 376 had ruptured membranes. The investigators found no difference in the frequency of chorioamnionitis, endometritis, or neonatal infection between those who bathed before and those who bathed after rupture of membranes. Furthermore, no differences were found between those who did not bathe at all and those who did.

Obviously, rigorous cleansing protocols are necessary (24), as is frequent culturing of any standing water in the plumbing. Two tubs, the Parker Bath and the Recline-A-Bath Two, are popular in North American maternity units because of the ease with which they are cleaned. Originally designed for hospital or home use by older persons and invalids, they are equipped with a backwash mechanism that effectively cleans the internal plumbing that cannot be reached by ordinary cleaning methods. These whirlpool tubs also have a hydraulic lift mechanism that makes it easy to get a laboring woman in and out. (For information on tubs, see Resources.)

North American hospitals do not allow birth in the water, although the practice is not uncommon at some birth centers and home births. Further studies are required to assess the risks and benefits of this practice (21).

Thus, bathing during labor is a popular practice that, as indicated in early studies, may provide benefits in terms of pain relief and labor progress. Although showers have not been studied, empirical evidence indicates that they enhance relaxation and relieve pain. Directing the warm spray over the woman's low back or abdomen brings immediate relief.

Soothing Touch and Massage

The use of touch in various forms conveys pain-reducing messages, depending on the quality and circumstances of the touch: a pat of reassurance, stroking the hair or cheek in an affectionate gesture, a tight embrace, holding a hand, or more formal purposeful massage techniques all communicate to the receiver a message of caring, of comfort, of wanting to be with her and to help her.

Nurses and midwives touch women in labor, but mostly for clinical purposes, such as taking a pulse, assisting with positioning, examining the cervix or abdomen, and attaching or inserting devices. Some caregivers never touch a woman in a nonclinical way. In fact, a recent work sampling study of the work activities of maternity nurses in a large teaching hospital detected only two instances of reassuring touch in 616 observations of work activities (25). Furthermore, less than 10 percent of their activities were categorized as in any way supportive; most were in the form of giving instructions or information to the woman. Approximately one-half of their work activities did not involve being with these women. Thus, the tasks of comforting, reassuring touch, and other palliative measures must be performed by people whom the mother brings with her into labor.

One controlled study of touch during active labor used women as their own controls (26). The women alternately received a high degree of physical contact from the nurse (hand holding, stroking brow or shoulder, patting the back) plus the usual clinical touch for three contractions, followed by a low degree of physical contact (clinical touch only—palpation, procedures, assistance in changing positions) for three contractions. When the women's behavior and vital signs were compared, the findings included improvements in the women's coping ability and comfort, together with drops in systolic blood pressure and pulse rate when they received the high degree of physical contact. These physiologic changes indicate that touch alleviated the women's fight-or-flight responses. With these findings in mind, it would be worthwhile for each maternity care professional to ask herself or himself, "How often do I touch a client to express reassurance, empathy, comfort? Should I do it more often?"

Massage is prescribed touch and takes many forms in labor: light or firm stroking; kneading; deep circular pressure; friction; and the use of fingertips, entire hands, and various devices that roll, vibrate, or apply pressure. One type, hand massage, is easy to perform and almost universally accepted by laboring women. It should include kneading, pressure, and friction over the entire hand. It is very soothing and is welcomed especially by women who grip their fists during contractions. In theory, massage stimulates a variety of sensory receptors in the skin and deeper tissues, thus inhibiting pain awareness (27).

Acupressure

Acupressure, or shiatsu, has been called acupuncture without needles (28). An ancient Eastern healing technique, it consists of applying finger pressure or deep massage to the traditional acupuncture points located along the body's meridians, or energy flow lines. Practitioners who use acupressure assume that it works in the same way as acupuncture, although to a lesser degree, by freeing a blockage of energy along the meridians. Others believe acupressure raises local endorphin levels in the treated area. The only references to acupressure for use in labor appear in the lay literature and childbirth education literature (29–31). There is no evidence of harm from properly performed acupressure, and some anecdotal evidence that it helps reduce labor pain and promote progress.

Two points, ho-ku and spleen 6 (Fig. 6), when stimulated, are said to enhance contractions without increasing pain. Ho-ku is located on the back of the hand at the indentation where the metacarpal bones of thumb and index finger come together. Spleen 6 is located on the tibia four finger-breadths above the medial malleolus (inner ankle bone). The tibia should be pressed diagonally forward. This point is very tender. Firm finger pressure is applied for 10 to 60 seconds, followed by rest for an equal period of time. The procedure should be repeated for up to six cycles. Contractions should speed up within that period. Precaution: These acupressure points should not be stimulated during pregnancy, but only when frequent contractions are desirable.

Intradermal Injections of Sterile Water

One of the most promising techniques for first stage back pain is four 0.1-ml intradermal injections of sterile water with a 25-gauge needle to form small blebs in the skin. Two injection sites are located over the posterior superior iliac spines; the other two sites are located 2 or 3 cm below and 1 to 2 cm medial to the first points (32). The injections cause intense stinging lasting less than 30 seconds, followed by immediate (within 2 min) relief of back pain that lasts for 60 to 90 minutes. The injections can be repeated. Two randomized placebo trials (33,34) reported excellent pain relief with this treatment, possibly caused by a rapid local increase in endorphin production. The pos-

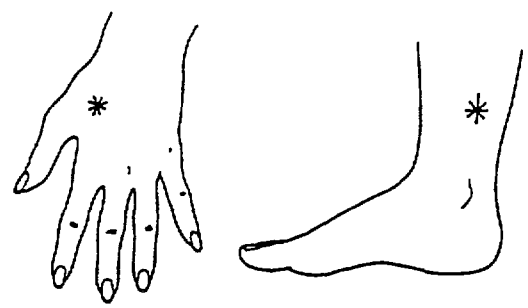

Figure 6. Ho-ku point and spleen 6.

sible risks are the same as for any needle puncture of the skin, which are minimal when proper technique is followed.

Transcutaneous Electrical Nerve Stimulation

Most often employed by physical therapists to treat chronic and postsurgical pain, transcutaneous electrical nerve stimulation (TENS) is also sometimes used in labor. A TENS unit is a small, hand-held, battery-operated device. It is connected to the skin of the low back by a pair of cables and four disposable electrode pads (Fig. 7). It causes sensations of buzzing, tingling, or prickling in the areas stimulated. When the intensity is turned up too far, these sensations become painful and the muscles beneath the electrodes may contract. For labor pain, the woman or her partner increases the intensity during and decreases it between contractions. It should not reach painful levels (35).

The pain-relieving mechanism of TENS is thought to be similar to that for intradermal injections of sterile water, mediated through increased endorphin production. With TENS, however, pain relief takes more time.

Four randomized controlled trials of TENS showed a decrease in the administration of epidural anesthesia and a favorable assessment by most of the women who used it, although reported intensity of labor pain was actually higher than in the control groups (36–39). Some women did not like it at all.

In my experience, women are more likely to find TENS helpful in active labor if they are taught in advance how to use it, if it is applied early in labor, and if they have a unit at home that they can use before going to the hospital. The unit obviously must be disconnected if the woman gets into a shower or tub. Most physical therapists are familiar with TENS and can teach nursing staff and childbirth educators how to help maternity patients use it. Occasionally, TENS is also applied to reduce incision discomfort and pain medication requirements after a cesarean delivery.

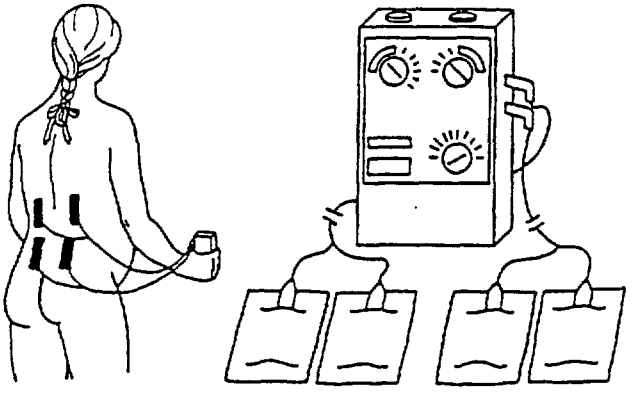

Figure 7. A TENS unit and placement of electrodes.

Measures to Reduce the Woman's Negative Psychological Reaction to Pain

Nurses and midwives exert great influence on the laboring woman's mental and emotional state. Reduction of fear, uncertainty, tension, and loneliness may make the difference to the woman between feeling overwhelmed and out of control and feeling safe and confident. The maternity caregiver carries more authority than partners or loved ones. As an expert, a nurse's compliments and words of reassurance and encouragement may be, as one woman said, "as good as a narcotic." Nurses should be encouraged to use their power to reinforce the laboring woman's sense of well-being.

Many techniques taught in childbirth classes, such as relaxation and tension release, patterned breathing, attention focusing, music, visualizations, and guided imagery, are designed to foster positive physical and emotional responses to painful contractions. Education about the physical and emotional processes of childbirth replaces misinformation and its associated fear. Stress inoculation, or desensitization through exposure to the sights, sounds, and other realities of birth, helps reduce fear of the unknown. In hospitals where clinical staff are familiar with and approve of the childbirth educator's teachings, they reinforce the woman's coping strategies, increasing the likelihood that the woman will actually use what she was taught.

The Doula

One of the most successful measures for reducing labor pain and the length of labor is the continuous presence of a trained, experienced woman who focuses on the laboring woman throughout each contraction, softly speaking words of reassurance and encouragement, stroking her, holding her hand, walking with her, suggesting position changes, instructing her and instructing and reassuring her partner. This birth attendant commits herself solely to the woman's emotional and physical comfort. Controlled trials consistently show that the presence of such a person, often called a doula, improves obstetric outcomes and patient satisfaction compared with usual hospital care without a doula (40).

A recent review of 11 randomized, controlled trials concluded that ". . . the continuous presence of a trained support person who had no prior social bond with the labouring woman reduced the likelihood of medication for pain relief, operative vaginal delivery and a 5-minute Apgar score <7 . . . Another beneficial effect in three trials was the decreased likelihood of

Table 3. One-Minute Comfort Measures for the Busy but Caring Nurse or Midwife

Psychological Support	*Physical Comfort Measures*
Role modeling: help woman through a contraction, give feedback. Ask partner to watch and do the same thing.	Hand, foot, back massage.
Watch couple or woman through a contraction; give feedback and suggestions.	Cold packs, hot packs, warm blankets.
Eye contact and soothing words throughout a contraction (as culturally appropriate).	Acupressure (role modeling).
Visualizations, guided imagery during a contraction.	Reassuring touch (holding, patting hand, stroking cheek).
Reassurance, encouragement, praise, empowering statements.	Suggestions for position changes.
Take-charge routine when woman is agitated or discouraged: maintain eye contact and a confident, firm tone of voice. Talk her through the contraction, "conducting" her breathing in rhythm with hand or head movements. Have partner continue this.	Shower or tub.
	Double hip squeeze, counterpressure, knee press (role modeling).
	Cool cloth to brow.

negative ratings of the childbirth experience, e.g., in an overall evaluation of the experience, in feeling very tense during labour, or finding labour to be worse than expected" (41).

Cesarean delivery rates decreased significantly when a doula was present in all the trials that took place in settings that did not permit the presence of a partner or loved one. These findings raised the question of whether a doula had the same impact as a partner or loved one. One recent randomized, controlled trial investigated that question. Women in the control group were accompanied by a family member or friend, and the experimental group had a doula as well. The cesarean rate decreased from 24.8 percent in the control group to 15.0 percent in the doula-supported group (42). Many hospitals now welcome the doula, who works side by side with the woman, her partner, the nurse, and the midwife or doctor, and sometimes the anesthetist, to ensure that all the woman's needs for clinical care, emotional support, and physical comfort are met.

Suggestions for the Busy but Caring Nurse and Midwife

Contemporary maternity care rarely allows constant one-to-one nursing care except in some high-risk situations. Many of the techniques described here are time consuming, but they can be taught by the nurse or midwife to the woman's partner. Other highly effective measures take one minute or less (Table 3).

Conclusion

Nurses and other maternity caregivers can employ a broad range of effective and simple nonpharmacologic techniques to promote the laboring woman's physical comfort, psychological well-being, and labor progress. Unfortunately, training and practice in the use of these measures are not included in the education of most maternity caregivers, nor are they a part of most orientation programs for new maternity nurses. This lack of knowledge is at least partly responsible for today's heavy reliance on drug management of labor pain. Clinical maternity staff should be regularly updated on these practices through in-service programs that include hands-on demonstration and practice. Childbirth educators, midwives, and some physical therapists possess much knowledge about these nonpharmacologic measures. In addition, videotapes are available that show and explain many of the techniques discussed here. (See Resources for information on some helpful videotapes.) Greater use of such techniques would contribute to better outcomes, lower costs, and higher patient satisfaction.

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216

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Resources

Cold packs:
write Dura Kold, 1117 Cornell Parkway, Oklahoma City, OK 73108. Ask for information on their DK201 cold pack.
Tubs for institutional use: write Ferno Healthcare, 70 Weil Way, Wilmington, OH 45177 for information on the Recline-A-Bath Two; write Parker Bath Corporation, 805 Teal Dr., Gallatin, TN 37066 for information on the Parker Bath.
Portable tub rental information: write Global Maternal/Child Health Association, Inc., P.O. Box 366, West Linn, OR 97068.
TENS Units: write EMPI Canada, 16773 Hymus Blvd., Kirkland, Quebec H9H 3L4, Canada.
Videotapes:
"Comfort Measures for Childbirth with Penny Simkin, PT": write to Penny Simkin, Inc., 1100 23rd Avenue E., Seattle, WA 98112.
"Water Birth: A Guide to Water Birth": write Global Maternal/Child Health Association, Inc., P.O. Box 366, West Linn, OR 97068.
"Interactive Positioning for Labor and Birth": write Hill-Rom, Highway 46, Batesville, IN 47006.

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THE EFFECT OF A SUPPORTIVE COMPANION ON PERINATAL PROBLEMS, LENGTH OF LABOR, AND MOTHER-INFANT INTERACTION

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Abstract We studied the effects of a supportive lay woman ("doula") on the length of labor and on mother-infant interaction after delivery in healthy Guatemalan primigravid women. Initial assignment of mothers to the experimental (doula) or control group was random, but controls showed a higher rate ($P<0.001$) of subsequent perinatal problems (e.g., cesarean section and meconium staining). It was necessary to admit 103 mothers to the control group and 33 to the experimental group to obtain 20 in each group with uncomplicated deliveries. In the final sample, the length of time from admission to delivery was shorter in the experimental group (8.8 vs. 19.3 hours, $P<0.001$). Mothers who had a doula present during labor were awake more after delivery ($P<0.02$) and stroked ($P<0.001$), smiled at ($P<0.009$), and talked to ($P<0.002$) their babies more than the control mothers. These observations suggest that there may be major perinatal benefits of constant human support during labor. (N Engl J Med. 1980; 303:597-600.)

IN all but one of 150 cultures studied by anthropologists, a family member or friend, usually a woman, remained with a mother during labor and delivery (Raphael D. Unpublished data). Before childbirth moved from the home to the hospital, it was also the practice in industrialized nations for family members to support the mother actively in labor, often with the assistance of a trained or untrained midwife. Although more fathers, relatives, and friends have been allowed into labor and delivery rooms in the past 10 years, a considerable number of mothers still undergo labor and delivery in some hospitals without the presence of family members or close friends. There has been little systematic study of this issue since the Newtons[1] reported that mothers who were quiet and relaxed and had better emotional relations with their attendants during labor and delivery were more pleased at the first sight of their babies. The study in Guatemala was designed to investigate the effects of a supportive companion (Raphael[2] termed such a person a "doula") on the length of labor and on mother-infant interaction after delivery in an obstetric setting in which mothers routinely undergo labor alone.

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METHODS

The study was conducted at the Social Security Hospital in Guatemala City, Guatemala. The women who delivered in this hospital, or their husbands, have had regular payroll deductions to entitle them to the medical benefits of the governmental Social Security system. Although their income level was low by United States standards, their general health was superior to that of the women who delivered at the free public hospitals.

In the maternity unit of the Social Security Hospital, the routine was for primigravid mothers in labor to be admitted to an observation ward when the dilatation of the cervix was 1 to 2 cm and regular uterine contractions were present. Mothers remained on this ward until the cervical dilatation was 3 to 4 cm, at which time they were transferred to labor rooms adjoining the delivery rooms. Hospital policies did not permit any family member, friend, or continuous nurse caretaker to be present in the rooms, apparently as a consequence of the large number of deliveries (average, 60 per day) and the limitation of space that was intensified in this hospital after the destruction of the previous maternity unit in the earthquake of 1976.

Primigravid mothers in early labor with cervical dilatation of 1 to 2 cm and no known preeclampsia or other medical problems were eligible for the study. The initial assignment of women to the control or experimental group was randomized by drawing an envelope after the woman entered the observation ward and agreed to participate in the study.

The control group followed hospital routines, which consisted of infrequent vaginal examinations to monitor the labor, auscultation of the fetal heart, and assistance to the mother during delivery. No electronic monitoring was used in this unit. In addition to the routine care, the mothers in the experimental group received constant support from an untrained lay woman from admission to delivery; one woman was present during the day and another at night. The support consisted of physical contact (e.g., rubbing the mother's back and holding her hands), conversation, and the presence of a friendly companion whom the mother had not met before.

A woman was removed from the study if the labor was false or prolonged; if evidence of fetal distress during labor or delivery necessitated an intervention (such as oxytocin augmentation, ce-

-ean section, or forceps); if the infant was asphyxiated (Apgar re below eight at five minutes), meconium-stained, depressed, stillborn, premature, or malformed; or if the infant had any evidence of illness such as respiratory distress. These clinical judgments were made by the attending physician, who did not know the purpose of the study. If a woman was removed, her group assignment was inserted at random into the pool of unused assignments. Women were enrolled in the study until there were 20 in the control group and 20 in the experimental group.

The women who constituted the final sample remained in the delivery room for up to one hour after delivery for the completion of the third stage of labor and episiotomy repair. During this period the baby was cleaned and kept in a bassinet in the same room. The median stay in the delivery room was 30 minutes (range, 20 to 60) for the control group and 28 minutes (range, 15 to 50) for the experimental group (Mann-Whitney U, 180; P>0.50).

Mothers in both groups were allowed 45 minutes of skin-to-skin contact with the undressed infant in a private room. A radiant-heat panel kept the babies warm. During the first 22.5 minutes of contact, an observer who did not know the previous experience of the mother watched the mother and infant through a one-way window for 15 seconds at 45-second intervals.

The observer recorded the mother's state (awake or asleep) and whether she maintained trunk-to-trunk contact with the baby. The mother's way of handling the infant was recorded — the part of the hand used (fingertips or palm), the part of the infant handled (head, trunk, or extremities), and whether the mother simply touched the infant or used a stroking motion. Looking (including en face), smiling, kissing, and talking (including nonspeech vocalizations) by the mother directed toward the infant, and nursing behavior by the mother and infant were also recorded. Spontaneous movement, opening or closing of the eyes, and crying by the infant were recorded, but only crying could be recorded reliably because of the position of the observer with respect to the mother and in-t. Some maternal behaviors (i.e., kissing and obvious attempts to .it a response from the baby) as well as crying by the infant were recorded, but they occurred too infrequently to be analyzed for group differences. Agreement between two observers (based on the observation of six mother-infant pairs not involved in the study) ranged from 0.88 to 0.98 for the items included in the analysis.

Results

Table 1 shows the demographic characteristics of the 40 mothers and babies in the final sample. There were no statistically significant differences between the groups in the marital status or age of the mothers or in the birth weights or sex distribution of the infants.

Perinatal Problems and Need for Intervention during Labor and Delivery

It was necessary to admit 103 mothers to the control group and 33 to the experimental group to obtain the final samples of 20 in each group with uncomplicated labors and normal vaginal deliveries. In other words, 83 women assigned to the control group and 13 assigned to the experimental group were not studied after the development of one or more of the problems described above: evidence of fetal distress requiring intervention during labor or delivery, meconium staining, or other manifestations of neonatal asphyxia. After exclusion of nine mothers — four in the control group and one in the experimental group who were removed because of false labor, and four others in the control group (three with premature infants and one with extreme anxiety) — a chi-square analysis indicated an association between the presence of a supportive companion during labor and a lower incidence of the problems of labor, delivery, or the neonate that were used as criteria for exclusion (chi-square with 1 degree of freedom = 17.2; P<0.001). Table 2 contains the number of women excluded for each reason. It should be noted that each mother was listed only once, under the first problem to occur. Thus, if a cesarean section was performed, the mother was excluded from the study and no further problems (e.g., meconium staining) were listed.

Table 1. Demographic Characteristics of Mothers and Infants.

Characteristic	Control Group	Experimental Group
No. of mothers	20	20
Mean age of mothers (yr)	21	20
]er not in household (no.)	3	1
]n infant birthweight (g)	3061	2943
ɔex of infant		
Male (no.)	12	10
Female (no.)	8	10

Table 2. Total Study Population, Including Mothers Removed Because of Problems or Intervention.

Characteristic	Control Group	Experimental Group
	95 mothers	32 mothers
	% of mothers *	
No problems	21 (20)	63 (20)
Problems or intervention †		
Meconium staining	25 (24)	9 (3)
Depressed newborn	3 (3)	0 (0)
Stillbirth	2 (2)	0 (0)
Cesarean section	27 (26)	19 (6)
Oxytocin augmentation	17 (16)	6 (2)
Forceps	5 (4)	3 (1)
Total removed	79 (75)	37 (12)

*Figures in parentheses denote number of mothers.

†Chi-square (1 degree of freedom) = 17.2 (P<0.001) for the association between the group and the total number of problems or interventions. Nine other women not listed here (eight in the control group and one in the experimental group) were eliminated for reasons explained in the text.

Length of Labor

The number of vaginal examinations performed to monitor cervical dilatation for each patient was determined by the obstetric staff and influenced by the clinical course of individual patients; such examinations were limited to minimize the risk of infection. The mean time from admission to the observation ward until delivery for the 40 mother-infant pairs retained in the study was 19.3 hours for the control group and 8.7 hours for the experimental group — (t[38] = 3.81; P<0.001).

Maternal Behavior

When the mothers in the two groups were observed alone with their infants in a private room, there were

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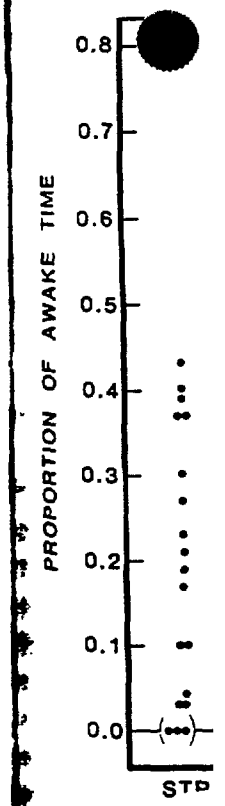

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219

differences in maternal state and behavior. (The normal approximation to the Mann–Whitney test, corrected for ties,[3] was used to compare the groups.) The amount of time during which the mothers remained awake in the period of observation was greater for the experimental group than for the control group ($z = 2.51$; $P<0.02$). Because some mothers slept for part of the time, scores for individual behaviors were expressed as a proportion of the number of time-sampled periods during which a mother was awake.

While the mothers were awake, there was a substantial difference in the amount of stroking, with the experimental mothers stroking more than the control mothers ($z = 4.09$; $P<0.001$) (Fig. 1). However, there was no significant difference in the amount of simple touching of the infants ($z = 1.87$; $P = 0.06$). The proportion of handling time (time spent touching or stroking the infant) that mothers spent in contact with the infant's head, trunk, or extremities did not differ between groups. Similarly, there was no difference between the groups in the proportion of handling time during which mothers used their fingertips or palms.

The mothers in the experimental group also talked to their infants ($z = 3.10$; $P<0.002$) and smiled at them ($z = 2.66$; $P<0.009$) more than the mothers in the control group (Fig. 1). However, the groups did not differ in the amount of time spent in body-to-body contact, en face, looking at the baby, or nursing.

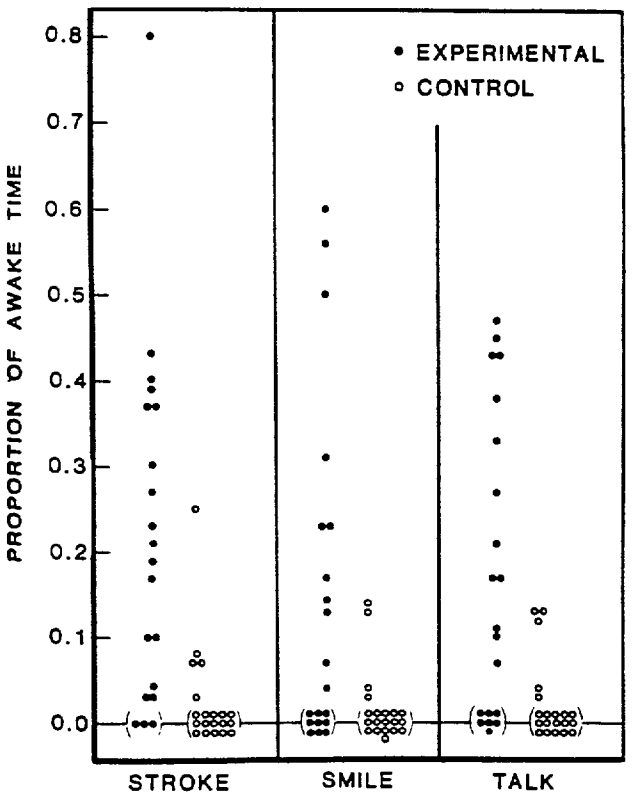

Figure 1. Maternal Behaviors during the First Hour after Birth for Which There Were Significant Differences between the Experimental (Doula) and Control Groups, Expressed as the Proportion of Awake Time.

Spearman rank-correlation coefficients were computed between the length of labor and the specific maternal behaviors for which there were group differences. Except for a marginal correlation with the amount of stroking by the control mothers ($r = 0.39$; $t[18] = 1.77$; $P = 0.09$) there were no significant correlations ($P>0.25$) between the length of labor and maternal behavior in the first hour after birth. The marginal association in the control group is positive — an indication that longer labors were associated with more stroking of the infant rather than less. Thus, it is unlikely that the group differences in these behaviors were primarily a result of differences in the length of labor.

Discussion

The findings of this study suggest the importance of human companionship during labor and delivery. Labor was shortened, and some aspects of maternal behavior in the first hour after delivery were enhanced. Unexpectedly, the likelihood of development of certain problems that require intervention during labor and delivery was lower for mothers who had a supportive companion. Since data on the length of labor for mothers who were eliminated from the study were not available, the relation between length of labor and the incidence of such problems could not be analyzed.

An earlier study of low-income, inner-city mothers in Cleveland suggested that the effects of the supportive companion on maternal behavior may last beyond the first hour after delivery.[4] In that study, mothers who were awake in the first 40 minutes of contact with their babies were more affectionate, attentive, and responsive to their infants at one month than were mothers who fell asleep. However, there are some difficulties in the use of the results of that study to argue for the long-term effects of a supportive person. In that investigation, mothers who fell asleep were also more heavily medicated, but in the present study, none of the mothers in the final sample received any medication. In addition, contact between mothers and infants in the Cleveland study was limited by hospital routine to feedings lasting 20 to 30 minutes every four hours plus five hours of continuous contact each day, in contrast to almost continuous contact from birth in our study.

Our findings raise the possibility of an association between acute anxiety and arrests of labor or fetal distress. Other studies of human and primate mothers have suggested that one mechanism to account for this relation is an increase in levels of catecholamines, which are known to decrease uterine contractility.[5] Lederman et al.[6] found that plasma epinephrine levels and self-reported anxiety at 3 cm of cervical dilatation were significantly correlated in 32 normal primigravid women. Physiologic elevations of plasma

220

epinephrine were associated with decreased uterine contractile activity at the onset of labor (3 cm of cervical dilatation) and a longer duration of labor from 3 to 10 cm of cervical dilatation.

Fetal distress could be secondary to increased levels of catecholamines as well, but this effect would be due to decreased uterine and placental blood flow. Barton et al.[7] noted marked reductions in blood flow (up to 50 per cent) to the sheep uterus after an injection of epinephrine and norepinephrine. Catecholamines administered to pregnant rhesus monkeys by Adamsons et al.[8] resulted in fetal asphyxia, but they had no such effect when injected only into the fetus. Myers[9] noted that psychological stress alone, without pain or physical contact with the pregnant monkey, resulted in fetal asphyxia.

It should be emphasized that in our study the combination of the crowded hospital conditions, the absence of prenatal preparatory classes, and the unfamiliar hospital environment may have markedly increased maternal anxiety and exaggerated the effect of the supportive companion. In any event, future studies are needed to determine whether the effects can be correlated with maternal catecholamine levels.

The powerful effects of the presence of the supportive companion in this investigation raise the possibility that human companionship may have influenced the results in studies of the effectiveness of electronic fetal monitoring. In four randomized control studies of fetal monitoring in mothers at high risk,[10-15] the rate of cesarean section was increased in the monitored group, presumably because of evidence of fetal distress or failure to progress in labor. Haverkamp et al.[15] suggested that the control group of patients in their study had more individualized nursing care and close physical contact for auscultation of the fetal heart, and that as a result these patients had less anxiety. They proposed that the added attention and physical contact might have contributed to the favorable outcome in the group that received personal nursing care rather than electronic monitoring. The results of our investigation suggest that further studies of any labor intervention must ensure that both groups receive the same amount of time and support from nurses and medical personnel.

The observations in our study, if confirmed, may have important implications for the future care of mothers and neonates in industrialized and developing nations. They are particularly relevant to the care of low-income, single, or teenage mothers, who may not receive positive support from their families during labor and delivery and who may have had no formal or strong cultural preparation for childbirth. How often has false labor or a dramatic deceleration of a mother's labor after she enters the hospital resulted from her reaction to the strange, inhibiting, or frightening aspects of the hospital environment? An untrained woman provided the friendly support in this study, but similar or greater benefits may be expected when a family member or a friend remains with the mother throughout the labor and delivery. This low-cost intervention may be a simple way to reduce the length of labor and the number of perinatal problems for parturient women and their infants.

We are indebted to Drs. Deborah Hales and Rodolfo Izaquirre and to the medical and nursing staff of IGSS Maternity Hospital for their assistance. We are particularly indebted to Marta Izabel Garcia, Rubidia Mendez, and Maricela Ochoa de Zelada for their work.

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CLINICAL SECTION

Clinical Opinion

Episiotomy: Can its routine use be defended?

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Episiotomy is routinely used before delivery in the United States. The rationale for routine episiotomy is based on two foundation arguments: that episiotomy reduces perineal trauma and that it prevents subsequent pelvic relaxation. A careful review finds little evidence to support these arguments. Episiotomy may predispose the gravid woman to third- and fourth-degree lacerations. Efforts should be directed to determine whether episiotomy is beneficial. (AM J OBSTET GYNECOL 1989;160:1027-30.)

Key words: Episiotomy, childbirth trauma, third- and fourth-degree lacerations, pelvic relaxation

Episiotomy commonly precedes vaginal delivery in the United States. In 1979 62.5% of vaginal deliveries were accomplished with this procedure. In nulliparous women, the episiotomy rate rises to 80%. Reported benefits include a decrease in perineal trauma and prophylaxis against pelvic relaxation. This article analyzes the data that support routine use of this technique.

History

Episiotomy is a relatively new phenomenon. It was first suggested by Ould in 1742 as an aid in difficult vaginal deliveries. Broomall advocated its routine use in 1878 as a procedure that would prevent perineal ruptures.[1]

During the ninteenth century there was much interest in the prevention of perineal trauma at the time of vaginal delivery. In 1855, Ritgen presented 4875 deliveries with only 190 perineal tears. Within this group only one patient had a laceration extending into the anal sphincter. This remarkable record was accomplished by a procedure called "scarification" (a series of superficial, circumferential vaginal incisions). Scarification was used in 7% of deliveries, with special attention to the delivery of the head and shoulders. Ritgen[2] admonished the physician to strive for "complete protection for the perineum" and warned against dismissing his findings as "much ado about a perineal tear."

It was not until 1920, after articles were published by DeLee[3] and Pomeroy[4] that routine use of episiotomy began. This coincided with the move of deliveries from the home to the hospital, with a change in attendants from midwives to physicians, with family sizes diminishing, and with an increase in cesarean deliveries.[1] The fact that this trend included routine use of episiotomy was not hailed as an advance by all. J. Whitridge Williams remarked, after DeLee's presentation in 1920, that he disagreed with everything DeLee said.[5] Unfortunately, this debate did not initiate scientific inquiry. Subsequent reports focused on whether midline or mediolateral episiotomy was better. Advocates of the midline approach won the battle in the United States and today it is the usual technique in this country.

Foundation arguments

The case for routine episiotomy rests on two foundation arguments: that episiotomy reduces perineal trauma and that it prevents subsequent pelvic relaxation.

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Table I. Third- and fourth-degree lacerations after midline episiotomy*

Study	*No. of patients*	*% with third- and fourth-degree lacerations*
Giles (1930)	500	3.2
Nuggent (1935)	20	10.0
Chang (1943)	635	0.5
Kaltreider (1948)	15,167	4.5
Ingraham (1949)	9,170	5.0
Smith (1951)	1,500	1.9
McNulty (1953)	6,577	0.9
Jacobs (1960)	5,358	3.0
Dodek (1963)	890	0.4
Harris (1970)	7,477	13.0
Beynon (1974)	1,938	13.5
Coats (1980)	163	23.9
TOTAL	49,395	6.5

*Modified from reference 1. Complete bibliography available on request.

Table II. Third- and fourth-degree lacerations without episiotomy*

Study	*No. of patients*	*% with third- and fourth-degree lacerations*
Ritgen[2] (1855)	4,875	0.0
Child (1919)	58	5.2
Nugent (1935)	72	6.4
Brendel (1979)	29	0.0
Gaskin (1980)	801	0.5
Malcki (1980)	379	1.0
Schmint (1980)	102	0.0
Cranch (1981)	799	3.6
Arauso (1982)	2,447	0.0
Buekens et al. (1985)	15,237	0.9
Blownal (1985)	13,500	0.4
Sleep and Grant[10] (1986)	457	0.0
Gass et al.[7] (1986)	205	0.0
TOTAL	38,961	1.4

*Complete bibliography available on request.

Prevention of trauma. The only commonly reported marker of severe pelvic trauma in the literature is third- and fourth-degree lacerations. Lesions of the upper vagina and anterior introitus are consistently underreported.[1]

Tables I and II illustrate the incidence of third- and fourth-degree lacerations with and without midline episiotomy, respectively. From these cumulative data it appears that midline episiotomy is not associated with a decrease in third- and fourth-degree lacerations.

We prospectively studied routine use of episiotomy and found that in nulliparous women this procedure predisposed women to third- and fourth-degree lacerations. The lacerations were more pronounced in nulliparous women who were delivered of infants >3400 gm. No third- or fourth-degree laceration occurred when episiotomy was not performed.[5]

Gass et al.[7] did a retrospective study in which they matched 205 pairs of women for age, parity, and birth weight. The women in one group were delivered with midline episiotomy, whereas patients in the other were not. If episiotomy is assumed to be equivalent to a second-degree laceration, then women in the group without episiotomy had less perineal trauma. No third- or fourth-degree laceration occurred without an episiotomy.[7]

In 1985 Buekens et al.[8] investigated the relationship of episiotomy to third-degree perineal tears in 21,278 deliveries. With an episiotomy rate of 28.4% and with the mediolateral approach, third-degree tears occurred in 1.4% of deliveries with episiotomy and in 0.9% of deliveries without. This difference was significant ($p < 0.01$). When a subsample of spontaneous occipitoanterior deliveries were reviewed and after the infants were stratified by birth weight and the mothers by parity, there was no relation between episiotomy and third-degree tears. The authors concluded that routine episiotomy does not prevent trauma to the anal sphincter or rectum.[8]

Blondel and Kaminski[9] found, despite an increase in the episiotomy rate from 8.1% to 37.1% in their hospital from 1972 to 1982, that the incidence of third-degree lacerations did not change. In analyzing their experience from 1981, they found that the incidence of third-degree lacerations was increased in women who had undergone episiotomy. The authors concluded that these findings were similar to the observations of Buekens' group.[8] Both studies used data to analyze mediolateral episiotomy. If the midline approach had been used, with its propensity for extension into the rectum, even more third- and fourth-degree lacerations could have occurred.

The literature on mediolateral episiotomy discusses trauma other than third- or fourth-degree lacerations. The West Berkshire Perineal Management Trial was a randomized controlled study of mediolateral episiotomy.[10] Patients were placed into two groups: the restrictive group in which episiotomy was "used only for fetal indications" and the liberal group in which episiotomy was "used to prevent perineal tears." One thousand patients were enrolled; the episiotomy rate was 10% in the restrictive group and 51% in the liberal group. Only one case of severe trauma to the upper one third of the vagina occurred in either group. The authors state that there is "no evidence that trauma is more extensive in the restrictive group."[10]

There is little evidence to support the argument that episiotomy limits perineal trauma. There are some data to suggest that the procedure predisposes the gravid woman to third- and fourth-degree lacerations.

Prophylaxis against pelvic relaxation. *Williams' Obstetrics*, in defense of episiotomy, states, "It can be said

223

with certainty, that since the era of in-hospital deliveries with episiotomy, there has been an appreciable decrease in the number of women subsequently hospitalized for treatment of symptomatic cystole rectocele, uterine prolapse, and stress incontinence." Although the two phenomena are associated, there are few scientific data to claim that episiotomy has caused less pelvic relaxation. However, most proponents of this argument cite the 1935 study by Aldridge and Watson.[10] They compared 2800 deliveries in primigravid women during two time periods 1920 to 1925 and 1929 to 1934. The women in the later time period had more frequent use of "midline episiotomy and prophylactic forceps." The authors concluded that vaginal and pelvic floor injuries were markedly diminished in women who had episiotomies and forceps deliveries.

In the Aldridge and Watson study,[11] follow-up was done at 6 weeks by observers not blinded to the mode of delivery. The criteria for "pelvic floor injury" were not described or standardized. No statistical analysis was performed. The use of forceps was a confounding variable. The overall episiotomy rate was 23%, which is one third of the present rate. They had an abdominal delivery rate of only 3%, which confounds extrapolation of these data to modern obstetrics. Aldridge and Watson clearly identify their bias toward the interventionist school of DeLee and Pomeroy and state that "the comparison of physical findings is not entirely fair or accurate."[11]

Gainey[12] presents the most convincing data that episiotomy can prevent subsequent pelvic relaxation. He compared two groups of 1000 women. The first group was delivered with episiotomy performed "late" only "when there were signs of impending laceration." The second group was delivered by outlet forceps over a right mediolateral episiotomy performed "early." Gainey evaluated all the women at 2 months to 10 years after their deliveries. Evaluation consisted of recording damage to the urogenital diaphragm, the levators, and vaginal wall attachments. His results included several findings: greater damage in all areas in patients delivered without episiotomy, increased damage on successive deliveries in both groups, and equivalent incidence of stress urinary incontinence and uterine descencus between the two groups.[12]

Although Gainey's work is impressive with objective definitions of pelvic damage, it remains open to criticism. First, there is the confounding variable of forceps delivery, which every patient in the second group underwent. Even the discussants of his work debated whether this had any impact and whether episiotomy alone would obtain similar benefits. Second, the observer was not blinded as to the mode of delivery, thereby interjecting biases into the asssessment. Third, the two groups being compared were very different and, as with the Aldridge and Watson study,[11] an attempt was made to compare women delivered in different decades. There is no mention of the length of the second stage of labor or abdominal delivery rate. The percentage of women who were actually symptomatic from this "pelvic damage" cannot be determined. No comment is made about dyspareunia or stool incontinence.

Another major issue is the timing and depth of episiotomy necessary to prevent pelvic relaxation. Both original and modern advocates urge incising the perineum when the vertex reaches the pelvic floor, stressing incision of the levator bundle before any distention of these muscles. Few modern episiotomies fulfill this objective; most are done after marked distention of the levators and perineum. If DeLee's premise is accepted,[3] then episiotomy must be performed early to prevent subsequent relaxation.

Modern studies

Recent studies attempt to determine the effects of childbirth and common obstetric procedures on the function of pelvic and anal musculature. Snooks et al.[13] report pudendal nerve damage in 40% of women who have vaginal deliveries. No damage was noted in women after abdominal delivery. Forty percent of this damage will persist at 8 weeks post partum. Prolonged second stage, forceps deliveries, delivery of an excessively large infant, and third-degree perineal lacerations were positively correlated with increased pudendal nerve latency. Midline episiotomy had no effect on pudendal nerve function. Snooks et al. suggest that pelvic relaxation and urinary or fecal incontinence that develop after vaginal delivery result from this damage to the pudendal nerve. Although they suggest that "obstetricians should use techniques that may protect the pelvic floor and its nerve supply," they do not identify which techniques to use. Their work does not support midline episiotomy as an effective technique for preventing such damage.

Haadem et al.[14] studied rectal sphincter function in 63 women after "rupture" of the perineum into the rectum. Only five of these deliveries were preceded by episiotomy. Half of these patients had significant morbidity: incontinence with flatus, dyspareunia, and pain with bowel movements. Fourteen had anal pressure profilometry, and these women had significantly less strength in the anal sphincter. The Haadem study suggests that lacerations involving the rectum result in more long-term anal dysfunction than is commonly recognized.

Using a simple perineometer, Goudon and Lougue[15] failed to demonstrate a significant difference in perineal function at 1 year after abdominal delivery, vaginal delivery with episiotomy, vaginal delivery over intact

perineum or without second lacerations, or forceps deliveries or in nulliparous control women. Perineal muscle function was found to be dynamically related to regular exercise done by the individual and not to mode of delivery.

In the West Berkshire perineal management trial,[16] there were no differences at 3 months post partum in the incidence of stress urinary incontinence between the liberal and restricted groups. Follow-up at 3 years failed to demonstrate prevention of urinary incontinence by liberal use of episiotomy.[16]

In conclusion, despite its common application, there is little evidence to support routine use of episiotomy. This procedure may well increase the incidence of third- and fourth-degree lacerations. There are few data to support the premise that this procedure prevents pelvic relaxation. Too many changes (such as diminishing family size, more frequent use of abdominal deliveries, shorter second stages) have occurred to attribute to episiotomy the credit for the decrease in pelvic relaxation over the last 50 years. Efforts should be directed toward objectively ascertaining whether routine episiotomy is truly beneficial.

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Amniotic band syndrome: Reevaluation of its pathogenesis

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Amniotic band syndrome is a poorly defined entity characterized by protean fetal malformations and disruptions. The pathogenic theory widely accepted in the obstetric literature is that the formation of fibrous amniotic bands is the initiating event in the disorder and is responsible for subsequently pathologic conditions. A critical review of the recent clinical and experimental literature appears to contradict this hypothesis. Evidence suggests that amniotic band syndrome results from a multifactorial process in which vascular compromise, specifically hemorrhage, is the principal pathogenic stimulus and that the fibrous bands are a late, reparative event of little or no pathogenic significance. (AM J OBSTET GYNECOL 1989;160:1030-3.)

Key words: Amniotic band syndrome, etiology, pathogenesis

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FAMILY-CENTERED MATERNITY CARE

Family-centered maternity care (FCMC) is a philosophy and practice of care for the childbearing family that respects the needs of its individual members and fosters and supports the establishment of parent-newborn-family relationships. The term, introduced in the United States in the late 1950s (Stella, 1960; Engel, 1963), recognizes childbirth as a healthy life event for women and families. FCMC is designed for both healthy and high-risk women and combines the physical and psychosocial aspects of prenatal, intrapartum, and postpartum care. It emphasizes individualization of care and social interaction between mother, father, infant, family members, and chosen support persons.

Various organizations have defined and endorsed FCMC (International Childbirth Education Association, 1978; Interprofessional Task Force on Health Care of Women and Children, 1978; Canadian Paediatric Society, 1979; Canadian Institute of Child Health, 1980; McMaster University, 1981; American Academy of Pediatrics and American College of Obstetricians and Gynecologists, 1988), and components of a hospital FCMC program have been published (Stella, 1960; Haire and Haire, 1970; Bishop, 1980; Sumner and Phillips, 1981; Klaus and Kennell, 1982; Young, 1982; McKay and Phillips, 1984). Different physical designs for hospital FCMC units have been described (Fenwick and Dearing, 1981; Brans, 1983; Ross Planning Associates, 1988).

Changing from conventional maternity care to FCMC requires extensive planning and staff and public education. A recommended program includes a written philosophy, goals, and objectives for care; in-service staff education; orientation and tour of maternity facility; childbirth and parenting education; individualized care; informed consent for medical interventions; nurturing philosophy and attitudes of staff; partner presence for labor and birth; availability of midwives; trained labor companion (doula); Leboyer, or "gentle." birth; flexible protocols and practices; homelike birth environment; mother/baby nursing; rooming-in; breastfeeding promotion; early parent- and family-infant contact; flexible visiting hours; and an early discharge program.

In-hospital FCMC settings may include a diagnostic/admitting area; a waiting room or early-labor lounge; library area; conventional labor, delivery, and postpartum rooms; birthing or labor/delivery/recovery (LDR) room (Sumner and Phillips, 1981; Young, 1982; Brans, 1983; Ross Planning Associates, 1988); single-unit delivery system (Notelovitz, 1978; Fenwick and Dearing, 1981; Young, 1982; McKay and Phillips, 1984; Phillips, 1988) or combined labor/delivery/recovery/postpartum (LDRP) room (Ross Planning Associates, 1988); in-hospital birth center (Allgaier, 1978; American College of Obstetricians and Gynecologists, 1980; Young, 1982; McKay and Phillips, 1984); well-baby central nursery; newborn holding room (Fenwick and Dearing, 1981); special care and intensive care nurseries (Brimblecombe, Richards, and Roberton, 1978; Klaus and Kennell, 1982); and care-by-parent pediatric facilities (James and Wheeler, 1969; Klaus and Kennell, 1982; Ross Planning Associates, 1988). Free-standing (out-of-hospital) birth centers use FCMC principles and practices to re for healthy childbearing women and families (International Childbirth Education Association, 1978; National Association of Childbearing Centers, 1985; Lubic, 1980).

Advantages of FCMC to women, infants, and families are clinical safety; continuity and coordination of care; promotion of family attachment (bonding) and relationships; personal and family satisfaction; heightened maternal self-esteem, autonomy, and control; increased self-confidence in infant caregiving and parental adjustment; early and extended breastfeeding; active parent participation in health care decisions and childbearing process; fewer medical interventions; and elimination of room-to-room patient transfers.

Advantages of FCMC to maternity care providers are lower infection rates; personal job satisfaction; cost efficiency; better utilization of maternity staff; marketability; consumer popularity; improved provider-patient relations; improved community relations; elimination of duplication of services; and increased utilization of maternity services. • DIONY YOUNG

A new family rejoices. Photo courtesy of Paulina G. Perez.

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APPENDIX B

The instructor may prepare the information on overhead transparencies or may use the Socratic method of teaching where s/he draws the information out of the trainees. The questions above the topics are to ask the students in hopes of eliciting the information following the questions.

Premises about adult learning (practical learning)

Ask: "How do you learn best?"

The most productive way of learning is by doing. Repetition is necessary for proficiency

Ask: "How do you like to be taught?"

Adult learning is most effective in an interactive environment where the participants discuss, role play, create action plans, etc.

Learning is easier when the participant knows what s/he is expected to learn.

People learn best when there is positive feedback--letting the participants know how they are doing through:

Verbal praise both in the group and individually
Acknowledging appropriate skills
Letting the participants know they are progressing

Ask: "What motivates you to learn new things?"

The adult learner must see relevance of the material to his/her profession to be motivated to learn it. Must be ready to learn.

Ask: "What hinders your learning?"

People may come to the training with person concerns such as:

A fear of failure or of being embarrassed
A fear of not understanding the content presented
A concern about how they will fit in with the other particpants
Will I get along with the trainers?
Will I be able to perform the new skills I am expected to learn?

Ask: "What is the most valuable commodity that you bring to this training?"

The adult learner brings her/his own expertise and experience to share with others. It is most productive when it builds on what the participant already knows or has experienced.

Techniques used in adult learning.

Ask: "What makes learning effective and fun?"

Adult learning is more fun when a **variety** of techniques are used.

- Lecture with audio-visual aides such as slides or overhead transparencies
- Video
- Role play and demonstration
- Small group work
- Case studies
- Team teach with participants
- Group discussion
- Games (purposeful, to demonstrate a point visually)
- Warm-up exercises (like having members introduce each other to help create a group working together)

Ask: "What are the differences in the formal education you received and adult or practical education as we have discussed above?"

Comparison of formal (pedogogy) and "adult" learning

FORMAL	PRACTICAL
Structured	Informal
Instructor is most important	Student-centered learning
Information mostly theoretical	Learning by doing (hands-on) Learning can be fun
Little or no interaction between Instructor and students	Interactive (trainer and students are partners
Few questions by students	Participatory (questions go both ways)

(Prepare this on a chart or overhead to show last, or ask students the differences and write on the dry-erase board as they list the points)

Responsibilities of the adult learner and the teacher/facilitator.

Ask: "What are the learners responsibilities?"

The adult learner has the responsibility to:

1. actively participate in learning
2. adequately prepare
3. accept responsibility for learning
4. communicate with faculty

Ask: "What are the differences between a teacher and a facilitator?"

Difference in teacher vs facilitator (not good vs bad--facilitators work well with adult and clinical learning. One does more formal "teaching" during the didactic week and more facilitating during the clinical week).

TEACHER	**FACILITATOR**
Gives info	Guides
Gives answers	Ask questions
One-way communication	two way
center stage	learners have center stage
decides goals & obj.	Proposes goals and obj.; incorporates learner's ideas
Focus is on course	Focus is on learner
Stays apart fromgroup	Is part of group

Remember: "People remember 20% of what they hear, 40% of what they hear and see, and 80% of what they hear, see, and experience."

Remind the participants of the importance of teaching and learning:

> "If you give a man a fish, he has one meal. If you teach him how to fish, he can eat for his entire life time."

References

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APPENDIX C

APPENDIX C: DAY TWO:

INTERPERSONAL RELATIONSHIPS AND COMMUNICATION SKILLS

"Relationship" is defined as the connection between people and/or things.

In a health care setting, there exists different kinds of relationships: doctor-patient, midwife-patient, midwife-doctor, and relationships with the community. To a great extent, the quality of these relationships affect health care provision. Where poor relationships exist, there will be no cooperation among workers themselves, and both clients and the public suffer.

Maternal health care providers do not want the public to perceive them as being insensitive or inhumane when they are supposed to be offering humanitarian services. Health care providers must therefore improve their communication skills and maintain good human relationships with clients and their relatives.

Determinants of Postive Relationship:

A good relationship is indicated by:

Greeting clients in a way acceptable to them
Friendliness
Taking time to listen to them
Answering their questions satisfactorily
Being patient even if they ask questions repeatedly
Other attitudes such as trust, caring, empathy, mutual understanding and willingness to allow the clients greater participation in their care

The attitude of trust is built through experience from childhood. If one grows up in a trusting environment, one would learn to trust and expect the same from others. However, experience of mistrust could reverse the attitude, and clients may learn not to trust health personnel or vice versa. Characteristics of a trusting person are:

acceptance of others as they are without attempting to impose change on them
Consistency between word and action
Openness in interaction

Definitions:

Empathy: The ability to perceive another person's situation or feelings. Empathy grows gradually and spontaneously through a progressive relationship.

Caring: A caring attitude is demonstrated by a gentle approach, respect, listening, physical touch, and provision of companionship--all of which help to relieve the patient's anxiety and provide her and her

family with a sense of security.

Participation: Clients and their relatives should be allowed to participate in decision-making concerning their care. Such participation promotes cooperativeness and compliance, which forms the basis for successful health care provision.

COUNSELING FOR MCH PROVIDERS

Health care providers come into contact with the public, clients, and their families everyday. They are expected to motivate, educate and counsel members of the community. The most intimate of these interactions, counseling, is a process of defining feelings, providing unbiased information and empowering clients to make their own decisions. The interpersonal skills a health care provider brings to communicating with and counseling her clients makeup the quality of care she provides for her clients.

The followin skills are important to use for successful counseling:

- Praise and encouragement
- Questioning
- Paraphrasing and summarizing
- Active listening
- Coping with special needs
- Use of support materials
- Observation

***Definitions*:**

Praise and encouragement: occurs when speaking to a client using words that motivate and assure a client that you approve of her. Why? Praise and encouragement help build a client's confidence and reinforce desired behavior. Praise elicits feelings of self-worth in clients, which in turn empowers them to make the right decision or execute the right task with enthusiasm.

EX: " Good, you are pushing well."
"Your breathing is excellent and you appear to be relaxing well"

Questioning: Questioning is a technique for learning from the client specific information or general feelings and concerns. Questions can be of four types:

1. Open-ended: "Tell me what your last birth was like"
2. Closed-ended: "How old are you?" How many babies have you had?"
3. Probing: "Describe for me where you are feeling the contractions now."
4. Leading: "This hurts a lot, doesn't it?"

Listening and Response: Active listening is the art of hearing and trying to interpret your client's words. Why: Often we think we are listening but we aren't really hearing our clients' responses. Paying attention to uninterrupted responses are one of the best ways we can come to know our clients and make appropriate responses to their questions and concerns.

***Paraphrasing and summarizing*:** Repeating back to the client what you heard her say, in short form.

Why? To make sure you understood her, to show her you are listening, and to help her clarify her feelings. This is most needed when trying to get information from the client, e.g. during history taking or when she seems concerned about something.

***Reflection and acknowledgement*:** Similar to summarizing and paraphrasing, reflection is a process of reflecting clients emotions back to them. Acknowledgement is a verbal recognition of fears, concerns, or satisfaction. Why? Reflection and acknowledgement validate the client's feelings and show empathy and respect on the part of the provider.

***Observation*:** Looking and listening to the clients's behavior, reaction, physical appearance. Why? A doctor or midwife will benefit from developing a high sense of awareness of her client as a complex human being. This is done consciously or intuitively and helps us to evaluate her educational level, socio-economic level, state of mind (distressed, agitated, calm) and the degree of pain she is in and whether she has family support.

***Explaining in language client understands*:** making a complex concept or procedure comprehensible to the client according to her level of education and informational needs. Why? Clients will be less fearful and better prepared to make decisions to benefit their health if they fully understand what has happened, what is going to happen, what is being required of them, and why. KISS= Keep It Simple Sensible.

Coping with special needs: Coping with special needs means being able to handle special problems or clients whose situations are unusual without imposing one's own values or judging the individual. EX: mother with HIV, high risk mother, teen pregnancy.

Verbal Communication Skills

C - Clarify
L - Listen
E- Encourage
A - Acknowledge
R - Repeat/reflect

Non-Verbal Communication Skills

R - Relax
O - Open
L - Lean Forward
E - Eye Contact
S - Sit Squarely (and smile!)

Counseling Skills

G- Greet
A- Ask
T- Teach
H- Hear
E- Explain
R- Return

COMMUNICATION EXERCISES

1. HAVE PEOPLE INTRODUCE EACH OTHER--SOMEONE THAT THEY DON'T KNOW

235

VERY WELL--SOMEONE NOT FROM THEIR TOWN IF POSSIBLE. GIVE NAME, PROFESSION, POSITION, WHERE THEY ARE FROM, WHY THEY ARE HERE, THE MOST IMPORTANT THING THEY DO IN THEIR LIVES, AND THE THING THEY DO THAT IS THE MOST FUN!

2. USING FLIP CHART, ASK THEM TO LIST AS MANY WAYS AS THEY CAN THAT WE COMMUNICATE a) verbally and b) non-verbally. Have them demonstrate a few or do CHARADE GAME for non-verbal demos.

3. Whisper game (Objective: two way communication)

"PEOPLE ONLY REMEMBER 20% OF WHAT THEY HEAR, 40% OF WHAT THEY HEAR AND SEE, AND 80% OF WHAT THEY SEE, HEAR, AND EXPERIENCE"

TRAINER whipers this to nearest particpant twice, then she whispers to next person, next person is not allowed to ask questions. The last particpant writes it on a piece of paper and gives it to theTRAINER.

Next, this same game is repeated and the whisperee is allowed to ask questions.

TRAINER asks:
-how did you feel when you received the message without being allowed to ask questions?
-how did you feel when you received the message and were allowed to ask questions?

FACILITATOR looks at results of the game--the final messages that were received in the two games.

Review: "What is the role of Feedback in communication?"

> In conducting communication, it is important to try to get feedback from thelistener for the communicator to have an idea about the information

4. USE RELEVANT SCENARIOS TO DEMONSTRATE THE POINTS INVOLVED IN GOOD COMMUNICATION

Have someone play the client (mother) and her husband. The facilitator can be the midwife and someone be the obstetrician. The people playing the midwife and obstetrician should try to motivate the mother and her husband to be part of the FCMC group of clients. The mother has at least one contraction during the exercise to show that the providers will not talk to her during contractions. Both the midwife and the obstetrician can do some talking. Hopefully the mother and father are convinced.

OBSERVER'S GUIDE

	USUALLY	SOMETIMES	RARELY
NONVERBAL COMMUNICATION SKILLS			
R- relaxes			
O- opens up to client/nonjudgemental			
L- leans forward toward client			
E- establishes eye contact			
S- sits squarely (and smiles)			
VERBAL COMUNICATION SKILLS			
C- clarifies			
L- listens			
E- encourages and praises client			
A- reflects and repeats			
GATHER = COUNSELING PROCESS (STEPS)			
G- greets client and family warmly			
A- asks open ended and probing questions			
T- tells clients about the benefits of _____			
H- helps her to make her own decision			
E- explains anticipated processes (admission, labor, etc)			
F- return visits, referral, follow-up explained			
OBSERVER'S COMMENTS			
Observer's Name _____			
Date _____			

APPENDIX D

Change Theory and FCMC
Introductory Lecture

It is said there are two events in life of which one *can* be certain: death and taxes! I would suggest there is another. CHANGE! Nothing stays static. What is known today may be changed in the future. But even knowing that everything must change does not make the process easier.

Think for a moment about how your morning begins. What habits do you do in the same way, the same order, each and every day? What are some of those habits?

(Elicit from the group some of the daily habits for example - which side they get out of bed, do they use the toilet first or brush their teeth, is water put on to boil or do they turn on some music)

Now tell me about getting dressed. Think about putting on a pair of pants. Which leg goes is first. Now imagine changing this routine. Put in the opposite leg first. It feels awkward and uncertain. *(You can have to group stand up and mime putting on a pair of pants.)*

In our personal lives we get used to doing activities a certain way. In our professional lives the same thing occurs. We become used to providing care to our clients in a certain way. Though you are an expert, there is a routine that you follow. You are now being challenged to change that routine. The protest to change will come in many forms - from your mind, your body, your emotions and your spirit. Change is not an easy task.

How can one make the change process successful and less painful? The theory of change provides some guidance. Change theory is the road map. It provides the path for initiating the change process, implementing change and finally solidifying the change.

(Overhead 1) A change agent one must recognize the components which will facilitate or hinder change. Flexibility is a necessity as is persistence. Frustrations will arise. These can lead to inaction. Within the process one must be realistic

(Overhead 2) Change can be facilitated by an outsider as our team represents. There are advantages and disadvantages to being an outsider. Being outside of a situation can provide a fresh and unbiased perspective. However, an outsider may not understand the informal power structure which is present in the organization. An insider facilitating change can know some of the subtleties of the organization but may face other hostilities by challenging his/her own superiors and coworkers.

Both the insider and the outsider can benefit from a structured approach to facilitate change. There are now many intricate theories which address the process of change among people and organizations. I chose to present Lewin's Stages of Change to provide us some structure in looking at changing maternity care practices. Lewin developed the first change theory in the 1950's. It is a simple structure but provides the basics from which to begin.

(Overhead 3) Lewin theorized there are three stages of change. Stage one is the "unfreezing" process. At the beginning, disequilibrium is created. This sets the stage for opening up institutions and people to be ready for the coming change. However one must proceed with caution to avoid extremes. Extreme measures initiated at the beginning of the change process can upset the process. Extremes can cause people to become more solidified in the status quo. *(Give an example of an unfreezing process)*

(Overhead 4) Lewin's second stage is MOVING. One must provide the environment conducive to behavioral change. And within the process of change there must be rewards - both internal and external.

(Overhead 5) Finally, the change has occurred. Now it is time to stabilize. Positive feedback will help ensure the continued implementation of what has been changed. Along with positive feedback, an ongoing formal evaluation process must be in place. This will allow for real understanding of the benefits and help identify the area for improvement.

(Overhead 6) Reinkmeyer outlines the change process in more specific steps. Let's look at the Reproductive Health initiative in Ukraine under each of these stages. *(Review the seven stages of change in the context of the implementation of FCMC in Ukraine)*

(Overhead 7) As one is in the midst of the change process, thoughtful reflection is useful to identify the driving forces of change and the restraining forces. Just as we identified the specific types of barriers to change *(knowledge, attitudes, skills, or resources)* in order to plan the way to shatter the barrier, so too must one know where the forces are and what they represent.

(Overhead 8) Resistance can come from many different fronts - concern for costs, wanting to keep the status quo, feeling threatened or a fear of failure. One can become frustrated and even angry when faced with resistance. I would suggest that you always take resistance in stride and transform it into an advantage. How to do this?

(Overhead 9) Resistance forces one to clarify the purpose of the change. Clarifying your purpose will enable you to provide people with real understanding of what and why they need to change. Resistance can be a real advantage.

(Overhead 10) Resistance is different from <u>reluctance</u>. The majority of people (60 - 80%) will be <u>reluctant</u> to change for various reasons. But with understanding, desire, training, and reinforcement, they will be able to integrate the new skills or behaviors and thus provide real change.

(Overhead 11) Unfreezing begins with enabling understanding - what and why people need to

change and providing the environment in which a person can feel emotionally compelled to change. Often understanding begins with one's perspective or point of view. Tell me your point of view *(Go through the three young/old woman images. Encourage the group to help one another see the different perspectives of the young and old woman)*

Notice how you couldn't see the image until someone helped you change your vision. It was not threatening to look at this image in a different way.

(Animal Overheads) One way to help introduce the ideas of change is to use non-threatening images. So as you approach the clinical week and will be experiencing changes for yourselves remember - *(create a story of the process of change using the computer images of animals and things to close the lecture)*

APPENDIX E

APPENDIX E: DAY TWO: PUEPERAL SEPSIS PRE-TEST*

Q.1 What is puerperal sepsis?

Q.2 When the membranes rupture many hours before labour begins, what condition may develop?

Q.3 Following delivery, where might puerperal sepsis be localized?

Q.4 What are three life threatening conditions which may result from puerperal sepsis?

Q.5 What are three common signs of puerperal sepsis?

Q.6 What are four risk factors for puerperal sepsis which could be identified on history taking?

Q.7 What are three risk factors for puerperal sepsis which could be identified by physical examination?

Q.8 What is the purpose of taking a high vaginal swab?

Q.9 What are two organisms that commonly cause puerperal sepsis?

Q.10 What is the preferred route of administration for antibiotics in the case of puerperal sepsis and why?

*from "Safe Motherhood, Puerperal Sepsis Module" WHO/FRH/MSM/96.4

3. **DAY THREE: Partograph/Infection Prevention/Puerperal Sepsis**

ADDENDA: DAY THREE

A. The Partograph and article from Lancet

B. Infection Prevention Materials

C. Excerpts from WHO Puerperal Sepsis Module

D. Bibliography and Key Articles on Infections

E. Group Exercise on FCMC and Infection Control

DAY 3: Partograph/Skills/Infection Prevention/Puerperal Sepsis

Learning Objectives:
At the end of Day 3, the participants' will be able to :

1. discuss and critique adult teaching and learning techniques used in previous day's session.
2. use the partograph to monitor the progress of labor, recognizing the need for action at the appropriate time
3. explain the significance of the partograph to other providers to and parents
4. demonstrate clinical skills essential to use of partograph using FCMC principles
5. discuss the accepted method of infection control utilizing an FCMC model of care.
6. discuss the incidence, prevention and treatment of puerperal sepsis

Morning Session

- Time:
  - 20 minutes group evaluation and discussion
  - 60 minutes lecture
  - 30 minutes small group work
  - 60 minutes lecture
  - 30 minutes large group work
- Materials:
  - Large laminated partograph and dry erase markers
  - Optional: abdominal and pelvic models

	TOPIC	TIME	TEACHING METHODS
I.	Evaluate teaching techniques Re-orient to action plan	20 Minutes	Discussion, Flip chart, Action plan
II.	Use of the Partograph	60 Minutes	Lecture, Overheads, Handouts (WHO), small group work
III.	Group work on partograph, Q&A	30 Minutes	
	BREAK	**15 Minutes**	
IV.	Use of Partograph, contd.	60 Minutes	Lecture, Overheads, Handouts (WHO), small group work
V.	Group work on partograph, Q&A	30 Minutes	

245

Lunch Break: 60 Minutes

Afternoon Session

- Time:
  - 60 Minute Demonstration and Skill Practice
  - 30 Minute Lecture
  - 45 Minute Lecture
  - 30 Minute Lecture
  - 15 Minute Discussion/Q&A
  - 45 Minute Group Exercise
- Materials:
  - Flip chart
  - Models for practice of dilatation, effacement, station
  - Handouts

TOPIC	TIME	TEACHING MATERIALS
VI. Skill Practice: pelvic exam	60 Minutes	Role play, skills practice
VII. Infection Prevention	30 Minutes	Lecture, Handouts
VIII. Puerperal Sepsis	45 Minutes	WHO material
BREAK	**15 Minutes**	
IX. Perinatal Infections	30 Minutes	Lecture, Handouts, Discussion
X. Discussion, Q&A	15 Minutes	Discussion
XI. Group Exercise on FCMC and Infection	45 Minutes	Small group work, large group discussion

END OF DAY 3

DAY 3: MORNING SESSION

SESSION OUTLINE	SESSION NOTES
I. Review of Teaching Techniques	
1. Purpose	• Address the training of trainers aspect of the course
2. Format	• Facilitate identification and discussion of pros and cons of various methods • Discuss specifically the effectiveness of particular methods for use with FCMC training • Large group discussion • Role play or demonstration as appropriate
II. Partograph	**See Appendix A, Day Three: "The Partograph" or may be attached as a separate document. Available with text in Russian.**
1. Introduction	Abstract: WHO article on use of partograph
2. Observations Charted	• The progress of labor • The fetal condition • The maternal condition
III. Partograph, Group Practice	
IV. Partograph, contd.	
1. Abnormal Progress of Labor	• Prolonged latent phase • Prolonged active phase (alert and action lines
2. Management of Labor	• Normal latent and active phase • Between alert and action lines • At or beyond Action line • Prolonged latent phase
V. Exercises	• Interpretation of existing partographs • Cases to practice entering data on partographs

END OF DAY 3 MORNING

DAY 3: AFTERNOON SESSION

SESSION OUTLINE	SESSION NOTES
VI. Skills Practice: Partograph	**Pelvic and Abdominal Exam**
VII. Infection Prevention	**See Appendix B, Day Three** • Review of infection control principles • Understanding the disease cycle
VIII. Puerperal Sepsis	**See Appendix C, Day Three, Excerpts from WHO Module on Puerperal Sepsis** • Definition • Prevalence, modes of transmission, risk factors • Management and suggested interventions • Management of Complications • Implications for FCMC
IX. Other Perinatal Infections	**See Appendix D, Day Three**
X. Q & A, Discussion	
XI. Group Exercise on FCMC and Infections	**See Appendix E, Day Three for Guidelines for this exercise**

END OF DAY 3

REFERENCES: DAY THREE

Session II. WHO, "Preventing Prolonged Labor: a practical Guide, The Partograph, Part II" WHO/FHE/MSM/93.11,

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Session VIII. Exerpts from WHO, "Puerperal Sepsis Module" WHO/FRH/MSM/96.4

Session IX. Perinatal Infections references:

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249

APPENDIX A

APPENDIX A: DAY THREE: THE PARTOGRAPH

The English Version, obtained from WHO, is entitled "Preventing Prolonged Labor: a practical Guide, The Partograph, Part II" WHO/FHE/MSM/93.11, Geneva

WHO's address to obtain documents is: Division of Family Health
World Health Organization
Geneva 27 Switzerland
Tel: 41 (22) 791 2111
Fax: 41 (22) 791 0746

There are two versions of the chapter on Partograph. One is found in the document listed above (Chapter II), and the other is in the WHO publication "Obstructed Labor" (WHO/FHR/MSM/96.6), Chapter 4. The version that is translated into Russian for the curriculum is the former. The following copy is the latter. However, there are few differences in the two chapters.

"The Partograph, Part II" is available in Romanian through UNICEF Moldova.

УСЛОВНЫЕ СОКРАЩЕНИЯ

AIDS: Acquired immunodeficiency syndrome	СПИД: синдром приобретенного иммуннодефицита
ANC: antenatal care	предродовая забота
CPD: Cephalopelvic disproportion	несоответствие головки плода с тазом матери
EPI: Expanded Programme of Immunization	ОПИ: общая программа иммунизации
FIGO: Federation of International Obstetrics and Gynaecology	Международная федерация акушерства и гинекологии
HDP: Hypertensive disorders of pregnancy	Гипертензивная патология беременности
HIV: Human immunodeficiency virus	ВИЧ: вирус иммуннодефицита человека
ICM: International Confederation of Midwives	Международная Конфедерация акушерок
IEC: Information, education and communication	Информация, образование и общение
IUD: Intrauterine device	ВМС: внутриматочная спираль
LGV: Lymphogranuloma venereumm	Венерическая лимфогранулема
MCH: Maternal and Child Health	Здоровье матери и ребенка
Min: minute	Минута
NGO: Nongovernmental organization	Неправительственная организация
PID: Pelvic inflammatory disease	ВЗОТ: воспалительное заболевание органов малого таза
PPH: Postpartum haemorrhage	Послеродовое кровотечение
STD: Sexually transmitted diseases	ЗППП: заболевания, передаваемые половым путем
SVD: Spontaneous vertex	

TB: Tuberculosis	Туберкулез
TBA: Traditional birth attendant	асистент в родах
UTI: Urinary tract infection	ИМП: инфекции мочевых путей
<: Less than	Менее, чем
>: More than	Более, чем

Изменение времени от 12.00 до 24.00

am											
0	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00
0	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00

pm											
12:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00
12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00

SESSION 4

PREVENTING PROLONGED AND OBSTRUCTED LABOUR: USING THE PARTOGRAPH

AIMS

To enable students to understand the concept and principles of using the partograph in the prevention of prolonged and obstructed labour. To apply this understanding in practice and to become increasingly skilled in assessing the progress of labour. To help students learn from their experience and make recommendations to improve the outcome when managing prolonged and obstructed labour.

OBJECTIVES

On completion of Session 4, students will be able to:

1. Explain the principles of the partograph as a tool for prevention of prolonged and obstructed labour.
2. Record clinical observations accurately on the partograph.
3. Explain the difference between the latent and active phases of labour.
4. Interpret a recorded partograph and recognize any deviation from normal.
5. Monitor the progress of labour, recognize the need for action at the appropriate time and decide on timely referral.
6. Explain to mothers and other members of the community the significance of the partograph.

INTRODUCTION

In this session you will learn how to monitor, record and interpret the progress of labour using the partograph. Following an introduction to the partograph, a series of exercises will be completed to demonstrate how to plot the progress of labour graphically using the partograph.

THE PARTOGRAPH

The partograph is a record of all of the observations made on a woman in labour, the central feature of which is the graphic recording of the dilatation of the cervix as assessed by vaginal examination. An orientation to the partograph is provided below (Figure 4.1).

Patient Information	Information including name, gravida, para, registration/ hospital number, date of admission, time of admission, time of ruptured membranes, is written at the top of the graph.
Fetal Heart Rate	This is recorded to monitor the condition of the fetus.
Liquor	Amniotic fluid is observed and recorded as clear ("C"), blood-stained ("B") or meconium-stained ("M"). If the membranes are not ruptured, record "I" for intact.
Moulding	This is recorded as follows: bones are separated and the sutures can be felt easily (o); bones are just touching each other (+); bones are overlapping (++); bones are overlapping severely (+++).
Cervical Dilatation	This is the most important observation to monitor progress of labour. The dilatation is plotted with an "X". The latent phase, active phase, alert and action lines will be explained in detail in the following pages.
Descent of the Head	This is very important in the monitoring of the progress of labour. The descent is plotted with an "O".
Time	This is recorded using the time of admission as zero time. The actual time of day is recorded below the hours line.
Contractions	Along with cervical dilatation and descent of the head, contractions tell the progress of labour. The contractions are recorded under the time line.
Oxytocin, Drugs and Intravenous Fluids	These are recorded in the space provided.
Blood Pressure, Pulse and Temperature	These are recorded in the space provided.
Urine	The amount is recorded every time urine is passed. Albumin and acetone (ketone) are tested if the materials for testing are available.

PARTOGRAPH

Name Gravida Para Hospital no.

Date of admission Time of admission Ruptured membranes hours

Fetal heart rate 180 170 160 150 140 130 120 110 100

Liquor

Moulding

Cervix (cm) [Plot X] 10 9 8 7 6 5 4 3 2 1 0

Descent of head [Plot O]

Hours

Active Phase

Alert

Action

Latent Phase

Time

Contractions per 10 mins 5 4 3 2 1

Oxytocin U/L drops/min

Drugs given and IV fluids

Pulse ● and BP 180 170 160 150 140 130 120 110 100 90 80 70 60

Temp °C

Urine protein acetone clume

Figure 4.1

USING THE PARTOGRAPH

When a woman is admitted in labour a complete evaluation of her condition and the condition of her baby is done. This includes a history, physical and pelvic examination. The following information will help you learn how to record, observe and interpret your findings using the partograph.

Progress of Labour

Cervical dilatation

The first stage of labour is divided into the latent and active phases.

The latent phase (slow period of cervical dilatation) is from 0-2 cm with gradual shortening of the cervix.

The active phase (faster period of cervical dilatation) is from 3-10 cm.

Look at the graph, **Figure 4.2**. Along the left side are the numbers 0-10. Each number/square represents 1 cm dilatation.

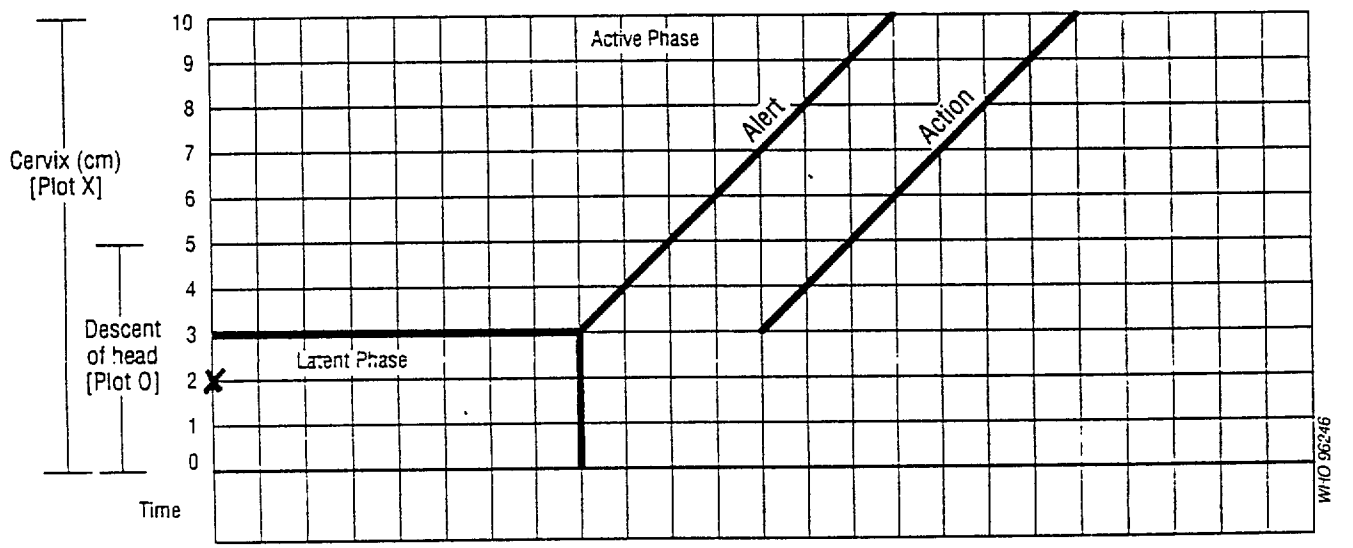


Figure 4.2

Along the bottom of the graph are 24 squares. Each square represents one hour.

The dilatation of the cervix is recorded with an X. Look at **Figure 4.2** to see the dilatation of the cervix recorded. The first vaginal examination, on admission, is recorded. Vaginal examinations are carried out at least every four hours. Women, particularly multipara, may need to be checked more frequently in advanced labour.

PARTOGRAPH

Фамилия Беременность Регистрационный номер

(1) Дата поступления Время поступления ч разрыв оболочек часы

сердцебиение плода (2)

180 170 160 150 140 130 120 110 100

ликвор (3)

раскрытие шейки (4)

10 9 8 7 6 5 4

активная фаза

линия бдительности

линия действий

прохождение головки плода (5)

латентная фаза

1 0

время (6)

сокращения (7)

5 4 3 2 1

окситоцин и в/в вливания (8)

полученные лекарства

пульс ● АД (9)

180 170 160 150 140 130 120 110 100 90 80 70 60

температура

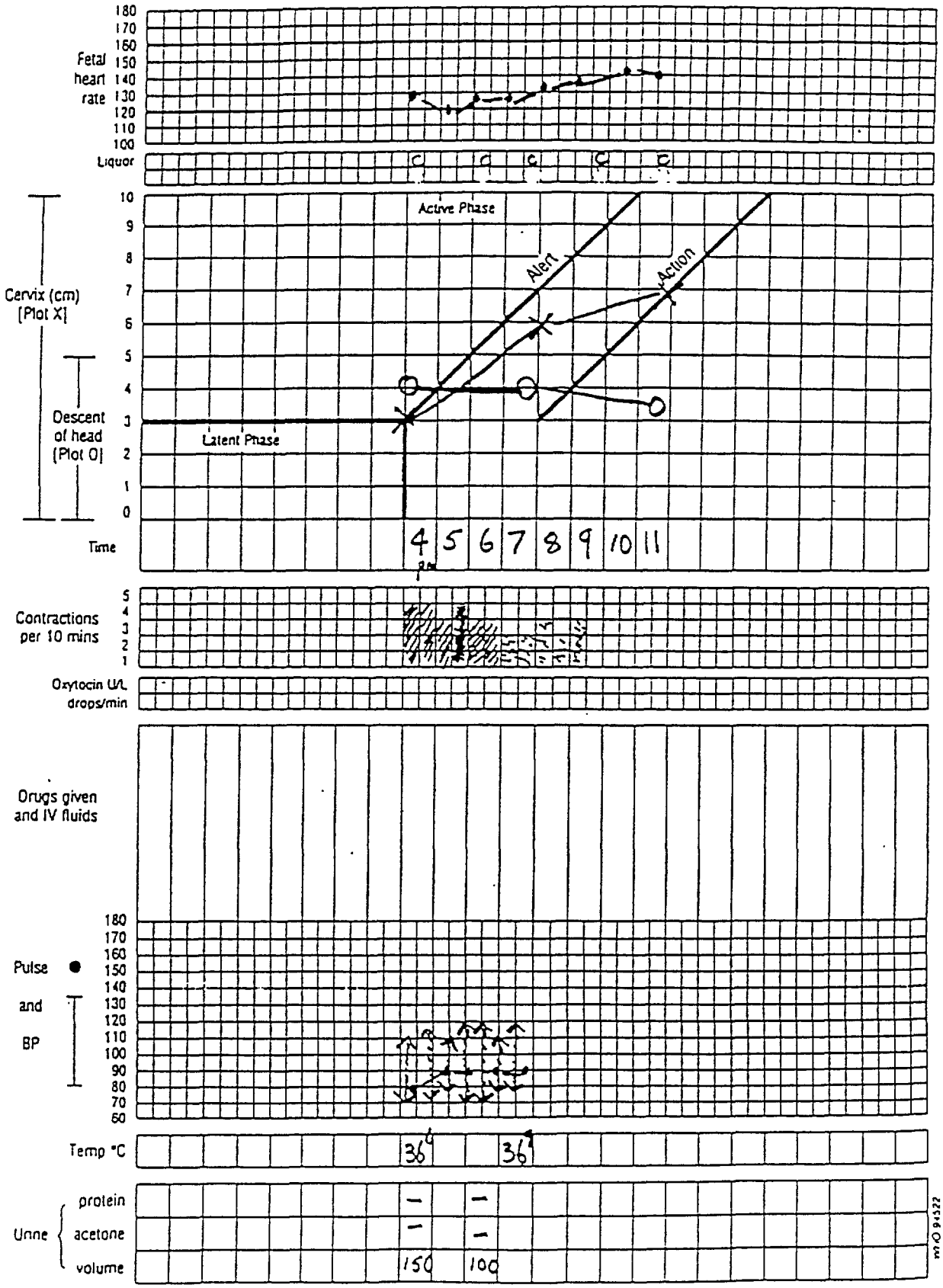
моча протеин ацетон объем

258

ПАРТОГРАММА

Name Gravida 3 Para 1 Hospital no

Date of admission Time of admission 4 pm Ruptured membranes hours



259

EXERCISE 1:

Plotting cervical dilatation when the labour is in the active phase on admission

Look at Figure 4.3.

In the section marked active phase there is an alert line, a straight line from 3-10 cm.

When a women is admitted in the active phase, the dilatation of the cervix is plotted on the alert line, at the place equal to her dilatation and the clock time written directly under the X in the space for time.

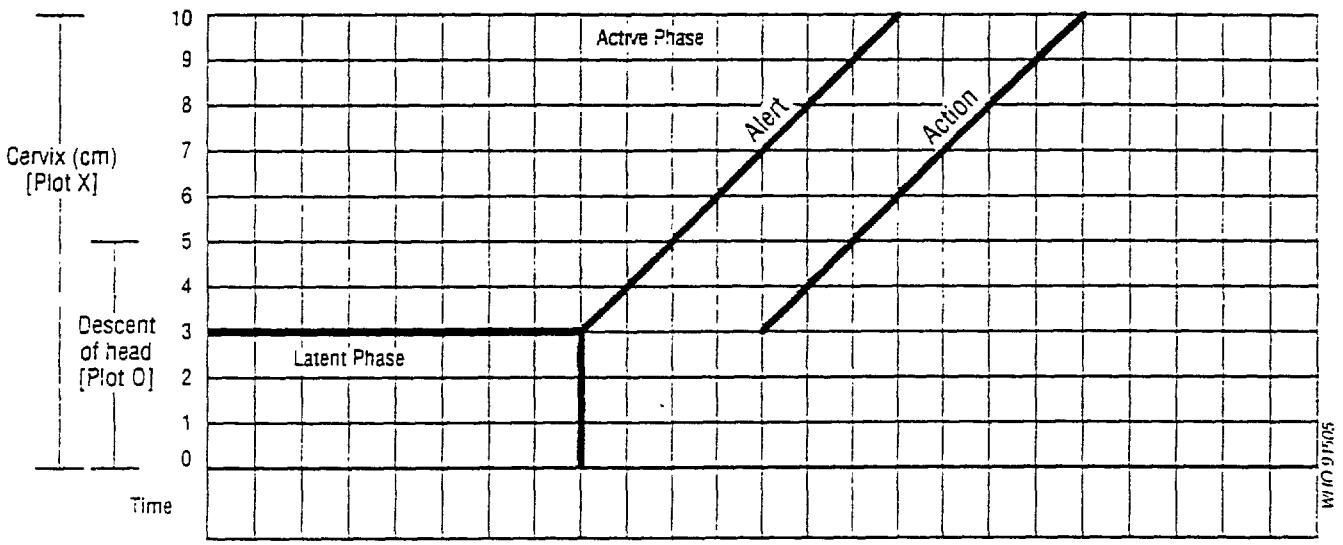


Figure 4.3

If progress is satisfactory, the plotting of cervical dilatation will remain on or to the left of the alert line.

Record the following on the graph:

- The time of admission was 15:00, dilatation of the cervix 4 cm.
- At 17:00, dilatation was 10 cm.

How long was the first stage of labour at the maternity?

ANSWERS TO EXERCISE 1:

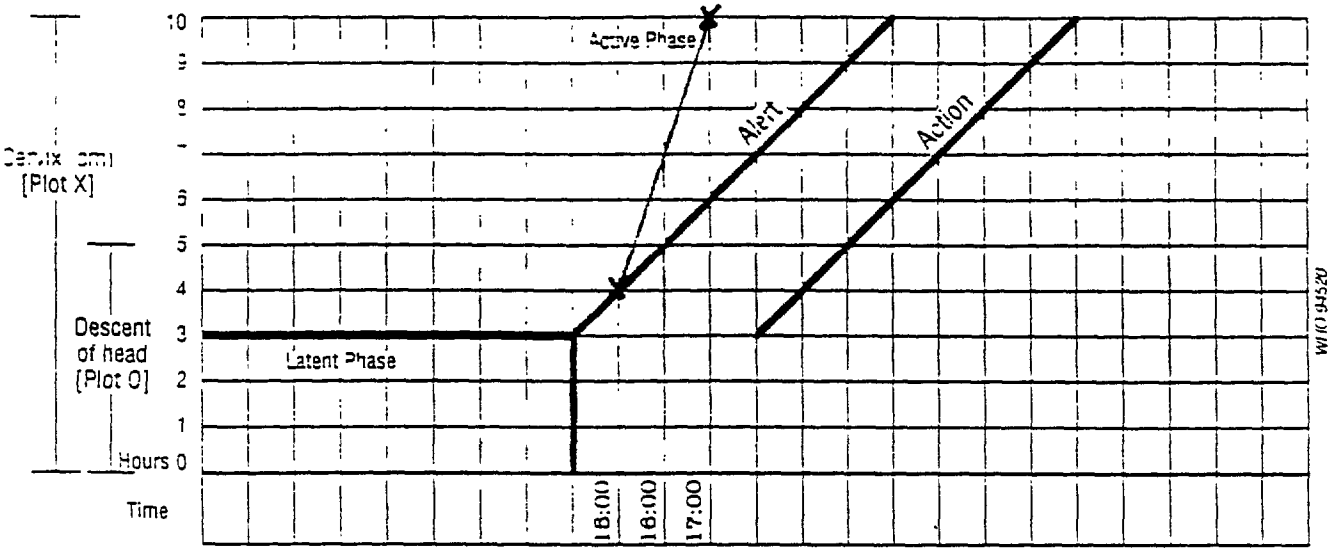


Figure 4.4

- Dilatation of the cervix was 4 cm, the active phase.
- Dilatation is plotted on the alert line at 4 cm.
- The time of admission was 15:00.
- At 17:00, dilatation was 10 cm.
- Time in the first stage of labour after admission was 2 hours.

Continue to Exercise 2.

EXERCISE 2:

Plotting cervical dilatation when admitted in the latent phase

The latent phase normally may take 8 hours.

When admission is in the latent phase, dilatation of the cervix is plotted on the line marked zero.

Vaginal examination is carried out every 4 hours, if the woman has contractions. If the membranes have ruptured and the woman has no contractions, a very careful vaginal examination is carried out upon admission to determine cervical dilatation, position of the head and to make sure the cord is not prolapsing.

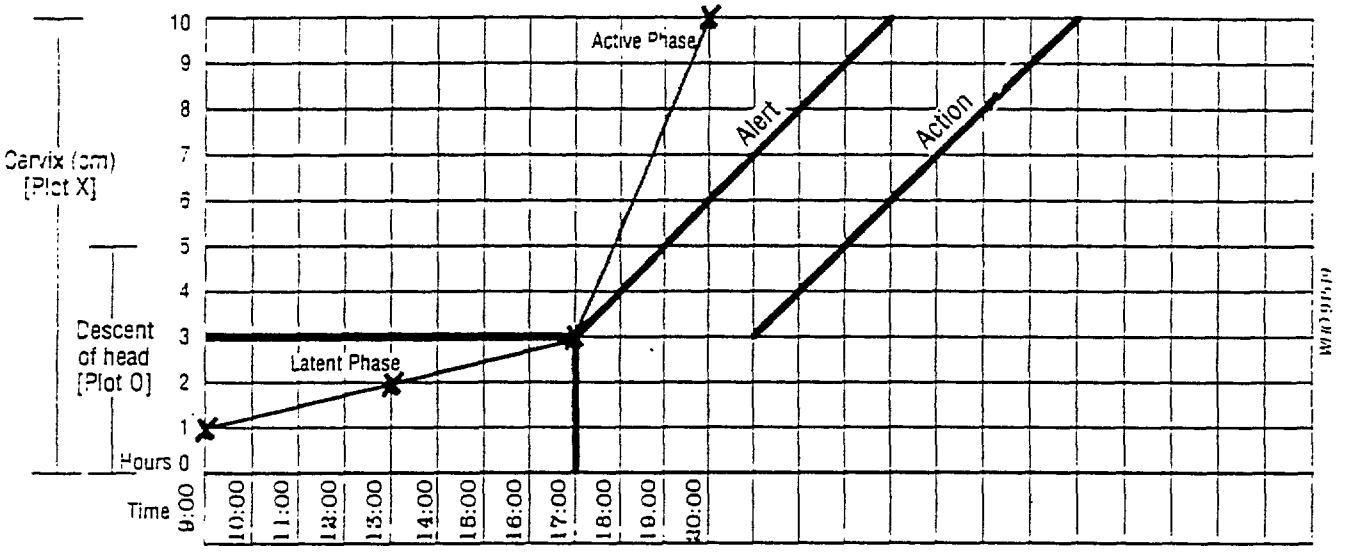


Figure 4.5

Find the following in Figure 4.5:

- Admission was at 9:00 and the cervix was 1 cm dilated.
- At 13:00, the cervix was 2 cm dilated.
- At 17:00, the cervix was 3 cm dilated when she entered the active phase of labour.
- At 20:00, the cervix was 10 cm.

How many hours was the latent phase of labour?

How many hours was the active phase of labour?

ANSWERS TO EXERCISE 2:

- The latent phase of labour began at admission (9:00) and the cervix was 1 cm dilated. The latent phase of labour ended at 17:00 when the cervix was 3 cm dilated. The latent phase lasted 8 hours.

- The active phase began at 17:00 when the cervix was 3 cm dilated and ended at 20:00 when the cervix was fully dilated. The active phase lasted 3 hours.

Continue with Exercise 3.

EXERCISE 3:

Plotting cervical dilatation from latent to active phase

When dilatation is 0-3 cm, plotting must be in the latent phase area of the graph. When labour goes into the active phase, plotting must be moved by a broken line to the alert line.

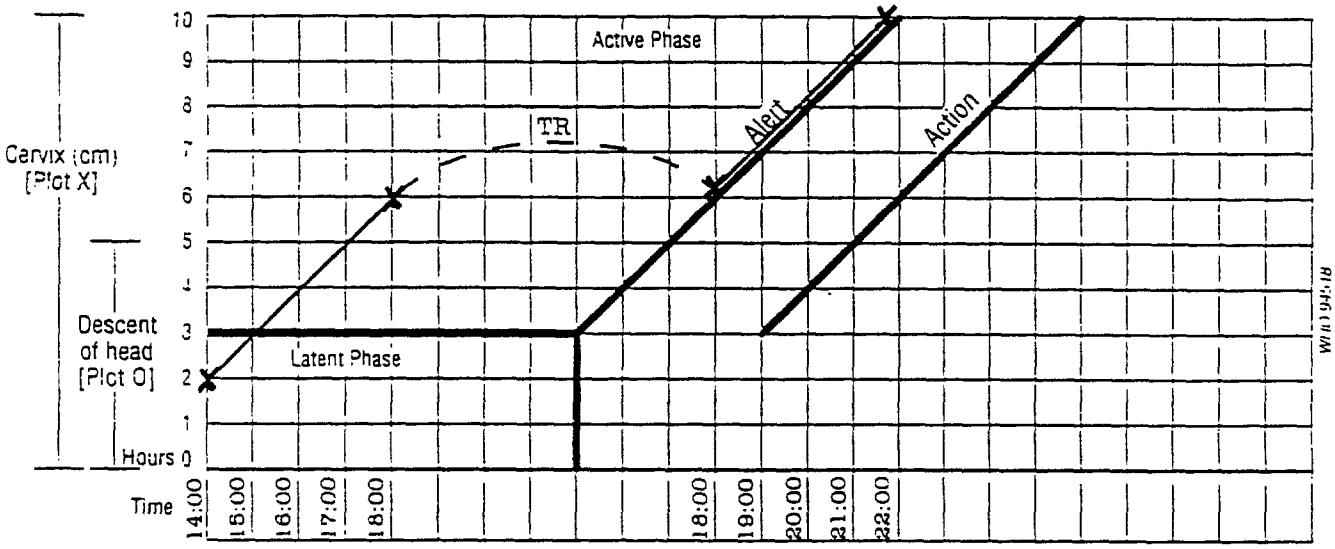


Figure 4.6

Note: TR = transfer of plotted point from the latent phase onto the alert line.

Look at the following information in Figure 4.6.

- Admission time was 14:00 and the dilatation was 2 cm.

- At 18:00 the dilatation was 6 cm - active phase.

Move the time and dilatation from latent to active phase on the alert line. Remember to use a dotted line for the move.

- At 22:00 the cervix was 10 cm.

How many vaginal examinations were performed?

How long was the first stage of labour at the maternity?

ANSWERS TO EXERCISE 3:

- Three vaginal examinations were performed at 14:00, 18:00, 22:00.
- First stage of labour was 8 hours, beginning at 14:00 and ending at 22:00.

Points to Remember

- The latent phase is from 0-3 cm dilatation and is accompanied by gradual shortening and thinning (effacement) of the cervix. It should normally not last longer than 8 hours.
- The active phase is from 3-10 cm dilatation which should be at the rate of at least 1 cm/hour.
- When labour progresses well, the dilatation should not cross to the right of the alert line.
- When admission takes place in the active phase, the admission dilatation is immediately plotted on the alert line.
- When labour goes from latent to active phase, plotting of the dilatation is immediately moved from the latent phase area to the active phase area on the alert line.

Descent of the fetal head

For labour to progress well dilatation of the cervix should be accompanied by descent of the head.

For convenience, the width of the five fingers is a guide to the expression in fifths of the head above the brim. A head which is mobile above the brim will accommodate the full width of five fingers (closed) (Figure 4.8 top).

As the head descends, the portion of the head remaining above the brim, will be represented by fewer fingers (4/5th, 3/5th etc). It is generally accepted that the head is engaged when the portion above the brim is represented by 2 fingers' width or less (Figure 4.8 bottom).

Descent of the head should always be assessed by abdominal examination immediately before doing a vaginal examination so that you will know where to expect to feel the head during the vaginal examination.

EXERCISE 4:

To plot descent of the head, on the left side of the graph see the word descent with lines going from 5-0. Descent is plotted with a 0 on the graph.

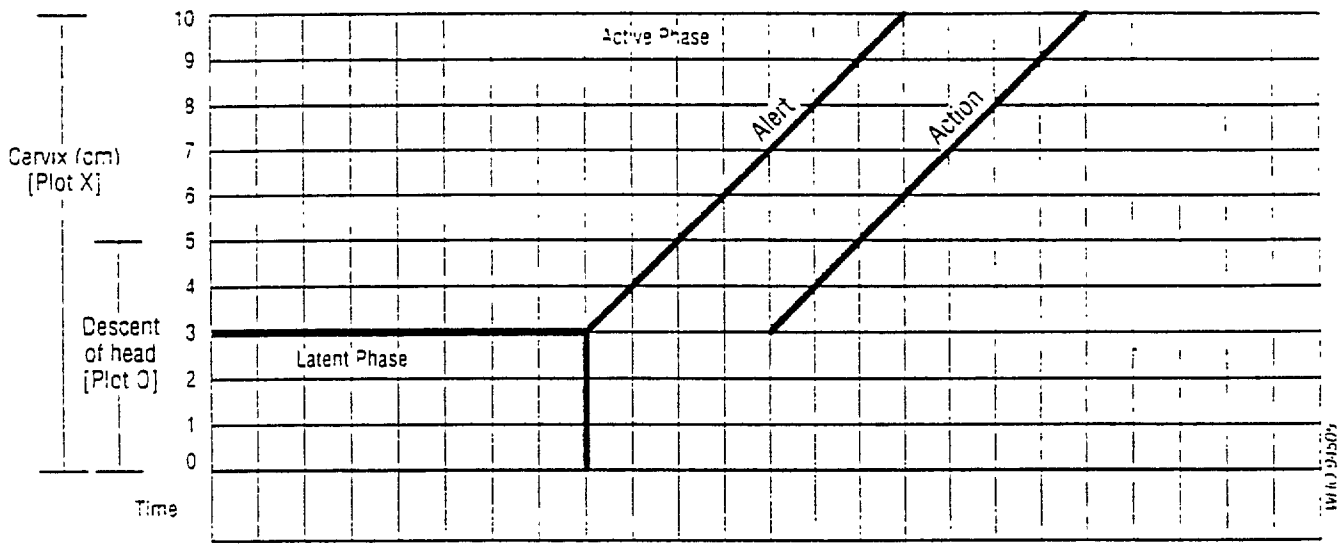
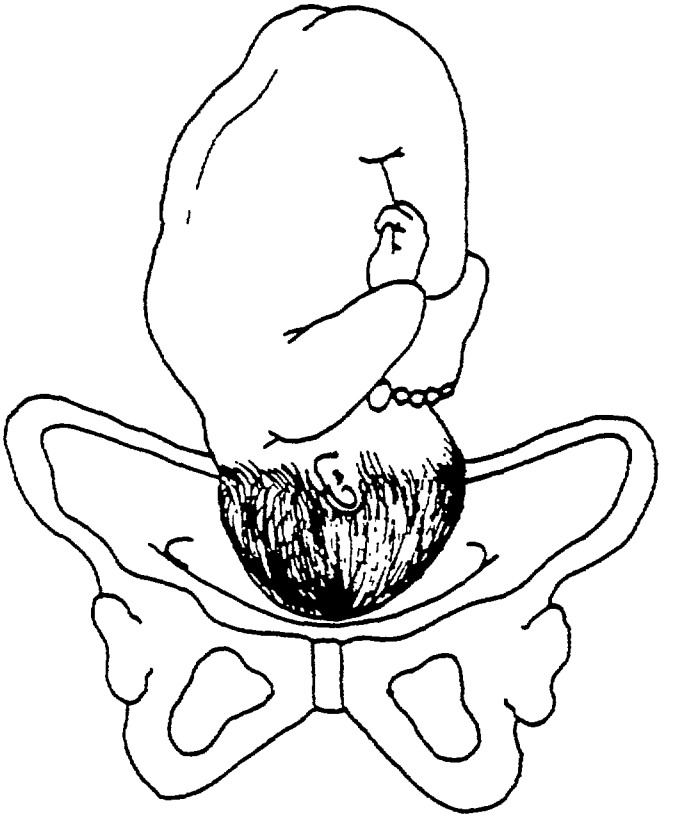


Figure 4.7

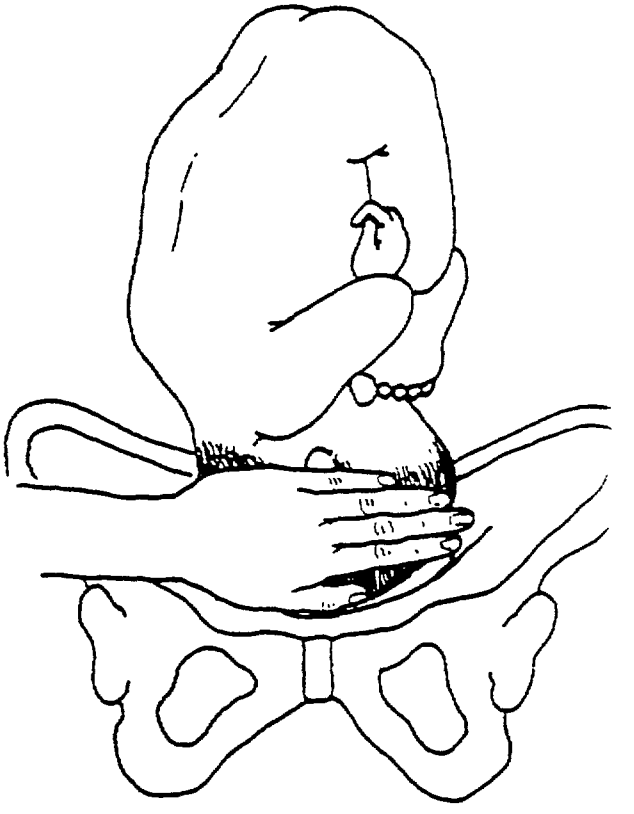
Record the following on the graph:

- On admission at 13:00, the head is 5/5 (five-fifths) above the pelvic brim and the cervix is 1 cm dilated.
- After 4 hours, the head is 4/5 (four-fifths) above the brim and the cervix is 5 cm dilated.
- Labour is now in the active phase. Cervical dilatation, descent of head and time recordings are transferred to the alert line.
- After 3 hours, the head is 1/5 (one fifth) above the pelvic brim and the cervix is 10 cm dilated.
- How long was the first stage of labour in the maternity?

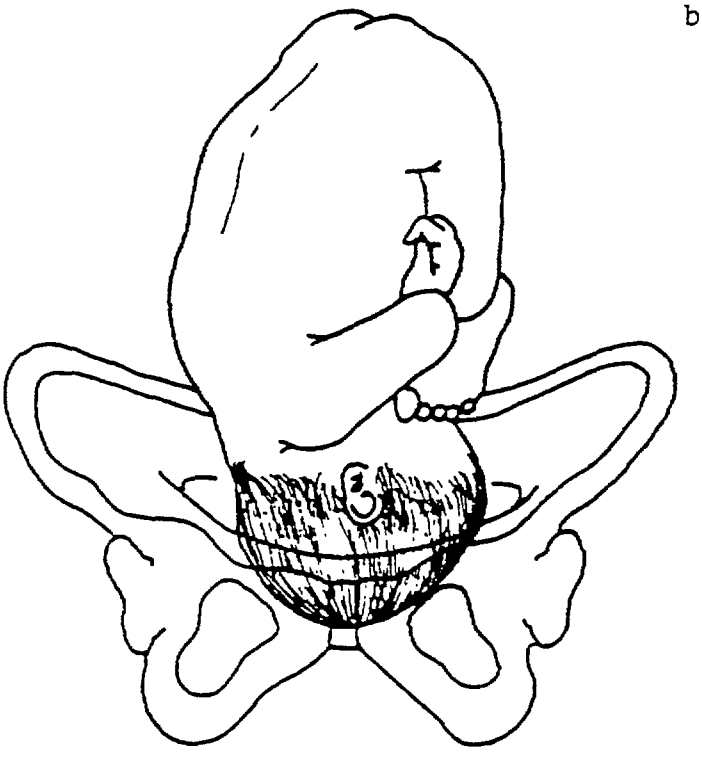
Head is mobile above brim = 5/5



Head accommodates full width of five fingers above the brim



Head is engaged = 2/5



Head accommodates two fingers above the brim

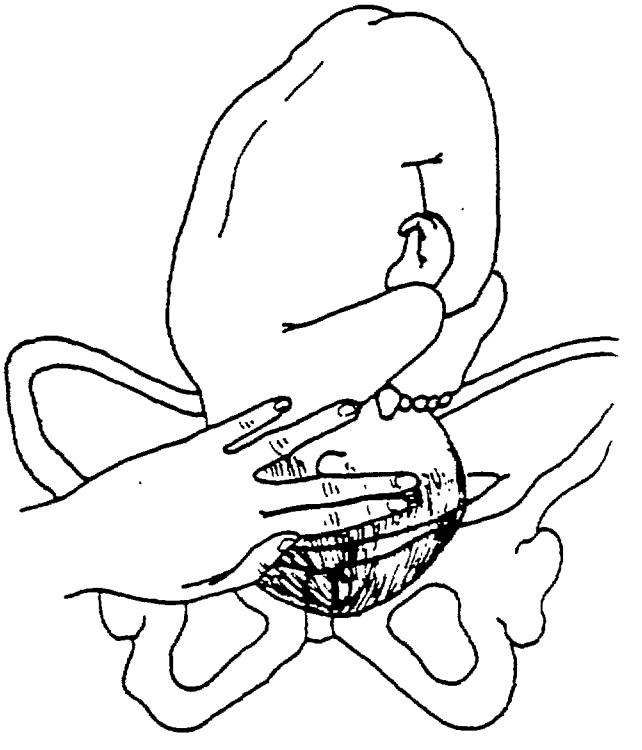


Figure 4.8: Descent of the head as assessed by abdominal examination

ANSWERS TO EXERCISE 4:

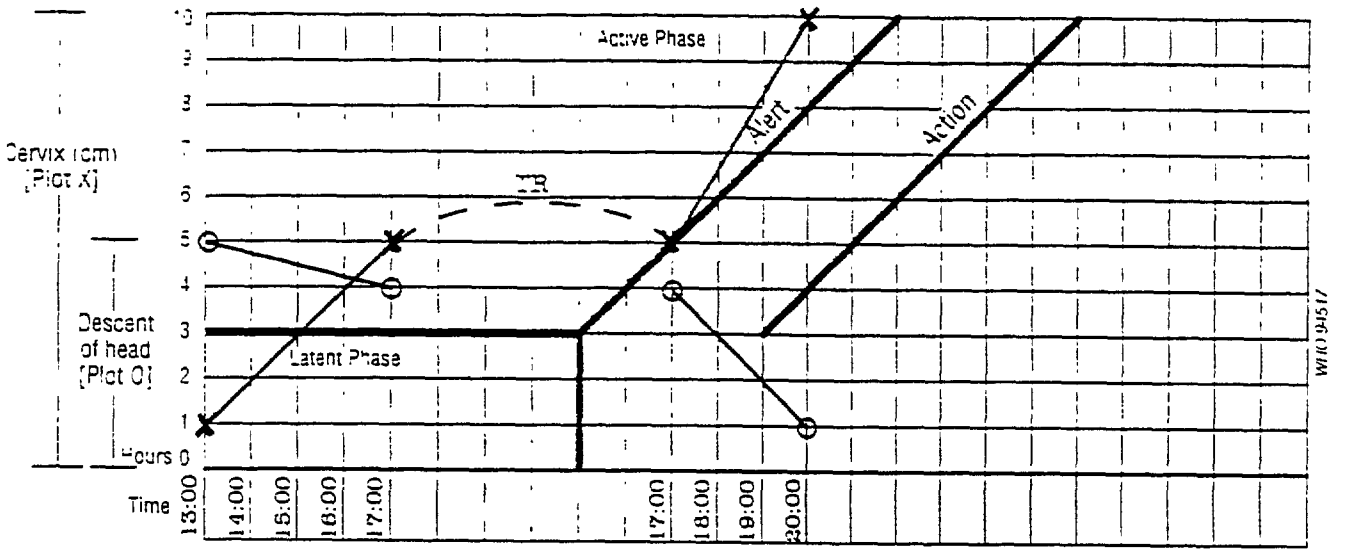


Figure 4.9

- On admission at 13:00, the head is 5/5 (five-fifths) above the pelvic brim and the cervix is 1 cm dilated.
- After 4 hours, the head is 4/5 (four-fifths) above the brim and the cervix is 5 cm dilated. Labour is now in the active phase. Cervical dilatation, descent of the head and time recordings are moved to the active phase.
- After 3 hours, the head is 1/5 (one-fifth) above the pelvic brim and the cervix is 10 cm dilated.
- The first stage of labour in the maternity was 7 hours.

Points to Remember

- Measuring descent of the baby's head helps the midwife follow the progress of labour.
- An abdominal examination must always be done before a vaginal examination.

Uterine contractions

Good uterine contractions are necessary for progress of labour. Normally contractions become more frequent and last longer as labour progresses.

Recording on the partograph:
Below the time line and at the left hand side is written "contractions per 10 mins".

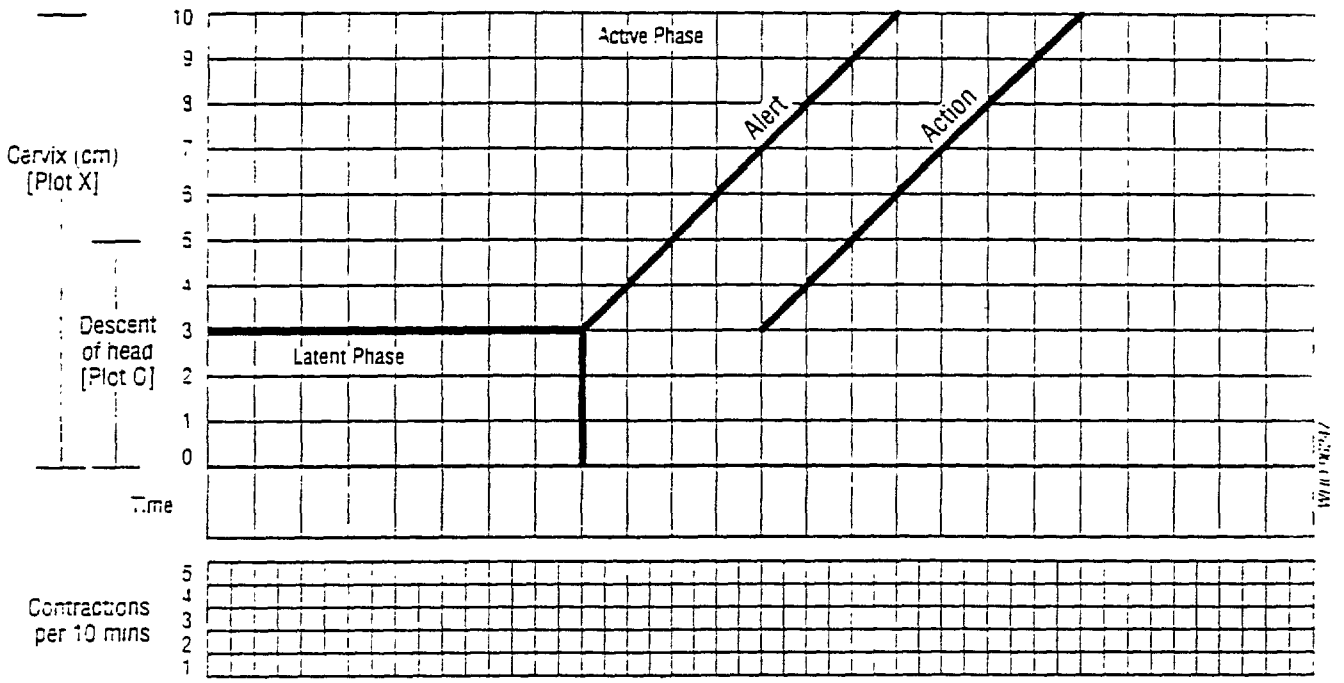
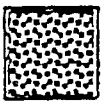


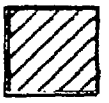
Figure 4.10

Squares are numbered from 1-5. Each square represents one contraction so that if 2 contractions are felt in 10 minutes, two squares will be shaded.

The squares below show the key to the three ways the strength of contractions are recorded on the partograph.



Dots represent mild contractions of less than 20 seconds' duration.



Diagonal lines indicate moderate contractions of 20-40 seconds' duration.

Solid colour represents strong contractions of longer than 40 seconds.

EXERCISE 5:

Plotting contractions on a partograph

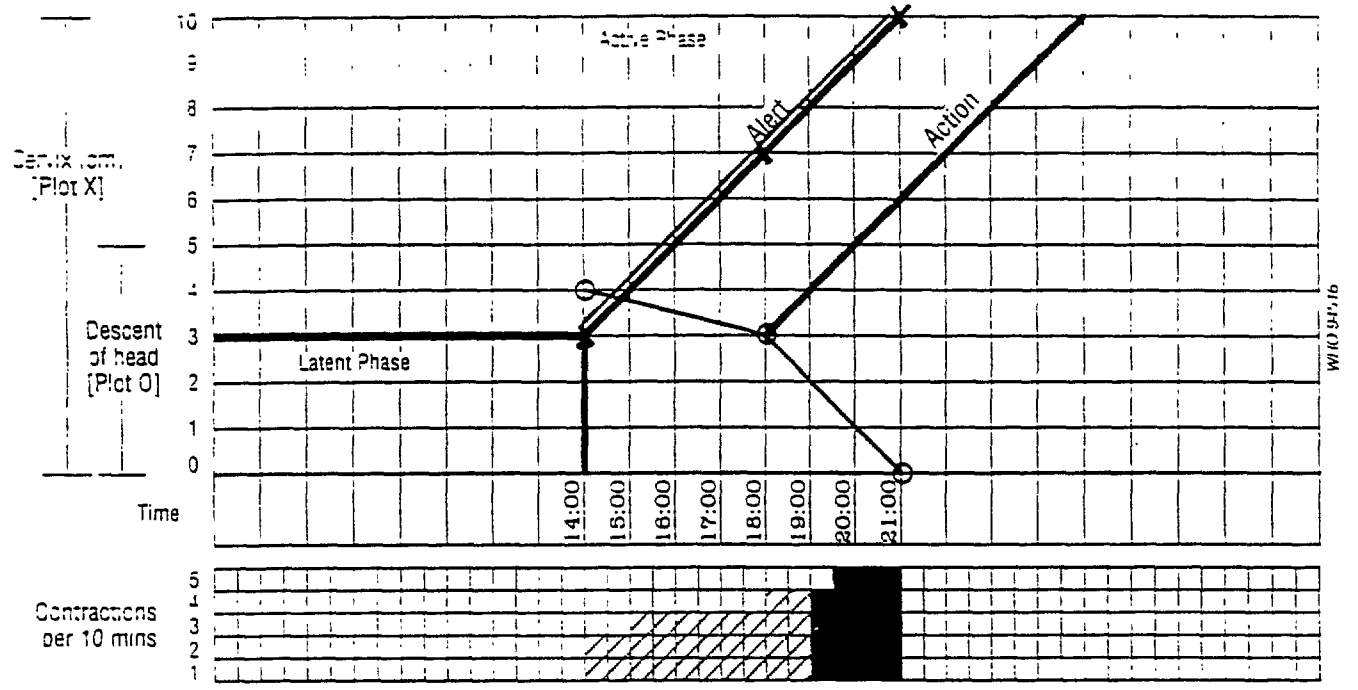


Figure 4.11

Find the following on the above graph:

The woman was admitted at 14:00 in the active phase of labour.

- The cervix was 3 cm dilated, the head was 4/5 (four-fifths) above the pelvic brim.
- Contractions were 2 in 10 minutes, each lasting 20–40 seconds.
- At 18:00 the cervix was 7 cm dilated, the head 3/5 (three-fifths) and contractions were 4 in 10 minutes, lasting between 20–40 seconds.
- At 21:00 the cervix was 10 cm, the head 0/5 (no-fifths), contractions were 5 in 10 minutes, lasting over 40 seconds.

Points to Remember

- Contractions are observed for frequency and duration.
- The number of contractions in 10 minutes is recorded.
- The three ways of recording the duration of contractions are: less than 20 seconds, 20–40 seconds, more than 40 seconds.
- Record contractions below the correct time on the partograph.

The Fetal Condition

Fetal heart rate, membranes, liquor (amniotic fluid) and moulding of the fetal skull bones give information about how the baby is doing during the labour.

Fetal heart rate

Listening to and recording the fetal heart rate is a safe and reliable way of knowing that the fetus is well.

The fetal heart rate is recorded at the top of the partograph, **Figure 4.12**. It is recorded every half hour. Each square represents 30 minutes. The lines for 120 and 160 beats per minute are darker to remind the midwife that these are the normal limits of the fetal heart rate.

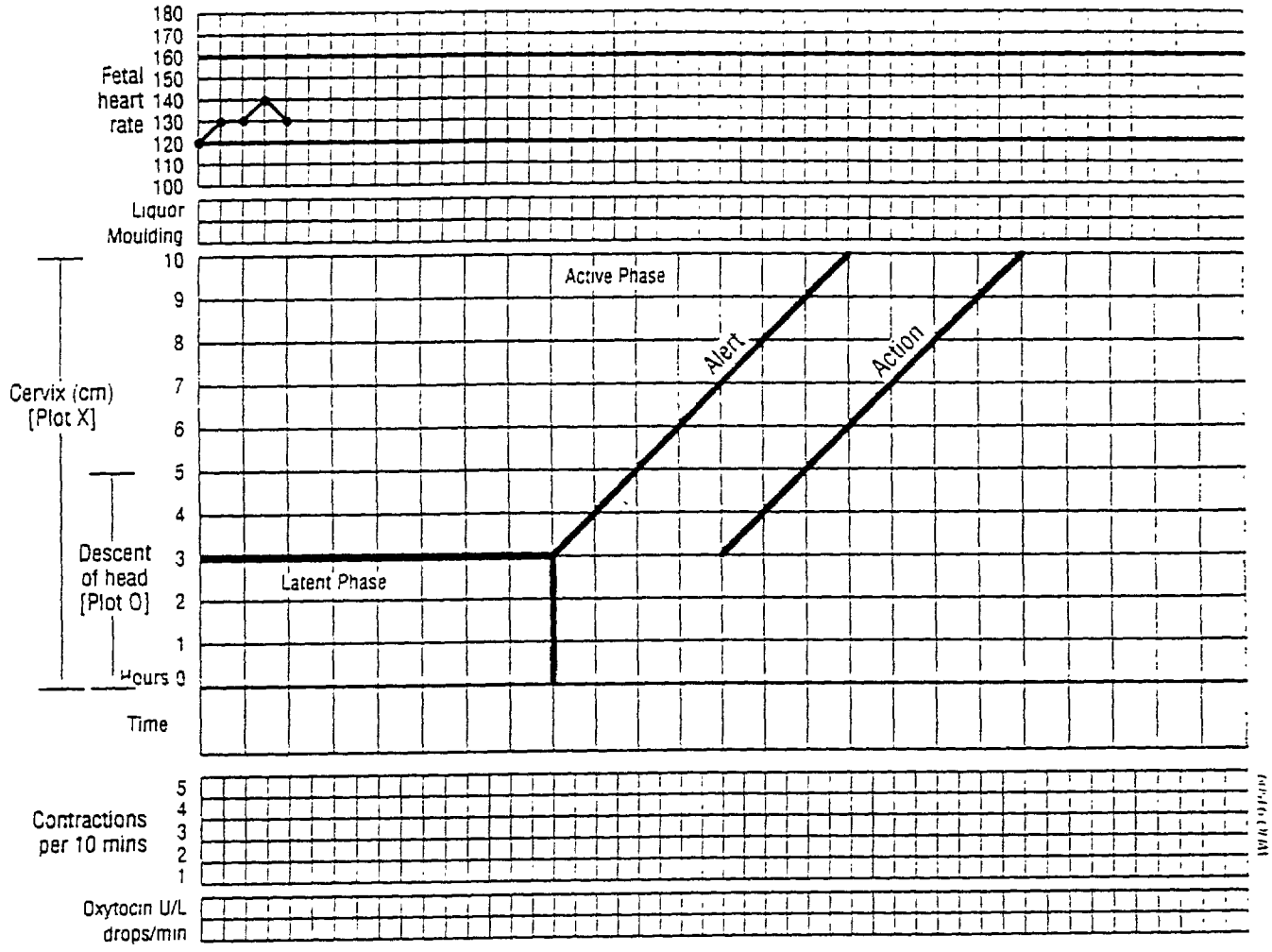


Figure 4.12

Membranes and liquor (amniotic fluid)

The state of the liquor or amniotic fluid can assist in assessing the fetal condition.

The following observations are recorded on the partograph immediately below the fetal heart rate recordings, Figure 4.13. The observations are made at each vaginal examination. They are:

If the membranes are intact:
Record as the letter "I" for "intact".

If the membranes are ruptured:
- Liquor is clear, record as the letter "C" for "clear".
- Liquor is blood-stained, record as the letter "B".
- Liquor is meconium-stained, record as the letter "M".
- Liquor is absent, record as the letter "A" for "absent".

Listen to the fetal heart rate every five minutes if:

- liquor has thick green or black meconium;
- liquor is absent at the time membranes rupture.

These may be signs of fetal distress (baby is in trouble).

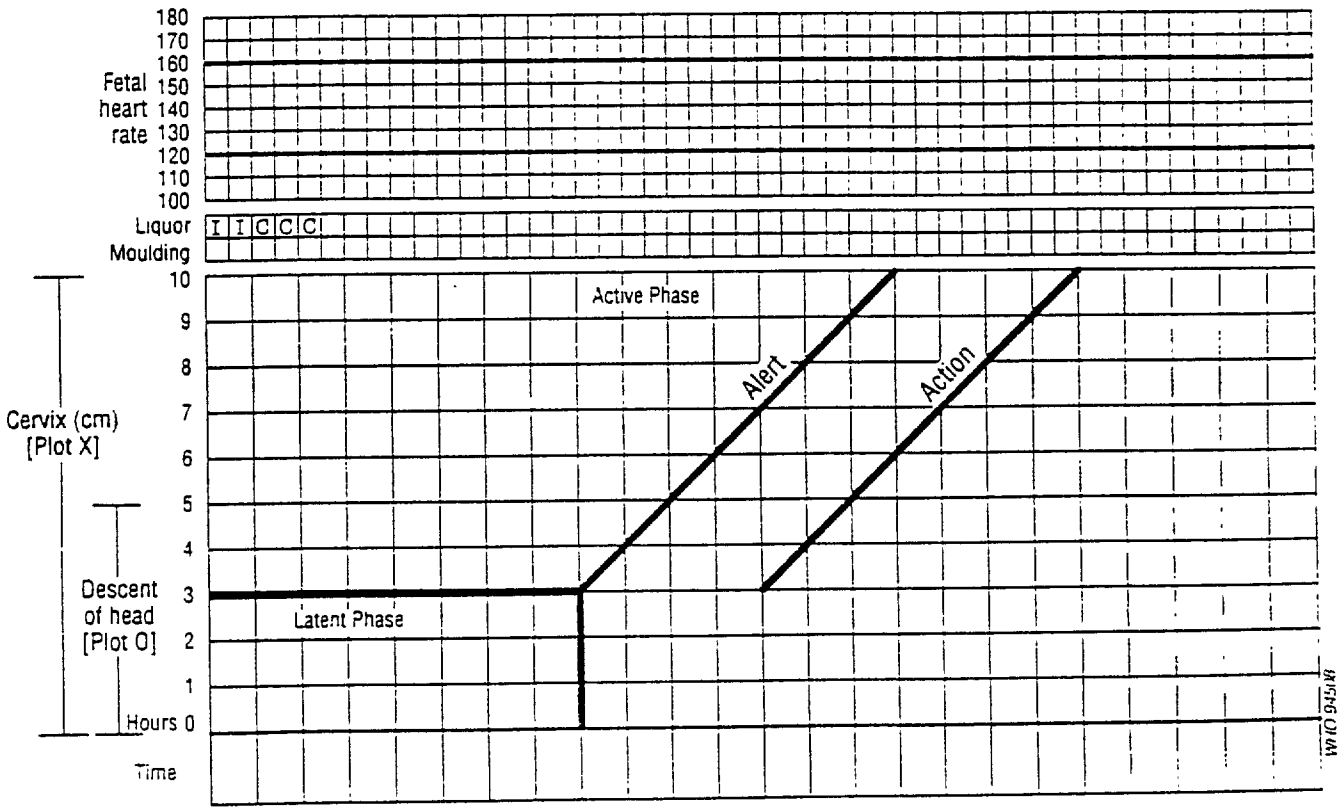


Figure 4.13

Moulding of the fetal skull bones

Moulding is an important finding as to how well the pelvis will accommodate the fetal head. Record the moulding, look at **Figure 4.14**, using the following key:

- o = bones are separated and the sutures can be felt easily.
- + = bones are just touching each other
- — = bones are overlapping but can be separated easily with pressure from you finger, refer
- +++ = bones are overlapping but cannot be separated easily with pressure from your finger, refer

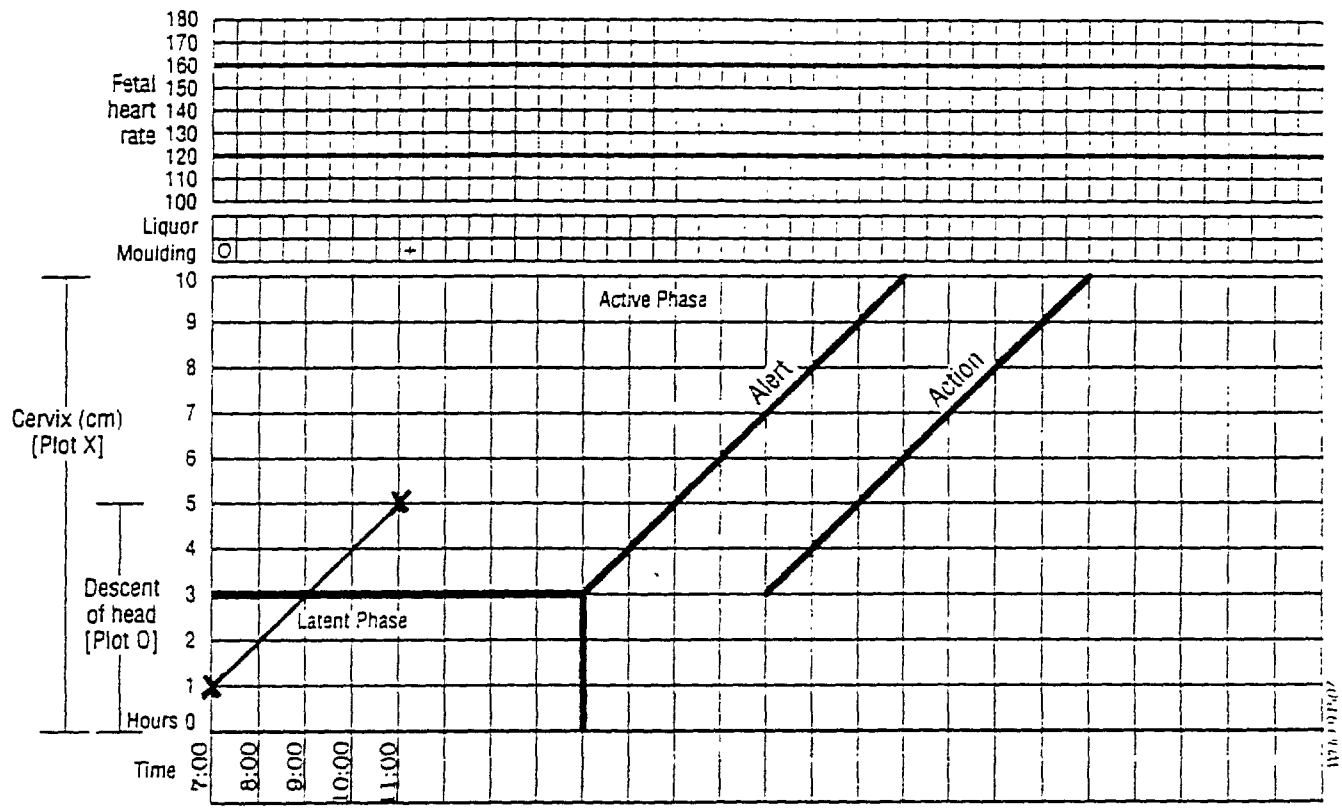


Figure 4.14

Points to Remember

- Listen to the fetal heart rate immediately after the strongest part of a contraction with the woman lying on her back.
- Recordings of the fetal heart rate are made every half hour in the first stage of normal labour.
- Normally the fetal heart rate is between 120-160 beats/minute.
- Increasing moulding with a high head is a sign of disproportion (baby is too big for mother's pelvis), refer immediately.

The Maternal Condition

All the observations for the mother's condition are written at the bottom of the partograph. Look at the partograph in Figure 4.15.

Pulse, blood pressure and temperature

Take the pulse every half hour.

Urine

Ask the mother to pass urine every 2–4 hours. Look at the urine for amount and concentration. The protein and acetone should be tested in hospital and at maternities, if possible.

Drugs and rehydration fluids

Chart these when you give them.

Oxytocin

There is a separate column for oxytocin above the column for rehydration fluids and drugs.

All entries are made on the time line at which the observations are made.

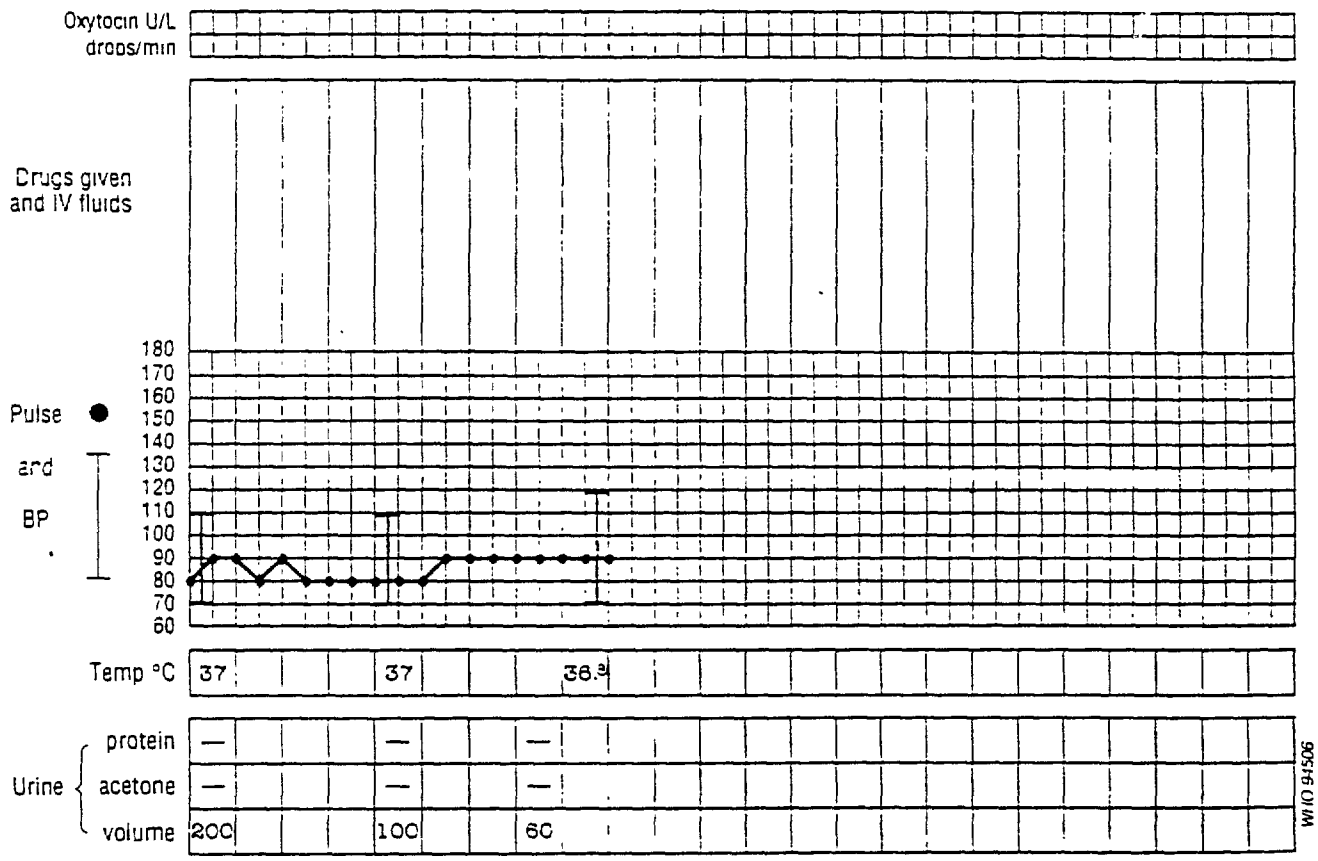


Figure 4.15

PARTOGRAPH

Name Mrs B. Gravida 1 Para 0 Hospital no. 1059

Date of admission 27.3.1988 Time of admission 5:00 Ruptured membranes 2 hours

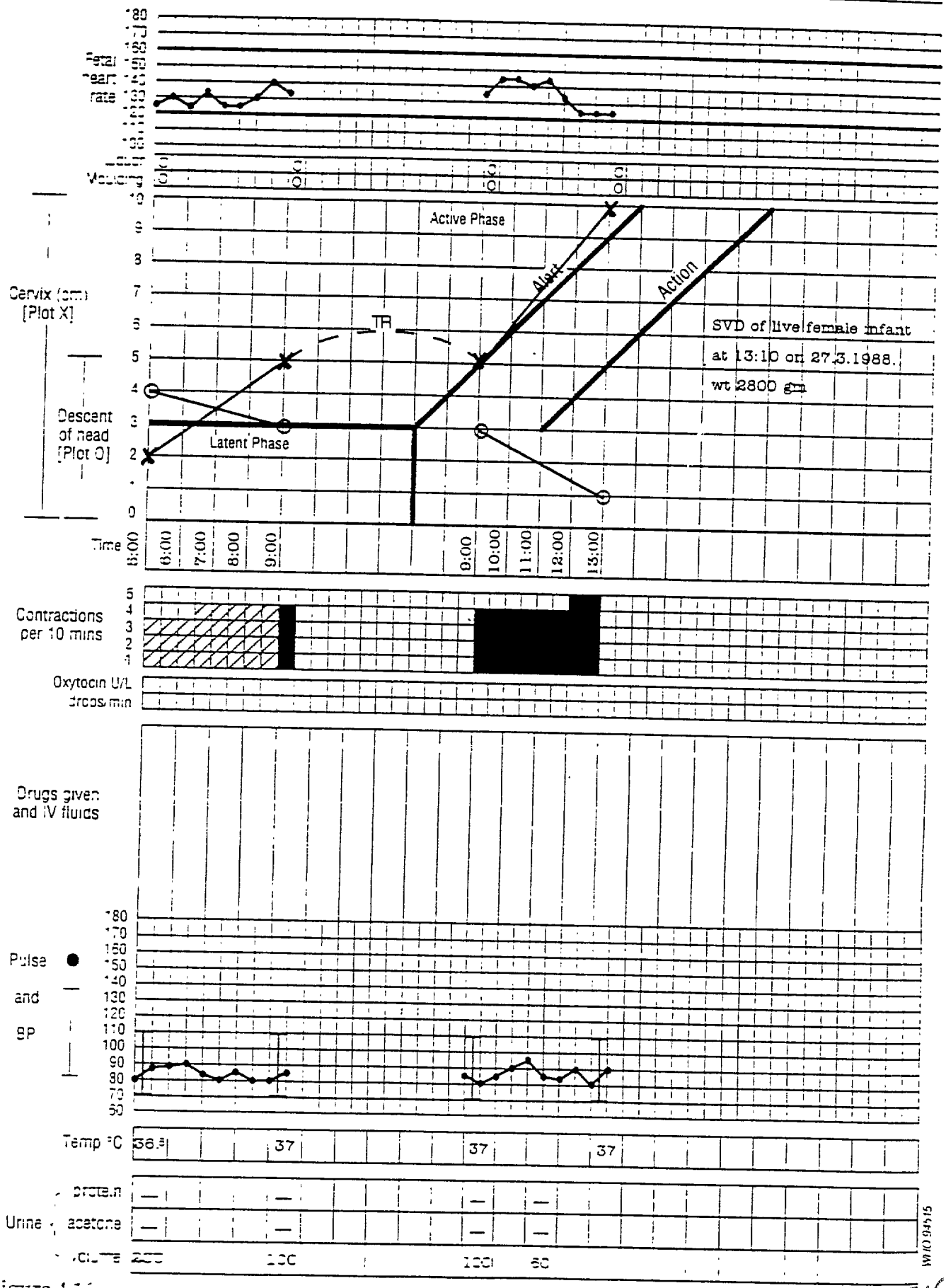


Figure 1.1.1

EXERCISE 6:

Look at the completed partograph of a normal first stage of labour, Figure 4.16. Answer these questions.

1. What was the fetal heart rate on admission?
   What was the fetal heart rate at 13:00?

2. When did the membranes rupture?
   What was the condition of the liquor?

3. How much moulding of the fetal head was recorded?

4. What was the dilatation of the cervix on admission?
   What was the station of the head?

5. What was the dilatation of the cervix when the labour transferred from latent to active phase?

6. Describe the contractions at 9:00.

7. List the vital signs on admission.

8. What was the length of labour from admission to full dilatation?

ANSWERS TO EXERCISE 6:

1. 120-130, 120-130.
2. 3:00, 2 hours before admission. Clear.
3. No moulding was recorded.
4. 2 cm, 4/5.
5. 5 cm.
6. 4 contractions in 10 minutes, strong lasting over 40 seconds.
7. B/P 110/70, P 80, T 36.8.
8. 8 hours.

Points to Remember

- Time of admission is zero time, when the woman comes in the latent phase of labour.
- When the active phase of labour begins all recordings are transferred, plotting the cervical dilatation on the alert line.
- When progress of labour is normal, plotting of the cervical dilatation remains on the alert line or to the left of the alert line.

Abnormal Labour Progress

The midwife or doctor can use the partograph to identify complications in labour. When the labour is not normal, the midwife must help the woman to get to someone more skilled who can decide the outcome of a delivery; cesarean section, oxytocin drip, analgesia, rehydration, forceps or vacuum extraction may be necessary to save the mother and her baby.

Prolonged latent phase

When a woman is admitted in labour in the latent phase (less than 3 cm dilated) and remains in the latent phase for the next 8 hours, progress is not normal. She must be transferred to a hospital for further care.

The heavy line drawn on the partograph at the end of eight hours of the latent phase means that the woman needs to be referred to a facility where more skilled help is available (caesarean section, forceps or vacuum extraction etc).

EXERCISE 7:

Prolonged latent phase

Fill in the following information, using the graph in **Figure 4.17**.

On admission at 7:00 the head was .....

and the cervix was .....

There were ..... contractions in 10 minutes, lasting .....

After 4 hours, at 11:00, the head was .....

and the cervix was .....

In the last ten minutes of that half-hour, there were ..... contractions lasting .....

Four hours later at 15:00, the head was still .....

and the cervix was still .....

Contractions were ..... in ten minutes lasting .....

The length of the latent phase was .....

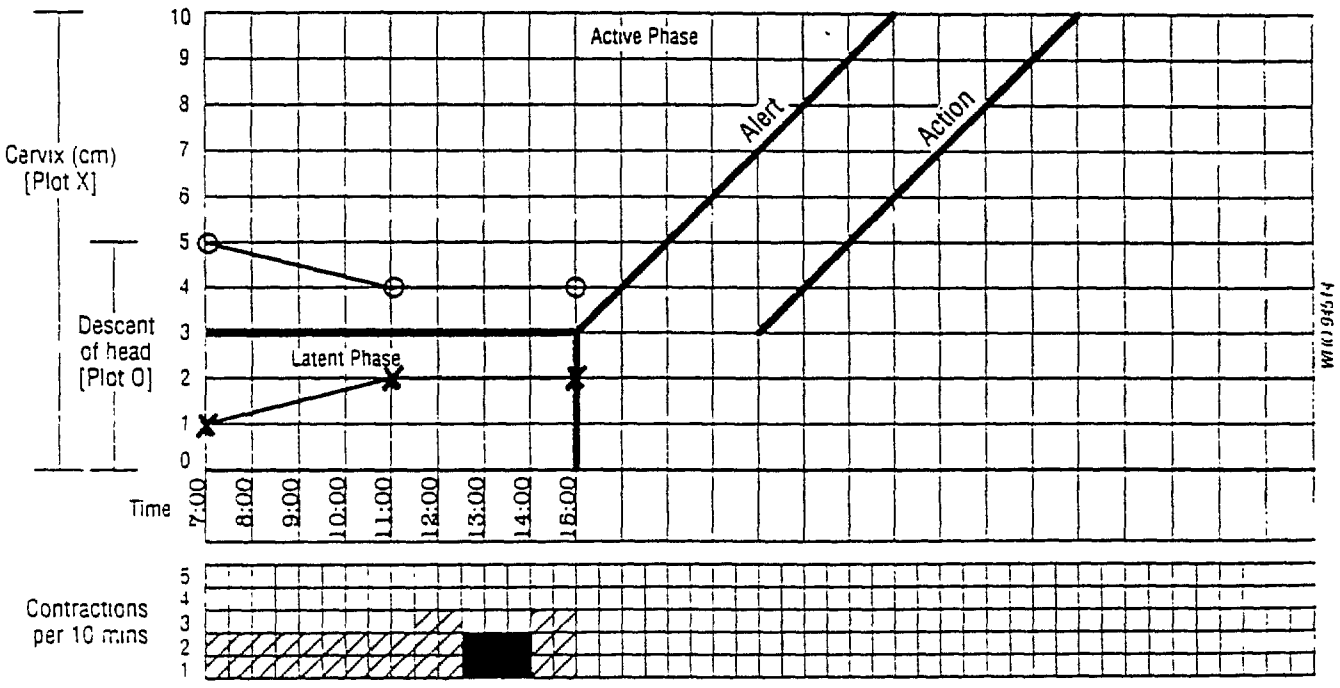


Figure 4.17

ANSWERS TO EXERCISE 7:

- On admission at 7:00, the head was 5/5 and the cervix was 1 cm dilated. There were 2 contractions in 10 minutes, lasting 20-40 seconds.
- After 4 hours, at 11:00, the head was 4/5 and the cervix was 2 cm dilated. In the last 10 minutes of that half-hour, there were 2 contractions lasting 20–40 seconds.
- Four hours later at 15:00, the head was still 4/5 and the cervix was still 2 cm dilated. Contractions were 3 in 10 minutes lasting 20–40 seconds.
- The length of the latent phase was 8 hours and not completed. Referral must be immediate in order to allow for a doctor to make a decision on how to assist the woman in labour.

Moving to the right of the alert line

In the active phase of labour, plotting of the cervical dilatation will normally remain on, or to the left of the alert line. When dilatation crosses to the right of the alert line, this is a warning that labour may be prolonged.

When the dilatation moves to the right of the alert line, the mother must be transferred to a hospital, unless she is very near to delivering.

At the action line

The action line is 4 hours to the right of the alert line. If a woman's labour reaches this line, a decision must be made about the cause of the slow progress and action taken. The decision as to what action should be taken to assist the labour must be made with a doctor, usually in the hospital.

Exercise 8 will demonstrate the importance of the alert and action lines. Look carefully at Figure 4.18 and answer the questions.

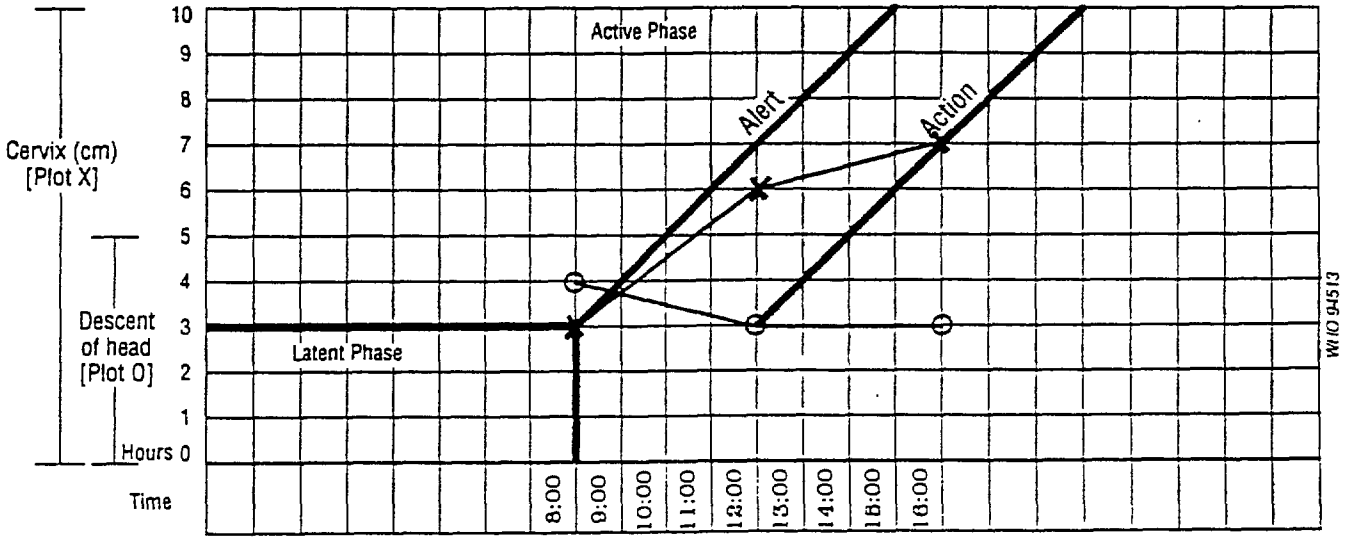


Figure 4.18

EXERCISE 8:

- At 8:00 the cervix is ..... dilated on the alert line. The woman may remain in the maternity.
- At 12:00 noon, the cervix is ..... dilated, moving to the right of the alert line. The woman must be transferred .....
- At 16:00 the cervix is ..... dilated, at the action line.

A decision must be made by a skilled person as to what action needs to be taken at the hospital.

ANSWERS TO EXERCISE 8:

- At 8:00 the cervix is 3 cm dilated on the alert line. The woman may remain in the maternity.
- At 12:00 noon, the cervix is 6 cm dilated, moving to the right of the alert line. The woman must be transferred to the hospital under the care of a doctor.
- At 16:00 the cervix is 7 cm dilated, at the action line. A decision must be made about what action needs to be taken at the hospital.

Points to Remember

- All women whose cervical dilatation moves to the right of the alert line must be transferred to hospital, unless delivery is near.
- At the action line, the woman must be re-assessed for lack of progress. A decision must be made on what action needs to be taken.

PARTOGRAPH

Name Gravida Para Hospital no.

Date of admission Time of admission Ruptured membranes 2 hours

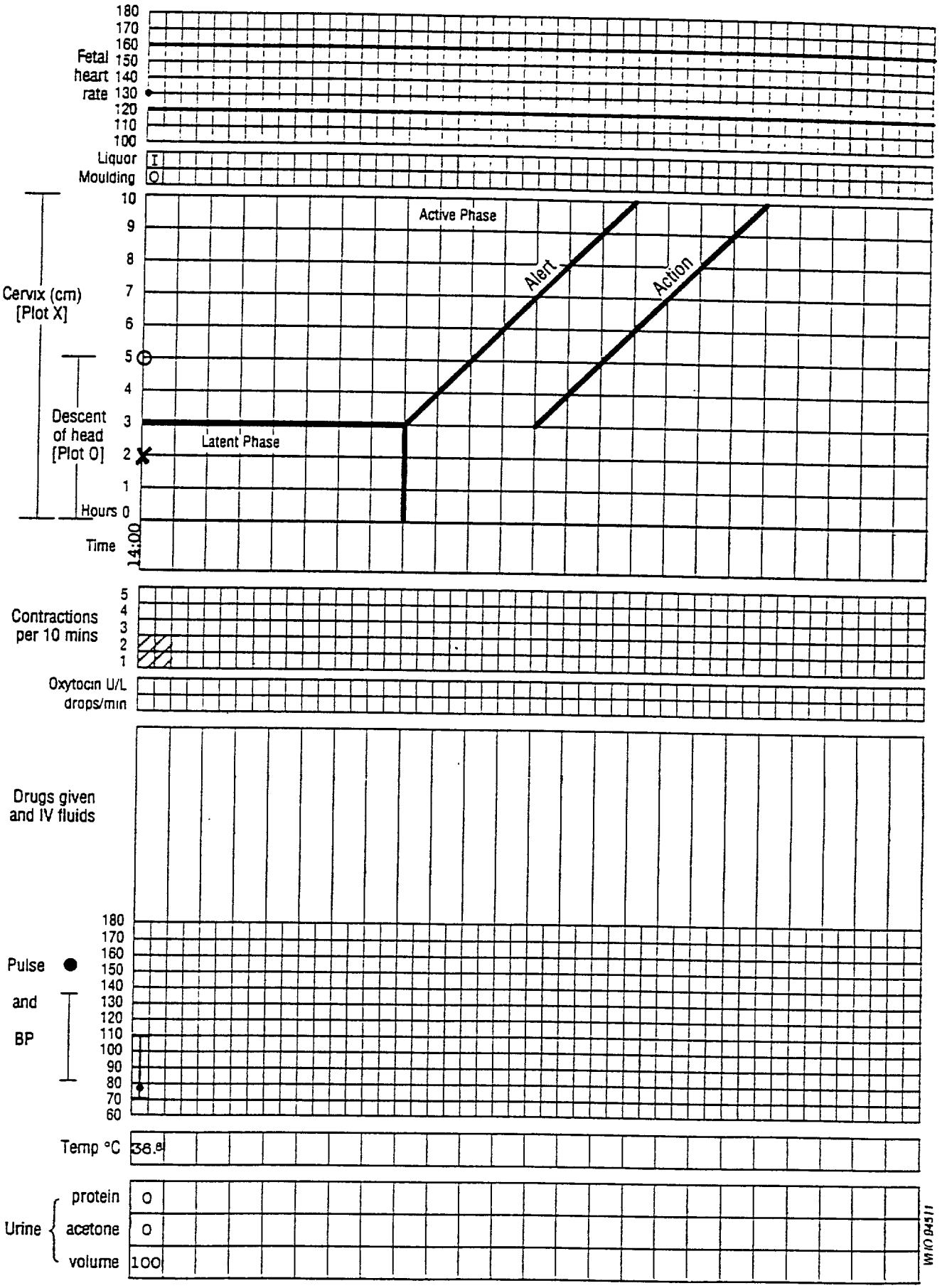


Figure 4.20

ANSWERS TO EXERCISE 9:

1. a) 3:00 b) 3 cm c) active phase

2. 4 contractions in 10 minutes, each lasting over 40 seconds, at 7:00

3. Fetal heart rate 130/min
   Membranes were ruptured (liquor clear) at 7:00

4. Acts as a warning that labour in the active phase is delayed when cervical dilatation moves to the right of it; or assists in early detection of delay in labour or warns the attendant of time to transfer a woman to hospital.

ANSWERS TO EXERCISE 10:

1. Completed partograph (see Figure 4.21)

2. 23:00

3. a) Immediate transfer to hospital because of delay - moving to the right of the alert line

   b) Careful reassessment of cause of delay and cephalopelvic disproportion

EXERCISE 9:

Look at the partograph (see Figure 4.20) and answer the following questions.

1. On admission to hospital

   a) What was the clock time?
   b) What was the cervical dilatation?
   c) What phase of labour was the woman in?

2. Describe the frequency and duration of the uterine contractions at 7:00.

3. At 7:00 what was the fetal heart rate and the state of the membranes?

4. What is the purpose of the alert line?

EXERCISE 10:

Recording and plotting on the partograph (see Figure 4.21)

Mrs X was admitted in labour at 14:00. On abdominal examination the contractions were 2 in 10 minutes, each lasting 20 seconds. The head was 5/5 above the brim and the fetal heart was 130/min. On vaginal examination the cervix was 2 cm dilated, membranes were intact, no moulding felt.

Her blood pressure was 110/70 mmHg; her pulse 78/min; temperature 36.6°C. She passed 100 ml of urine; protein and acetone were negative.

1. An abdominal and vaginal examination was carried out on Mrs X at 18:00.

   Record and plot the following:

   a) Time of examination
   b) Fetal heart rate of 140/min
   c) Membranes ruptured, liquor clear
   d) No moulding
   e) Cervix 5 cm dilated
   f) Descent of the head 3/5 above the brim
   g) Uterine contractions 3 in 10 minutes, each lasting 50 seconds
   h) Blood pressure of 105/70 mmHg; pulse 80/min, temperature 37°C.

2. What is the latest expected time Mrs X will reach 10 cm dilatation should labour progress satisfactorily?

3. If a vaginal examination is made at 22:00 and the cervix is 7 cm dilated, what would the management be in:

   a) a health centre?
   b) a hospital?

PARTOGRAPH

Name Gravida Para Hospital no.

Date of admission Time of admission Ruptured membranes hours

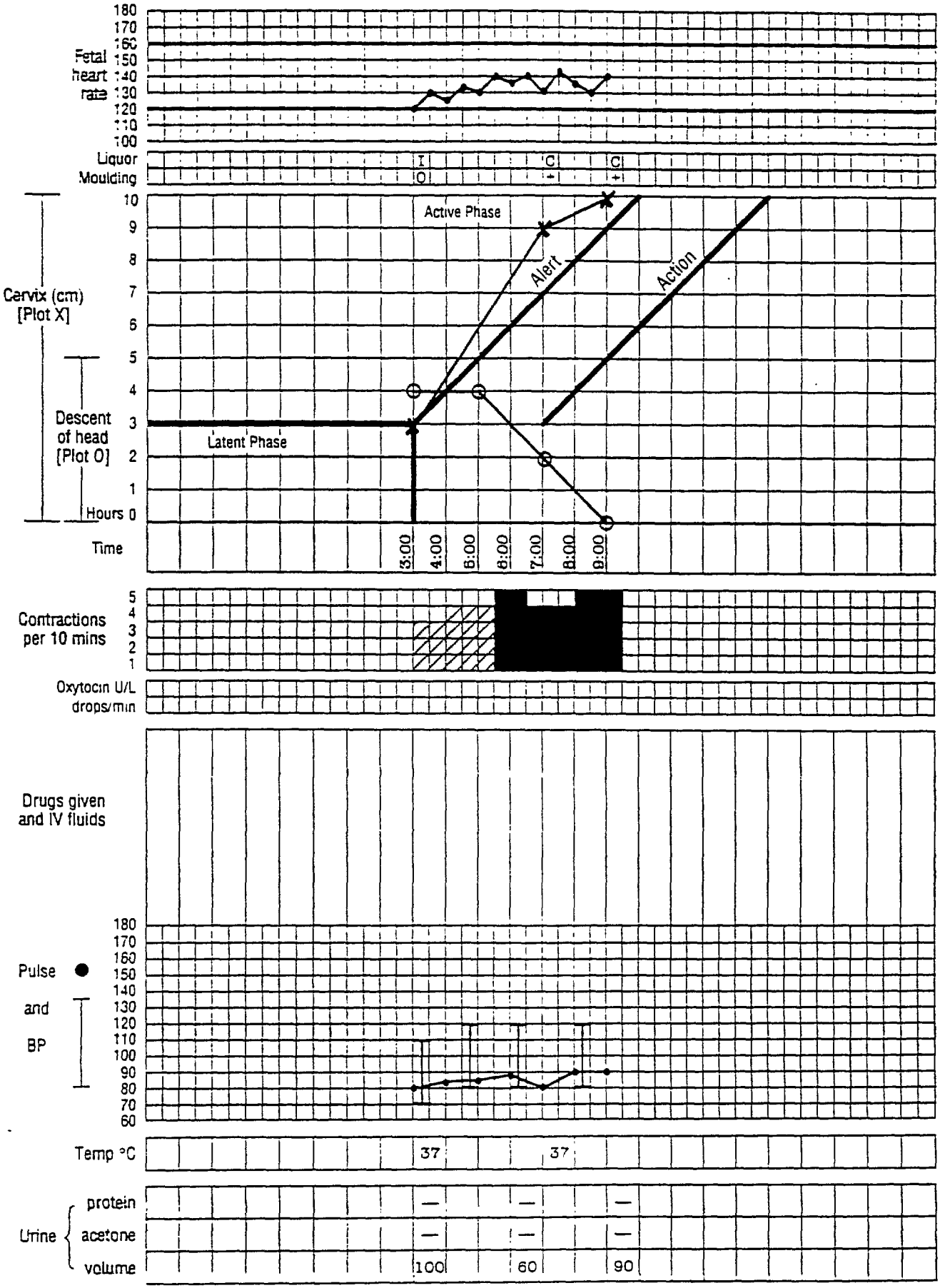


Figure 4.19

PARTOGRAPH

Name Gravida Para Hospital no.

Date of admission Time of admission Ruptured membranes hours

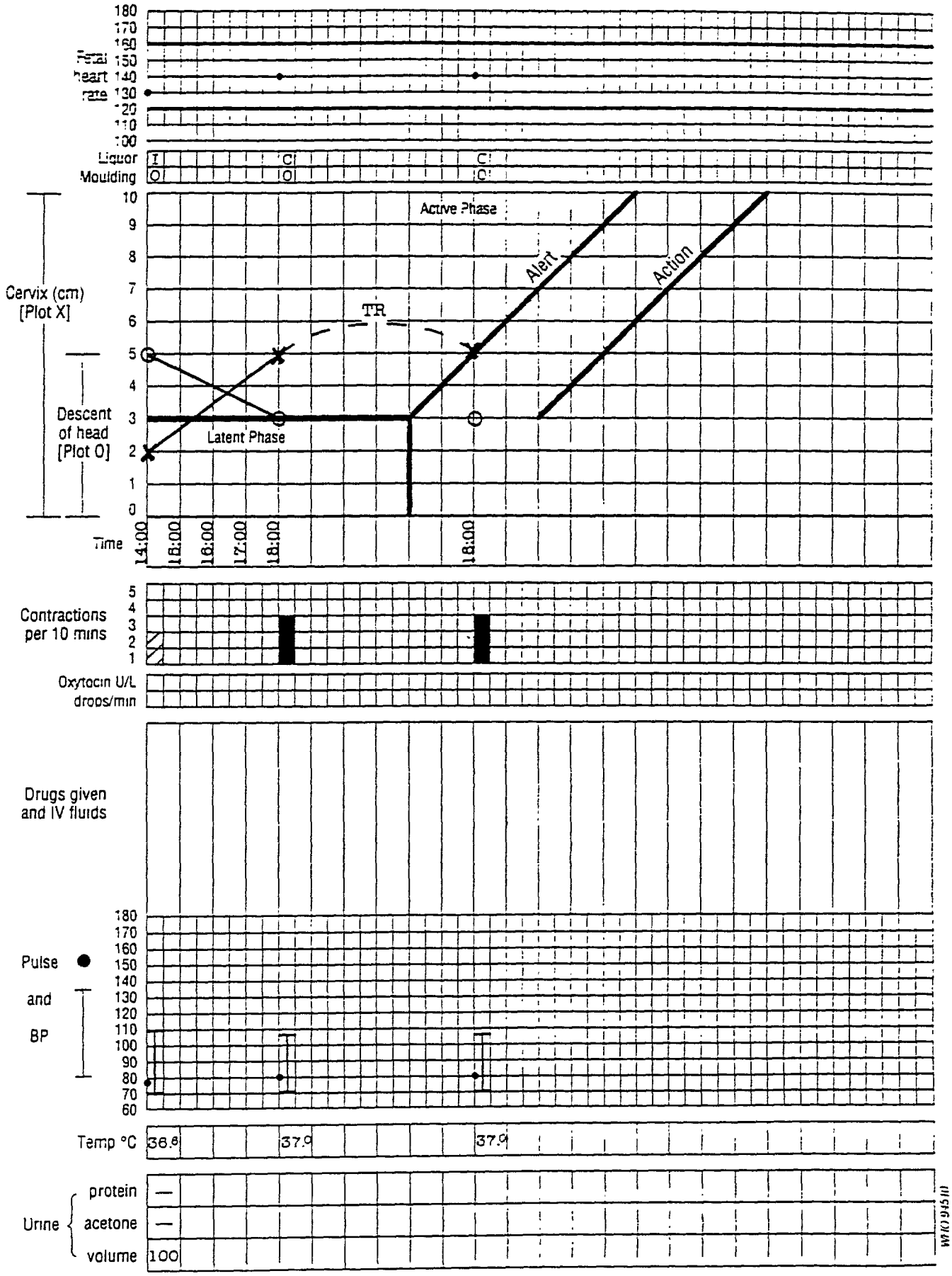


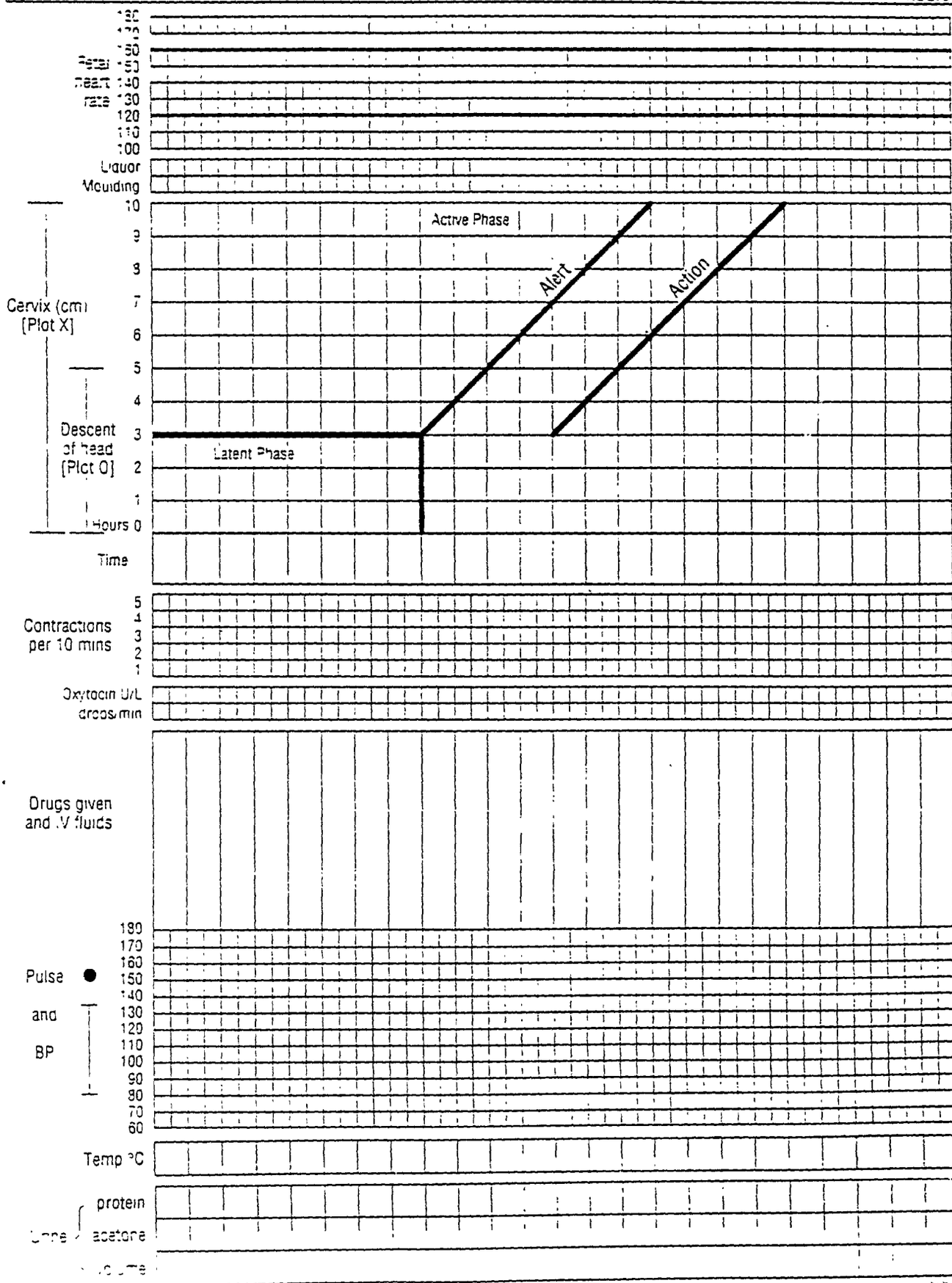
Figure 4.21

For use if required.

PARTOGRAPH

Name Gravida Para Hospital no.

Date of admission Time of admission Ruptured membranes hours



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285

LEARNING AID - CERVICAL DILATATION

The dilatation of the cervical os is measured in centimetres (cm), fingers, percentages and inches. This module refers to cm. If you use another method of measuring, change the cm to your method using the following information.

1 finger	=	½ inch or 1.25 cm		
2 fingers	=	1¼ inches or 3 cm		
3 fingers	=	1¾ inches or 4.5 cm		
4 fingers	=	2¼ inches or 5.5 cm		
5 fingers	=	50% dilatation	=	2¾ inches or 7 cm
6 fingers	=	75% dilatation	=	3½ inches or 8.5 cm
7 fingers	=	95% dilatation or rim	=	3¾ inches or 9.5 cm

Once 50% dilatation has been reached, the experienced midwife may think about the amount of cervix remaining during the vaginal examination. For instance, when the dilation is 75%, the midwife feels only a circle of cervix about the width of a finger remaining. When the dilatation is 95%, the midwife feels only a very thin rim of cervix. She knows that the cervix soon will slip over the fetal head. She knows that second stage will soon begin.

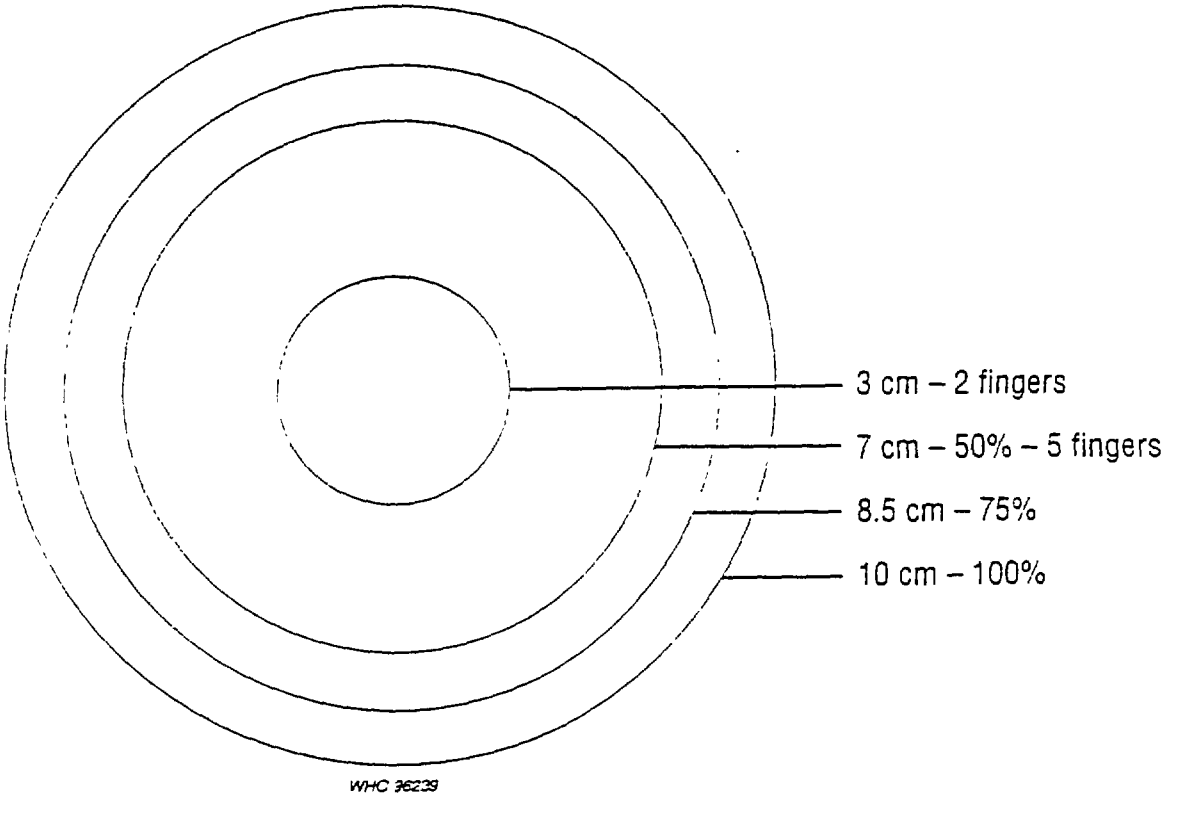

Figure 4.23: Measurement of cervical dilatation

Clinical practice

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World Health Organization partograph in management of labour

*World Health Organization maternal health and safe motherhood programme**

Summary

As part of the Safe Motherhood Initiative, launched in 1987, the World Health Organization have produced and promoted a partograph with a view to improving labour management and reducing maternal and fetal morbidity and mortality. This partograph has been tested in a multicentre trial in south east Asia involving 35 484 women.

Introduction of the partograph with an agreed labour-management protocol reduced both prolonged labour (from 6 4% to 3 4% of labours) and the proportion of labours requiring augmentation (from 20·7% to 9 1%). Emergency caesarean sections fell from 9 9% to 8 3%, and intrapartum stillbirths from 0 5% to 0 3%. Among singleton pregnancies with no complicating factors, the improved outcome was even more marked, with caesarean sections falling from 6 2% to 4 5%. The improvements took place among both nulliparous and multiparous women.

The World Health Organisation partograph clearly differentiates normal from abnormal progress in labour and identifies those women likely to require intervention. Its use in all labour wards is recommended.

Lancet 1994; **343:** 1399–404

Introduction

Prolonged and obstructed labour are important causes of maternal morbidity and contribute significantly to the half a million women worldwide who die annually as a result of childbirth.[1,2] Active management has reduced prolonged labour in western obstetric practice but many elements of this approach remain controversial.[3] For example, rising caesarean-section rates increase maternal morbidity while showing little evidence of an improvement in fetal outcome.[4] The ideal pattern of labour management and intervention has yet to be determined.

Progress has been made in improving active management of labour. The pattern of progressive cervical dilation in normal labour was identified by Friedman nearly 40 years ago[5] and its application with the aid of a partograph (a graphical record of the progress of labour) was developed by Philpott in Zimbabwe.[6,7] Reports of the use of a partograph in other countries have been published and it has become clear that it can be used worldwide since the pattern of cervical dilation in normal labour in different racial groups is similar.[8]

Despite descriptive reports, there is little information on changes in outcome of labour due to implementing a partograph. Philpott and Castle[7] reduced prolonged labour, caesarean sections, labour augmentation, and perinatal deaths in Zimbabwe. Similar improvements have been reported from Malawi,[9] but none from Papua New Guinea.[10] Beazley and Kurjak[11] reported an increase in oxytocin augmentation and a shortening of labour. No other such studies have been published. Interest in the partograph to manage labour has, however, been rekindled by the World Health Organization's (WHO's) promotional work and the publication of a partograph based on the WHO design.[12]

The Safe Motherhood Conference organised jointly by the World Bank, WHO, and the United Nations Population Fund held in Nairobi in 1987[4] recommended that all pregnant women in labour are managed by appropriately trained personnel using practical and relevant technology. Responding to this call, WHO developed a printed partograph, the format of which was agreed by a WHO Technical Working Group, and published manuals, teaching aids, and operations-research guidelines.[13] In order objectively to evaluate the impact of the WHO partograph on labour management and outcome, a multicentre trial was done in Indonesia, Malaysia, and Thailand. A detailed analysis of the design and use of the WHO partograph is reported elsewhere.[14]

Patients and methods

The figure shows the WHO partograph which is similar to Philpott and Castle's original description,[6] retaining the action line in the active phase drawn 4 hours to the right of, and parallel to, the alert line. The central feature is the cervicograph which plots cervical dilation against time. Distinction is made between the latent phase of labour (up to 3 cm cervical dilation) and the active phase when labour is expected to progress at a rate of at least 1 cm cervical dilation per hour (the alert line). Other maternal and fetal observations are also recorded on the partograph. The WHO strategy document[13] recommends referral from health centre to hospital when cervical dilation moves to the right of the alert line. In a central unit, conservative management is recommended until cervical dilation reaches or crosses the action line. A protocol for labour management with the partograph was devised and tested as part of the study.

4 pairs of hospitals in south east Asia were invited to participate (2 pairs in Indonesia, 1 each in Thailand and Malaysia). All the centres functioned as district general hospitals in urban environments with adequate medical and midwifery staffing and suitable facilities for operative obstetric care. All were already practising active labour management including oxytocin augmentation.

The study ran for 15 months from 1 January, 1990. During the first 5 months, all centres collected data on their deliveries on a standardised form for entry onto the database held on computer at WHO headquarters in Geneva. After 5 months, the WHO partograph was randomly introduced in one of each hospital pair 10 months into the study, the partograph was introduced into the remaining hospitals and thus used in all 8 for the last 5 months. No discussions were held concerning labour management or

*Participants listed at end of paper.

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287

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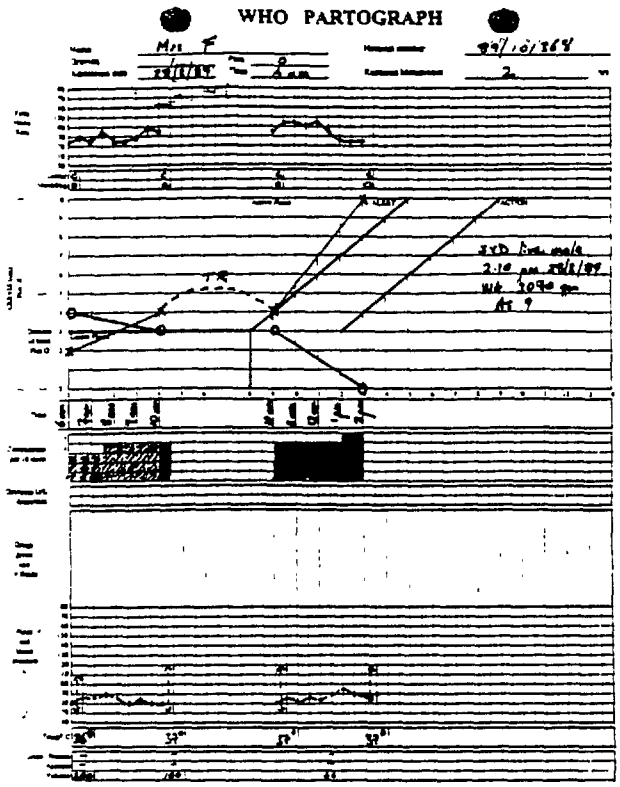

Figure 1: **The WHO partograph**

Progress of labour is recorded on the graph of cervical dilation against time (4 hourly observations), with space to record all fetal and maternal observations. The illustration shows a woman admitted at 2 cm dilation (latent phase), who progressed to 4 cm at the next vaginal examination. This observation in the active phase is transferred onto the Alert line (1 cm per hour—the lower limit of normal progress) and the time scale for all subsequent maternal and fetal observations is shifted to the right accordingly. Full dilation (10 cm) occurred at the next vaginal examination, with delivery 10 minutes later.

	Before implementation	After implementation	p
Total deliveries	18 254	17 230	
Duration of labour (h)* **Median (5–95 percentiles)**	3 25 (0 17–20 4)	3 13 (0 17–15 83)	0 319
Labour > 18 h*	1147 (6 4)	589 (3 4)	0 00[illegible]
Labour augmented	3785 (20 7)	1573 (9 1)	0 023
Postpartum sepsis	127 (0 70)	37 (0 21)	0 028
Mode of delivery†			
Singleton pregnancies			
Spontaneous cephalic	13 186 (72 4)	12 704 (73 9)	0 201
Vaginal breech	618 (3 4)	591 (3 4)	0 975
Vacuum or forceps	1793 (9 8)	1649 (9 6)	0 110
Caesarean section (total)‡	2278 (12 5)	1926 (11 2)	0 841
Elective	458 (2 5)	418 (2 4)	0 576
Emergency	1802 (9 9)	1495 (8 7)	0 678
Other singleton vaginal§	106 (0 6)	70 (0 4)	0 007
Multiple pregnancies			
All vaginal	198 (1 1)	210 (1 2)	0 339
Caesarean section	41 (0 23)	37 (0 22)	0 848

All women before and after implementation (number of women with percentages in parentheses, except where stated).
*Length of labour not recorded in 209 and 98 women before and after implementation, respectively. †Mode of delivery not recorded for 11 (including 1 multiple pregnancy) and 15 women before and after implementation, respectively; 23 and 28 women delivered by laparotomy before and after implementation, respectively. ‡Classification into elective or emergency Caesarean section not clear in 18 and 13 women before and after implementation, respectively. §Other singleton vaginal deliveries include 82 destructive and 31 other deliveries.

Table 1: **Duration of labour, augmentation, mode of delivery, and postpartum sepsis: all women**

partography until the partograph was introduced, at which point a common protocol was agreed for commencing women on the partograph and for labour management. This protocol was adopted in all 8 hospitals but did not introduce any new form of management which was not already being carried out.

The labour management protocol can be summarised as no intervention in latent phase until after 8 hours; rupture membranes in active phase; at active phase action line consider oxytocin augmentation, caesarean section, or observation and supportive treatment. Introduction of the partograph and the associated labour management protocol was achieved by several days' intensive teaching of midwifery and medical staff with the help of a WHO consultant in each centre. A partograph was commenced in all labours over 34 weeks' gestation, including inductions, malpresentations, and multiple pregnancies, except when women were admitted at 9 cm or 10 cm cervical dilation or immediate caesarean section was indicated.

Since subjects could not be individually randomised to receive conventional or partograph obstetric care, the study unit was the hospital rather than individual subjects. The WHO partograph with its protocol for the management of labour, was introduced into four hospitals after 5 months and in the remainder after 10 months. The hospitals were grouped into pairs according to country and geographical location and one of these pairs was selected at random to use the partograph early. The pairing of hospitals ensured balance between the two sets.

An analysis of variance model for a nested design[15] was used to assess the impact of introducing the partograph within each hospital. Consequently, to assess the impact of the partograph on continuous endpoints, the partograph by hospital interaction term was used as the error term in the denominator of the F ratio with 1 and 7 degrees of freedom. The assessment of error was thus within hospital between periods.

Since the distribution of duration of labour was highly skewed, values were log transformed before computation of summary statistics and analysis of variance models. These have been back-transformed to the original scale (geometric means) for presentation. For analysis of discrete endpoints, the empirical logistic transform[16] was used to estimate the impact of the partograph within each hospital on a log-odds ratio scale. These were averaged with weights inversely proportional to their variances to provide an overall estimate of partograph impact. The standard error of this estimate was based on the weighted within-hospital residual mean square of the logistic differences and the t distribution with 7 degrees of freedom was used to assess the significance of any changes and to construct confidence intervals. This analysis is analogous to that used for the the analysis of the continuous endpoints which considers the hospital by study-period interaction term as the correct estimate of error since this is the study unit rather than the individual woman. The summary log-odds ratios are expressed as percentage reductions in event rates (with 95% confidence intervals) following the introduction of the partograph, except where stated otherwise. Additional analyses were done to compare the impact of the partograph among those hospitals that implemented early and those that implemented later.

The impact on all women who were delivered during the 15 months of the study was assessed, whether or not the partograph and its management protocol would be expected to result in improvements. Results are also presented for the subgroup of normal women (54%) admitted in labour with cervical dilation no greater than 8 cm on whom no immediate caesarean section was indicated and who had none of the following features at the time of admission: hypertension, multiple pregnancy, malpresentation, antepartum haemorrhage, previous caesarean section, gestation less than 37 or greater than 43 weeks. Results on all women delivered during the study are presented, except for two women with abdominal pregnancies and 13 women (0·037%) on whom insufficient data were available for analysis (6 before and 7 after implementation of the partograph). Additional missing data for certain items, not sufficient to require exclusion, are indicated where relevant in the tables. A detailed description of the trial methodology and of the management protocol is available[14]

284

Results

Data from 35 484 women were analysed. Indonesia's four centres contributed 13 803, with 12 054 from Malaysia's two centres, and 9627 from Thailand's two. 18 254 women were delivered before implementation of the partograph and 17 230 after.

Mean age was 27 23 years (standard deviation 5·72) and mean gestation on admission 39·0 weeks (2·1). 2970 women (8·4%) were < 37 weeks. 39·1% were nulliparous, 51·9% parity 1–4, and 8·9% parity 5 or more. 2529 labours (7·1%) were induced and a further 1397 women (3·9%) did not have an observed labour but were delivered by elective or immediate emergency caesarean section. The total caesarean section rate was 12·1% (2·5% elective, 9·5% emergency, and 0·1% unclassifiable). There were 55 cases of ruptured uterus and 47 (0·13%) maternal deaths, almost all among women admitted from home with neglected serious complications.

There were 479 sets of twins and 8 sets of triplets resulting in a total of 35 944 infants. 929 (2·6%) were stillbirths and in the majority of cases (781) the fetus was dead on admission. The mean birth weight was 3·065 (0·506) kg and 2·276 (0·558) kg for all singleton infants and multiple births, respectively; with 9·2% and 61·4% less than 2 5 kg, respectively. There were 139 first-week neonatal deaths recorded before discharge of the mother.

There were no differences in characteristics of women who delivered before and after implementation of the partograph (mean ages 27·29 [5·68] and 27·17 [5·75], p = 0·55 and mean gestational age 39·01 [2·09] and 39·07 [2·01] weeks, p = 0·26 before and after implementation, respectively; 39·0% and 39·2% were nulliparous, p = 0·87, and 55·1% and 53·0% were normal women, p = 0·68, before and after implementation, respectively; mean maternal height 153·37 [5·55] cm before and 153·36 [5·45] cm after implementation [p = 0·73]). Most women had a minimum of two visits to an antenatal clinic; slightly fewer (91·7%) received this amount of antenatal care after implementation compared to women before implementation (93·8%) (p = 0·41).

The impact of implementing the partograph on the duration of labour, oxytocin usage, and mode of delivery is shown in table 1. Labours augmented with oxytocin were reduced by 54% (95% confidence interval, 13%–76%). Despite this, the mean duration of labour was only slightly reduced from 2·72 to 2·68 hours (adjusted geometric means) or from 5·72 (7·41) to 5·05 (5·89) hours (arithmetic means), with a drop of 41% (24%–54%) in labours lasting more than 18 hours. Among singleton deliveries the rate of spontaneous cephalic deliveries increased by 6% (−4% to 17%), instrumental (vacuum extraction or forceps) deliveries were reduced by 9% (−3% to 20%) and emergency caesarean sections by 3% (−16% to 19%). When indications for emergency caesarean section were examined, 62% of the overall reduction was accounted for by cephalo-pelvic disproportion. Changes in other indications for caesarean section were small; in particular there was no change in the proportion of caesarian section done for fetal distress. There were no significant changes in the rates of other types of deliveries, including the rate or mode of delivery of multiple pregnancies. The mean number of vaginal examinations during the first stage of labour fell from 1·77 (1·35) before to 1·51 (1·24) after implementation (adjusted within-centre difference 0·23 [−0·01 to 0·47], p = 0·057).

	Before implementation	After implementation	p
Total deliveries	10 049	9130	
Duration of labour (h)* Median (5–95 percentiles)	3 83 (0 58–18 9)	4 15 (0 78–15 5)	0 257
Labour > 18 h*	551 (5 5)	249 (2 7)	0 001
Labour augmented	2575 (25 6)	967 (10 6	0 041
Postpartum sepsis	54 (0 54)	10 (0 11	0 003
Mode of delivery†			
Spontaneous cephalic	8428 (83 9)	7869 (86 3)	< 0 001
Vacuum extraction	654 (6 5)	614 (6 7)	0 702
Forceps	341 (3 4)	227 (2 5)	0 005
Caesarean section	621 (6 2)	409 (4 5)	0 056

Normal women before and after implementaton (number of women with percentages in parentheses, except where stated).
*Duration of labour not recorded in 61 and 27 women before and after implementation, resoectively †Mode of delivery not recorded for 5 and 11 women before and after implementation, resoectively.

Table 2: **Duration of labour, augmentation, mode of delivery, and postpartum sepsis: normal women**

Postpartum haemorrhage (blood loss ≥ 500 mL) after caesarean section or vaginal delivery was unchanged by the implementation of the partograph (9·3% before and 8·7% after implementation). However, the rate of postpartum sepsis was reduced by 59% (12%–81%). As sepsis rates among women discharged early in the postnatal period may be underestimated, sepsis rates after casearean section alone were examined separately. In this group, the rate fell from 1·64% (38 women) before implementation to 0·56% (11 women) after implementation—a reduction of 50% (−32% to 81%), p = 0·14.

23 maternal deaths occurred before implementation and 24 afterwards. All were admitted with severe complications; only 5 had a partograph. The causes of death in these cases were pulmonary embolism (2), eclampsia (2), and postpartum haemorrhage and/or anaesthetic death (1). The partograph also had no influence on the incidence of uterine rupture (26 cases before and 29 after implementation, p = 0·19). In 43 cases the uterus was already ruptured on admission and bad management, especially of the second stage, was probably responsible for the 12 cases in which rupture occurred after admission. There was no evidence that the implementation of the partograph had any influence on uterine rupture.

Table 2 shows the impact of implementing the partograph in normal women. Oxytocin usage fell by 59%

	Before implementation‡	After implementation‡	p
Total deliveries	4212	3924	
Duration of labour (h)* Median (5–95 percentiles)	5 58 (1 17–21 9)	5 75 (1 40–17 7)	0 518
Labour > 18 h*	347 (8 3)	176 (4 5)	0 017
Labour augmented	1353 (32 1)	539 (13 7)	0 049
Postpartum sepsis	34 (0 81)	3 (0 08)	0 001
Mode of delivery†			
Spontaneous cephalic	3129 (74.3)	3069 (78 3)	< 0 001
Vacuum extraction	441 (10 5)	413 (10 5)	0 636
Forceps	227 (5 4)	165 (4 2)	0 022
Caesarean section	414 (9 8)	271 (6 9)	0 060

Nulliparous normal women before and after implementation (number of women with percentages in parentheses, except where stated.
*Length of labour not recorded in 24 and 11 women before and after implementation, respectively †Mode of delivery not recorded for 1 and 6 women before and after implementation, respectively. ‡Parity not recorded in 27 and 14 women before and after implementation, respectively.

Table 3: **Duration of labour, augmentation, mode of delivery, and postpartum sepsis: nulliparous normal women**

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249

	Before implementation†	After implementation‡	p
Total deliveries	5810	5192	
Duration of labour (h)* **Median (5–95 percentiles)**	2·83 (0·42–15·2)	3·08 (0·60–13·1)	0·245
Labour > 18 hr	203 (3·5)	72 (1·4)	<0·001
Labour augmented	1214 (20·9)	427 (8·2)	0·038
Postpartum sepsis	20 (0·34)	7 (0·13)	0·045
Mode of delivery†			
Spontaneous cephalic	5275 (90·9)	4787 (92·3)	0·044
Vacuum extraction	213 (3·7)	200 (3·9)	0·730
Forceps	113 (1·9)	62 (1·2)	0·026
Caesarean section	205 (3·5)	138 (2·7)	0·170

Parous normal women before and after implementation: number of women with percentages in parentheses, except where stated.
*Length of labour not recorded in 37 and 16 women before and after implementation, respectively. †Mode of delivery not recorded for 4 and 5 women before and after implantation, respectively. ‡Parity not recorded in 27 and 14 women before and after implementation, respectively.

Table 4: **Duration of labour, augmentation, mode of delivery, postpartum and parity: parous normal women**

(5%–82%), there was a reduction of 49% (30%–63%) in labours lasting more than 18 hours and the postpartum sepsis rate was reduced by 73% (45%–86%). Sepsis rates after caesarean section were reduced by 45% (−39% to 79%, p=0·17). There was a reduction of 19% (−1% to 35%) and 30% (14%–43%) in emergency caesarean section and forceps delivery rates, respectively; with an increase of 22% (14%–30%) in spontaneous cephalic deliveries. 75% of the reduction in caesarean sections occurred where cephalo-pelvic disproportion was the stated indication. Caesarean sections for fetal distress fell from 1·1% of all deliveries before to 0·9% after implementation.

Similar patterns were observed among nulliparous and parous normal women (tables 3 and 4). In particular, labours longer than 18 hours were reduced by 45% (13%–65%) and 57% (49%–64%), augmentation rates by 59% (1%–83%) and 58% (6%–81%), and postpartum sepsis rates by 76% (54%–88%) and 50% (2%–75%) among the nulliparous and parous women, respectively. There was a reduction in caesarean section rates of 20% (−1% to 38%) and 20% (−13% to 44%) and in forceps delivery rates of 28% (6%–45%) and 35% (7%–55%) with a corresponding increase in spontaneous cephalic deliveries of 25% (16%–34%) and 23% (1%–51%) among the nulliparous and parous women, respectively. The rates of postpartum haemorrhage after either caesarean section or vaginal delivery were not changed significantly following the implementation of the partograph among the nulliparous and parous normal women (5·6% to 4·9% overall).

Stillbirths among all women delivered fell from 516 (2·8%) to 413 (2·4%) (p=0·06). In most cases the fetus was already dead on admission, but intrapartum stillbirths (which partography may influence) fell from 93 (0·50%) before introduction of the partograph to 55 (0·31%) after introduction (p=0·024). First-week neonatal deaths before discharge of the mother fell from 89 (0·5%) to 50 (0·3%) (p=0·68).

Neonatal morbidity was estimated from Apgar scores, the need for resuscitation, and the need for admission to special or intensive care nurseries. There were no significant changes in these indices. Among normal women intrapartum fetal deaths were few (6 before and 3 after implementation). There was a reduction among infants delivered of normal women in admissions to neonatal special care, from 638 (6·3%) to 453 (5·0%) (p=0·49). No other changes were seen.

Additional comparisons of the event rates before and after implementation were made among those hospitals that implemented the partograph early and those that implemented it later. Such analyses revealed that the impact of the partograph was similar in the two sets of hospitals, and there was no evidence of any trend in event rates with time after introduction (comparison between the second and third observation periods among those hospitals that implemented the partograph early). Similarly there was no trend in event rates before introduction of the partograph among those hospitals that implemented late (comparison between the first and second periods).

A detailed description of the progress of labour plotted on the WHO partograph in this trial is available in a WHO document;[14] briefly, 8840 normal women had their course of labour adequately plotted on a partograph (96·8% of all normal women admitted after implementation). 73% were admitted in the active phase of labour and 27% in the latent phase. There was a preponderance of nulliparous women among the latent phase admissions. Only 9 women required delivery (by caesarean section) within a normal (<8 hour) latent phase. A further 112 women (1·3%) had a prolonged latent phase (≥8 hours). These women had high rates of caesarean section delivery (20·4%) and of augmented labour (68·9%). Of 8689 women with an active phase of labour plotted on the partograph, 72·8% remained on or to the left of the alert line, 17·3% moved to the right of the alert line but did not reach the action line, and 9·9% reached the action line. Among labours remaining on or the left of the alert line, 2·5% received oxytocin, and 0·6% were delivered by caesarean section. Labours moving between the alert and action lines but not to the action line were augmented in 9·0% and had a 3·4% caesarean section rate. Corresponding figures for those reaching or crossing the action line were 65·3% augmentation, and 21·7% caesarean section.

Discussion

The results provide evidence that the use of the WHO partograph with a simple management protocol improves the outcome of labour. A randomised controlled trial of the partograph would not be possible since women could not be allocated individually to labour management with or without a partograph. Despite this, it is surprising that more formal before and after comparisons have not been attempted.

Collecting detailed data on intrapartum care in any hospital may change the quality and practice of that care. For this reason a standard data collection form was used throughout the trial (both before and after implementation of the partograph) on which basic socio-demographic, medical, and obstetric data were recorded for each woman. After implementation of the partograph the data collection forms were supplemented by the partograph used during labour and an additional sheet on which various features of the progress of labour and its management were summarised after delivery. No assessment of the impact of the first intervention—conducting a study on obstetric care—is available and the routine hospital obstetric statistics were not considered sufficiently reliable or detailed to enable such a comparison to be made. However the additional impact of the introduction of the partograph with its management protocol was assessed by comparison of the before and after event rates. The lack of trends in event rates with time since the introduction of the

290

partograph, and the similarity of the changes among those hospitals that implemented the partograph early and those that implemented it later suggest that the observed differences were in fact due to the intervention studied.

Introduction of the partograph led to a reduction in prolonged labour (> 18 hours), achieved despite halving the proportion of labours receiving oxytocin augmentation. Caesarean section rates also fell and there was a corresponding rise in spontaneous vaginal deliveries; operative vaginal deliveries by forceps were reduced with little change in vacuum extractions. The association of a reduction in both augmentation and prolonged labour accords with the findings of Philpott and Castle[7] but is in marked contrast to the findings of most other authors.[11,17] That the labours were more efficient appears to be confirmed by the reduced rate of caesarean sections. This may be in part explained by the greater use of artificial rupture of the membranes at earlier dilations after implementation of the partograph, especially in Indonesia.

The caesarean-section rates achieved were not as low as some other studies. Although a single partograph design may be applicable to all populations, caesarean section rates may vary with different populations. Thom et al[18] found, in a single-centre study, that a similar proportion of women from different ethnic origins reached an action line but caesarean-section rates varied. A caesarean section rate of 0·5% was achieved by Bird[19] in Papua New Guinea (0·7% if symphysiotomies are included) among women of all parities, probably broadly comparable to the normal group in the WHO trial. Perhaps more remarkable was the 1·8% caesarean section rate reported among labouring nullipara by O'Driscoll et al in Dublin.[17] O'Driscoll's aggressive management policy (55% augmentation rate) would not necessarily be appropriate or desirable in other settings. Lowering augmentation rates from 32·1% to 13·7% reduced caesarean sections in this trial. Philpott and Castle[7] reduced caesarean sections from 9·9% to 2·6% among nullipara, who were the only women studied. The corresponding drop for nullipara in this trial was from 9·8% to 6·9%. Although the reduction in prolonged labour had no impact on postpartum haemorrhages, this, together with the reduction in vaginal examination in labour and in caesarean sections, probably contributed to the significant fall in postpartum sepsis rates.

There was no impact on the incidence of maternal deaths or uterine rupture, but these events occurred almost entirely among women admitted with severe complications. They were rare in this group of women. Intrapartum stillbirths fell with the use of the partograph and other measures of neonatal outcome were not compromised by improvements in maternal outcome. First-week neonatal mortality prior to discharge also fell but the reported numbers are small and such deaths underestimate the true neonatal mortality rates since no systematic follow-up of mothers or infants was undertaken. The improvements described were most marked in normal women who had no other complications to influence the likelihood of intervention and occurred among multiparous and nulliparous women.

The visual presentation of clinical information can affect decision making and this may be particularly true of partography.[20] The results summarised here and reported in detail elsewhere[14] confirm that the WHO partograph identifies those labours likely to have an abnormal outcome. A detailed analysis of the design did not suggest that any modification is necessary. Caesarean section rates of 0·6% when labour remained on or to the left of the alert line and 21·8% when the action line was reached, convincingly demonstrates the capacity of the partograph to identify problem labours. A similar caesarean section rate (20·4%) occurred after a prolonged latent phase (8 hours on the partograph) but the most important finding was the small number of women who experienced a prolonged latent phase. The existence of clear guidelines about when to start the partograph was undoubtedly the main reason for this. O'Driscoll et al[17] similarly emphasised the critical importance of the correct diagnosis of labour.

The partograph itself is of little more than observational value without a management protocol. The protocol used in this trial merely indicated the timing of certain interventions. No alterations to the nature of these interventions was suggested, in particular each centre continued to use their pre-existing regime for oxytocin augmentation. The main changes brought about by agreed management protocol were that ARM in labour was performed earlier in the active phase and that augmentation was delayed, usually until the action line was reached (hence the reduction in labours requiring augmentation). The steady increase in augmentation rate as labour progress slowed across the partograph was therefore an inevitable but appropriate result of the application of the protocol with the partograph. Labour wards intending to use the WHO partograph may adapt local management protocols of their own but the improved labour outcomes reported in this trial suggest that the WHO partograph works successfully with the protocol described in the methods.

It was not possible from this study to address the partograph as an aid to referral decisions in labour. Nonetheless, some conclusions can be drawn from the 27% of women in this study whose labours moved to the right of the alert line. If such a rate were typical among women having an observed labour in a peripheral unit, the referral of 20–30% of labouring women is likely to be unacceptable and impracticable in many settings. However, it must be concluded that, where local circumstances permit (and every effort should be made to ensure that they do permit[21]), women in labour should be transferred to a unit with facilities for caesarean section when the progress of labour moves to the right of the alert line, except when labour is advanced and delivery appears imminent.

The impressions of the principal investigators and their staff of the partograph as a management tool were unanimously favourable. It was felt that observation of the progress of labour was clearer and this helped in interpreting findings and communication between members of the maternity-care team. The reduction of intravenous infusions for augmentation of labour was appreciated by the midwives as they could give more supportive care to the women.

Appropriate technology is defined by the WHO as "Methods, procedures, techniques and equipment that are scientifically valid, adapted to local needs, acceptable to those who use them and to those for whom they are used, and that can be maintained and utilized with resources the community or country can afford".[20] The WHO partograph has been carefully evaluated in this study and it is hoped that the results will encourage all maternity units to use a partograph with incorporated management guidelines to the benefit of mothers, babies, midwives, and doctors. Its universal application has the potential not only to reduce fetal and maternal mortality and morbidity but also to reduce the number of caesarean sections.

291

A Multicentre Project coordinated by the Maternal and Child Health and Family Planning Programme and the Special Programme of Research, Development and Research Training in Human Reproduction, World Health Organization, Geneva, Switzerland.

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292

APPENDIX B

WOMEN CARE INTERNATIONAL

SUBJECT: BASIC INFECTION CONTROL GUIDELINES

POLICY: The Infection Control department recognizes the need to include basic infection control procedures into daily routine work practices. These procedures are designed to reduce the transmission of microorganisms in the healthcare setting and in turn reduce the incidence of hospital-associated (nosocomial) infections. These procedures include personal hygiene habits, handwashing practices and work flow practices.

GENERAL INFORMATION

I. PERSONAL HYGIENE HABITS:

A. Daily showering or bathing.

B. Wearing clean clothes daily.

C. Keep hair clean and restrained.

D. Keep hands clean. Nails should be trimmed. Nail polish, acrylic/false nails or nail ornaments are not permitted.

E. Keep jewelry to a minimum. Jewelry interferes with good handwashing practices.

F. Cover nose or mouth if coughing or sneezing with a tissue.

G. Pay attention to where ones hands are wondering. Do not put your fingers in your mouth or objects in your mouth.

H. Eat a balanced diet, exercise regularly, get enough sleep and seek medical attention on a regular schedule and sooner if needed.

I. A healthcare worker who develops a highly communicable infection such as an undiagnosed rash, acute diarrhea, skin lesions (i.e. weeping dermatitis, exudative lesions), active conjunctivitis, active respiratory infection, active herpes lesions, hepatitis A, bloodborne infections (i.e. hepatitis B, human immunodeficiency virus infection), tuberculosis symptoms or varicella (chickenpox), must report this to his/her immediate supervisor. The supervisor will contact the Infection Control Department to determine whether or not the employee must be restricted from caring for patients or reassigned for the duration of infection. This will be determined on an individual basis.

II. HANDWASHING

A. ALL patients must be suspected as being potential reservoirs for cross-contamination. Good handwashing between patient contacts must be standard procedure at all times. If good handwashing technique is strictly adhered to by ALL concerned in patient care, the occasional unsuspected infection should pose few transmission problems during time spent in care before isolation is implemented.

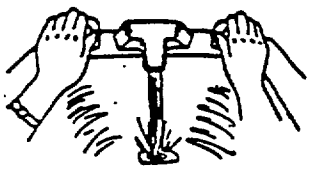
B. Handwashing is the single most important means of preventing the spread of infection. Handwashing sinks are located in patient rooms, newborn nurseries, restrooms, laboratories, patient care and ancillary care areas. In addition, surgical scrub sinks are located in surgical areas.

C. Hands should be washed:
- before and after your work shift
- before and after direct hand contact with patients, their immediate environment and their secretions and excretions
- before performing invasive procedures or manipulating tubes/catheters
- after removing gloves
- when your hands are soiled
- before eating or handling food
- after covering a sneeze or cough
- after using the toilet

D. Handwashing agents are an aid to effective handwashing,but they should not be used as a substitute for correct handwashing.

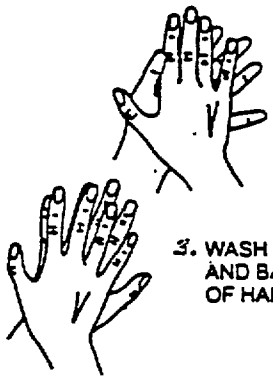
REMOVE WATCH AND RINGS AND PLACE THEM IN UNIFORM/CLOTHES POCKET OR ATTACH TO UNIFORM/CLOTHES.

Now that we know when to wash our hands,
this is how to wash your hands.



1. ADJUST WATER TO A COMFORTABLE TEMPERATURE

AVOID SPLASHING



3. WASH PALMS AND BACK OF HANDS

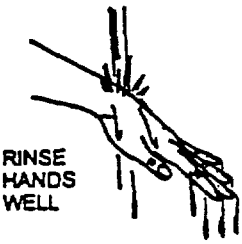
2. USING SOAP, WARM WATER, AND FRICTION.

LATHER UP!

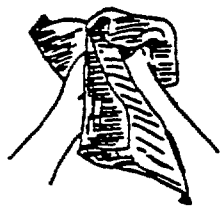
4. DON'T FORGET TO WASH BETWEEN FINGERS AND . . .

295

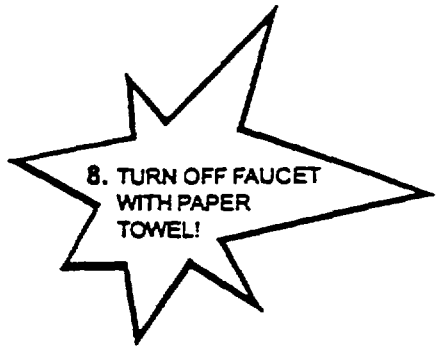
5. AROUND FINGERNAILS



6. RINSE HANDS WELL



7. DRY HANDS WELL



REMEMBER TO TAKE GOOD CARE OF YOUR HANDS. THEY ARE YOUR MOST IMPORTANT TOOLS AND IN THE HOSPITAL THEY ARE YOUR MOST IMPORTANT INSTRUMENTS.

III. <u>WORK FLOW PRACTICES</u>

A. Work flow practices should define how we provide the least amount of contamination to our work environment.

B. Each department should define clean and dirty areas in their work environment.

C. Work flow practices should be designed to work from clean areas to dirty areas. When going from a defined dirty area to a clean area one should always wash hands.

D. Clean supplies (i.e. clean linen, clean instruments, sterile supplies) should be stored separately from dirty supplies (i.e. dirty linen, soiled instruments).

E. Each department should define specifics in regard to handling, disposing or reprocessing of soiled/contaminated supplies.

F. Healthcare workers must know which procedures require aseptic technique.

APPROVAL:_____
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ORIGINAL: 6/94
REVIEWED:
REVISED:

WOMEN.BIC

APPENDIX C

APPENDIX C: DAY THREE:

PUERPERAL SEPSIS[1]

INTRODUCTION

Puerperal sepsis is one of the major causes of maternal death and accounts for 15% of all maternal deaths in developing countries. If it does not cause death, puerperal sepsis can cause long-term health problems such as chronic pelvic inflammatory disease (PID) and infertility. It is very important for midwives and doctors to be able to prevent puerperal sepsis and treat it promptly if it occurs.

DEFINING PUERPERAL SEPSIS

Puerperal sepsis is an infection of the genital tract at any time between the onset of rupture of membranes or labor and the 42nd day following delivery or abortion in which two or more of the following are present:

- pelvic pain;
- fever of 38.5 degrees C or more measured orally on any one occasion;
- abnormal vaginal discharge;
- abnormal smell, foul odor of discharge;
- delay in the rate of reduction of the size of the uterus.

Bacteria which Cause Puerperal Sepsis

Some of the most common ones are:

- streptococci
- staphylococci
- Escherichia coli (E. coli)
- Clostridium tetani
- Clostridium welchli
- chlamydia and gonococci bacteria which cause sexually transmitted diseases

Infection is most often a mixed infection with several kinds of bacteria. Bacteria may be either endogenous or exogenous.

Endogenous bacteria: These are bacteria which normally live in the vagina and rectum without causing harm (e.g. some kinds of streptococci and staphylococci, E. coli, Clostridium welchli).

Even when a sterile technique is used for delivery, infection can still occur from endogenous bacteria.

Endogenous bacteria can become harmful and cause infection if:

- they are brought into the uterus by the examining finger or by instruments during pelvic examinations; they are in the presence of bruised, lacerated or dead tissue (e.g. after a traumatic delivery or following obstructed labor);
- they go up into the uterus when there is prolonged rupture of membranes.

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[1]Excerpted from "Puerperal Sepsis Module" WHO/FRH/MSM/96.4

Exogenous bacteria: These are bacteria which are introduced into the vagina from the outside (streptococci, staphylococci, Clostridium tetani etc).

Exogenous bacteria can be introduced into the vagina:

- by unclean hands and unsterile instruments;
- by foreign substances that are inserted into the vagina (e.g. herbs, oil, cloth);
- by sexual activity.

Students should be aware of the problem of sexually transmitted diseases which are caused by exogenous bacteria.

In areas where sexually transmitted diseases (STDs) (e.g. gonorrhea and chlamydial infection) are common, they cause the majority of uterine infections. If a woman gets an STD during pregnancy and it remains untreated, the bacteria causing the STD will stay in the vagina and may cause a uterine infection after delivery. Uterine infections caused by STDs can be prevented by diagnosing and treating women for STDs during their pregnancy.

Signs and Symptoms of Puerperal Sepsis

The woman usually has a fever but this may not be so in clostridial infections. The woman may have pelvic pain, the uterus is tender, lochia may be offensive, and there may be a delay in the rate of reduction of the size of the uterus. There may be pain, swelling and pus discharge at the site of lacerations or episiotomy

Risk Factors for Puerperal Sepsis

Some women are more vulnerable to puerperal sepsis, including for example anaemic or malnourished women or women who have been in prolonged labor.

HOW PUERPERAL SEPSIS OCCURS

Puerperal sepsis can occur intrapartum or postpartum. Before delivery, the amniotic and chorionic membranes may become infected when membranes rupture many hours before labor starts. Bacteria have then enough time to go up from the vagina into the uterus and infect the membranes, the placenta, the baby and mother. Chorioamnionitis is a very serious problem and the woman and her baby are both in danger of losing their lives.

Following delivery, puerperal sepsis may be localized in the perineum, vagina, cervix or uterus. Infection of the uterus can rapidly become widespread causing infection of fallopian tubes or ovaries, parametritis, peritonitis and spreading to the lymphatics, leading to septicaemia as it enters the bloodstream. This may be further complicated by septic shock and disseminated intra vascular coagulation which gives rise to bleeding problems. Puerperal sepsis can become rapidly fatal.

Women are vulnerable to infection in the postpartum period, because of the following factors:

I. The placental site is large, warm, dark and moist. This allows bacteria to grow very quickly. It is an ideal medium to culture bacteria. In the laboratory, warm, dark and moist conditions are produced artificially in order to help bacteria grow and multiply.

2. The placental site has a rich blood supply, with large blood vessels leading directly into the main venous circulation. This allows bacteria in the placental site to move very quickly into the bloodstream. This is called septicemia. Septicemia can lead to death very quickly.

3. The placental site is not far from the outside of the woman's body. Only the length of the vagina (7-10 cm) separates the entrance to the uterus from the outside. This means that bacteria which naturally live in the rectum (such as E.coli) can easily move into the vagina and into the uterus. Here they are harmful or "pathogenic" because they will cause infection in the placental site.

4. During delivery, women may have suffered tears in the cervix, vagina or perineal area or had an episiotomy. These areas of traumatized tissue are susceptible to infection, especially if a sterile technique of delivery was not used. Infection is usually localized, but in severe cases it spreads to underlying tissues.

CHECKLIST FOR PUERPERAL SEPSIS

The most common site of infection in puerperal sepsis is the placental site. Other sites of infection are tears of the cervix, vagina, perineum and site of episiotomy.

Risk Factors for Puerperal Sepsis

These include:

- poor hygiene
- poor aseptic technique
- manipulations high in the birth canal
- presence of dead tissue in the birth can be due to intrauterine death of fetus, retained fragments of placenta or membranes, shedding of dead tissue from vaginal wall following obstructed labor
- insertion of unsterile hand, instrument or packing
- pre-existing anemia and malnutrition
- prolonged/obstructed labor
- prolonged rupture of membranes
- frequent vaginal examinations
- caesarean section and other operative deliveries
- unrepaired vaginal or cervical lacerations
- pre-existing sexually transmitted diseases
- postpartum hemorrhage
- not being immunized against tetanus
- diabetes

Other factors that affect puerperal sepsis include community and health service factors. These make the danger of death from puerperal sepsis greater.

Community Risk Factors

These include:

- lack of transportation and resources;
- great distance from a woman's home to a health facility;
- low socioeconomic status;

- cultural factors which delay care seeking behavior,
- low status of women;
- lack of knowledge about signs and symptoms of puerperal sepsis.

Health Service Risk Factors

These include:

- inadequate monitoring of temperature in prolonged labor and after delivery;
- lack of asepsis during delivery;
- inadequate bacteriological investigations in women with puerperal sepsis;
- shortage of blood for transfusion;
- inadequate management with appropriate antibiotics or further operative intervention;
- non-availability of appropriate antibiotics.

MANAGEMENT OF PUERPERAL SEPSIS

1. Isolation and Barriers, Nursing of the Woman

The aim of this is to prevent the spread of infection to other women and their babies.

Basic nursing principles are important. Nurses/midwives should:

- nurse the woman in a separate room or, if that is not possible, in the corner of the ward, separated from the other patients;
- use a gown and gloves when attending to the woman and use this particular gown and gloves only when attending to her;
- keep one set of equipment, dishes and other utensils exclusively for the use of this woman and make sure it is not used by anyone else;
- wash hands carefully before and after attending to this woman.

Where possible a special midwife/nurse should be allocated to care for this mother and her baby. It may also be helpful to have a relative assist with their care. If so, the relative must be instructed in the basic principles of preventing the spread of infection. Otherwise visitors should be limited.

2. Administration of High Doses of Broad Spectrum Antibiotics

These will normally be prescribed by a doctor. Where no doctor is available, midwifery personnel must know how to prescribe and give appropriate drugs. If legislation does not allow this, it should be reviewed urgently.

Women will die of puerperal sepsis if appropriate antibiotic therapy is not given early enough. The aim of the antibiotics is to start treatment immediately and stop further spread of the infection.

Choice of antibiotic

If the woman is not very sick (e.g. fever absent or low grade, pulse not very high, normal state of consciousness), useful regimes are:

- amoxicillin 1 g stat orally followed by 500 mg every 8 hours for 7 days + metronidazole 400 or 500 mg every 8 hours for 7 days, or

- amoxicillin 1 g stat orally followed by 500 mg every 8 hours for 7 days + tetracycline* I g stat orally followed by 500 mg every 6 hours for 7 days

  (NOTE: Tetracycline should only be given to breast feeding mothers if there is no suitable alternative antibiotic available.)

If the woman is very sick, (e.g. very high fever, rapid pulse, confused), offen more than one kind of bacteria is involved. A combination of antibiotics should be given to provide as broad a coverage as possible.

Metronidazole and chloramphenicol** are very effective against chlamydia and other bacteria which are resistant to other antibiotics. Metronidazole should be given if the woman has had a caesarean section or if you suspect chlamydia.

(NOTE: **Warning**: Chloramphenicol has some serious side effects such as anemia or leucopenia. If you give Chloramphenicol you must be able to monitor the blood count.)

Useful regimens are:

- benzylpenicillin 5 million IU IV stat followed by 2 million IU every 6 hours + gentamicin 100 mg stat IM followed by 80 mg every 8 hours + metronidazole 400 or 500 mg orally every 8 hours; OR

- ampicillin I g IV stat followed by 500 mg IM every 6 hours + metronidazole 400 or 500 mg orally every 8 hours; OR

- benzylpenicillin 5 million IU IV stat followed by 2 million IU every 6 hours + gentamicin 100 mg stat IM followed by 80 mg every 8 hours OR

- benzylpenicillin 5 million IU IV stat ORfollowed by 2 million IU every 6 hours + chloramphenicol' 500 mg IV every 6 hours.

Note: the first regimen provides the broadest coverage.

Follow-up

If the woman does not improve after 48 hours or the laboratory report states that the bacteria are resistant to these antibiotics, the antibiotics must be changed.

Do not change the antibiotics until you have considered:

- is the original diagnosis correct?
- is there an abscess anywhere?

Intravenous therapy should continue until the woman has had no fever for at least 48 hours. Antibiotics can then be given orally for another week on an outpatient basis.

3. Giving Plenty of Fluids

The aim of this is to correct or prevent dehydration and help to lower the fever.

In severe cases, it is necessary to give intravenous fluids at first. If the woman is conscious and there is no indication for the need of a general anesthetic in the next few hours, she should also be given oral fluids. In mild cases, increase oral fluid intake.

4. Ruling out Retained Placental Fragments

Retained placental fragments can be a case of puerperal sepsis. Suspect this if the uterus is soft and bulky, if lochia are excessive and contain blood clots. The woman should be referred to a facility that has the equipment and health care personnel to perform a currettage.

5. Providing Skilled Nursing Care

This requires careful attention both to the comfort of the woman and to carrying out the doctor's instructions. It is important to:

- advise woman to rest in bed;
- monitor vital signs;
- measure intake and output;
- keep accurate records;
- prevent the spread of infection and cross-infection.

Practical problems that may arise include:

- facilities do not allow for proper isolation;
- staff shortage does not allow a single midwife/nurse to be allocated to give care.

The midwife must be gentle both physically and emotionally. This means that the woman must be handled gently when giving physical care. Rough handling increases pain and shock.

A sensitive approach is important in speaking with the woman and her relatives. The woman is ill. The midwife and the doctor should demonstrate empathy.

The midwife must also be accurate in all her observations, recording and reporting.

6. Managing Complications

Peritonitis

Generalized peritonitis is inflammation of the whole of the peritoneum. This means both the parietal peritoneum, which is the membrane which lines the abdominal wall, and the visceral peritoneum, which lies over the viscera or internal organs, are inflamed.

Diagnosis:
It is important to know how to recognize peritonitis. Peritonitis and/or multiple abscesses in the abdomen

can follow cesarean section or ruptured uterus or can be a complication of puerperal sepsis.

The following signs and symptoms are present in addition to fever:

- rebound tenderness *
- abdominal pain
- distended abdomen at 3 to 4 days
- vomiting
- poor bowel sounds
- diarrhea.

* To elicit rebound tenderness, palpate the abdomen then nelease your hand suddenly: if there is peritoneal inflammation, this will be painful.

Management of generalized peritonitis:
Treat actively if suspected, without waiting for confirmation of diagnosis.

Start antibiotics such as benzylpenicillin plus gentamicin plus metronidazole, IV fluids and analgesics (such as pethidine 50—00 mg IM every 6 hours). If available, pass a naso-gastric tube and aspirate the stomach contents.

Ensure that the woman is transferred without delay to the next referral level where skilled medical/surgical help is available.

Salpingo-oophoritis and Parametritis

Salpingo-oophoritis is infection of the ovary and fallopian tubes. Parametritis is infection of the parametrium. (The parametrium is the loose tissue found around the uterus. It extends onto the sides of the cervix and between the layers of the broad ligament).

Diagnosis:
Salpingo-oophoritis: fever, bilateral pain and tenderness in the lower abdomen.

Parametritis: fever, pain or tenderness on one or both sides of the abdomen, marked tenderness on vaginal examination.

Managernent of salpingo-oophiorins or parametritis:

Start antibiotics such as benzylpenicillin plus gentamicin plus metronidazole.

If necessary, give pain relief such as pethidine 50-100 mg TM every 6 hours.

If the woman does not improve in 2 or 3 days she should be transferred to the appropriate level hospital.

Septicemia

Septicemia is the presence and multiplication of bacteria in the bloodstream.

Diagnosis:
Fever and chills, fast pulse, woman very sick.

Management of septicemia:
Start antibiotics, e.g. benzylpenicillin + gentamicin + metronidazole. Refer the woman without delay to theappropriate hospital. Consideration may be given to starting Heparin if disseminated intravascular coagulation is suspected.

Abscesses

Diagnosis:
Bulging, fluctuating mass on vaginal examination, severe pain and tenderness, fever not decreasing in spite of antibiotics.

Management of abscesses:
Refer the woman to the appropriate hospital for a posterior colpotomy (surgical incision into the posterior wall of the vagina) for abscesses in the Pouch of Douglas (see Figure 5.1), or a laparotomy for abscesses elsewhere in the abdomen.

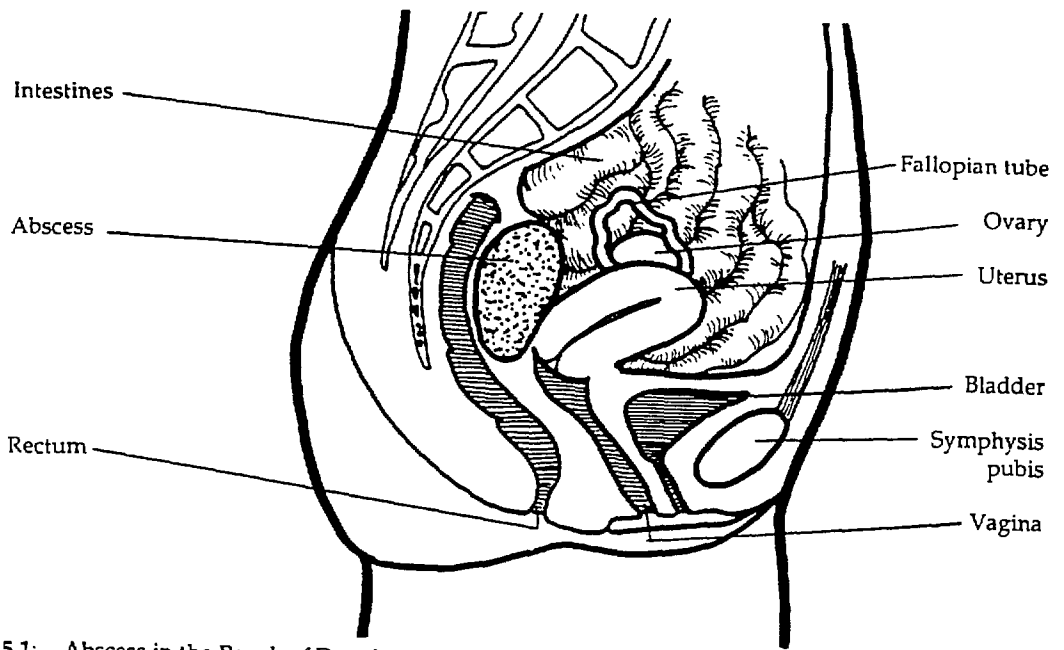

Figure 5.1: Abscess in the Pouch of Douglas

- **Managing Infections of Tears of the Perineum, Vulva, Vagina, Infection of Episiotomy**

Signs and symptoms

- pain
- swelling
- redness
- pus discharge
- fever.

Management

- antipyretics or analgesics
- sitz* baths three times daily
- clean wound with hydrogen peroxide or betadine twice daily after genital area has been cleaned with water.

* The woman sits in a tub of clean warm water for a few minutes

If there is no improvement after 3 days, remove sutures if present, probe wound and drain. Clean wound with hydrogen peroxide or betadine twice daily. If after 3 days there is still no improvement, refer to the appropriate hospital for surgical exploration and debridement.

8. Managing Chorioamnionitis

Signs and symptoms

- fever
- tender uterus on palpation
- foul smelling amniotic fluid draining
- fast pulse (above 90 per minute)
- the baby also has a fast heartbeat (above 160 per minute)
- there is history of prolonged rupture of membranes.

Management

Delivery should take place as soon as possible. The woman and her baby are both in danger of losing their lives:

- set up an IV infusion and start IV fluids;
- start antibiotics and also give an antipyretic;
- monitor for signs of shock;
- transfer the woman without delay to the hospital where skilled obstetrical and pediatric help is available. Be prepared for delivery and infant resuscitation during transfer.

Prevention of chorioamnionitis

-Advise all pregnant women to seek medical help as soon as they notice any fluid coming out from the birth canal. If the membranes are ruptured and the woman is not having contractions, do not do a vaginal examination.

-If labor does not begin within 12 hours after the membranes rupture, give the mother prophylactic(preventive) antibiotic treatment: use a broad spectrum antibiotic such as ampicillin 1 g stat IM then 300 mg IM every 6 hours or amoxicillin 500 mg orally ever 8 hours. As an alternative, sulfamethoxazole/trimethoprine 800/I 60mg may be given twice daily.

- Refer to the next level of care after a maximum of 12 hours of no labor.

APPENDIX D

APPENDIX D: DAY THREE:

Bibliography and Key Articles on Infection Available in Russian

Enkin M, Enkin E, Chalmers I, and Hemminki E. Prophylactic antibiotics in association with caesarean section.

Mercer BM, Arheart KL Antimicrobial therapy in expectant management of preterm premature rupture of the membranes. (Summary).

Mugford M, Kingstone J, Chalmers I. Reducing the incidence of infection after caesarean section: implications of prophylaxis with antibiotics for hospital resources. (Abstract).

NIH Consensus Conference. Effect of Corticosteroids for Fetal Maturation on Perinatal Outcomes., JAMA, February 1, 1995 - vol.273, No.5, 413-418.

Reducing the incidence of infection after caesarean section: implications of prophylaxis with antibiotics for hospital resources

Miranda Mugford, John Kingston, Iain Chalmers

Abstract

Objectives—To estimate the cost effectiveness of giving prophylactic antibiotics routinely to reduce the incidence of wound infection after caesarean section.

Design—Estimation of cost effectiveness was based, firstly, on a retrospective overview of 58 controlled trials and, secondly, on evidence about costs derived from data and observations of practice.

Setting—Trials included in the overview were from obstetric units in several different countries, including the United Kingdom. The costing study was based on data referring to the John Radcliffe Maternity Hospital, Oxford.

Subjects—A total of 7777 women were included in the 58 controlled trials comparing the effects of giving routine prophylactic antibiotics at caesarean section with either treatment with a placebo or no treatment. Cost estimates were based on data on 486 women who had caesarean sections between January and September 1987.

Main outcome measure—Cost effectiveness of prophylaxis with antibiotics.

Results—The odds of wound infection are likely to be reduced by between about 50 and 70% by giving antibiotics routinely at caesarean section. Forty one (8·4%) women who had caesarean section were coded by the Oxford obstetric data system as having developed wound infection. The additional average cost of hospital postnatal care for women with wound infection (compared with women who had had caesarean section and no wound infection) was estimated to be £716; introducing routine prophylaxis with antibiotics would reduce average costs of postnatal care by between £1300 and £3900/100 caesarean sections (at 1988 prices), depending on the cost of the antibiotic used and its effectiveness.

Conclusions—The results suggest that giving antibiotics routinely at caesarean section will not only reduce rates of infection after caesarean section but also reduce costs.

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Introduction

Recovery from caesarean section is more difficult for women who develop postoperative infection. These infections may affect the pelvic organs, the surgical wound, and the respiratory and urinary tracts. Such infections are not uncommon and often not trivial. Moir-Busby *et al* estimated that in England and Wales at least 6% of women who had caesarean section developed wound infection. Their survey found that rates of wound infection in hospitals varied between 0 and 20·5%, and that women with wound infection [illegible] to the additional costs resulting from infection, they did not do a detailed costing study.

There is strong evidence that the risk of infection after caesarean section can be reduced by prophylactic antibiotics,[illegible] yet the only data available that are nationally representative suggest that obstetricians in England and Wales use such prophylaxis rarely. Giving antibiotics for this purpose could add considerably to pharmacy costs, but this might be justifiable not only in terms of averted pain and suffering but also because of cost savings arising from a reduced incidence of infection after caesarean section.

We report the results of a study in which we estimated the costs of care after caesarean section with and without a policy of routine prophylaxis with antibiotics.

Methods

ASSESSMENT OF EFFECTS OF ROUTINE PROPHYLAXIS WITH ANTIBIOTICS

The effects of routine prophylaxis with antibiotics used at the time of caesarean section were assessed by analysing the results of 58 controlled trials comprising a total of 7777 women in which routine treatment with an antibiotic had been compared with either treatment with placebo or no treatment. The methods used in this analysis have been published elsewhere. Typical estimates of the effects of the policy of prophylaxis were derived by a modification of the Mantel-Haenszel method[illegible] and expressed as summary odds ratios with their 95% confidence intervals.

ASSESSMENT OF COSTS

We used the framework of analysis of cost effectiveness, in which the difference in costs of alternative policies of care was related to the difference in outcome and expressed in terms of cost incurred or saved for each unit of outcome changed.[illegible] Hospital costs for care of women with and without wound infection after caesarean section were estimated from evidence gathered at the John Radcliffe Maternity Hospital, Oxford, and the Oxford District and Regional Health Authorities. Unless otherwise specified all costs referred to were hospital costs.

We used three main sources of information: observation of ward practice; hospital statistics; and administrative data on costs of different services and resources. Details of the usual postnatal care of women who had had caesarean section, with and without postoperative wound infection, were given by the midwives responsible for the wards concerned at the maternity hospital. Statistics on the length of postnatal stay for women who had delivered at the unit were derived from the Oxford obstetric data syste[illegible]

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Enkin M, Enkin E, Chalmers I, and Hemminki E. Prophylactic antibiotics in association with caesarean section. Taken from: Chalmers I, Enkin M, Keirse M, eds. Effective care in pregnancy and childbirth. Oxford: Oxford University Press; 1989, p. 1265-6

7 Conclusions

7.1 Implications for current practice

The first step that should be taken to reduce the infectious morbidity that is so common following caesarean section is to minimise the numbers of unnecessary operations (see Chapters 69 and 70). The second step requires attention to the variety of factors that reduce the risk of infection following justified use of the operation. These include minimizing the length of hospital admission prior to surgery; delaying shaving of the operation site until immediately before the operation; sterilizing swabs and instruments, the hands of the operating team, the skin of the patient, and the air of the operating theatre (Pollock 1988); and paying attention to good surgical technique (see Chapter 72).

Decisions about whether or not to institute a policy of antibiotic prophylaxis should no longer depend on uncertainties about whether reductions in the risks of serious infections can be achieved in this way: they can. If the level of post-caesarean infectious morbidity is very low without a policy of antibiotic prophylaxis, the ratio of benefits to costs, in absolute terms, might argue against instituting such a policy. We think that such circumstances are rare and that the evidence we have reviewed justifies far wider adoption of antibiotic prophylaxis than currently exists. Although the incidence of adverse drug effects among women receiving prophylactic antibiotics seems very likely to have been underestimated in the body of literature we have reviewed, it is inconceivable that it could outweigh the reduction in serious maternal morbidity which can be achieved by a policy of antibiotic prophylaxis. Adverse drug effects in the baby can be lessened by beginning prophylaxis after the umbilical cord has been divided.

Adverse ecological effects on bacterial flora are more difficult to quantify and predict, but are potentially of greater concern than adverse drug reactions in individual mothers and babies. If prophylactic antibiotics are used routinely, genital tract cultures and drug sensitivity studies should be performed in all the women who become infected despite receiving prophylaxis, and the hospital bacteriology laboratory should conduct a periodic review of the susceptibility patterns of commonly isolated organisms to detect gradual changes in antibiotic resistance (Duff 1987).

The risk of these adverse ecological effects is likely to be reduced if the total load of antibiotics is reduced. Had our analysis suggested that single dose or short regimens were as effective as multiple dose or longer regimens, we would have been able to endorse the recommendations of others that the simpler regimens ld be adopted. Their conclusions, however, seem y to have been based on samples of insufficient size to exclude a clinically important advantage of the multiple dose and the longer regimens. Even so, the disadvantages of longer courses of antibiotics in terms of the resulting increase in the total antibiotic load, the numbers of women experiencing side effects, and the additional cost in financial terms may actually outweigh the advantages of their greater prophylactic efficacy relative to shorter or single-dose regimens (Freire *et al.* in press).

As far as choice of antibiotic is concerned, the broad spectrum penicillins are as effective as the cephalosporins. No strong case for adding aminoglycosides to broad spectrum penicillins can be made; on the basis of current evidence any increase in effectiveness which may result is likely to be marginal and would add the of otoxicity and nephrotoxicity associated with these drugs. Metronidazole currently has no place in antibiotic prophylaxis for caesarean section because is no convincing evidence that it is effective.

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Mercer BM; Arheart KL. Antimicrobial therapy in expectant management of preterm premature rupture of the membranes. Lancet 1995 Nov 11;346(8985):1271-9

AUTHOR AFFILIATION: Department of Obstetrics and Gynecology, University of Tennessee, Memphis, Tennessee, USA

ABSTRACT: We review the impact of antimicrobial treatment on maternal and fetal outcome during expectant management of preterm premature rupture of the membranes. Relevant studies were retrieved from Medline (1966 to August, 1994) with the search term fetal-membrane-premature-rupture and antibiotics or antimicrobial, Excerpta Medica (1972 to August, 1994) with the search term premature fetus, membrane rupture, and antibiotic or antimicrobial therapy, and the Cochrane database of systemic reviews with the criterion antibiotics and prelabour rupture of membranes. We also obtained unpublished data from a randomised clinical trial of ceftizoxime versus placebo. The selected studies were randomised controlled trials of systemic antimicrobial therapy for prolongation of gestation in non-labouring women after preterm premature rupture of the membranes. Data extraction was done by a single reviewer. Studies were evaluated for post-randomisation exclusion and other confounding variables that might introduce analytical bias. Analysis was done with SAS statistical software by a blinded investigator. Antimicrobial therapy after preterm premature rupture of the membranes is associated with a reduced number of women delivering within 1 week (62 vs 76%; OR 0.51, 95% CI 0.41-0.68), and reduced diagnosis of maternal morbidity including chorioamnionitis (12 vs 23%; 0.45, 0.33-0.60) and postpartum infection (8 vs 12%; 0.63, 0.41-0.97). Fetal morbidity, including confirmed sepsis (5 vs 9%; 0.57, 0.36-0.88), pneumonia (1 vs 3%; 0.32, 0.11-0.96), and intraventricular haemorrhage (9 vs 14%; 0.65, 0.45-0.92) were less often diagnosed after antimicrobial therapy. Separate analysis of the six placebo-controlled trials revealed similar or improved odds of pregnancy prolongation, chorioamnionitis, neonatal sepsis, postpartum infection, positive infant blood cultures, and pneumonia. Antimicrobial therapy, when used in the expectant management of preterm premature rupture of the membranes is associated with prolongation of pregnancy and a reduction in the diagnosis of maternal and infant morbidity. Further study should be directed towards determination of optimal antimicrobial therapy, increasing pregnancy prolongation, and enhancement of corticosteroid therapy for induction of pulmonary maturity after preterm premature rupture of the membranes.

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Effect of Corticosteroids for Fetal Maturation on Perinatal Outcomes

NIH Consensus Development Panel on the Effect of Corticosteroids for Fetal Maturation on Perinatal Outcomes

Objective.—To develop a consensus on the use of antenatal corticosteroids for fetal maturation in preterm infants.

Participants.—A nonfederal, nonadvocate, 16-member consensus panel including representatives from neonatology, obstetrics, family medicine, behavioral medicine, psychology, biostatistics, and the public; 19 experts in neonatology, obstetrics, and pharmacology presented data to the consensus panel and a conference audience of approximately 500.

Evidence.—An extensive bibliography of references was produced for the consensus panel and the conference audience using a variety of on-line databases including MEDLINE. The consensus panel met several times prior to the conference to review the literature. It also commissioned an updated meta-analysis, a neonatal registry review, and an economic analysis that were presented at the conference. The experts prepared abstracts for distribution at the conference, presented data, and answered questions from the panel and audience. The panel evaluated the strength of the scientific evidence using the grading system developed by the Canadian Task Force on the Periodic Health Examination and adapted by the US Preventive Services Task Force.

Consensus.—The consensus panel, answering predefined consensus questions, developed their conclusions based on the scientific evidence presented in open forum and the scientific literature.

Consensus Statement.—The consensus panel composed a draft statement that was read in its entirety at the conference for comment. The panel released a revised statement at the end of the conference and finalized the revisions a few weeks after the conference.

Conclusions.—Antenatal corticosteroid therapy is indicated for women at risk of premature delivery with few exceptions and will result in a substantial decrease in neonatal morbidity and mortality, as well as substantial savings in health care costs. The use of antenatal corticosteroids for fetal maturation is a rare example of a technology that yields substantial cost savings in addition to improving health.

(*JAMA*. 1995;273:413–418)

PRETERM delivery occurs in 7% 10% of all pregnancies and is a ma cause of infant mortality and morbidi In addition, preterm births are asso ated with more than $2 billion in hea care costs annually. Preterm infants : count for the majority of all neona deaths. Immature infants may have r merous complications including respi tory distress syndrome (RDS), intrav tricular hemorrhage (IVH), necrotizi enterocolitis (NEC), bronchopulmona dysplasia, sepsis, patent ductus arter sus (PDA), and retinopathy of pren turity. Respiratory distress syndro is often the most acute problem of t very immature infant and, along w IVH, accounts for a significant prop tion of neonatal deaths. Although m premature infants survive without n jor sequelae, some require rehospit ization and special services.

Corticosteroid treatment of pregn women delivering prematurely was fi introduced in 1972 to enhance fetal lu maturity. A recent meta-analysis c cluded that corticosteroid administ tion prior to anticipated preterm de ery is associated with a large reduct in the incidence of early neonatal dea RDS, IVH, and NEC.

Despite evidence of beneficial effe from both experimental models and r domized controlled trials in human minority of women delivering prer turely receive antenatal corticoster treatment. In reports from appr mately 500 perinatal centers, only 1 to 18% of women who deliver prete infants of 501- to 1500-g birth wei are treated with antenatal corticos roids. Clinicians are not treating m patients who might benefit becaus concerns about the efficacy of cort steroids and the potential complicati of treatment in certain conditions. 1

NIH Consensus Development Conferences are convened to evaluate available scientific information and to resolve safety and efficacy issues related to a biomedical technology. The resultant NIH Consensus Statements are intended to advance understanding of the technology or issue in question and to be useful to health professionals and the public.

NIH Consensus Statements are prepared by a nonadvocate, nonfederal panel of experts based on (1) presentations by investigators working in areas relevant to the consensus questions during a 2-day public session, (2) questions and statements from conference attendees during open discussion periods that are part of the public session, and (3) closed deliberations by the panel during the remainder of the second day and morning of the third day. This statement is an independent report of the panel and is not a policy statement of the NIH or the federal government.

Preparation and distribution of this statement is the responsibility of the Office of Medical Applications of Research of the National Institutes of Health. Free copies of this statement and bibliographies prepared by the National Library of Medicine are available from the Office of Medical Applications of Research, Federal Bldg, Room 618, National Institutes of Health, 7550 Wisconsin Ave MSC 9120, Bethesda, MD 20892 (William H. Hall), or the NIH Consensus Program Information Service by 24-hour voice mail at (800) NIH-OMAR (644-6627).

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of this therapy is further impeded by lack of access to prenatal care and to appropriate delivery services.

To address these issues, the National Institute of Child Health and Human Development, together with the Office of Medical Applications of Research of the National Institutes of Health, convened a Consensus Development Conference on the Effect of Corticosteroids for Fetal Maturation on Perinatal Outcomes. The conference was cosponsored by the National Heart, Lung, and Blood Institute and the National Institute of Nursing Research. After a year of study and preparation concluding with 1½ days of presentations by experts in the relevant fields and discussion from the audience, an independent consensus panel composed of representatives from the medical and related scientific disciplines, as well as representatives from the public, considered the evidence and formulated a consensus statement in response to the following key questions:

1. For what conditions and purposes are antenatal corticosteroids used, and what is the scientific basis for that use?
2. What are the short-term and long-term benefits of antenatal corticosteroid treatment?
3. What are the short-term and long-term adverse effects for the infant and mother?
4. What is the influence of the type of corticosteroid, dosage, timing, and circumstances of administration, and associated therapy on treatment outcome?
5. What are the economic consequences of this treatment?
6. What are the recommendations for use of antenatal corticosteroids?
7. What research is needed to guide clinical care?

1. FOR WHAT CONDITIONS AND PURPOSES ARE ANTENATAL CORTICOSTEROIDS USED AND WHAT IS THE SCIENTIFIC BASIS FOR THAT USE?

Animal studies conducted in the 1950s and 1960s showed that the pituitary adrenal system affected differentiation of the intestine and lung. Later studies found physiologic surges in corticosteroids just before term or preterm delivery, and a relationship between fetal cortisol levels at delivery and lung maturity. Since then, randomized controlled trials in women have confirmed the maturational effects of corticosteroids on fetal organ systems such as the cardiovascular, respiratory, nervous, and gastrointestinal systems. As a result, antenatal corticosteroids are now administered for the purpose of hastening maturation of the preterm infant's organs and tissues, thus reducing morbidity and mortality related to prematurity.

Evidence for Efficacy of Corticosteroids and Strength of Recommendation According to Delivery Interval, Gestational Age, Status of Membranes, and Neonatal Outcome

	Quality of Evidence for Benefit, Grade	Strength of Recommendation
Interval from treatment to delivery		
<24 h	I	B
24 h to 7 d	I	A
>7 d	I	C
Gestational age		
Delivery at 24-28 wk	I	A
Delivery at 29-34 wk	I	A
Delivery at >34 wk	I	C
Preterm premature rupture of membranes	I	B
Neonatal outcomes		
Mortality	I	A
Respiratory distress syndrome	I	A
Intraventricular hemorrhage	I	A

The clinical conditions under which antenatal corticosteroid administration has been investigated are those associated with threatened or inevitable preterm delivery. These include (1) preterm labor, which accounts for 30% to 50% of all preterm deliveries; (2) preterm premature rupture of membranes (PPROM), which accounts for 20% to 50% of all preterm deliveries; (3) preeclampsia, which is associated with 10% to 25% of preterm deliveries; and (4) other conditions, such as diabetes mellitus, third trimester bleeding, fetal distress, or isoimmunization necessitating preterm delivery, which account for up to 10% of preterm deliveries. The use of antenatal corticosteroid therapy has been studied in relatively few pregnancies less than 24 weeks' or greater than 34 weeks' gestation.

Additional issues that have been investigated include duration of the "treatment window," the gender and race of the fetus, the relationship of gestational age to the risks and benefits of treatment, and the use of antenatal corticosteroids along with other treatments, such as postnatal pulmonary surfactant and tocolytic administration.

Scientific Basis

Studies of antenatal corticosteroid treatment were evaluated with the grading system developed by the Canadian Task Force on the Periodic Health Examination and adapted by the US Preventive Services Task Force (Table). The ratings reflect both the quality of evidence and the strength of the recommendations that can be based on that evidence. For most of these conditions or outcomes, at least some data were available from randomized controlled trials. For some outcomes, such as RDS, data were extensive. For other maternal conditions or neonatal outcomes, though derived from randomized controlled trials, data were limited. Hence, for some conditions or outcomes, although grade I evidence was available, this evidence was judged insufficient to allow a recommendation concerning the use of corticosteroids.

Quality of Evidence

The various grades of evidence are defined as follows:

Grade I: Evidence obtained from at least one properly designed randomized controlled trial.

Grade II-1: Evidence obtained from well-designed controlled trials without randomization.

Grade II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.

Grade II-3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.

Grade III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Strength of Recommendation Regarding Corticosteroid Administration

The strength of recommendation regarding corticosteroid administration is based on the following categories:

A: There is good evidence to support use.

B: There is fair evidence to support use.

C: There is inadequate evidence to argue for or against use.

D: There is fair evidence to avoid use.

E: There is good evidence to avoid use.

2. WHAT ARE THE SHORT-TERM AND LONG-TERM BENEFITS OF ANTENATAL CORTICOSTEROID TREATMENT?

Short-term Benefits for the Infant

Antenatal corticosteroid therapy in the preterm fetus in many randomized controlled trials has reduced neonatal mortality and the incidence of RDS. A meta-analysis based on 15 such trials showed a reduction in the incidence of RDS with a typical odds ratio (OR) of 0.5 (95% confidence interval [CI], 0.4 to 0.6) and a reduction of neonatal mortality with a typical OR of 0.6 (95% CI, 0.5 to 0.8). These data are not only statistically significant, but also clinically compelling. In subgroup analysis these benefits were confirmed regardless of the infant's gender or race. (A meta-analysis uses quantitative methods to summarize results derived from a systematic review of randomized controlled trials. Results of meta-analyses are customarily reported in terms of ORs and 95% CIs. Odds ratios of 1.0 indicate no effect; those below 1.0 imply protective effect; and those above 1.0 an increased risk. Ninety-five percent CIs that exclude 1.0 are considered significant at the $P<.05$ level.)

One recent randomized controlled trial showed a significant reduction in IVH with antenatal corticosteroid treatment. Secondary outcome variables reported in the meta-analysis of randomized controlled trials also showed a significant reduction in the incidence of IVH with an OR of 0.5 (95% CI, 0.3 to 0.9). This reduction in IVH is supported by the results of the observational database, information prospectively collected in five registries involving more than 30 000 low-birth-weight infants. Since IVH is an important contributor to mortality and serious long-term neurodevelopmental disability, this reduction is a major benefit.

Improved circulatory stability and reduced requirements for oxygen and ventilatory support were additional benefits identified in randomized controlled trials. Data are conflicting for NEC and PDA. The meta-analysis of the randomized controlled trials revealed a reduction of the incidence of NEC, however, this finding was not corroborated by the observational database. Conversely, the incidence of PDA was not found to be reduced in the meta-analysis, but was significantly reduced in the observational database.

Long-term Benefits for the Infant

Several studies have followed infants from the randomized trials for as long as 12 years. The increased survival of treated infants has not resulted in the appearance of adverse long-term effects.

3. WHAT ARE THE SHORT-TERM AND LONG-TERM ADVERSE EFFECTS FOR THE INFANT AND MOTHER?

Short-term Adverse Effects for the Infant

Short-term adverse effects of antenatal corticosteroid administration of greatest concern in the neonate include infection and adrenal suppression. The evidence presented to date shows no increase in infection in treated infants, no clinically important adrenal suppression, and rapid return of adrenal function when antenatal corticosteroids are discontinued.

Some animal studies have suggested that antenatal corticosteroid treatment might promote maladaptive responses to hypoxia. Other animal studies have shown that corticosteroids in doses similar to those used in humans antenatally provide protection against hypoxic-ischemic brain injury. More data are needed from human studies in this area of research.

Long-term Adverse Effects for the Infant

Studies initiated in the 1970s, which followed the development of children treated antenatally with corticosteroids up to the age of 12 years, showed no adverse outcomes in the areas of motor skills, language, cognition, memory, concentration, or scholastic achievement. The possibility of adverse, long-term neurodevelopmental outcomes has been suggested by studies of corticosteroid administration in animals. These studies were conducted using doses approximately 10 times the doses used in human clinical trials. There does not seem to be an increased risk in children of long-term neurodevelopmental impairment as reflected in any greater prevalence of learning, behavioral, motor, or sensory disturbances. Long-term effects of antenatal corticosteroids on growth and the onset of puberty are not fully known.

Short- and Long-term Adverse Maternal Effects

Maternal pulmonary edema can occur when antenatal corticosteroids are used in combination with tocolytic agents. This complication is more commonly associated with maternal infection, fluid overload, and multiple gestation. Pulmonary edema has not been reported when antenatal corticosteroids are used alone.

The risk of maternal infection may be increased when corticosteroids are u in PPROM, however, the degree of effect, if any, is unclear. Furtherm there is no evidence that antenatal ticosteroid treatment interferes with ability to diagnose maternal infect When corticosteroids are administe to pregnant diabetic women, diab control may become more difficult insulin may have to be adjusted acc ingly. Screening for gestational di tes may similarly be affected. In ser maternal medical conditions that ne sitate premature delivery, the delay essary to demonstrate maximal c costeroid effects for the fetus worsen the maternal medical statu subgroup analysis in the first rand ized trial suggested that antenatal ticosteroid administration might dispose to fetal death in hyperten women. Subsequent trials failed to d onstrate this effect. No long-term ternal adverse effects have been ported.

4. WHAT IS THE INFLUENCE OF TYPE OF CORTICOSTEROID, DOSAGE, TIMING, AND CIRCUMSTANCES OF ADMINISTRATION, AND ASSOCIATED THERAPY ON TREATMENT OUTCOME?

Type of Corticosteroid

Dexamethasone and betamethas are the preferred corticosteroids for tenatal therapy. These two compou are identical in biological activity readily cross the placenta in their logically active forms. They are de of mineralocorticoid activity, relati weak in immunosuppressive acti and exert longer duration of action t cortisol and methylprednisolone. T also are the most extensively stu antenatal corticosteroids for accele ing fetal maturation.

Dose

Treatment of two doses of 12 m betamethasone given intramuscularl hours apart or four doses of 6 m dexamethasone given intramuscul 12 hours apart has been shown t effective. Although these regimens w arbitrarily selected, subsequently have been shown to deliver concen tions to the fetus that are comparab physiologic stress levels of cortiso curring after birth in untreated pre ture infants who develop RDS.

These regimens result in an estim 75% occupancy of available cortic roid receptors, which should provi near maximal induction of antenatal ticosteroid receptor-mediated resp in fetal target tissues. Higher or n

frequent doses do not increase the benefits of antenatal corticosteroid therapy and may increase the likelihood of adverse effects.

Timing

Strong evidence exists for neonatal benefits from a complete course of antenatal corticosteroids starting at 24 hours and lasting up to 7 days after treatment. Evidence suggests a reduction in mortality, RDS, and IVH even with treatment initiated less than 24 hours prior to delivery. Both clinical and in vitro evidence suggest that the corticosteroid biological effects persist up to 7 days following initial treatment.

Data are inadequate to establish the clinical benefit beyond 7 days after antenatal corticosteroid therapy. The potential benefits or risks of repeated administration after 7 days are unknown. In vitro experiments in human fetal lung explants show that inducible biochemical effects have dissipated by 7 days, although structural changes persist.

Circumstances of Administration

Gestational Age.—For infants born at 29 to 34 weeks' gestation, treatment with antenatal corticosteroids clearly reduces the incidence of RDS and overall mortality. While antenatal corticosteroids do not clearly decrease the incidence of RDS in infants born at 24 to 28 weeks' gestation, they reduce its severity. More important, antenatal corticosteroids clearly reduce mortality and the incidence of IVH in this age group. All fetuses between 24 and 34 weeks' gestation threatened with premature delivery are candidates for treatment with antenatal corticosteroids.

In infants born beyond 34 weeks' gestation the risk of neonatal mortality, RDS, and IVH is low. The evidence for significant improvement in outcomes in these infants with antenatal corticosteroid use is limited. Use of corticosteroids in mothers expected to deliver at more than 34 weeks is therefore not recommended unless there is evidence of pulmonary immaturity.

Race and Sex.—There is no convincing evidence from any of the clinical trials that either gender or race of the fetus affects the response to therapy with antenatal corticosteroids.

PPROM.—The use of antenatal corticosteroids to reduce infant morbidity in the presence of PPROM remains controversial. Antenatal corticosteroids reduced the risk of RDS in PPROM in randomized controlled trials, although the magnitude of the reduction was not s great as when the membranes were .ntact. Strong evidence from observational studies suggests that, even in the presence of PPROM, the incidence of neonatal mortality and IVH is reduced when antenatal corticosteroids are used. Although the risk of neonatal infection associated with antenatal corticosteroid use in the face of PPROM may be increased, the magnitude of the increase is small. Because of the effectiveness of antenatal corticosteroids in reducing mortality and IVH in fetuses of less than 30 to 32 weeks' gestation, antenatal corticosteroid use is appropriate in the absence of chorioamnionitis.

Other Conditions.—Data are insufficient to assess the effectiveness of antenatal corticosteroid use in certain maternal high-risk conditions such as hypertension and diabetes. In the absence of evidence of adverse effects, it may be reasonable to treat these women as one would others with threatened premature delivery. Similarly, in the presence of high-risk fetal conditions, such as multiple gestation, intrauterine growth retardation, and hydrops, it is reasonable to treat these patients as one would others with threatened premature delivery.

Associated Therapies

Surfactant.—Antenatal administration of corticosteroids acts additively with postnatal administration of surfactant to reduce mortality, RDS, and IVH. Furthermore, surfactant replacement appears to have little or no impact on the incidence of IVH or PDA. For these reasons the decision to use antenatal corticosteroids should not be altered by availability of surfactant replacement therapy.

Thyrotropin-Releasing Hormone.—Thyroid hormones accelerate fetal lung maturation in animal studies. However, T3 and T4 do not cross the placenta. This problem has been circumvented by maternal administration of thyrotropin-releasing hormone. The combination of thyrotropin-releasing hormone plus antenatal corticosteroids was more effective than corticosteroids alone in two randomized studies. Women who received both drugs had infants with fewer adverse outcomes, fewer days on the ventilator, and a lower incidence of bronchopulmonary dysplasia. The use of thyrotropin-releasing hormone to accelerate fetal pulmonary maturation currently is experimental and randomized studies are in progress.

Beta-mimetic Tocolytics.—Beta-mimetic agents such as ritodrine and terbutaline are frequently administered in an attempt to arrest preterm labor. Women receiving tocolytic therapy are candidates for antenatal corticosteroids to accelerate fetal maturation in the face of threatened premature delivery. Several studies have examined the outcomes of infants born prematurely to mothers who received both ritodrine and dexamethasone or betamethasone. Although there are flaws in the design of each of these studies, they all showed a significant decrease in incidence of RDS. In addition, one study demonstrated a decrease in ventilator dependency and incidence of PDA. There is evidence that beta-mimetic agents may be associated with increased risk of IVH. However, the use of antenatal corticosteroids may reduce this risk.

5. WHAT ARE THE ECONOMIC CONSEQUENCES OF THIS TREATMENT?

Neonatal intensive care is expensive, but is more cost-effective in terms of years of life gained than many other accepted medical interventions. Because the costs of caring for infants with RDS are so high, interventions that may reduce its incidence, such as antenatal corticosteroids or prophylactic surfactant, have the potential of producing large cost savings, in addition to improving health.

The net economic consequences include the costs of initial treatment, changes in treatment made to allow the corticosteroids to work, the costs of any harmful side effects of treatment, the savings resulting from reduced length of stay and intensity of treatment, and the long-term costs of the burden of chronic diseases in surviving infants. Because the direct costs of corticosteroid treatment are so low and differential extra long-term burden has not been well quantified, net cost estimates were derived from the balance of costs of the health outcomes of initial treatment. Costs of infant care are relatively low for both uncomplicated preterm infants and early neonatal deaths. For any proposed clinical situation, costs are decreased to the extent that corticosteroids reduce illness in survivors, and increased for infants that would have died quickly without them. Data on costs from randomized trials are scant, but length of stay was reduced by about one third in corticosteroid-treated infants in the four trials for which these data were collected. To estimate costs or savings from increased use, data on efficacy from all corticosteroid trials can be applied to data on current costs of caring for infants with and without disease. The resulting calculated base case cost savings were more than $3000 per treated neonate. Of the 4 100 000 babies born in the United States each year, 106 000 weigh less than 2000 g at birth. Currently, 15% of these babies are treated with corticosteroids. If this were increased to 60%,

315

as observed in some hospitals, a conservative estimate of the annual savings in health care costs would be $157 million from the initial hospitalization alone.

6. WHAT ARE THE RECOMMENDATIONS FOR USE OF ANTENATAL CORTICOSTEROIDS?

- The benefits of antenatal administration of corticosteroids to fetuses at risk of preterm delivery vastly outweigh the potential risks. These benefits include not only a reduction in the risk of RDS but also a substantial reduction in mortality and IVH.
- All fetuses between 24 and 34 weeks' gestation at risk of preterm delivery should be considered candidates for antenatal treatment with corticosteroids.
- The decision to use antenatal corticosteroids should not be altered by fetal race or gender or by the availability of surfactant replacement therapy.
- Patients eligible for therapy with tocolytics should also be eligible for treatment with antenatal corticosteroids.
- Treatment consists of two doses of 12 mg of betamethasone given intramuscularly 24 hours apart or four doses of 6 mg of dexamethasone given intramuscularly 12 hours apart. Optimal benefit begins 24 hours after initiation of therapy and lasts 7 days.
- Because treatment with corticosteroids for less than 24 hours is still associated with significant reductions in neonatal mortality, RDS, and IVH, antenatal corticosteroids should be given unless immediate delivery is anticipated.
- In PPROM at less than 30 to 32 weeks' gestation in the absence of clinical chorioamnionitis, antenatal corticosteroid use is recommended because of the high risk of IVH at these early gestational ages.
- In complicated pregnancies where delivery prior to 34 weeks' gestation is likely, antenatal corticosteroid use is recommended unless there is evidence that corticosteroids will have an adverse effect on the mother or delivery is imminent.

7. WHAT RESEARCH IS NEEDED TO GUIDE CLINICAL CARE?

Areas of animal and human research that need to be addressed include the following:

- The short- and long-term benefits and risks of repeating administration of antenatal corticosteroids 7 days after the initial course.
- Long-term effect of antenatal corticosteroids on cognitive, behavioral, psychological, and physical development of the neonate.
- Effects of antenatal corticosteroids on organ maturation.
- Effects of antenatal corticosteroids on hypoxic-ischemic insults.
- Effects of antenatal corticosteroids on neonatal hemodynamic stability.
- Mechanism of antenatal corticosteroid induction of cell and organ maturation at the molecular level.
- The interaction of antenatal corticosteroids with other therapies administered during the perinatal period (eg, the effect of corticosteroids and tocolytics on the incidence of IVH).
- Development of alternative therapies to antenatal corticosteroids for fetal maturation.
- Systematic study of the diffusion of these scientifically based recomme tions into clinical practice.

CONCLUSION

Antenatal corticosteroid therap fetal maturation reduces mortality, I and IVH in preterm infants. These efits extend to a broad range of g tional ages (24 to 34 weeks) and ar limited by gender or race. Althoug beneficial effects of corticosteroids greatest more than 24 hours afte ginning treatment, treatment less 24 hours in duration also improves comes. The benefits of antenatal c costeroids are additive to those der from surfactant therapy.

In the presence of PPROM, ante corticosteroid therapy reduces the quency of RDS, IVH, and neonatal d although to a lesser extent than intact membranes. Whether this the increases either neonatal or mate infection is unclear. However, the of death from prematurity is gre than the risk from infection.

Data from trials with follow-up of dren up to 12 years old indicate antenatal corticosteroid therapy doe adversely affect physical growth or chomotor development.

Antenatal corticosteroid therapy dicated for women at risk of prema delivery with few exceptions and result in a substantial decrease in natal morbidity and mortality, as as substantial savings in health costs. The use of antenatal cortic roids for fetal maturation is a rare ample of a technology that yields stantial cost savings in addition tc proving health.

(Continued on next p

APPENDIX E

APPENDIX E, DAY THREE: EXERCISE ON INFECTIONS AND FCMC

OBJECTIVE: Have participants demonstrate how they will adapt the material on infection within their plans for FCMC.

Divide the group into small groups. Draw a labor/birth ward on the dry erase board that has only one floor with only 8 small rooms. In each room, chose and place some of the following mothers depending on the size of your group. Assign a mother to each group and have then decide on the answers to the questions following the list of mothers.

Room 1: a mother who is normal, in labor, and has her husband present.
Room 2: a mother who had syphilis at her first prenatal visit, she and her husband were treated adequately as demonstrated by her low titer when recheck during the third trimester, husband present
Room 3: Mother with Hepatitis B, active carrier, husband present
Room 4: Mother 2 days postpartum with puerperal sepsis, husband and baby present
Room 5: Normal postpartum mother at two hours with husband present
Room 6: Mother in early labor with ruptured membranes, husband present

Please answer the following questions:

1. What, if anything, is this mother at risk for?
2. What organism(s) is responsible for it?
3. How can it be transmitted?
4. What precautions are necessary to prevent transmission this organism?
5. Are the following people at risk for contracting this infection during labor, birth or the postpartum period?
    a. the mother
    b. the fetus/infant
    c. the father
    d. the midwife
    e. the doctor
6. If yes to # 4, please explain mode of transmission during labor, birth or postpartum for each person at risk
7. Describe how you could implement FCMC in this situation.
8. How would you discuss this condition with the mother and/or her family?
9. After she is moved, how should the room be cleaned for the next mother?

Allow each group 15 minutes to work on these situations. Then allow 5 minutes for each group to present their findings and 10 minutes for discussion. Stress that they may use the reference material in their curricula.

Wrap up with a review of principles and related it all to FCMC.

EXERCISE WORKSHEET: INFECTIONS AND FCMC

Please answer the following questions:

1. What, if anything, is this mother at risk for?

2. What organism(s) is responsible for it?

3. How can it be transmitted?

4. What precautions are necessary to prevent transmission this organism?

5. Are the following people at risk for contracting this infection during labor, birth or the postpartum period? If yes, please explain the mode of transmission.

    a. the mother

    b. the fetus/infant

    c. the father

    d. the midwife

    e. the doctor

6. Describe how you could implement FCMC in this situation.

7. How would you discuss this condition with the mother and/or her family?

8. After she is moved, how should the room be cleaned for the next mother?

SECTION 4. DAY FOUR: NEWBORN PRACTICES AND BREAST-FEEDING; BARRIERS TO CHANGE; EVALUATION AND MONITORING

ADDENDA: DAY FOUR

A. Bibliography and articles on newborn practices and breast-feeding

B. Case Studies (3): Barriers

C. Evaluation Lecture Notes and Case Studies

D. 1. Continuous Improvement Strategy

2. Critical Indicators

3. Benchmarks

4. Delivery Record

5. PP Questionnaire

6. Hospital Monthly Tally Sheet

DAY 4: Barriers to Change/Integration of FCMC/Evaluation/Monitoring Plans

Learning Objectives:
At the end of Day 4, the participants will be able to:
1. demonstrate five ways to make their training more effective.
2. describe rationale for FCMC newborn practices and support of breast-feeding.
3. list and define consumer, institutional and provider barriers to FCMC.
4. develop solutions to identified barriers to FCMC utilizing change theory.
5. describe the rationale, components and models of evaluation.
6. describe the purpose, importance and methods of consumer involvement in evaluation.
7. develop site-specific evaluation/monitoring plans for introducing FCMC

Morning Session

- Time:
  - 10 minute evaluation
  - 15 minute review
  - 75 minute lecture and discussion
  - 30 minute large group work
  - 30 minute presentation of small group work
- Materials:
  - Case study and handouts
  - Overheads
  - Flip chart or dry erase board

	TOPIC	TIME	TEACHING METHOD
I.	Evaluate teaching techniques	10 Minutes	Discussion, Flip Chart, Action Plan
II.	Review FCMC material to date	15 Minutes	Slides, Overheads, Flip charts
III.	Newborn practices and breast-feeding	75 Minutes	Lecture, Overheads
	BREAK	**15 Minutes**	
IV	Group identified barriers to FCMC List and discuss barriers	30 Minutes	Large group
V.	Application of Change theory to group identified barriers to FCMC	30 Minutes	Small group presentations

Lunch Break: 60 Minutes

Afternoon Session

- Time:
  - 60 minute lecture/case study
  - 45 minute group work-site specific
  - 30 minute small group presentation
  - 30 minute lecture
  - 45 min. site specific group work
- Materials:
  - Overheads
  - Case Study
  - Sample evaluation plans
  - Flip chart or dry erase board
  - Action plans

TOPIC	TIME	TEACHING METHOD
VI. Evaluation Lecture and VII. Case Stud y	60 Minutes	Overheads, Case Study, Flip Chart
VIII. Develop practice evaluation plans for institutions, providers, consumers	45 Minutes	Small group work, handouts, flipchart
Break	**15 Minutes**	
IX. Share plans with large group X. Discussion of plans	30 Minutes	Small group presentation, large group discussion, Flip chart
XI-XII. Consumer involvement and Focus Groups	15 Minutes	Lecture, Overheads
XIII. Site-specific work on action plans	60 Minutes	Site-specific group work on Action plans

322

DAY 4: MORNING SESSION

SESSION OUTLINE	SESSION NOTES
I. Review Teaching Techniques of Previous Day	• Small group work • Action plans • Review of handout on tips for effective training
II. Review of Material to date	
1. Purpose	• Review content offered to date • Facilitate integration of concepts
2. Format	• Large group discussion • Review with pertinent AV aides
III. Newborn Practices and Breast-feeding	**See Appendix A - Day Four and Essential Care of the Newborn, Session 4**
1. Overview	• Gentle second stage and birth; assessment, resuscitation • Skin-to-skin contact • Cleaning the airway • Delayed cord clamping
2. Physical Care	• Bathing, eye prophylaxis, swaddling
3. Promotion of Infant Bonding	• Active alert period • Fathers at births or immediate postpartum • Supportive policies for mothers for labor, birth, and postpartum
4. Breast-feeding management In the healthy newborn	**See Essential Care of the Newborn: Session 5 and 6** • Anatomy and physiology of the breast • Helping and hindering natural reflexes • Reflexes in the baby

SESSION OUTLINE	SESSION NOTES
4. Breast-feeding management contd	• Attachment and positions • Breast-feeding in first few days • Meeting baby's needs • Problems with attachment
5. Breast-feeding difficulties	• Not enough milk • Expressing and feeding breast-milk • Breast and nipple problems • Special situations
IV. Barriers to FCMC (group identified)	**See Appendix B- Day Four** • Form three groups with leaders • One case study per group • One case study each for provider, institution and consumer-based barriers • Each group to identify barriers and prepare to present and discuss with the large group • Differentiate between barriers of knowledge, skills, attitude and resources • List barriers according to institution, provider, consumer • Identify as knowledge, skills, resource or attitude-based • Discuss process of identifying barriers • Evaluate the excercise
V. Change Theory and Identified Barriers	Group exercise to demonstrate the utilization of change theory to address identified barriers to FCMC including identifying different approaches to change depending on barrier type.
End of Morning Session	

DAY 4: AFTERNOON SESSION

SESSION OUTLINE	SESSION NOTES
VI. Evaluation	**See Appendix C, D - Day Four**
1. Purpose	• Determine if project goals achieved • Evaluate effectiveness of a change • Influence future direction of an initiative • Validate for internal community • Validate for broader community
2. Techniques	• Written questionnaire or survey • In-person interview • Pre- and post-tests • Focus groups • On-site review
3. Comparison of techniques	• Questionnaire - easy to administer - low cost - easy to decipher results - offers many avenues for distribution - able to validate results - lacks interpersonal component - best suited for quantitative measures - can have poor return rate • Interviews - more difficult to conduct - higher cost - requires more time and personnel use - less available - may be quantified or qualified for evaluation and validation • Pre- and post-test - commonly used for comparison - low cost and personnel use - easily produced and administered - may evaluate effectiveness over time - quantitative only

SESSION OUTLINE	SESSION NOTES
3. Comparison of techniques - contd	• Focus groups - higher cost - personnel and labor intensive - values personal encounter - primarily qualitative
	• On-site review - higher cost - requires more time and personnel - adds objective evaluation component - can be validated - adds interpersonal component
VII. Case Study of Evaluation Plan	**See Appendix C- Day Four** Use case study to discuss and demonstrate an evaluation technique and plan or use FCMC Practice Indicators.
VIII. Develop Evaluation Plans for Consumer, Institutions and Providers (site-specific	• One group for each site
	• Type of plan and target assigned
	• Develop practice evaluation plan utilizing project critical indicators
IX. Share Plans	• Present plans to large group
X. Discussion of Evaluation Plans	• Facilitate group discussion/ critique of evaluation plans
XI. Consumer Involvement 1. Purpose	• Evaluate need from consumer perspective • Increase identification with change • Guide effectiveness and alterations

SESSION OUTLINE	SESSION NOTES
2. Pros/cons	• Pros - identifies needs more accurately - enhances potential for acceptance - enhances ultimate success of intervention • Cons - time consuming - may encumber process with additional information
XII. Focus Groups	
1. Purpose	• To discuss a particular topic in an open-ended manner which facilitates discussion while addressing certain questions
2. Method	• Facilitator-led • May be audio or video taped • Open-ended questions or topic directed
3. Evaluation	• Qualitative evaluation techniques • May include written quantitative section
XIII. Action Plan	• Site-specific groups with leader • Begin action plan based on material to date, including: - current policies and procedures - perceived barriers - plan to begin change among all three groups: institutions, providers and consumers - identification and categorization of areas of change as knowledge, skills, attitude or resources • Form site specific evaluation plans for each site utilizing the FCMC project critical indicators

END OF DAY 4

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APPENDIX A

Current Knowledge About Skin-to-Skin (Kangaroo) Care for Preterm Infants

GENE CRANSTON ANDERSON, PhD

Skin-to-skin ("kangaroo") care for preterm infants is becoming widespread in Western Europe. During this care the mother holds her diaper-clad premature infant against her skin beneath her clothing and allows self-regulatory access to breast-feeding. Fathers hold their infants skin-to-skin also. Research projects in Western Europe and the United States provide data that support the safety and effectiveness of this method. Infants held skin-to-skin are warm enough and have regular heart rate and respirations, more deep sleep and alert inactivity, less crying, no increase in infections, greater weight gain, and earlier discharge. Lactation is more productive and of greater duration. Parents become attached to their infants and feel confident about caring for them. This research is summarized and annotated in a table, along with descriptive reports and videotapes. These data can be used by health care professionals to make informed decisions about offering kangaroo care opportunities to selected parents and their preterm infants. *(J Perinatol 1991; XI:216-226)*

By now many health care professionals in fields related to perinatology have heard about skin-to-skin care for preterm infants, otherwise known as "kangaroo care." With this method, the mother holds her diaper-clad infant beneath her clothing, skin-to-skin, and lying upright between her breasts or on one breast. In complete kangaroo care, she allows self-regulatory access to breast-feeding. Fathers also hold their infants skin-to-skin.

Kangaroo care originated in Bogotá, Colombia, where it was followed by reports of dramatic improvement in infant outcome and parental attachment.[1] These reports were later discounted, however, when it became clear that the methodology was questionable: the control group included all infants born at the hospital, whereas the treatment group included only those infants healthy enough to enter the kangaroo program.[2,3] Nevertheless, the reports stimulated interest, visits to Bogotá, and research in developed countries.

The decision to begin kangaroo care varies along continua of gestation, birthweight, postnatal age, and severity of illness. To facilitate description, four categories have been developed. The first category is *late kangaroo care*, which begins after the infants have completed the intensive care phase, have stable respirations, and are breathing room air. This usually occurs many days or weeks postbirth.

Intermediate kangaroo care begins after the infants have completed early intensive care, usually about 7 days postbirth. These infants usually still require oxygen and may have apnea and bradycardia. Infants stabilized on ventilators are also included in this group.

Early kangaroo care is done with infants who are easily stabilized and begins as soon as they are stable postbirth. This can occur during the first day, even the first few hours. In Bogotá, stabiliza-

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tion is accomplished as follows: following birth, preterm infants with Apgar scores of 7 to 10 are placed prone in a warm incubator; preterm infants with Apgar scores of 4 to 6 are placed prone in a warm incubator and given oxygen and intravenous therapy as needed.

Very early kangaroo care begins by returning infants to their mothers during the first minute postbirth. Mothers who give birth in the supported semisquatting position simply sit down cross-legged, pick their infants up, and hold them. If the mother has given birth lying down, the infant is placed prone near her breasts. The infants are allowed to stay with their mothers thereafter in the same bed or an adjacent incubator and have self-regulatory breast-feeding opportunities.

Until recently, the only controlled scientific investigations of kangaroo care were being carried out in Europe. The first two randomized clinical trials were conducted in Dusseldorf, Germany,[4] and London, England.[5] In addition, excellent models of implementation exist. Two outstanding examples are at the Academic Medical Center in Amsterdam, The Netherlands, introduced by neonatologist Richard de Leeuw,[6] and at Helsingborg Hospital in Helsingborg, Sweden, introduced by Berlith Persson, nursing director.[7] Funded by UNICEF, the author visited these four sites and six others in May and June of 1988.

In June 1990 a second visit was made to Helsingborg, this time to learn more about ways to facilitate breast-feeding during kangaroo care. At that visit it was also learned that Berlith Persson and Per Henriksson, MD, had begun to give very early kangaroo care to any preterm infant who was healthy following an uncomplicated vaginal birth. The three smallest infants were 27 to 28 weeks' gestation. The behavior of these infants was similar to full-term infants, the postnatal course was uneventful, the infants were discharged home fully breast-fed, and their development was normal. Similarly, Dr Nils Christensen, Soenderborg, Denmark, gives very early kangaroo care to infants who are healthy at birth and weigh 2000 g or more. The forerunner of this method was carried out very successfully with 100 infants weighing 1600 to 2490 g by Dr Michel Odent in Pithiviers, France.[8]

Some knowledge gained on the first investigative tour to Europe has been reported.[9] A second article, in preparation, will emphasize breast-feeding aspects of kangaroo care and ethical considerations that may arise when parents in the United States request kangaroo care. The first international research conference on kangaroo care was held in Bogotá in November 1990, sponsored by the Maternal and Child Institute of Bogotá, Fundación VIVIR, UNICEF Regional Office for Latin America and the Caribbean, and the Pediatric Department of the Colombian National University. Tentative future plans include an international conference for clinicians, a consensus conference at the National Institutes of Health, and the establishment of an institute (currently the Fund for Natural Care Postbirth, University of Florida Foundation) to study and promote kangaroo care and related approaches.

Table 1 contains an overview of all known research data and descriptive reports in the English language that are about kangaroo care and its implementation. The reports have been arranged in order of decreasing scientific rigor, as can be seen by the side headings. One can quickly see that research ranging from randomized clinical trials to descriptive exploratory endeavors have yielded rather consistent findings that support the safety and value of kangaroo care.

Infants given kangaroo care were warm enough; had adequate oxygenation; had fewer episodes of periodic breathing, apnea, and bradycardia; and had no increase in infection. Almost no crying occurred during kangaroo care. The infants had twice as much regular sleep (sleep with deep regular respirations), longer bouts of regular sleep, and a fourfold increase in alert inactivity. The infants came out of incubators sooner, went home sooner, and cried less at 6 months.

During kangaroo care the mothers showed thermal synchrony with their infants, that is, their own body temperatures increased or decreased as needed to maintain their infants in a thermoneutral range. The mothers were more inclined to breast-feed, produced more milk, and breast-fed longer. Mothers felt close to their infants; felt confident about monitoring their infant's health, even in the neonatal intensive care unit; and were eager to take their infants home. Often fathers wished to give kangaroo care, and their infants responded similarly to them.

The information in Table 1 is current as of June 1991, but the table undergoes frequent revisions. Additional information for a future publication of the table, and requests to be placed on a mailing list for information regarding kangaroo care, can be sent to the author. Numerous videotapes are also available (see annotated listing in the Appendix).

Currently, kangaroo care is becoming widespread in Western Europe, especially in Scandinavia, and is being used with infants who are weaker or of earlier gestation or both. It is also started sooner after birth, and breast-feeding is encouraged and supported in numerous ways. Apparently no further research is in progress in Europe at this time. Instead, the focus appears to be on implementation. Representatives from virtually every major hospital in Sweden have visited Helsingborg to observe the Persson model. In Finland, implementation of kangaroo care has begun in all 5 university hospitals and 13 of 15 central hospitals.[30]

In the United States, research has begun on the West Coast,[13,16-19] including a pretest-posttest randomized clinical trial with incubator infants now in progress in Richland, Washington, by Ludington, Hadeed, and the

Table 1

AN OVERVIEW OF RESEARCH DATA AND DESCRIPTIVE REPORTS IN THE ENGLISH LANGUAGE ON KANGAROO CARE, 1983-1991

Type of Study	Reference/Study Site	Sample on Day of Entry*	Kangaroo	Control	Results (Kangaroo vs Control)	Comments
Randomized Clinical Trials	Schmidt, Wittreich (1986).[4] University of Dusseldorf, Dusseldorf, Germany	n = 12; 11† AGA and SGA BW = 1000-1500 g	Late KC‡ $\bar{x}$ BW = 1312 g $\bar{x}$ wt DOE = 1350 g	Incubator care, holding, feeding by mothers $\bar{x}$ BW = 1158 g $\bar{x}$ wt DOE = 1238 g	Breast-fed: 50% vs 0%. Daily milk production: 640 mL vs 400 mL Feedings per day: 12 vs 9. KC infants' growth is slightly better Letters re KC infants were seven times as long, with deep emotion expressed KC infants had no increase in infections	Assignment by alternate sequential series. Some control mothers expressed milk KC infants in N = 23 may have been healthier on DOE Follow-up at 3 and 6 months
	Tuomikoski-Koiranen (1988).[10] University Central Hospital of Turku, Turku, Finland	n = 8;8†	Intermediate and late KC $\bar{x}$ = 1610 g (1330-1900 g) $\bar{x}$ = 28 days (7-94) 20-60 min per visit	$\bar{x}$ = 1600 g (1500-1770 g) $\bar{x}$ = 19 days (8-44)	Ongoing lactation: 100% vs 75% All KC parents liked KC	Assignment by alternate-sequential series
	Ludington, Hadeed, Anderson (1991).[11] Kadlec Medical Center, Richland, Wash	n = 11; 13† AGA and SGA Infants in open cribs KC once for 2-3 hours	Intermediate and late KC Open air crib between feedings 1 and 2 KC between feedings 2 and 3 Open air crib between feedings 3 and 4	Open air crib between feedings 1 and 2, 2 and 3, and 3 and 4	HR, RR, SaO_2, and ST stayed within normal limits for both groups in all periods During KC increases occurred in HR (.01), ST (.03), and percent of RQS (.03). Frequency of periodic breathing decreased (.03)	Protocol spanned 3 interfeeding intervals between feedings 1 and 4 Measurements were only done between feedings All measurements were recorded each minute
	Whitelaw, Heisterkamp, Sleath, et al (1988).[3] Hammersmith Hospital, University of London, London, England	n = 35,36† AGA and SGA <1500 g	Intermediate and late KC ad lib $\bar{x}$ = 16 days (1-61 days) Clothed in diaper, no hat	Incubator care, holding, feeding by mothers $\bar{x}$ = 16 days (1-66 days)	Lactation longer than 6 weeks: 55% vs 28% KC infants maintained stable temperature Complications and visiting were equal Hospitalization 30 days vs 37 Deaths. 2 (NEC; septicemia) Duration of lactation 9 weeks vs 5 weeks Crying/day at 6 months: 25 min vs 38 min KC infants did not cry more to be held and were not carried more	After randomization, KC mothers were asked to do KC; 5 did not, but were included in analyses Hat is advisable for the smallest infants Breast-feeding was not done during skin-to-skin time KC dyads averaged 36 min/d of skin-to-skin
Repeated Measures§	Acoler, Sleath, Whitelaw (1989).[12] Hammersmith Hospital, University of London, London, England	N = 14 AGA and SGA $\bar{x}$ = 1550 g (1000-2200 g) $\bar{x}$ = 35 days postbirth (6-134)	Late KC and intermediate Held at 60° angle 10 min	Incubator: prone, horizontal 10 min	*During KC:* Nine infants with normal lungs: HR increased 6.5 beats/min Five infants with chronic lung disease (two still on O_2): $TcPO_2$ rose 1.0 kPa No serious apnea, bradycardia, or hypoxia Skin temperatures for 3 smallest infants (1000, 1100, 1250 g) were stable, rising slightly	Order of condition was randomly assigned Ten minutes of stabilization between conditions Room temperature = 26-29°C Measured $TcPO_2$, $TcSaO_2$, HR, and temperature
	Bosque, Brady, Affonso, Wahlberg (1988).[13] University of California, San Francisco, Calif	N = 6 $\bar{x}$ = 1370 g (1250-1460 g) <1500 g <32 weeks	Late KC Held 4 h/d, 6 d/wk, for 3 weeks Breast-feeding ad lib	Incubator	Heart rate, respiratory rate, apnea and $TcSaO_2$ similar Percentage of sleep time lower (44 vs 68) Skin temperature lower (36.5°C vs 36.8)	Condition was monitored once each week, 4 hours in KC, 4 hours in incubator KC is safe, feasible, and beneficial for selected mothers in a tertiary level nursery Room temperature lower than at Hammersmith

332

Table 1 (*Continued*)

Type of Study	Reference/Study Site	Sample on Day of Entry*	Kangaroo	Control	Results (Kangaroo vs Control)	Comments
Repeated Measures§ (cont)					Less bradycardia during breast-feeding than gavage or bottle in both conditions All mothers felt confident, fulfilled 67% were breast-feeding at discharge	
	de Leeuw, Colin, Dunnebier, Mirmiran (1991)[14] Academic Medical Center, University of Amsterdam, The Netherlands	N = 8 GA = 28 wk (27-29) AGA, SGA not specified BW = 1104 g (770-1465 g) PNA = 18.1 days (6-33) Eight infants studied 16 times (one once, two twice, one three times)	Intermediate 1 hour KC	Incubator 1 hour pre KC 1 hour post KC	No significant difference in mean respiratory rate, percent time in regular respiration, number of apneic attacks, heart rate, $TcPO_2$, behavioral state, or rectal temperature No crying occurred at any time Respiratory rate and apnea increased in some, decreased in others Bradycardia went from 0 to 8 and 0 to 13 in two infants during KC Rectal temperature decreased in two infants by 0.3°C (to 36.5°C) and 0.9°C (to 36.2°C) during KC	Regularity of breathing patterns was studied by spectral analysis Conclusion. KC is a safe method, even for very small nonstabilized infants KC in more stable infants, as practiced in their unit, provokes no clinical problems No clinical deterioration occurred, no KC needed to be stopped A trained nurse should screen and monitor nonstabilized infants
	de Leeuw (1988)[15] Academic Medical Center, University of Amsterdam, The Netherlands	*Study 1* N = 15 AGA and SGA GA = 28.7 wk (26-33) BW = 1100 g (620-1560 g) PNA = 21 days (6-45)	Early KC‖ Intermediate KC $\bar{x}$ = 44 min (25-70)	Incubator	Pretest / During KC / Posttest Skin temp 35.9°C / — / 36.9°C Rectal temp 36.5°C / — / 37.0°C	Skin temperatures continuously recorded and apparently averaged just before and just after KC Rectal temperature measured once just before KC and once just after
	de Leeuw (1988)[15] Academic Medical Center, University of Amsterdam, The Netherlands	*Study 2* N = 20 AGA and SGA GA = 29.4 wk (26-33) BW = 1184 g (690-1670 g) PNA = 13.7 days (6-32)	Early KC Intermediate KC 1 hour KC	Incubator 1 hour pre-KC 1 hour post-KC	Pretest / During KC / Posttest Periodic breathing (n = 14) 30% (0-89) / 9% (0-31) / 26% (0-82) Apneic attacks (>5 seconds) during KC (n = 14): decreased in 12 infants; remained the same in 2	Breathing pattern recorded continuously Six infants had no periodic breathing or apnea at any time
	Ludington-Hoe (1990).[16] Hollywood Presbyterian Hospital, University of California, Los Angeles, Calif	N = 8 AGA $\bar{x}$ = 2167 g (1865-2560 g) PNA = 9.5 days (2-28)	Intermediate and late KC Between feedings 2 and 3 Infants were diapered and under a velour blouse	Open air crib Between feedings 1 and 2; and feedings 3 and 4 Infants were fully clothed with hat, wrapped in one blanket and under another	Pretest / During KC / Posttest HR: 148 / 157 / 149 MA: 3.2 / 1.1 / 4.0 RQS (%): 13 / 27 / 12 IS (%): 32 / 33 / 36 AS (%): 16 / 9 / 17 VAS (%): 14 / 7 / 11 Twice as much RQS in KC as in pre- or post-KC (P = .0002) Periodic breathing was common and HR often approached bradycardia and tachycardia in pre- and post-KC, but not in KC.¶	Protocol spanned 3 interfeeding intervals (IFI) between feedings 1 and 4 Measurements were only done between feedings All measurements were recorded each minute, except rectal temperature (at end of each IFI) Continuous video *Conclusion*: Viewed from an energy balance framework, energy conservation probably occurred during KC

Table 1 (*Continued*)

Type of Study	Reference/Study Site	Sample on Day of Entry*	Kangaroo	Control	Results (Kangaroo vs Control)	Comments
Repeated Measures§ (cont)	Ludington Hoe, Hadeed, Anderson (1991)[17] Hollywood Presbyterian Hospital, University of California, Los Angeles, Calif (n = 8) and Kadlec Medical Center, Richland, Wash (n = 4)	N = 12 AGA $\bar{x}$ = 2149 g (1780-2560 g) PNA = 9.9 days (2-28)	Intermediate and late KC. Between feedings 2 and 3 Infants were diapered and under a velour blouse	Open air crib Between feedings 1 and 2; and feedings 3 and 1 Infants were fully clothed with hat, wrapped in one blanket, and under another	Pretest / During KC / Posttest HR 145 / 155 / 149 RR 41 / 41 / 42 SaO_2 95 8 / 95.2 / 95.7 ST 36 1 / 36.9 / 36.5 RT 36 6 / 37 2 / 36 7 PB¶ 4 / 0 / 5 All variables were in normal limits during the study HR and RR were much more stable in KC Only during KC was mean ST at a level associated with minimal oxygen consumption for these infants	Protocol spanned 3 interfeeding intervals (IFI) between feedings 1 and 4 Measurements were only done between feedings All measurements were recorded each minute, except rectal temperature (at end of each IFI) Continuous video *Conclusion*. KC was safe for the infants in this sample and had a beneficial warming effect
	Ludington Hoe, Anderson, Hadeed (1990).[18] Hollywood Presbyterian Hospital, University of California, Los Angeles, Calif	N = 8 AGA $\bar{x}$ = 2167 g (1865-2560 g) PNA = 9.5 days (2-28)	Intermediate and late KC Between feedings 2 and 3 Infants were diapered and under a velour blouse	Open air crib Between feedings 1 and 2; and feedings 3 and 4 Infants were fully clothed with hat, wrapped in one blanket and under another	Twice as much sleep in KC (27%) as in pre KC (13%) or post-KC (12%) (P = .0002) No change in irregular sleep Duration of consecutive observations of regular quiet sleep were 2½ times longer in KC than pre-KC (P = .0002) or post KC (P = .0002) Alert inactivity increased nearly fourfold in KC with a doubling of that increase in post-KC (NS)	Protocol spanned 3 interfeeding intervals (IFI) between feedings 1 and 4 Measurements were only done between feedings All measurements were recorded each minute, except rectal temperature (at end of each IFI) Continuous video *Conclusion*: Improved regulation of behavioral state occurred during KC
	Ludington Hoe, Anderson, Hadeed (1990).[19] Hollywood Presbyterian Hospital, University of California, Los Angeles, Calif	N = 8 AGA $\bar{x}$ 2167 g (1865-2560 g) PNA = 9.5 days (2-28)	Intermediate and late KC Between feedings 2 and 3 Infants were diapered and under a velour blouse	Open air crib Between feedings 1 and 2; and feedings 3 and 4 Infants were fully clothed with hat, wrapped in one blanket, and under another	Mother-infant skin temperature: 0-10 min: strong positive correlation (6 of 8 pairs) 11 80 min: negative correlation. Change of 0 2°C ST in infant was followed by 1.5°C-2 5°C change in maternal ST in opposite direction (7 of 8 pairs) Infants stabilized by 60 min (7 of 8 infants) Maternal ST was 2° < infant ST Each mother's ST met the neutral thermal environmental zone requirements of her own infant	Protocol spanned 3 interfeeding intervals (IFI) between feedings 1 and 4 Measurements were only done between feedings All measurements were recorded each minute, except rectal temperature (at end of each IFI) Continuous video *Conclusions*: KC was associated with thermal stabilization, maternal temperatures may regulate infant temperatures in specific patterns
Historical Control	Affonso, Wahlberg, Persson (1989).[7] Helsingborg Hospital, Helsingborg, Sweden	n = 33;33† AGA and SGA	Early KC Intermediate KC Late KC GA = 31.1 wk (26-38) BW = 1482 g (745-2450 g)	Standard GA = 31 3 wk (26 37) BW = 1497 (805-2300 g)	Discharge 41 6 vs. 49.4 days Warm toward infants vs "Why?", "How long?" re technical care Confidence in breast feeding, comfortable in nursery, eager for discharge vs frequently abandoned breast-feeding, anxious in nursery and re discharge Self monitoring of infant vs dependence on monitors	KC began 1-30 days postbirth Control mothers were interviewed by phone approximately 1 to 1½ years after infant's birth; KC mothers in person during and after KC on unit

Table 1 (*Continued*)

Type of Study	Reference/Study Site	Sample on Day of Entry*	Kangaroo	Control	Results (Kangaroo vs Control)	Comments
Historical Control (cont)	Rey, Martinez (1983)[1] Hospital Materna Infantil, Bogotá, Colombia	AGA and SGA	Late KC Intermediate KC Early KC	Completely separated, shared incubators	Infant deaths. 30% vs 70% Infant abandonment: decreased 75% during KC period	These results are in question: the control group was not only nonequivalent because historical controls were used, but because of very different selection criteria KC began 1-4 days postbirth
	Wahlberg, Persson, Allonso (1990)[20] Helsingborg Hospital, Helsingborg, Sweden	n = 33,33† AGA and SGA	Early KC Intermediate KC. Late KC GA = 31.1 wk (26-38) BW = 1182 g (745-2450 g)	Standard GA = 31.3 wk (26-37) BW = 1197 g (805-2300 g)	No problems with KC care KC infants out of incubator 1 week earlier Breast feeding at discharge; 77% vs 42% KC infants had greater weight gain; home 8 days sooner	Some duskiness noted in small infants soon after birth, if they were clothed but not if skin to skin
Retrospective	de Leeuw (1988)[13] Academic Medical Center, University of Amsterdam, The Netherlands	*Study 3* All surviving newborn infants admitted to the NICU and <2000 g	Early KC Intermediate KC. First 6 months of 1986 (n = 112)	First 6 months of 1985 (n = 121)	4 blood culture; 4 vs 7 infants 4 culture liquor CSF. 4 vs 6 Skin infections. 8 vs 1 Conjunctivitis: 8 vs 16	*Conclusion*: no difference; especially no increase in infection in KC infants
Descriptive (Primary)	Colonna, Uxa, da Graca, de Vonderweld (1990).[21] Central Hospital of Maputo, Mozambique	N = 100 GA = 32.5 wk BW = 1329 g 28% AGA; 72% SGA; no IGA PNA = 11.6 days $\bar{x}$ = 1239 g	Early KC and intermediate KC. Transferred to "kangaroo mother" ward when stable and showed sucking reflex	—	Discharged at $\bar{x}$ = 28 days (9.61) $\bar{x}$ = 1418 g $\bar{x}$ weight gain 12.8 g/d Five infants died. 3 from diarrhea with septicemia; 2 unexpectedly, during mother's night sleep	Consecutively studied Breast-fed freely and at least every 2 hours No gavage feeding and rare formula supplementation on KC ward Almost all were exclusively breast fed at discharge
	Odent (1984)[8] Pithiviers, France**	N = 100 $\bar{x}$ = 2298 g (1600-2490 g) AGA and SGA	Very early KC. Infant in incubator at bedside thereafter Mothers held and breast-fed ad lib	—	All infants survived except one (2300 g) Discharged home at $\bar{x}$ = 7.8 days (2-16) First 48 were followed for one year and had no rehospitalization	Consecutively studied Mothers began holding their infants immediately postbirth; the infants were covered with a blanket Gestational age data will be gathered from medical records
	Fudington, Anderson, Simpson, Hollingsead (1991).[22] Hospital Universitario Universidad del Valle, Cali, Colombia, in collaboration with Dr Humberto Rey Vargas, neonatologist, and Luz Angela Argete, RN, nursing professor	N = 6 GA = 31-36 wk AGA = all but one 36 wk infant (9th percentile)	Begun 19-43 min postbirth ($\bar{x}$ = 26) as soon as monitor electrodes were attached Continued next 6 hours HR and RR: Corometric 515A Pneumogram: Corometric 535 Temperature. Cole Palmer 100 thermistors (infant abdomen and toe; maternal chest) SaO_2 and HR: Nellcor 200. KC room temperature $\bar{x}$ = 30.3°C (86.6°F) Range = 28.8°C to 32.7°C.	—	In general, vital signs stabilized rapidly within normal limits Two infants (34 and 36 wk) had loud grunting respirations which disappeared in 2-7 min with warmed humidified O_2 given during KC All infants went to postpartum with mother at 6 to 8 hours, were fully breast-feeding by 24 hours, and were discharged by 24-48 hours	Exception in one infant was 9 min of low SaO_2 (80-87; $\bar{x}$ = 84.3) when abdominal temperature persisted at 38.0°C despite cooling efforts No air conditioning in this hospital
	Sleath, Whitelaw (1987)[23] Hammersmith Hospital, London, England	N = 5 $\bar{x}$ = 1100 g $\bar{x}$ = 15 days GA = 26-31 wk	Intermediate and late KC, ad lib	—	Maintained body temperature $TcPO_2$ 56-70 mm Hg Quiet and content Searched for nipple, 2 found it and began to breast-feed	

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Table 1 *(Continued)*

Type of Study	Reference/Study Site	Sample on Day of Entry*	Kangaroo	Control	Results (Kangaroo vs Control)	Comments
Descriptive (Primary) (cont)	Whitelaw (1986) [24] Hammersmith Hospital, London, England	N = 20 AGA and SGA < 1500 g	Late KC Up to 3 h/d	—	Even in infants as small as 700 g, body temperature was well maintained and no apnea occurred Some stronger infants began 3 days postbirth	Infants were tube fed Mothers reported they produced more milk after giving KC Five fathers held their infants skin-to skin and enjoyed it
	Armstrong (1987) [25] Nairobi, Kenya	AGA and SGA < 2000 g	Late KC All mothers stay in the hospital dormitory, hand-express milk every 3 hours day and night, often hold their babies on their lap at this time, and give KC at other times Infants have their own mother's milk Gavage, then cup, then breast; no bottles	—	Most infants are discharged fully breast-feeding between 1850-2000 g Mother-to-mother bonding also occurs Extended families and employers support this method	Infants > 2000 g stay with mothers from birth Valuable guidelines are given for this method See videotape by Armstrong and Kamau Author concludes that "milk insufficiency among preterm mothers may have some iatrogenic element"
	de Leeuw (1986).[6] Academic Medical Center, University of Amsterdam, The Netherlands	AGA and SGA	Late KC Intermediate KC Early KC	—	More regular breathing Temperatures remained good provided they were good at the start	Excellent description of how to do KC
	Moeller-Jensen, Hjort-Gregersen, Matthiessen, et al (1987).[26] Hospital of Soenderborg, Soenderborg, Denmark	At first < 1500 g Soon as small as 1000	Early KC Intermediate KC	—	Positive impact on child's temperature, pulse, respiration Need less clothing than expected or became too warm Infants were more awake, seeking, and eager to suck After KC were more dissatisfied in incubators	In a ward with 16 incubators or cradles and 8 beds for mothers; same staff nursed mother and infant Used telemetry (a small wireless transmitter) connected to child's electrodes and a receiver connected to cardioscope; this permitted mothers to move about the ward
Descriptive (Secondary)††	Anderson (1989) [9] Hospitals throughout Europe	AGA and SGA	All levels	—	All data from European research support safety and value of KC	KC becoming widespread in Europe Even infants on ventilators are given KC
	Anderson, Marks, Wahlberg (1986).[2] Hospital Materno Infantil, Bogotá, Colombia	AGA and SGA	Late KC Intermediate KC Early KC	—	See videotape by Anderson, Marks, and Wahlberg.	Background and description of status quo in Bogotá in June 1985 Both SGA and AGA infants benefit No infants began KC at birth
	Sleath (1985).[27] Hospital Materno Infantil, Bogotá, Colombia	AGA and SGA	Late KC Intermediate KC Early KC	—		An English nurse reports on her observations of KC in Bogotá
	Virgin (1988).[28] Hospital Materno Infantil, Bogotá, Colombia	AGA and SGA	Late KC Intermediate KC Early KC	—		A Danish physical therapist reports on her observations of KC in Bogotá

236

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Table 1 (*Continued*)

Type of Study	Reference/Study Site	Sample on Day of Entry*	Kangaroo	Control	Results (Kangaroo vs Control)	Comments
Descriptive (Secondary) (cont)	Whitelaw, Sleath (1985)[3] Hospital Materno Infantil, Bogotá, Colombia	AGA and SGA	Late KC Intermediate KC Early KC	—	The control group in the Rey and Martinez research[1] included all infants born at the hospital, the experimental group included only infants well enough to enter the KC program However, the authors were very impressed clinically by the KC they saw being given, and they have been doing KC research ever since	Background and description of KC in Bogotá An investigative tour, funded by UNICEF, to determine the accuracy of the reports from Bogotá
Review	Sims (1988).[29] Grapeview, Wash	—	—	—	—	The status quo, as of March 1988, as known in the United States
	Tuomikoski Koitanen (1990)[30] University Central Hospital of Turku, Turku, Finland	—	—	—	—	Overview of KC, especially in Finland KC began there in 1986 and is now being applied in all 5 university hospitals and 13 of 15 central hospitals. "Kangaroo Care is here to stay."
	Wahlberg (1987).[31] Nordic School of Public Health, Gothenberg, Sweden	—	—	—	—	Presents summary of data from several studies not yet published Raises ethical questions such as "Do we have the right to deny parents with preterm infants in stable condition this alternative?"
	Whitelaw (1990)[32] Ullevaal Hospital, Oslo, Norway	—	—	—	—	Provides an overview of KC to date. *Conclusions*: KC may be lifesaving in developing countries KC is not an alternative to intensive care in developed countries, but is valuable for the parents
Brochure	Neonatal Intensive Care Team (1990)[33] St Paul Childrens Hospital, St Paul, Minn	—	—	—	—	Given to all parents with NICU infants. Describes safety and probable value of KC. Offers to help parents interested in KC.

* Sample size and mean and range of weight and postnatal age on day of entry; † Number of infants in KC; number in control group; ‡ KC categories (late, intermediate, early, and very early); § Each infant was studied in both conditions, ‖ These infants were able to have early KC, but apparently the research was done at a later postnatal age; ¶ Anecdotal from one pneumogram, typical of all 12; during 9 minutes at 1 hour postfeeding in pre-KC, KC, and post-KC; # Authors gave KC to their patients; ** All data are personal correspondence, July 27, 1988; †† Authors observed KC being given.

Definitions: KC—kangaroo care; AGA—appropriate for gestational age; SGA—small for gestational age; BW—birthweight; $\bar{x}$—mean; DOE—day of entry; HR—heart rate; RR—respiratory rate; SaO_2—transcutaneous arterial oxygen saturation; ST—skin temperature; RQS—regular quiet sleep; NEC—necrotizing enterocolitis; SIDS—sudden infant death syndrome; $TcPO_2$—transcutaneous oxygen; kPa—kilo pascals (1 = 7.5 mm Hg); $TcSaO_2$—transcutaneous arterial oxygen saturation; PNA—postnatal age; MA—motor activity; IS—irregular sleep; AS—active sleep; VAS—very active sleep; RT—rectal temperature; PB—periodic breathing; CSF—cerebrospinal fluid; LGA—large for gestational age; NICU—neonatal intensive care unit.

author.[11] At Children's Hospital, Oakland, California, kangaroo care is being given to infants with bronchopulmonary dysplasia and infants who were cocaine-exposed in utero and whose mothers are being rehabilitated. To date, numerous anecdotal outcomes are promising. This federally funded work is being directed by Richard Umansky, MD. National Institutes of Health funds were awarded recently to Dr Susan Ludington, University of California, Los Angeles, for a randomized clinical trial with multiple sessions of kangaroo care given to bassinette infants approaching discharge.

Suggestions for future research include randomized clinical trials conducted longitudinally to determine long-term outcomes. Lower risk preterm infants, who might benefit the most from kangaroo care, need to be studied in this way as well, ideally beginning at birth. The first step toward this goal was taken in June 1991 in Cali, Colombia, where in a descriptive research project physiologic and behavioral variables were monitored every minute during kangaroo care beginning in the delivery room and continuing for 6 hours.[22]

The value of breast-feeding as a component of kangaroo care and the effect of kangaroo care on lactation and milk maturation need evaluation also. The father's effect on his infant during kangaroo care merits study as well. From another perspective, ways need to be developed to provide social support, defined broadly, to mothers so they can be more available to their infants for kangaroo care.

Provision of kangaroo care in the United States began in 1986. Isolated successful cases of kangaroo care have occurred in Seattle, Washington, at Northwest Hospital with Louis Pollack, MD, and Judi Withers Hollies, MSN; at the University of Florida in Gainesville, at Shands Hospital with Marylou Behnke, MD, and the author; and in St Paul, Minnesota, at St Paul Childrens Hospital with Stephen Boros, MD, Mark Mammel, MD, and Cindy Sagmeister, MSN.

The last isolated case quickly became a frequent event. Within one year, a brochure on kangaroo care[33] was developed that is now given to all parents at St Paul Childrens Hospital when they have an infant admitted to the NICU. The staff then offers to help the parents if they would like to try. The staff has also helped one of their auxiliary hospitals to implement kangaroo care.

In conclusion, the potential that kangaroo care has for health promotion, parental involvement, and cost containment is clear, and successful prototypes are already established. Thus, it seems only a question of time before kangaroo care becomes more broadly requested and available in the United States. Fortunately the choice to request, and to offer, this more natural approach will be an increasingly informed choice because of the research database being compiled.

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338

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APPENDIX

VIDEOTAPES (ANNOTATED)

Anderson, G. C., Marks, E. A., Wahlberg, V. (1986). *Early Breastfeeding and Discharge Home for Premature Infants in Bogota, Colombia: Kangaroo Method.* Available in English from Learning Resources and Communications, Television and Film, Box J-6, University of Florida, Gainesville, FL 32610. Background regarding the method is presented; a description is given of an 1850 g, 32-week-gestation infant who is appropriate in weight for gestation. He experienced a difficult breech vaginal delivery with both hands down; Apgar at 1 minute was 6. The infant's gestational age assessment is shown. He is also shown breast-feeding at 8 hours postbirth, being discharged home at 36 hours, returning to the clinic with his mother 2 days later, and returning to their one-room home. (8 minutes; $25.00)

Armstrong, H., Kamau, M. (1986). *Feeding Low Birthweight Babies.* Co-produced by IBFAN and UNICEF, East and Southern Africa Regional Office (ESARO). Available in English, French, Portuguese, or Spanish from the UNICEF Office or National Committee in your country, or UNICEF TV and Video Unit, H9F, 3 UN Plaza, New York, NY 10017, USA. In Kenya, mothers are housed free of charge nearby to their low-birthweight babies; they handle their babies frequently every day, which promotes good bonding; mother-to-mother support occurs naturally; mothers provide fresh hand-expressed colostrum and breast milk every 3 hours around the clock; bottles are outmoded; only cups are used; breast-feeding supplemented by cup feeds of expressed breast milk begins at 1600 to 1850 g; health education can be given quietly, day by day; babies are discharged weighing approximately 2000 g, exclusively breast-fed; continued breast-feeding for 4 months without supplemental feeds is usual; following discharge, babies attend special follow-up clinics. (29 minutes; contact UNICEF regarding price)

Colonna, F., Uxa, F., Graca, A., Ferreira, M. H., Bertolaso, G. (1988). *"Kangaroo-mothers": A Method of Care for Babies in Developing Countries.* Videotape presented at the 11th European Congress of Perinatal Medicine, Rome, Italy, April 10–13, 1988. Available in English and Italian from Dr U. de Vonderweit, Dept of Neonatology, Istituto per l'Infanzia "Burlo Garefolo," Trieste, Italy. (18 minutes; as yet unavailable in VHS)

Gloppestad, K. (1987). *From Separation to Closeness: Parents' Experiences with Closeness.* Available in English or Norwegian from Kari Gloppestad, Department of Pediatrics, National Hospital, University of Oslo, Pilestredet 32, 0027 Oslo 1, Norway, or in case of *immediate* need, from the Fund for Natural Care Postbirth (Gene Cranston Anderson, founder and director; use author's address). In 1981, based on needs expressed by parents during interviews, Kari Gloppestad started taking small prematurely born infants in steady condition out of incubators and placing them skin-to-skin under the parents' clothes. This was done even though some of the infants' required supplemental oxygen and assisted ventilation. The video also shows how to encourage the infants to open their eyes in the presence of their parents at an earlier stage than usual. (25 minutes; $140.00)

UNICEF Regional Office for Latin America and the Caribbean (1988). *Mother Kangaroo—A Light of Hope.* Bogotá, Colombia, South America. Available in English or Spanish from UNICEF TV and Video Unit,

339

H95, 3 UN Plaza, New York, NY 10017. This excellent update on the kangaroo method answers many questions raised by students of the method and viewers of earlier films and videotapes. (14 minutes; Contact UNICEF regarding price)

Van Rees, S., de Leeuw, R. (1987). *Born Too Soon: The Kangaroo Method.* Available in English from the Mediatheek Lichaamstaal, Ans Aarts, Pr. Marijkestraat 32, 6039 BZ Stramproy, The Netherlands. In the autumn of 1985 Richard deLeeuw introduced the kangaroo method at the Academic Medical Centre at Amsterdam. The parents take care of their prematurely born babies themselves and carry them against their bare skin. Even babies born 3 months prematurely react intensively to this. It is beneficial not only to their physical condition but also to their psychological development. (35 minutes; $60)

Virgin, C., Lange, U. (1988). *The Environment of Childhood Is the Landscape of Our Soul.* Produced for Danish television and available in Danish (being translated into English) from Cecelia Virgin, Åbrinke 267, DK283 Virum, Denmark. This video shows the most progressive kangaroo care in Europe and includes comments by nursing director B. Persson, Helsingborg, Sweden, and neonatologists B. Friis-Hansen, Rigshopitalet, Copenhagen, Denmark; N. Svenningsen, Lund, Sweden; and N. C. Christensen, Soenderborg, Denmark. (30 minutes; not in production, but will be loaned on request for $10 postage)

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Oronasopharyngeal suction at birth: Effects on arterial oxygen saturation

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The effect of oronasopharyngeal suction (ONPS) on arterial oxygen saturation (Sa_{O_2}) is described in a controlled study of 30 normal term newborn infants. In 15 of them, ONPS was performed immediately after birth. The Sa_{O_2} value was recorded through a pulse oximeter. The ONPS group had a significantly lower Sa_{O_2} between the first and the sixth minutes of life and took longer to reach 86% and 92% saturation. According to this study, ONPS should not be performed as a routine procedure in normal, term, vaginally born infants. (J Pediatr 1997;130: 832-4)

The Journal of Pediatrics
Volume 130, Number 5

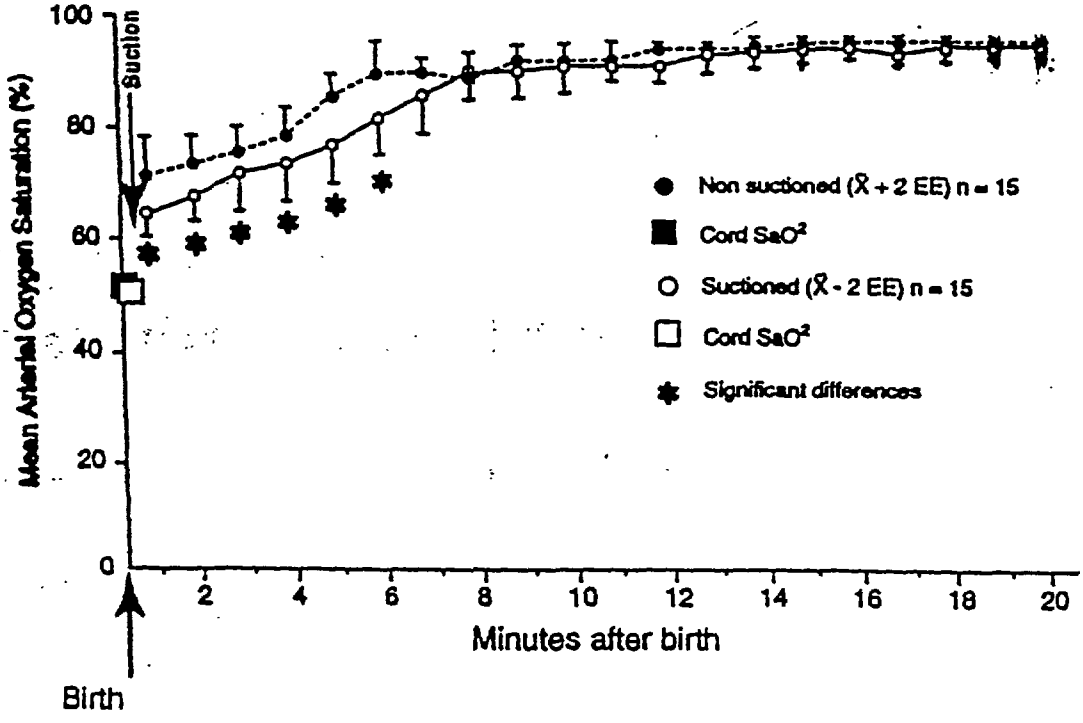

Figure. Sa_{O_2} in two groups of newborn infants, with and without ONPS in the first 20 minutes of life.

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MEDICAL PROGRESS

Breast-feeding and health in the 1980s: A global epidemiologic review

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In 1968, Lee Forrest Hill[1] observed that "formula feeding has become so simple, safe, and uniformly successful that breast-feeding no longer seems worth the bother." His comments were intended for physicians and the American middle class, but his words have been overtaken by events. Mothers in poor countries have bottle fed increasingly, with disastrous results.[2] Mothers in industrial nations have breast fed increasingly, permitting clinicians among the well-to-do to rediscover the advantages.[3] Much new research has permitted scientists to discover previously unappreciated benefits of breast-feeding. For example, immunologists and cell biologists have found an increasing range of protective factors in human milk.[4,5] When the last decade began, the medical benefits of breast-feeding in the United States and other industrial nations were considered to result mainly from the absence of bacterial contamination and from limited immunologic protection against microbial agents in the gastrointestinal tract. In 1981 the U.S. government commissioned a task force to review the scientific evidence relating infant feeding practices to infant health.[6] The task force concluded that breast-feeding prevented infantile gastrointestinal infections in all settings and improved infant survival rates in poor countries.

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9/18/28189

Although the praises of breast-feeding are widely sung, there are recent signs of ambivalence. An articulate minority doubts its importance in industrial nations,[7] and this view has been widely publicized. Coincidentally, there is evidence that the prevalence of breast-feeding is declining.[8] In response to these events, some American manufacturers of proprietary formulas have begun advertising directly to consumers, rather than marketing their products through health professionals.[9] The resulting furor has generated a good deal of rhetoric from both professionals and manufacturers.[10]

Is breast-feeding "worth the bother"? The epidemiologic evidence is strongly affirmative. Important protection against gastrointestinal infections in every setting has been confirmed and reconfirmed; most clinicians now accept such observations. Many clinicians, however, are surprised to learn that breast-feeding is associated with significant reductions in nongastrointestinal infections, including pneumonia, bacteremia, and meningitis, and with a reduced frequency of certain chronic diseases later in life. Much of the important data concerning the health benefits of breast-feeding appeared in the last decade and are not widely known, so we provide here a global cross-section of the published information. We tried to select articles that are readable, practical, and methodologically sound, emphasizing the impact of feeding methods on the incidence of nongastrointestinal diseases.

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342

LOWER RESPIRATORY TRACT ILLNESS

The toll exacted by diarrhea from unsanitary bottle feeding in the Third World has drawn attention away from the fact that bottle feeding imposes an increased risk of respiratory disease as well. A marked increase in respiratory deaths among bottle-fed infants was repeatedly documented in North America and Western Europe before the Second World War.[11] Since then, an excessive frequency of respiratory illness among bottle-fed infants has continued,[11] and during the 1970s one of us observed a fivefold excess of lower respiratory tract infections in bottle-fed infants from a largely middle-class population.[12] Any uncertainty about the relevance of these observations was removed by well-controlled observations during the last decade.

The risk of dying from lower respiratory tract infection is nearly four times higher among infants who are not breast fed in the urban environment of developing nations. In a meticulous case-control study, Victora et al.[13, 14] investigated all deaths of infants aged 7 to 364 days during 1985 in two southern Brazilian cities. Twins and infants weighing <1500 gm at birth, infants with major congenital malformations, and those with illnesses in the newborn period were excluded. The study controlled for age and a wide variety of socioeconomic, environmental, biologic, and health care factors. The feeding method before the fatal illness was carefully ascertained. The relative risk of supplementing breast-feeding with bottle feeding was 1.6. There was little difference in the risk imposed by cow milk or formula, but supplementation of breast-feeding or bottle feeding with solid food was, surprisingly, found to reduce the risk of death threefold, perhaps as a result of improved nutrition. Other significant risk factors included low birth weight, the presence of young siblings, and limited paternal education. Of the 127 respiratory deaths studied, 82 could be attributed to bottle feedings.[14, 15]

Hospitalization for respiratory infections is also more frequent in bottle-fed infants. This has been shown in at least three well-controlled studies from Newcastle, England,[16] Dundee, Scotland,[17] and Shanghai, China.[18] The relative risk is more than twofold, and the cohort studies from Dundee and Shanghai permit us to estimate that as many as 7% of all infants are hospitalized for respiratory infections primarily because of the added risk of bottle feeding. When respiratory infections develop in breast-fed infants, the illnesses are likely to be less severe. Depending on the circumstances, this effect can be dramatic. In Rwanda, where the general infant mortality rate exceeds 100/1000, the case-fatality rate for minimally or partially breast-fed infants admitted to the hospital for respiratory illness is half the rate for infants who are completely weaned (13% vs 27%).[19] Even in fully industrialized nations with low infant mortality rates, breast-feeding's protection against dying of respiratory infections is an important consideration. Respiratory syncytial virus is the most important respiratory pathogen among infants in Western Europe and North America, and accounts for considerable morbidity and death.[20-22] The prophylactic effect of breast-feeding against this infection is therefore especially pertinent.[16]

Breast-feeding's advantages are most evident during the first 6 months of life,[13, 23-26] but are still evident through the second year.[18, 19, 27] The advantages are seen in any setting but may be especially important where climate or living circumstances are unfavorable.[26, 28] Protection is most evident against serious respiratory disease (wheezing, bronchitis, bronchiolitis, pneumonia) rather than uncomplicated upper respiratory tract infections.[23-26, 28] Finally, the protection afforded by breast-feeding is greatest when bottle feeding is excluded, and the protection declines in proportion to the degree of supplementation with cow milk or formula.[13, 17, 23, 24, 26, 27] These generalizations have accounted for other factors relevant to respiratory disease, such as smoking or the presence of young siblings. In fact, when such factors are taken into account, the relative risk of bottle feeding is even higher than the average figures quoted here.[26, 29]

OTITIS MEDIA

The middle ear cleft is a branch of the respiratory tree, so it should be no surprise that breast-feeding protects it in the same way. The theory that bottle feeding causes middle ear disease because of positional effects and the regurgitation of fluid and secretions through the eustachian tube is probably an oversimplification, as suggested by the observation that human milk fed via bottle helps protect infants with cleft palate against otitis media with effusion.[30]

Studies of infant feeding and otitis media have been done almost exclusively in the northern temperate zone of Europe and North America. Most are cohort studies that show that bottle feeding increases the risk of otitis media. Saarinen[31] studied upper middle class Finnish children who were not in day care. When she compared children exclusively breast fed for 6 months or more with infants weaned before 2 months, she found a relative risk of 3.3 for two or more episodes of otitis media in infants weaned early (6% vs 19%) and a relative risk of 4.3 for four or more episodes for children 12 to 36 months of age (6% vs 26%). The duration of secretory otitis media is also reduced in breast-fed children,[32] and in the harsh Labrador environment chronic granulomatous otitis media is seen only in Inuit children given bottle feedings before 6 months of age.[33]

BACTEREMIA AND MENINGITIS

Four studies that have focused primarily on the epidemiology of *Haemophilus influenzae* infections have shown that breast-feeding prevents bacteremia and meningitis

Table. Mortality risk of bottle feeding

Country, yr (reference)	Age group	Relative risk	Attributable risk	Comment
Egypt, 1981 (53)	~0-3 yr	2.0-5.0	130-290/1000	Cumulative mortality to next sibling
Rwanda, 1981 (19)	0-2 yr	2.0	135/1000	Hospital case fatality
England, 1981 (58)	0-3 mo	7.7		Sudden death
United States, 1982 (59)	0-6 mo	>7.0		Sudden death
England, 1983 (54)	1 wk to 1 yr		>0.8/1000	Unexpected death
England, 1986 (55)	1 mo to 1 yr		<5.1/1000	General prevention program
Brazil, 1987 (13)	1 wk to 1 yr	2.5-14.2		Death from infection
Latin America, 1988 (50)	0-1 yr	3.0-5.0		Program estimate
Malaysia, 1988 (52)	1 wk to 1 yr	2.5-5.2	28-153/1000	General mortality rate
United States, 1988 (57)	0-1 yr	3.7-5.0		Sudden death
Bangladesh, 1988 (51)	1½-3 yr	3.0		Death from diarrhea
United States, 1989 (56)	0-1 yr		4/1000	Mathematical model

Cochi et al.,[34] Istre et al.,[35] and Lum et al.[36] have shown that bottle feeding imposes a 4- to 16-fold risk of *H. influenzae* bacteremia and meningitis in North American infants. In the United States the protection afforded by breast-feeding seems to be greatest during the first 6 months.[34] In Finland, where breast-feeding is more common and more prolonged, *H. influenzae* meningitis is much less frequent during the first year, and children breast fed longer than 6 months are only one third as likely to have invasive disease during the second year of life.[37] These findings have been corroborated in feeding-morbidity studies. Thus, in Syracuse, N.Y., and New Haven, Conn., bottle-fed infants have a tenfold risk of being hospitalized for any bacterial infection and a fourfold risk of bacteremia and meningitis.[38,39] In a study of Brazilian infants, Victora et al.[13] found a threefold mortality risk of infections other than diarrhea and respiratory disease, including bacteremia and meningitis.

Narayanan et al.[40-43] studied the effects of feeding expressed human milk to low birth weight infants in a New Delhi hospital nursery. They consistently showed at least a threefold risk of bacteremia in infants who received only formula feedings. Unheated human milk provided greater protection than pasteurized human milk, and the addition of formula substantially reduced the protection against diarrhea and bacteremia. On a smaller scale, there were similar findings among sick, very low birth weight infants in Syracuse, N.Y.[44] Formula-fed premature infants are more likely to be withdrawn from studies of feeding and growth because of feeding intolerance and necrotizing enterocolitis,[45] and when necrotizing enterocolitis does develop in premature infants receiving human milk they are less likely to have septicemia or die.[46] The pathogenesis of necrotizing enterocolitis is complex, and human milk is not a panacea. Nevertheless, recent observations in British neonatal units[47] suggest that feeding human milk is the single most effective method of preventing this important cause of bacteremia in premature infants.

These observations explain the reductions in neonatal mortality rates seen elsewhere. Thus the changes in hospital nursery routines that increased breast-feeding also produced a fourfold reduction in mortality rates for diarrhea, pneumonia, bacteremia, and meningitis in rural Costa Rica.[48] In the city of Baguio, in Luzon, the Philippines, rooming-in, a shortened therapeutic starvation period, and an increase in breast-feeding from 48% to 92% of infants in the General Hospital nursery were accompanied by a decline in mortality rates for neonatal sepsis from 13.6 per 1000 to 0.6 per 1000.[49] Most of this improvement resulted from reduced mortality rates for low birth weight infants.

MORTALITY RATES

In a recent report the director of the Pan American Health Organization stated that in Latin America and the Caribbean the mortality risk for artificially fed infants is

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three to five times higher than for breast-fed babies.[50] The Table shows that this is a figure with wide application. It becomes more tangible if we address individual factors and circumstances.

Globally, most of the deaths related to artificial feeding are due to diarrheal illnesses. In Latin America alone there are more than 500,000 deaths annually from intestinal infections with diarrhea in children less than 5 years of age.[50] Most of these deaths occur in infants for whom the mortality risk associated with artificial feeding is more than 14-fold.[13] In rural Bangladesh, one third of all deaths in children from 18 to 36 months of age are attributable to failure to breast-feed.[51] In Malaysia the attributable mortality rate for artificial feeding is between 28 and 153 per 1000 infants, depending, respectively, on the presence or absence of piped water and toilet facilities in the home.[52] In Cairo, 150 children per 1000 die before the birth of the next sibling[53]; most of these deaths are related to premature cessation of breast-feeding.

In industrialized nations the impact of breast-feeding on mortality rates is smaller because the hazards of bottle feeding in sanitized environments are reduced, and because of other factors that reduce infant mortality rates. Nevertheless, breast-feeding is associated with reduced mortality rates in technically developed societies. It has been estimated that breast-feeding (or the use of pooled human milk) could prevent 100 deaths from necrotizing enterocolitis annually in British neonatal units.[47] In Sheffield, England, breast-feeding was the single most important factor in a prevention program that reduced the postperinatal mortality rate from 5.2 to 1.9 per 1000; the emphasis on breast-feeding accounted for an estimated 24% of the reduction in the mortality rate.[54] In Nottingham, England, increased use of breast-feeding was one of several factors in the decline of the postneonatal mortality rate from 8.7 to 3.6 per 1000.[55] Preliminary data from the U.S. National Center for Health Statistics has shown a postperinatal mortality rate difference of 3.7 per 1000 when infants initially breast fed are compared with bottle-fed infants (Paul Placek: personal communication, 1986.) Finally, a risk-benefit analysis by the U.S. National Institute of Environmental Health Sciences estimates that the decision to breast-feed decreases the mortality rate during the first year by 4 per 1000.[56]

In the United States and Western Europe, sudden death of unknown cause is the leading cause of postneonatal death.[22] A recent study by the U.S. National Institute of Child Health and Human Development showed that the relative risk for predominantly breast-fed infants was only 0.2 for black infants and 0.27 for nonblack infants compared with that for babies who were bottle fed from birth.[57] These comparisons were adjusted for maternal age, socioeconomic status, and parity. The Nine Area Study in England found that in infants 3 months of age or younger were from families with an excellent standard of home, an infant's relative risk of sudden death when breast-fed during the preceding 3 weeks was 0.13 compared with that for bottle-fed babies.[58] Sudden death from infant botulism occurs only in formula-fed infants.[59] Sudden death is also more likely to occur in bottle-fed infants as a result of respiratory infections, particularly those caused by respiratory syncytial virus.[16, 20-22] Sudden death is a complex problem with several causes, only a few of which are known at present.[60, 61] Current data, however, permit us to estimate conservatively that there is one sudden infant death per 1000 live births as a result of failure to breast-feed in western industrial nations.[15, 57, 62]

LONG-TERM HEALTH

Until relatively recently, there were three prevailing opinions about the health benefits of breast-feeding: (1) Tangible benefits are evident only among infants in less technically developed countries. (2) Health benefits are limited to diarrhea prevention because contaminated nursing bottles are avoided. (3) The benefits are limited to the prevention of acute infectious disease during infancy, and there are no lasting benefits. As indicated by the foregoing, the first two opinions have been rejected. In the last decade the final belief has begun to fall.

One of the most interesting developments is the co[illegible] association between bottle feeding and immune system disorders. In infancy, artificial feeding can cause lymphoid hypertrophy[63, 64] and some of the immunologic phenomena associated with autoimmune diseases.[65] It accelerates the development of celiac disease[66] and is a risk factor for Crohn disease and ulcerative colitis in adulthood.[67, 68] Insulin-dependent diabetes mellitus is believed to result from an immunologic attack on pancreatic beta cells; investigators have shown that bottle feeding is a risk factor that may account for 2% to 26% of cases of this type of diabetes.[69] Furthermore, breast-fed children in whom diabetes does develop are less likely to have antithyroid antibodies.[70] Lymphomas are malignant neoplasms that result, in part, from disordered immune system regulation, and a recent study by Davis et al.[71] showed that the relative risk of bottle feeding, or of breast-feeding for less than 6 months, is nearly sixfold.

Although breast-feeding is not the panacea against allergic diseases that has been popularly supposed,[72] food allergies appear to be less frequent in infants who are exclusively breast fed,[73] and breast-feeding delays the development of atopic dermatitis, particularly in allergic families.[74, 75]

Finally, breast-feeding may have a role in preventing or modifying certain types of chronic liver disease. The [illegible]

anism may be as simple as the avoidance of copper toxicity from contaminated milk or water.[76] The mechanism may also be obscure and complex, as in children with α_1-antitrypsin deficiency, who have been shown in some studies to be less likely to die of cirrhosis if they were breast fed.[77, 78]

The foregoing observations are preliminary, but they have opened up an interesting and complex field for investigation.

PROBLEMS IN METHODOLOGY

Students of the epidemiology of illness and infant feeding should be aware of three methodologic problems. First, there is the problem of *definition*: What is breast-feeding? The definition may be restricted to babies who are breast fed exclusively, or it may include babies who receive only a single daily feeding of human milk. In general, the largest morbidity differences are found when exclusive breast-feeding is compared with exclusive bottle feeding; the differences narrow in proportion to the amount of supplementation permitted.[13]

Second, there is the problem of *assignment*. The most accurate morbidity comparisons are made when the illness in question is assigned to the feeding method used just before the onset of illness. Only sometimes is this achieved in feeding-morbidity studies.[12, 13] Both case-control and cohort studies may be biased in favor of either bottle feeding or breast-feeding by failure to account for feeding changes before onset or after the onset of an illness.

Interesting epidemiologic and physiologic questions relate to these problems of definition and assignment. Is breast-feeding protective after it has been discontinued? Some studies of acute respiratory illness suggest this possibility,[16, 31] and there are fascinating observations that the impact of feeding methods may be felt even years later.[66-71, 77, 78] What are the mechanisms that account for the prevention of illness weeks, months, or years later?

Finally, there is the problem of confounders, or *associated variables*. This vexatious problem accounts for much of the skepticism about the benefits of breast-feeding for middle class populations. In well-to-do industrial nations, breast-fed infants are likely to come from the protected environment of small, nonsmoking families with high educational levels and an excellent standard of home care.[12, 16, 25] Thus it is difficult to discern whether reduced morbidity is due to breast-feeding per se or the associated environmental factors. The problem has been overcome by meticulous studies that have accounted for these factors in suburban middle and upper class groups and mixed urban populations. These studies show, unequivocally, that breast-feeding prevents gastrointestinal and lower respiratory tract disease,[17, 26] otitis media,[31, 32] and bacteremia and meningitis[34, 35, 37] in these settings.

Is the type of bottle feeding important? We assume that formula is safer than cow milk, but the data do not always support this assumption.[13, 79] What happens when other foods are given? If contaminated, they may increase the risk of diarrheal illness, but there is some evidence that the addition of pureed foods may reduce mortality rates for respiratory disease, perhaps because of improved caloric intake.[13, 14]

HOW DOES BREAST-FEEDING PROTECT BABIES?

The strictly honest answer to this question is that we do not know.[80] It seems clear that where sanitation is poor, the microbial burden from bottle feeding is substantial and that the resulting diarrheal illness is easiest to avoid when a baby is breast fed. However, serious diarrheal illnesses also occur with modern sanitation and are also prevented or treated with human milk.[81, 82] The usual explanation is that human milk contains immunologic components and other host defense factors that counteract the enteric and nonenteric pathogens which remain even in a hygienic environment.[83, 84] The activity of many such factors has been demonstrated in vitro, but in only three studies has the presence of such factors been correlated with prevention of illness in infants.[85-87] Secretory antibody and other immunologic factors are important components of human milk's defensive repertoire, but laboratory studies suggest that the repertoire is extremely varied and engenders complex interactions among the mother, the suckling infant, and the external environment.

An enteromammary circulation has been described in which antibody-producing cells from the maternal intestine migrate to the breast.[88] By this means, secretory antibodies against enteric pathogens common to the maternal-infant environment are produced in the milk and provided to the nursing baby. There is evidence of a similar system for respiratory pathogens,[89] although how it protects the lower respiratory tract is obscure; coating of the pharyngeal entrance to the lower airway is one possibility.[80, 84] Stimulation of the infant's respiratory defenses by soluble immunoregulatory factors in mother's milk is another.[90] There is also evidence of the circulation of protective milk factors such as lactoferrin, secretory IgA, and oligosaccharides to other mucosal surfaces such as the urinary tract,[91-93] and some casual observations suggest that breast-fed infants may have fewer urinary tract infections.[94, 95]

The idea of a secretory antibody system and a mammary-mucosal axis appeals to common sense and teleologic principles, but there are undoubtedly other mechanisms of protection. Thus it is suggested that breast-fed infants have fewer symptoms of rotavirus infection because the virus interacts with the more benign bacterial flora in the nursling's

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gut.[96] There is also the suggestion that antiinflammatory substances in human milk modify exuberant and damaging host responses to the microbial and food antigens to which the nursling is exposed.[97]

The whole subject of host defense in the breast-fed infant is complex, and the foregoing examples can give only an inkling of the array of defenses in human milk. They say nothing of why babies who are breast fed may be protected years later from immunologic disease, and they neglect the fact that breast-feeding is more than just the ingestion of milk. Evidence that nursing mothers and their babies interact differently from those who bottle-feed is difficult to find, but lactation does have physiologic and behavioral consequences for the mother.[98, 99] At all levels—biochemical, immunologic, physiologic, behavioral, and epidemiologic—there is much to learn.

CONCLUSION

Breast-feeding has advantages for both babies and mothers, and the advantages are seen in rich and poor nations. They include the prevention of gastrointestinal and respiratory illness, and of infections as well as certain immunologic disorders. In addition to preventing illness early in life, breast-feeding appears to reduce the risk of certain chronic diseases as well. It has advantages for the premature as well as the term infant.

How long should babies be breast fed? In the technically developed countries of Europe and North America, there are cogent reasons for breast-feeding for 6 months or longer.[16, 31, 37, 57, 71, 75] In Bangladesh, Rwanda, or Egypt, an infant's survival may require his mother's milk through the third year of life.[19, 51, 53]

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348

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PSYCHOSOCIAL AND CULTURAL ASPECTS OF BREAST-FEEDING

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ABSTRACT

Recent research advances in infant development have shed important light on the basic components of early human development. It is now clear that the neonate has complex behavioral competencies that allow him to be an active participant in his own early social experience. This is of critical importance and it's in this context the child develops a concept of self and others, of the rules of interaction and of the communicative intent of his behavior and that of others. These are the foundations of development which explain the predictive value of social interaction on child development. Breast-feeding supports psychological growth by providing the optimal interactive environment for the child and enhancing parental sense of competence. Cultural goals and values shape this interaction. Infant malnutrition has psychosocial and developmental consequences through direct detriment on the central nervous system (CNS), but also through perpetuating a cycle of failed interaction with the social and object world. Breast-feeding must be valued for its wide-ranging effects on the infant and society at large. It must been seen as reflecting and shaping cultural values and expectations.

"Mothers have as powerful an influence over the welfare of all future generations as all other earthly causes combined." (1814 On the Education of Children)

The perspectives on roles of mothers and more broadly the social context of the infant in determining the course of his development have changed rapidly over the last several years in spite of this early observation. In order to understand the full impact of breast-feeding, one must have a clear appreciation of the psychosocial factors of breast-feeding in the context of infant development with these new insights in mind.

COMPETENCIES OF THE INFANT

Within the last several years there have been dramatic increases in our appreciation of the enhanced capacities of the human newborn[1]. He begins life with the equipment available to interact in a complex pattern with the world around him[2,3]. The infant is born with incredible visual competencies that rapidly increase in the first weeks and months of life[4]. The infant's vision is quite mature at birth and allows him to have a fixed focal distance with good resolution of imaging in the 8- to 10-inch range. This allows him to focus on primary caretakers during the course of routine care and feeding. This gaze is directed selectively toward those objects in the environment that are most salient to his integration into the social world, specifically his parents' faces and smiles and those visual stimuli that have high contrast and information to give him. This gaze progression proceeds rapidly in the first months of life so that by the time a child is 3 to 4 months of age he can track the social interaction around him through complex coordination of motor movement and visual tracking. Additionally, the infant, even in the newborn period, can quiet extraneous motor movement in order that his gaze is directed at an object or person of interest. He immediately begins to coordinate seemingly random motor movement with objects that attain his attention, with rounded movements of the extremities occurring with attention to people and more jagged and abrupt activities directed toward objects in his environment[3].

Auditory competencies are also geared toward social interaction in the newborn period. The child selectively attends and will orient to the human voice, particularly if the voice has high modulation of intensity and pitch. He may quiet his distress and focus his visual attention through auditory tracking[2,4]. Additionally, he demonstrates "interactional synchrony" whereby his seemingly random body movements are coordinated with

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MOTHER TO INFANT BIOCHEMICAL AND IMMUNOLOGICAL TRANSFER THROUGH BREAST MILK

by

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Before birth, nutrients and bioactive components are transferred from mother to fetus through the placenta. After birth, the same function is carried out by breast milk. Newborn mammals, including humans, receive a balanced diet and generally thrive on their mother's milk. While the nutrient composition of human milk has been known for many years (especially as a result of the in-depth studies of Macy and Associates(1)), the bioactive components in milk have been investigated only recently. These studies have been discussed in several recently published books on "Human Lactation" (2-4). It is important to realize that most of the milk nutrients (the micronutrients, minerals and many trace elements) are not markedly affected by pasteurizing human milk (for feeding from donor to another mother's infant), whereas the "bioactive" components of milk, such as enzymes, cellular components, growth factors, certain hormones, immunoglobulins, are destroyed by the heating process. These bioactive components are the reason that human milk is superior to even the best infant formulas. Because of space limitations, we will present selected examples of specific milk components that have well characterized functions in the infant's growth and development. We will also mention briefly the differences in composition between the milk produced by mothers of full term infants and that of mothers of premature infants (5).

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IMMUNOLOGIC AND ANTIINFECTIVE COMPONENTS OF HUMAN MILK

At birth, the infant does not have a well developed immune system. The latter continues to develop postnatally through much of infancy. Maternal milk provides many of the components not yet produced by the infant (6). The main immunoglobulin of human milk is IgA. During the first four months of life the breast-fed infant receives 500-600 mg IgA daily from milk. The maternal IgA transmitted through milk protects the infant against the pathogens in its environment, i.e maternal intestinal microbial flora and pathogens of the respiratory tract (6). Human milk contains leukocytes, the type and amount changing with duration of lactation. Colostrum and early milk contain 106 - 107 cells/ml - 40-55% macrophages, 40-55% neutrophils and 5-10% lymphocytes - the cell number decreases rapidly during the first few months of lactation (7). Although it has been suggested that cell-mediated immunity may be transferred by human milk, it is at present unknown whether human milk leukocytes remain viable during transit through the gastrointestinal tract (6). Goldman, et al have recently suggested that human milk protects the infant not only by providing antiinfective agents, but also by minimizing inflammation (8). Table 1, p. 337 provides a list of selected antiinfective and antiinflammatory components of human milk. Recent studies indicate that feeding of human milk to premature infants not only provides the infants with immune factors (such as IgA, lactoferrin and lysozyme), but might in addition enhance the endogenous synthesis of these agents by the infant (9). The nutritional status of the mother during pregnancy and lactation can affect the level of immunologic and other antiinfective substances in colostrum and milk, malnutrition resulting in lower levels of IgA, IgG and component 4 of complement (10). The level of immunoglobulins and other protective factors varies in the course of lactation being highest in colostrum and during the weaning period.

Hormones and Growth Factors

Human milk and that of many other species contains a great number of hormones (ref. #4 pp. 183-196) and growth factors (ref. #2 pp. 191-219, and ref. #11 pp. 98-114). While it has been shown in animal studies, that these agents stimulate in vivo the growth of gastrointestinal tissues and in vitro the replication of cultured cells, the exact function of these components in the newborn infant is not yet known.

Some of the growth factors function in the mother by stimulating the functional maturation of the lactating mammary gland. Several recent studies (cited in refs. #2-4 and 11) suggest that some hormones and growth factors might resist passage through the gastrointestinal tract and thus retain biological activity in the infant. Table 2, p. 338 lists the hormones and growth factors reported to be present in human milk. The data presented should, however, be interpreted with caution, because analytical techniques vary greatly among laboratories. Thus, previous reports of high levels of prostaglandins in human milk (12) have recently been questioned when more sensitive methods of quantitation were used (13).

Enzymes

Milk contains a large number of enzymes. These differ in nature and degree of activity among species. Comparisons have been made between the activity level of some enzymes in human and cow milk (cited in ref. #2 pp. 251-266). More recently the enzymes of human milk have been reviewed with special emphasis to their functional role; a) in the lactating mammary gland for the synthesis of milk components; b) in the infant, to promote growth and development by providing compensatory digestive function during neonatal pancreatic insufficiency, by acting as metal carriers and as antiinfective agents (see Hamosh et al, ref. #2 pp. 251- 266, ref. #11 pp. 66-97 for details, and Table 3, p. 339). Many of the milk enzymes are not inactivated during passage through the stomach because of a more hydrophobic tertiary structure than that of identical enzymes from other sources, and because milk is an excellent buffer, rising the gastric pH to 5.5-6.0.

Milk Components with Special Metabolic Function

Milk contains a number of components with special functions. While many of these components can be synthesized in the body, the newborn is either lacking the required amounts or is yet unable to synthesize these factors. Among these factors are long chain polyunsaturated fatty acids (necessary for brain development and membrane synthesis) (14), carnitine-the specific carrier for long-chain fatty acids that enables their final oxidation in mitochondria (14), taurine - facilitates fat absorption and may function in brain development, p-casomorphins (ref. #4 pp. 213-225) opioid agonists derived from the breakdown of the casein molecule that have a wide range of

effects, polysaccharides that inhibit bacterial binding to mucosal surfaces and might be unique to each individual (ref. #3 pp. 581-588, ref. #4 pp. 251-259, ref . #15). Table 4, p. 340 lists a few of these milk components.

COMPARTMENTATION OF MILK COMPONENTS

The specific compartmentation of nutrients and bioactive components in milk is important in their optimal delivery to the infant. For example, breakdown of milk fat by the endogenous lipases of human milk is efficiently preserved by packaging of the milk triglycerides within the milk fat globules that are unaccessible to the enzymes.

EFFECT OF LENGTH OF PREGNANCY ON MILK COMPOSITION

The milk produced by women who deliver prematurely differs from that produced after a full term pregnancy (5). In general, the composition of milk produced by women who deliver at 25 to 35 weeks of gestation remains close to the composition of colostrum for the first 4 to 6 weeks of lactation (Table 5, p. 341), providing higher levels of total nitrogen, protein, minerals and medium-chain and long-chain polyunsaturated fatty acids. Although sodium and chloride concentration is much higher (50-100%), that of the macro minerals calcium, phosphorus, and magnesium and the trace elements copper, zinc, and iron is similar in preterm and term milk. The different composition of preterm milk is probably the result of the immaturity of the mammary gland, which lacks the additional 2 to 3 months of functional maturation before term delivery. The higher concentration of IgA, of protein, and of some minerals in milk can be attributed to higher paracellular transport because of leaky junctions between apical membranes of mammary secretory epithelial cells.

The enzyme content of preterm milk is equal to or slightly higher than that of term milk (ref. #2 pp. 251-266, and ref. #11 pp. 66-97), suggesting that the preterm infant (who is even more dependent on compensatory digestive enzymes than the full-term newborn) is supplied by adequate amounts of lipase and amylase by his or her own mother's milk. Indeed, recent studies show much better growth of preterm infants who were fed preterm human milk than of those fed pooled mature milk from mothers of term infants (16).

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TABLE 1:

ANTIINFECTIVE AND ANTIINFLAMMATORY COMPONENTS IN HUMAN MILK+

Milk Component	Function
Secretory IgA	Prevents bacterial adherence. Limits antigen penetration.* Inhibits neutrophil chemotaxis.*
Cells: T Cells	Transfer of cell mediated immunity?
B cells	Role unclear
Macrophages and	Phagocytosis - microbial killing
Neutrophils	Poor response to chemoathroctants*
Non-Immunologic antimicrobial agents	
Lactoferrin	Inhibits complement* Inhibits bacterial growth by binding iron (Fe+3)
Lysozyme	Inhibits chemotaxis and production of toxic oxygen radicals*
Lipases	Produce free fatty acids and monoglycerides which disrupt virus envelopes and lyse protozoa
Antiinflamatory agents	
Catalase	Degrades hydrogen peroxide
Alpha-tocopherol, cysteine,ascorbic acid	Scavengers of oxygen radicals
Histaminase	Degrades histamine
Aryl sulfatase	Degrades leukotrienes.
Alpha-1-anti trypsin	Neutralize enzymes that act in
Alpha-1-antichymotrypsin	inflammation
Prostaglandins (E2,F2)	Cytoprotective
Oligosaccharides	Inhibit microbial attachment

+ Adapted from reference #6 and 8
* Antiinflammatory action

TABLE 2:

HORMONES AND GROWTH FACTORS IN HUMAN MILK++

Hormones	Growth Factors
Adrenal steroids+	Epidermal Growth Factor (EGF)*+
Calcitonin*	Human milk growth factors I,II and III
Erythropoietin +	Mammary derived growth factor I
GRF*	Nerve growth factor (NGF)+
GnRH*	Transforming growth factor
Insulin*+	Colony stimulating factor
Neurotensin*	Bifido bacterium Bifidum growth factors
Oxytocin*	
Ovarian Steroids	
Prolactin	
Relaxin*	
Somatostatin*	
Triiodothyronine, Thyroxine	
TRH+	
TSH+	

++ Adapted from references 2,4 and 11.
* Concentration in breast milk higher than in blood (plasma or serum)
+ Evidence for absorption and/or activity in the newborn

354

TABLE 3 :

ENZYMES IN HUMAN MILK THAT FUNCTION IN THE NEWBORN+

Enzyme	Function
Amylase	Digestion of polysaccharides
Lipase (bile salt dependent)	Digestion of fat (triglyceride)
Proteases	Proteolysis?
Xanthine Oxidase	Iron, Molidemum carrier
Glutathione peroxidase	Selenium carrier (antioxidant activity)
Alkaline phosphatase	Zinc, Magnesium carrier
Antiproteases	Protection of bioactive components-enzymes, immunoglobulins, growth hormone factors
Sulfhydryloxidase	Maintenance of structure and function of milk proteins and GI mucus (?)
Lysozyme	Bactericidal
Peroxidase	
Lipases	Antiinfective (see Table 1)

+ Adapted from references #2 pp. 251-266 and #11 pp. 66-97.

TABLE 4:

MILK COMPONENTS WITH SPECIFIC FUNCTIONS IN THE NEWBORN *

Component	Function
Long chain polyunsaturated Fatty acids	Brain development, Membrane structure and function
Carnitine	Essential for oxidation of fatty acids in mitochondria
Taurine	Fat absorption; needed for brain development
P-casomorphins	Opioid agonists
Polysaccharides	Inhibit bacterial binding to mucosal surfaces.

* This is a selective listing of only a few milk components.

TABLE 5:

COMPOSITION OF PRETERM* HUMAN MILK

	Comparison to mature term** human milk
Protein	50-100% higher during first 4 - 7 weeks after delivery
Sodium	30-150% higher during first 4-6 weeks after delivery
Chloride	30-80% higher during first 3-4 weeks after delivery
Potassium	30-75% higher during first 3-4 weeks after delivery
IgA	Higher during first 2-3 months of lactation
Medium chain fatty acids	40-80% higher during first 3 months of lactation
Polyunsaturated fatty acids	40-70% higher in colostrum and transitional milk
Bile salt-stimulated lipase	Equal to mature human milk
Amylase	Equal to mature human milk
Epidermal growth factor	Equal to mature human milk

* Preterm milk - secreted by women who deliver after 26-36 weeks of pregnancy. ** Mature term milk - secreted by mothers of full term infants at 6 weeks post partum
The data are from references #5,15.
* Preterm infants (27-33 weeks gestation) regained birth weight in 11.4 +0.8 versus 18.8+1.7 days when fed preterm or term human milk, respectively (ref. #16).

356

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Resuscitation of Asphyxic Newborn Infants with Room Air or 100% Oxygen

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ABSTRACT. To test the hypothesis that room air is superior to 100% oxygen when asphyxiated newborns are resuscitated, 84 neonates (birth weight > 999 g) with heart rate <80 and/or apnea at birth were allocated to be resuscitated with either room air (n = 42) or 100% oxygen (n = 42). Serial, unblinded observations of heart rates at 1, 3, 5, and 10 min and Apgar scores at 1 min revealed no significant differences between the two groups. At 5 min, median (25th and 75th percentile) Apgar scores were higher in the room air than in the oxygen group [8 (7–9) *versus* 7 (6–8), p = 0.03]. After the initial resuscitation, arterial partial pressure of oxygen, pH, and base excess were comparable in the two groups. Assisted ventilation was necessary for 2.4 (1.5–3.4) min in the room air group and 3.0 (2.0–4.0) min in the oxygen group (p = 0.14). The median time to first breath was 1.5 (1.0–2.0) min in both the room air and oxygen groups (p = 0.59), and the time to first cry was 3.0 (2.0–4.0) min and 3.5 (2.5–5.5) min in the room air and oxygen groups, respectively (p = 0.19). Three neonates in the room air group and four in the oxygen group died in the neonatal period. At 28 d, 72 of the 77 surviving neonates were available for follow-up (36 in each group), and none had any neurologic sequelae. This preliminary study did not provide conclusive evidence that room air is superior to 100% oxygen in the resuscitation of asphyxiated newborns, although it indicated that room air is as effective as 100% oxygen. Additional trials with increased numbers of patients are necessary before deciding whether room air or oxygen should be used in clinical practice. (*Pediatr Res* 34: 809–812, 1993)

Abbreviations

HIE, hypoxic-ischemic encephalopathy
PaO_2, arterial partial pressure of oxygen
$PaCO_2$, arterial partial pressure of carbon dioxide

In the wake of the disasters with retinopathy of preterm infants in the early fifties, the oxygen concentrations in the incubators and the time supplementary oxygen was used were curtailed. Sjostedt and Rooth (1) observed that preterm and term infants thrived well in incubators with only 15% oxygen. In recent years, it has become evident that oxygen radicals are produced in excess in the posthypoxic reoxygenation period (2–4) with the potential to increase tissue damage. Despite this, guidelines for the resuscitation of asphyxiated newborn infants advocate the use of supplementary oxygen, usually 100% oxygen (5, 6). To our knowledge, no clinical studies have tested this practice.

Saugstad has previously suggested that the use of 100% O_2 may be detrimental in the resuscitation of hypoxic newborn infants (2, 4, 7, 8). Recent experimental work from his group with newborn pigs suggests that room air is as effective as 100% oxygen (9–11). Given this background, we have felt it not only justified but also necessary to investigate whether resuscitation of newborn infants should be performed with room air instead of 100% oxygen. Furthermore, in many developing countries, supplementary oxygen is rarely available at all places and at all times, and it is important to find out whether resuscitation can be performed effectively even when oxygen is not at hand.

In the present preliminary study, we have investigated the short-term effects of resuscitating asphyxic newborn infants with either room air or 100% oxygen.

MATERIALS AND METHODS

The investigation was initiated and designed in Oslo and Uppsala and performed at the Department of Pediatrics, Maulana Azad Medical College, New Delhi, India. We tested the hypothesis that room air is superior to 100% oxygen when asphyxiated newborn infants are resuscitated. Primary outcome measures used for this preliminary study were *1*) Apgar score and *2*) heart rate, both at 5 min. Secondary outcome variables were PaO_2, $PaCO_2$, and base excess at 10 and 30 min to assess posthypoxic respiratory and metabolic recovery. The study was also intended as a pilot experiment to calculate sample size requirements for later studies.

Sample size. The sample size was calculated on the basis of the first primary outcome measure. A trial of 72 babies (36 in each group) would have an 80% power to detect as statistically significant ($p < 0.05$, two-tailed test) a difference of 1 in mean Apgar score at 5 min if SD is 1.5.

Enrollment criteria were *1*) heart rate <80 bpm and/or apnea at birth justifying resuscitation, and *2*) weight >999 g. Newborn babies with lethal anomalies, hydrops fetalis, or congenital cyanotic heart defects were excluded. Neonates born on even dates were allocated to the room air group, and those born on odd dates, to the oxygen group.

Protocol for ventilation. The neonates were bagged with an AMBU Infant Resuscitator (Ambu International Inc., Brøndby, Denmark) using a face mask and a ventilatory frequency of about 60/min for as long as it was needed. Neonates in the room air group who were [illegible] or bradycardic after 90 s were switched to 100% oxygen supplementation. One hundred percent oxygen was delivered by connecting a corrugated tube reservoir to the bag with an oxygen flow rate of at least 4 L/min.

Baseline parameters. Detailed baseline material, intrapartum, and neonatal variables were recorded in every newborn enrolled into the study. These included gestational age, parity, antenatal

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Model Hospital Breastfeeding Policies for Full-Term Normal Newborn Infants

Definition and Purpose:

To promote a philosophy of maternal and infant care which advocates breastfeeding and supports the normal physiologic functions involved in this maternal-infant process. The goal is to assure that all families who elect to breastfeed their infants will have a successful and satisfying experience.

1. Hospital administrative, medical, nursing and nutrition staff should establish a strategy which promotes and supports breastfeeding through the formation of an interdisciplinary team responsible for the implementation of hospital policies and provision of ongoing educational activities.[1,2,3,4,5]

2. All pregnant women should receive information regarding the benefits and management of breastfeeding prior to delivery.[1,3,4,6,7,8,9,10]

3. Every mother should be allowed to have a close companion stay with her continuously throughout labor.[11,12,13,14]

4. Infants are to be put to breast as soon after birth as feasible for both mother and infant. This is to be initiated in either the delivery room or recovery room, and every mother is to be instructed in proper breastfeeding technique and re-evaluated before discharge.[8,15,16,17,18,19,20,21]

5. Breastfeeding mother-infant couples are to room-in together on a 24 hour basis.[7,15,22,23,24,25,26]

6. The infant is to be encouraged to nurse <u>at least</u> 8-12 times or more in 24 hours, for a minimum of 8 feedings per 24 hours.[8,18,23,27,28,29,30,31]

7. Specific timing at the breast is not necessary. Infants usually fall asleep or release the nipple spontaneously when satiated.[27,28,32,33,34,35,36,37]

8. Infants should spontaneously finish the first breast, and then be encouraged to try the second breast at each feed.[36,37,38]

9. If a feeding at the breast is incomplete or ineffective, the mother should be instructed to begin regular expression of her breasts in conjunction with continued assistance by an experienced staff member. The colostrum or milk obtained by expression should be given to the baby.[39,40,41,42,43,44,45]

10. No supplementary water or milk is to be given unless specifically ordered by a physician or nurse practitioner.[6,8,41,42,46,47,48]

11. Pacifiers are not to be given to any breastfeeding infant unless specifically ordered by a physician or nurse practitioner. The use of bottle nipples and nipple shields should be discouraged.[17,49,50,51]

12. Breastfeeding mothers are to have breasts examined for evidence of lactation or breastfeeding problems at least once every nursing staff shift.[43,52,53]

13. Discharge gift packs offered to breastfeeding mothers should contain only noncommercial materials which provide educational information and promote breastfeeding.[6,24,54,55,56]

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14. All breastfeeding mothers are to be advised to arrange for an appointment for their baby's first checkup within one week after discharge.[42,57]

15. At discharge, each mother is to be given a phone number to call for breastfeeding assistance.[42,57]

16. Policies 1, 2 and 4 and 10 through 15 apply when mothers and babies are separated. Mothers who are separated from their babies are to be instructed on how to maintain lactation.[3,40,42,44,45,58,59]

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Meconium-stained amniotic fluid and respiratory complications: impact of selective tracheal suction.

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OBJECTIVE:

To determine prospectively the incidence of several pulmonary diagnoses among infants born through clear or meconium-stained amniotic fluid (AF) managed by a selective approach to tracheal intubation.

METHODS:

All live births greater than 36 weeks' gestation occurring between January 1990 and December 1992 were included. Diagnostic criteria for several respiratory disorders were determined prospectively and monitored.

Infants with light meconium and vigorous infants with moderate to thick meconium were selectively not suctioned. A control group of infants with clear AF matched for gestational age and year of birth was randomly selected for comparison. The incidence and severity of respiratory disease were compared between the groups.

RESULTS:

Of 4938 live births, 799 (16%) had meconium-stained AF (light, 334; moderate to thick, 465). Compared to 211 infants with moderate to thick meconium selectively not suctioned, 196 suctioned infants had significantly greater rates of abnormal fetal heart rate (FHR) patterns, fetal acidosis, low Apgar scores at 5 minutes, need for resuscitation, and neonatal intensive care unit admission.

Meconium aspiration syndrome was significantly more common in suctioned infants as compared to those selectively not suctioned, those with light meconium, and those with clear fluid (11 versus 3 versus 0 versus 0%; $P < .01$).

The need for ventilator or oxygen support was similar between infants with clear fluid, lightly stained fluid, and moderate to thick fluid who were selectively not suctioned, but **was significantly greater among suctioned infants ($P < .01$)**.

CONCLUSIONS:

We conclude that a selective approach to tracheal intubation and suction of infants with meconium-stained AF was not associated with increased pulmonary morbidity or mortality.

Postnatal management of neonates at greatest risk of meconium aspiration syndrome does not necessarily prevent adverse pulmonary outcome.

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Swaddling and Acute Respiratory Infections

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Abstract: In Turkey and China the ancient practice of swaddling is still commonly practiced. Both countries have extremely high rates of pneumonia, especially during the neonatal period. Preliminary evidence on the possibility that swaddling may interfere with normal respiratory function and thereby predispose to pneumonia was gathered in a teaching health center in Ankara. Babies who had been swaddled for at least three months were four times more likely to have developed pneumonia (confirmed radiologically) and upper respiratory infections than babies who were unswaddled. These preliminary findings were highly significant and are being followed up by further studies. (*Am J Public Health* 1990; 80:873–875.)

Introduction

The ancient practice of swaddling has almost disappeared in most countries of the world. A national sample survey in Turkey, however, showed that 93 percent of mothers swaddle their children.[1] In China also, most babies are tightly swaddled from birth through the first several months of life.[2] Since these two countries include over one-fifth of the children of the world, the number of swaddled babies is substantial.

In both countries pneumonia is the first cause of death among children, with particularly high incidence among neonates. In Turkey about 50,000 infant deaths occur annually due to pneumonia.[3] In China over 300,000 child deaths per year are attributed to pneumonia with a child mortality rate twice as high as the second highest cause of death.[4] Forty percent of these deaths are under one month of age.

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In trying to explain this extremely high incidence of pneumonia we focused on the possibility that swaddling might interfere with normal respiratory function and lung expansion. No studies have been published of possible relationships between swaddling and acute respiratory infections or pneumonia.

The common cultural practice is that immediately after birth babies are tightly bound in layers of cloth. Complete swaddling immobilizes the baby from the neck to the feet. The legs are pressed firmly together with the knees straight and the arms are bound to the sides or slightly to the front of the body. The layers of cloth are not only pulled tightly but they are also securely tied to minimize body movement. In partial swaddling cloth is wrapped around the legs and torso up to the armpits, but the arms are free. In both types of swaddling the child may also be covered with netting or a blanket to prevent exposure to flies, drafts or cold air. Babies are almost always laid on their backs and kept in a dark room to induce sleep.[5] Swaddled babies seldom cry and respirations seem shallow to an observer, raising the question of whether full expansion of the lungs occurs. A variety of devices are used to dispose of excreta in Turkey but in the urban area where this study was done families use cloth diapers.

Methods

The records from Gulveren Health Center in a suburb of Ankara were examined to look for associations between swaddling and selected health problems. This teaching health center of Hacettepe Medical School has high standards of follow-up and care of all the children in the health center area. Records were available on 186 infants, of whom 94 had been unswaddled, 29 had been partially swaddled, and 63 had been completely swaddled. The rate of swaddling is lower than the national figure because this study included only those babies who were swaddled for at least three months.

All infants were examined and detailed histories were taken. The ages of the children at the time of this cross-sectional study ranged from three to 12 months, with a mean of 6.8 months. Sex ratios were similar in all groups as shown

364

Table 1. The mothers ranged in age between 21 and 25 years and literacy levels in the three groups were 84, 88, and 89 percent. The average number of people in each household was 5.0 in the unswaddled group, 4.81 in partially swaddled, and 5.47 in the completely swaddled group. Families were all from the same socioeconomic levels with most fathers employed in industrial plants in Ankara and approximately 11 percent unemployed in each group.

Body weights and developmental stages were similar in all groups. The history included careful questioning about respiratory infections; having more than two infections during the period up to examination was classified as frequent upper respiratory infections. Physical examination included observation for signs of rickets and congenital dislocation of the hip.

All children had been followed at the health center by midwives with high compliance for regularly scheduled clinic and home visits. If illness occurred, babies were usually brought to the health center. At the time of regularly scheduled visits, parents were also asked about illnesses treated elsewhere. All of this information was filled in on follow-up records. If the baby had special tests at a hospital, the laboratory and x-ray records were obtained and transferred to the follow-up cards. History of respiratory infections was included in this analysis only if the diagnosis had been recorded on the baby's follow-up records. A diagnosis of pneumonia was made only when clinical records showed cough, fever, and crepitations. All pneumonia cases had positive x-rays at the time of illness which were reviewed again as part of this study. Some had respiratory distress but none required hospitalization.

Results

Table 1 shows the frequency of respiratory illnesses identified in these infants. Pneumonia and a history of at least two upper respiratory infections were each about four times more common in swaddled than unswaddled babies. The association with partial swaddling was as strong as with complete swaddling and these groups were combined for statistical testing.

Discussion

Few studies have been done of the effects of swaddling. Lipton,[6] *et al*, reported that swaddling reduces motor activity and encourages the baby to sleep. Chisholm[7] confirmed these findings about motor activity and sleep and also reported less response to stimulation and less variation in heart rate. A report from Beijing[8] compared transcutaneous oxygen tension in 40 neonates with moderate pneumonia, confirmed radiologically, who were observed for periods when they were swaddled and unswaddled and placed in prone and supine positions. Measurements were made 30 minutes after feeding when the infant was asleep. Unswaddled babies in the prone position had oxygen tension 18 percent higher than swaddled supine babies and 12 percent higher than unswaddled supine babies. Several studies have shown that babies in the prone position have improved respiratory function when compared with babies in the supine position.[9,10] It may be that a combination of swaddling and the supine position produces the greatest effect on respiratory ventilation.

Rickets was more common in swaddled babies than in unswaddled babies presumably because of lack of exposure to sunlight. In Israel, Block reported an association between swaddling and congenital dislocation of the hip[11] and similar results were reported among Navajo babies bound to cradle boards.[12] No such association was found in this series of cases.

The extremely high mortality and morbidity from neonatal and infant pneumonia in China and Turkey is being further investigated by prospective studies which will provide more precise information on time relationships between swaddling and pneumonia. If a causal relationship can be defined, educational efforts can try to modify this traditional practice. The possible advantages of swaddling should also be studied since parents say that a swaddled baby child is easy to care for because it is quiet and sleeping most of the time.

TABLE 1—Swaddling, Pneumonia and Respiratory Infections in Turkey

	Unswaddled (n:94)		Partially Swaddled (n:29)		Completely Swaddled (n:63)	
Age (months)	7.9 ± 2.3		8.1 ± 3.3		7.4 ± 2.1	
Male/Female	1.08		1.07		1.11	
Number in Household	5.0		4.81		5.47	
% Literacy of Mothers	84		88		89	
	n	%	*n*	%	*n*	%
Pneumonia*	3	3.2	7	24.1	8	11.6
Frequent URI*	3	3.2	4	13.8	10	14.5

*Fisher's exact test used to compare unswaddled with both groups of swaddled babies added together: for pneumonia p = .002 and for frequent upper respiratory infections p = .004.

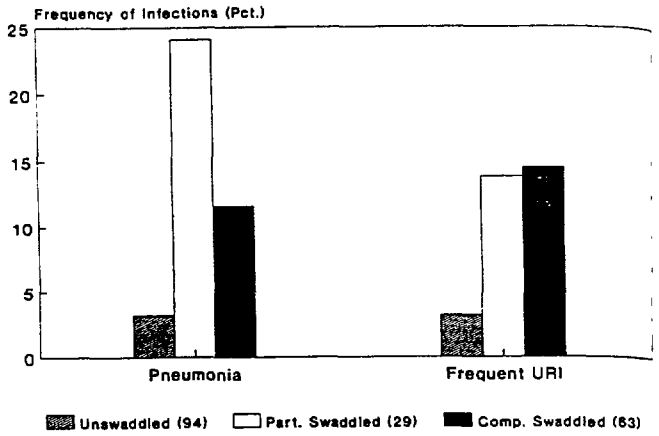

FIGURE 1—Swaddling and Respiratory Infections.

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366

APPENDIX B

APPENDIX B: DAY FOUR

CASE STUDY: INSTITUTIONAL BARRIERS

Scenario: A small group of physicians and midwives attended a conference on FCMC and now they desire to initiate some of the practices they learned about it their own institution.

Barrier: The head of the maternity is concerned that this is just a reaction to what they learned--a passing fad. He or she is concerned that there are Ministry of Health regulations prohibiting these changes. He or she doesn't want to rock the boat.

Problem: What should the providers do to address the administrator's concerns? Specifically how can they address the regulations, assure acceptance and longevity among providers and reassure him/her about the benefits of these practices?

CASE STUDY: PROVIDER BARRIERS

Scenario: The physicians and midwives at an urban maternity hospital would like to reassess their practices and incorporate some of the newer FCMC practices that have proven successful elsewhere. They feel that their best success in selling the idea to administration will be to have pediatrics present when they request these changes. When they approach the chief pediatrician and the chief obstetrician, they find both are resistant to the idea. The chief obstetrician is concerned that women are too high risk for these practices. Further he thinks the risk of infection is great. When they tried allowing visiting once before, they had trouble with fathers drinking as it is the custom in Moldova to celebrate the birth of the child with wine. The chief pediatrician has concerns about the effects of the fathers' handling of the baby after birth and the family visitations. She is particularly concerned about infant infections.

Problem: How will the physicians and midwives approach educating the two chiefs and addressing their concerns? What resources might they access to educate the two chiefs about her concerns?

CASE STUDY: CONSUMER BARRIERS

Scenario: A group of physicians and midwives have initiated some FCMC practices in their prenatal clinic and maternity. They are offering many more classes for both the woman and her partner and family. They are encountering much skepticism on the part of the women about their own ability to labor and birth without analgesia and their husbands' ability to support them. In addition, very few male partners are interested in the classes that are being offered which is minimizing attendance by the women as well.

Problem: Describe the specific steps that the providers will take to increase the confidence level and interest among their clientele.

APPENDIX C

APPENDIX C-1: DAY FOUR

EVALUATION: --OBJECTIVES FROM CURRICULUM

4. describe the rationale, components and models of evaluation.
5. describe the purpose, importance and methods of consumer involvement in evaluation.
6. develop program-specific and site-specific evaluation/monitoring plans for introducing FCMC

DEFINITION: Application of social science research procedures to judge and improve the way that programs and social policies are conducted

WHY? 1. PURPOSE

- Determine If Project Goals Achieved
- Evaluate Effectiveness of A Change
- Influence Future Direction of An Initiative
- Validate for Internal Community
- Validate for Broader Community

Look at:

1. How are programs carried out at different levels?
2. What is the cost of the program?
3. How does change occur over time?
   In resources
   In production
   Use of services
4. Mid-course correction needed?
   On track? Problems? Unexpected results?

Evaluation should be an integral part of any intervention and built in from the start!

Overview of Procedure

Determine goals and objectives

Describe how programs should work

Decide on type of evaluation

Decide on level of measurement

Identify indicators to measure

Determine goals and objectives

Example: The goal of this initiative

Integrate FCMC philosophy and practices into the maternity care services in Moldova by conducting a training for trainers (tot) in FCMC.

Create a core group of FCMC trainers
Develop action plans for FCMC implementation into each training site
Develop training strategies for conducting FCMC TOT's at their institutions and others
Motivate and attain commitment from TOT Trainers to establish a demonstration model for FCMC at their various institutions.
Develop strategies to reduce barriers to implementation of FCMC.
Maintain technical working groups to provide training oversight each institution.

TO BEGIN: DESCRIBE HOW PROGRAM SHOULD WORK. Choose type of evaluation that is practical and feasible and answers the most important questions.

LOOK AT SCOPE AND FOCUS

TARGET AREA = COUNTRY, REGION, CITY, INSTITUTION

PROGRAM COMPONENTS = INPUTS, PROCESSES, OUTPUTS, OUTCOMES

MEASUREMENTS = CAN BE POPULATION LEVEL (RANDOM SAMPLE) OR PROGRAM LEVEL (EVERYONE IN PROGRAM)

TECHNIQUES = QUALITATIVE (PROCESS) VERSUS QUANTITATIVE (RESULTS)

TARGET POPULATION = WOMEN AND FAMILIES FOR THIS PROJECT

DEFINITIONS

OBJECTIVE: A SPECIFIC OPERATIONALIZED STATEMENT DETAILING THE DESIRED COMPONENTS OF A PROGRAM. IS BEST WHEN IT CAN BE MEASURED EXACTLY AND IS LIMITED IN TIME, E.G. By January 30, 1998 all staff in the labor and birth units at the maternity will be trained in FCMC.

INPUTS: SET OF RESOURCES (personnel, facilities, space), OR RAW MATERIAL OF THE PROGRAM (equipment, supplies, etc)

PROCESSES: SET OF ACTIVITIES IN WHICH PROGRAM INPUTS ARE USED TO REACH EXPECTED RESULTS FROM THE PROGRAM. INCLUDES ALL SERVICE DELIVERY OPERATIONS THAT THE PROGRAM CONDUCTS (Management, training, commodities, logistics, information, education, communication, research, and evaluation.)

OUTPUTS: THE RESULTS OBTAINED AT THE PROGRAM LEVEL THROUGH EXECUTION OF THE ACTIVITIES USING THE RESOURCES. (Examples: number of personnel trained, number of informational talks given, number of women using the program or services, quality of care given

OUTCOMES: SET OF RESULTS EXPECTED TO OCCUR AT THE POPULATION LEVEL. VERY DIFFICULT TO MEASURE AS CHANGES IN MATERNAL-CHILD HEALTH STATUS COULD TAKE 5 TO 10 YEARS.

PROGRAM LEVEL POPULATION LEVEL

INPUT --- PROCESS ---- OUTPUT ---------- OUTCOME

TECHNIQUES see curriculum

COMPARISON OF TECHNIQUES see curriculum

IDENTIFY INDICATORS TO MEASURE

Consider availability of data needed to measure indicator

Consider amount of time allotted to the evaluation

Financial support available

Donor agency requirements

EVALUATION

WHAT	**SCOPE**
	GOALS AND OBJECTIVES OF THE PROGRAM
	CONCEPTUAL FRAMEWORK: MAP BETWEEN LINKS OF INPUTS, PROCESSES, OUTPUTS, OUTCOMES
	OBJECTIVE OF EVALUATION = PROGRAM MONITORING
HOW	**METHODOLOGICAL APPROACH**
	STUDY DESIGN
	INDICATORS
	DATA SOURCES
WHO, WHEN WHAT FUNDS	**IMPLEMENTATION PLAN**
	INDIVIDUALS AND INSTITUTIONS RESPONSIBLE FOR DIFFERENT PARTS OF THE PROGRAM
	TIMETABLE
	BUDGET
WHY	**DISSEMINATION AND UTILIZATION OF RESULTS**
	AUDIENCES
	FORMAT AND CONTENT

APPENDIX C-2: DAY FOUR

CASE STUDY: EVALUATION PROCESS

SCENARIO: The clinicians at a local clinic have requested a change in the way that prenatal care is delivered. They wish to make it more family-centered, particularly involving husbands and partners more in the care and increasing the education component. Their desire for change is based on their own readings and has not been addressed with the women and families they serve. The clinic administrator has agreed to this if they can prove that the families they serve also desire it and will accept it. They reach agreement of a two-month trial period for this new initiative. If the project is to continue past that time, the clinicians must be able to demonstrate acceptance and desire for continuation among the families they serve.

PLAN: The clinicians meet and define the steps that they think will lead to the greatest chance for success: education, positive reinforcement and evaluation. They decide that they need to do a pre- and post-project evaluation piece for comparison. They then decide to combine a qualitative and quantitative aspect to the evaluation. They design questionnaires eliciting information regarding families needs and desires for education and involvement. The qualitative piece is done via focus groups which meet before and after the trail period to obtain input and discussion about various aspects of the project. This input is used in the design and administration of the project.

RESULTS: At the end of the two month trail period, the clinicians were able to produce editorial comments for participants plus documented responses to the perceived pluses and minuses of the project with recommendation from both providers and families about continuation and content.

APPENDIX C-3: DAY FOUR

CASE STUDIES ON EVALUATION PROCESS

CASE STUDY: PRENATAL CARE

Scenario: The providers at a prenatal clinic have been told by their administrators that they will be receiving education about FCMC and integrating the material into their management within three months. She has asked them to develop and conduct a pre-project evaluation tool which will be used for strategic planning for the integration of changes. The subjects are the consumers.

Problem: Describe the evaluation tool(s), including when, how and by whom they will be administered. Discuss all the details of recruitment and compliance and how barriers will be addressed.

CASE STUDY: INTRAPARTUM CARE

Scenario: The providers at a busy urban maternity hospital have been asked to attend a training on FCMC and integrate the new practices within 6 months of the training. The request has come from the consumers and is supported by administration. The providers express many concerns, particularly about having the time to perform what they perceive as labor-intensive practices, such as bedside support. The chief of service has been asked to conduct a pre-TOT evaluation project to ascertain providers barriers and attitudes. The information from the evaluation will be used to direct the training and implementation.

Problem: Describe the evaluation project that would best meet the stated goals of identifying barriers and directing implementation. Please be specific about how this information could then be utilized to direct the TOT.

CASE STUDY: POSTPARTUM/NEWBORN CARE

Scenario: Pediatrics has agreed to try family visitation for a period of three months at your institution. Continuation after three months depends on consumer and providers satisfaction and effect on maternal and infant morbidity. It is your job as Chief of OB to design and execute an evaluation plan to ascertain the requested results at the end of the trail period.

Problem: Describe in detail the evaluation plan that you will design. Be specific about all of the components, that is who will administer what aspects to which groups and how results will be interpreted and presented to the administrative and clinical staff including pediatrics.

APPENDIX D

APPENDIX D-1: DAY FOUR

Continuous Improvement Strategy

1. The **Postpartum Questionnaires for Mothers** and the **Clinical Practice Indicators Patient Information** form should be collected by the FCMC Statistics Coordinator at each Demonstration Site.

2. The data should be tabulated monthly on the **Monthly Tally Sheet** and monthly reports comparing results to the **Clinical Practice Indicator Targets** prepared.

3. Reports should be distributed to the FCMC TOT Team and to the administration and staff at the maternity.

4. The reports should be discussed at regular meetings where additional strategies may be planned.

5. In addition, the data may be collected for the entire project by establishing a Statistical Coordinator for the FCMC Project who will collect this data on a quarterly basis. This person may compare data from all sites implementing the new program, prepare reports, and send this information back to the sites, allowing each to compare their progress with the others. This data should also be sent to MotherCare at John Snow, Inc, and may be sent to UNICEF, the Ministry of Health, and other interested parties.

APPENDIX D-2: DAY FOUR

CLINICAL PRACTICE INDICATORS FOR FCMC TOT

By _____, The following maternities will reach these goals.

INDICATORS	SIMFEROPOL	LVIV
PARTICIPATION	>20%	>10%
BREAST-FEED	>80%	>90%
AMBULATION	>80%	>80%
ROOMING-IN	>60%	>80%
ENEMA	<35%	<70%
SHAVE	<15%	<50%
EPISIOTOMY	<15%	<18%
LABOR SUPPORT	>95%	>90%
ACCOMPLISHMENT	>61%	>60%
DECISIONS	>50%	>50%
PARTOGRAPH	>65%	>45%

APPENDIX D-2: DAY FOUR
CLINICAL PRACTICE INDICATORS FOR FCMC TOT

By _____, The following maternities will reach these goals.

MATERNITY				
1. PARTICIPATE				
2. FIRST B-FEED				
3. C/SECTION				
4. PRIOR C/S				
5. TRIAL LABOR				
6. VBAC				
7. MONITORING				
8. EPISIOTOMY				
9. INDUCTIONS				
10. ANALGESIA				
11. ANESTHESIA				
12.PARTOGRAPH				
13. DECISIONS				
14. SUPPORT				
15. AMBULATE				
16. ACCOMP.				
17. ENEMA				
18. SHAVE				
19. ROOMING-IN				
20. SUPPORT PP				

APPENDIX D-3: DAY FOUR
OBSTETRIC PRACTICES AND BENCHMARKS FOR SUCCESS

GOAL: The maternity department at _____ will implement a program which includes the following 15 obstetric practices. They are recommended by the World Health Organization and supported by the preponderance of scientific literature as reported in Effective Care in Pregnancy and Childbirth by Chalmers, et. al.

1. **Practice** - the staff will promote the family-centered maternity care program.
   Benchmark - >_____% of women will participate in the family centered maternity care program.

2. **Practice** -The maternity staff will encourage and support breast-feeding to begin as soon as possible, right in the delivery room in most instances.
   Benchmark - > _____ % of mothers will begin breast-feeding in delivery room.

3. **Practice** - The maternity staff will exercise appropriate discrimination in their indications for Cesarean section.
   Benchmark - < _____% of all births will be by Cesarean section.

4. **Practice** - The maternity staff should arrange for patients with a prior C/section (except those with a vertical incision in the uterus) to be given a trial of labor.
   Benchmark - _____% of patients with a prior low transverse C/section will have a trial of labor and _____% will deliver vaginally.

5. **Practice** - The maternity staff will use continuous fetal heart rate monitoring for obstetrical indications only (not routinely).
   Benchmark - < _____% of women will have continuous fetal heart rate monitoring during labor.

6. **Practice** - The maternity staff will be very discriminate in their use of episiotomy.
   Benchmark - < _____ % of women will have an episiotomy performed.

7. **Practice** - The maternity staff will induce labor only for medical obstetric problems or for pregnancy that goes beyond 41 completed weeks.
   Benchmark - < _____ % of labors will be induced

8. **Practice** -The maternity staff will recognize the importance of women delivering their babies with a sense of awareness, control, and accomplishment and also be aware of the potential adverse effects of analgesics and anesthetics. They will therefore exercise appropriate discrimination in their use.
   Benchmark 8A - > _____ % of women will feel that they delivered their babies with a sense of control and accomplishment.
   Benchmark 8B - < _____ % of women will receive analgesic during labor.
   Benchmark 8C - < _____ % will receive conduction anesthesia for labor or a

spontaneous vaginal birth.

9. **Practice**: The maternity staff will assist women to participate in decisions about their care.
Benchmark -> _____ % of women will feel that they played an active role in making the decisions about their maternity care.

10. **Practice** -The mother will receive extensive support from the family and the maternity staff, during labor and delivery.
Benchmark - > _____ % of women will say that they felt supported physically and emotionally during labor.

11. **Practice** -The maternity staff will recognize and encourage the advantages of the upright position and ambulation during labor and a variety of positions for delivery.
Benchmark - > _____ % of women will ambulate significantly during labor and delivery.

12. **Practice** - The maternity staff will not administer an enema to laboring women prior to delivery.
Benchmark - < _____ % of women will have an enema prior to delivery.

13. **Practice** - The maternity staff will not shave the pubic hair of laboring women prior to delivery.
Benchmark - < _____ % of women having a vaginal delivery will have their pubic hair shaved.

14. **Practice** - The maternity staff will arrange for healthy mothers and newborns to remain together whenever possible.
Benchmark - > _____ % of mothers and babies will room in together.

15. **Practice** -The maternity staff will recognize the value of the use of partograph during labor
Benchmark - > _____ % of women will have information recorded on their partographs as labor progresses.

APPENDIX D-4: DAY FOUR

Post-Partum Delivery Record*

To be completed by the maternity staff soon after delivery.

MOTHER'S NAME:_____DATE _____

The patient participated in our family-centered maternity care program.	1.	YES	NO
The first breast-feeding occurred in the first hour.	2.	YES	NO
This birth was by Cesarean Section (Indication _____).	3.	YES	NO
This patient had a prior transverse uterine C/Section	4.	YES	NO
If Yes, did she have a trial of labor?	5.	YES	NO
If YES, did she deliver vaginally?	6.	YES	NO
This patient had continuous fetal heart rate monitoring for more than 45 minutes during labor and delivery.	7.	YES	NO
An episiotomy was performed.	8.	YES	NO
This labor was induced (Indication _____)	9.	YES	NO
Analgesic drugs were used during this labor.	10.	YES	NO
Was a conduction anesthetic used either for labor or a spontaneous vaginal birth?	11.	YES	NO
The partograph was indicated and was used for this labor.	12.	YES	NO

COMMENTS: _____

_____

_____

_____

_____

_____

*This form should be filled out by the midwife or doctor who performs the delivery as soon as possible after the delivery. Please give this form to the Coordinator for FAMILY-CENTERED MATERNITY CARE PROJECT statistics

APPENDIX D-5: DAY FOUR

Postpartum Questionnaires for Mothers

To be completed by mother and family 24-48 hours after delivery.

Name _____ **Date** _____

		Please circle one	
I feel that the maternity staff invited me to participate in decisions about my obstetric care, and they also provided me with enough information to make intelligent decisions	13.	Yes	No
Someone from my family was with me almost 100% of the time and additionally, one of the maternity staff was with me at least 50% of the time during labor and delivery.	14.	Yes	No
The maternity staff encouraged and assisted me to be out of bed for more than 50% of my labor (even when I was pushing)	15.	Yes	No
I delivered my baby with a sense of control, and I feel a great sense of accomplishment.	16.	Yes	No
I received an enema prior to my delivery.	17.	Yes	No
My pubic hair was shaved.	18.	Yes	No
My baby was in the same room with me almost the entire time I was in the hospital.	19.	Yes	No
The maternity staff has been very helpful and encouraging to help me establish breast-feeding with my baby. immediately after birth.	20.	Yes	No

Additional Comments:

_____

_____

Please fill out this form before you leave the maternity and leave it with the charge midwife. Your comments will be considered confidential and the information will be used to assess the changes that are being made in the maternity to improve services for mothers and their families.

FAMILY-CENTERED MATERNITY CARE PROJECT: CLINICAL PRACTICE INDICATORS MONTHLY TALLY SHEET p. 1

MONTH/INDICATOR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTALS
NO. OF BIRTHS													
1. PARTICIPATION													
2. FIRST B-FEED													
3. C/SECTION													
4. PRIOR C/S													
5. TRIAL OF LABOR													
6. VBAC													
7. MONITORING													
8. EPISIOTOMY													
9. INDUCTIONS													
10. ANALGESIA													
11. ANESTHESIA													
12. PARTOGRAPH													

FCMC INDICATORS p. 2													
MONTH/INDICATOR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTALS
13. DECISIONS													
14. SUPPORT													
15. AMBULATE													
16. ACCOMPLISHMENT													
17. ENEMA													
18. SHAVE													
19. ROOMING-IN													
20. SUPPORT PP													

SECTION 5. DAY FIVE: Adaption of FCMC into Various Settings

ADDENDA: DAY FIVE

A. Scenarios for Role Play

B. Evaluation Week One

C. 1. FCMC Post-Test

2. Puerperal Sepsis Post-Test

3. FCMC Post-Test Answers (Trainers' Copy Only)

4. Puerperal Sepsis Post-Test Answers (Trainers' Copy Only)

D. Clinical Skills List

DAY 5: Adaptation of FCMC into Various Settings

Learning Objectives:
At the end of Day 5, the participants will be able to:

1. differentiate between a trainer and preceptor
2. demonstrate the possession of the necessary knowledge, skills and motivation to integrate FCMC into a variety of settings
3. identify and articulate remaining barriers, particularly attitudinal, to FCMC.
4. identify strategies to address and facilitate removal of all remaining barriers.
5. demonstrate psychological and physical methods of labor support useful for FCMC

Morning Session

- Time:
  - 1 hour discussion
  - 2 hours of role play
- Materials:
  - Handouts
  - Flip chart
  - Props for Role Play as Available
  - Clinical skills list

	TOPIC	TIME	TEACHING METHODS
I.	General discussion/evaluation of the weeks information and teaching techniques. Orient to the clinical experience of the next week. Discuss differences between trainer and preceptor. Address remaining questions and answers.	60 Minutes	All old materials: Flip charts Overhead Handouts Clinical skills list
II.	Role play demonstration	30 Minutes	Props as appropriate
	BREAK	**15 Minutes**	
III.	Separate group role play	90 Minutes	Props as appropriate

Lunch: 60 Minutes

Afternoon Session

- Time:
  - 2 hours role play
  - 30 minute question and answer period
  - 20 minute. written evaluation
  - 20 minute. post-test
- Materials:
  - Props as appropriate
  - Post-test

	TOPIC	TIME	TEACHING METHODS
IV.	Role Play	90 Minutes	Props as appropriate
V.	Question and answer period	30 Minutes	Large group discussion
VI.	Written evaluation of didactic	20 Minutes	Evaluation form
VII.	Post-test	20 Minutes	Post-test
	Complete Action plans	As Needed	

DAY 5: MORNING SESSION

SESSION OUTLINE	SESSION NOTES
I. Large Group Meeting	• Evaluate previous days teaching techniques • Differentiate between trainer and preceptor • Question and answer period for didactic • Introduce/orient to clinical week • Orient to materials for week 2
II. Role Play Demonstration	**See Appendix A-Day Five** • Briefly discuss role play • Volunteer participant and staff role play a scenario • Players discuss their dynamic • Observers discuss their reactions
III. Role Play	• Various groups are formed • Scenarios for all settings of care are role played

DAY 5: AFTERNOON SESSION

SESSION OUTLINE	SESSION NOTES
IV. Role Play	• Continue until all participants have role played all care settings
V. Questions and Answers	• Address all final questions for this component
VI. Written Evaluation	**See Appendix B-Day Five** • Written evaluation of didactic component
VII. Post-test	**See Appendix C-Day Five** • All participants complete post-test
Action Plans	• Spend additional time completing action plans as needed

END OF DAY 5 AND WEEK ONE

APPENDIX A

APPENDIX A: DAY FIVE

ROLE PLAY
SCENARIOS/ACTIVITIES/SKILLS

NORMAL LABOR

- Position change/movement
- Massage/touch
- Counter pressure/acupressure/knee press/double hip squeeze
- Superficial heat/cold
- Hydrotherapy
- Vocalize/words/music/visualization
- Attention focusing/eye contact/breathing
- Role model for spouse/partner/labor support person

LABOR "CHALLENGES"' AND COMPLICATIONS

- Posterior position
- Prolonged latent phase of labor
- Prolonged active phase of labor
- Prolonged second stage of labor
- Decreased maternal Pain tolerance
- Fetal heart rate changes
- Maternal anxiety/family anxiety

APPENDIX B

APPENDIX B: DAY FIVE

FIRST TOT WEEK EVALUATION

Now, that the first TOT week has finished, we would like to learn about your impressions of the Course. Please read the given below questions attentively and circle the most appropriate answer. There is a choice of grades from 1 to 5, where 1 corresponds to an absolute disagreement and 5 to an absolute agreement.

	Disagree				Agree
1. The contents embraced all the most important clinical aspects of the FCMC practice.	1	2	3	4	5
2. An adequate number of various teaching methods was used to keep the interest.	1	2	3	4	5
3. The work in small groups was very effective for discussing and planning changes at my place of work.	1	2	3	4	5
4. Materials are concrete, well designed and easy to use.	1	2	3	4	5
5. The language and method used are of a very high professional level.	1	2	3	4	5
6. The work of the trainers is well-organized and they work effectively with the group.	1	2	3	4	5
7. There was enough time for the contact with the group.	1	2	3	4	5
8. This Course met my expectations.	1	2	3	4	5
9. I feel capable to teach this part of the TOT at my place of work.	1	2	3	4	5
10. I would like to implement some of the FCMC practices in a clinical setting.	1	2	3	4	5

I have the following suggestions for changes:

_____

_____

_____

APPENDIX C

APPENDIX C-1: DAY FIVE

FCMC TOT POST-TEST

Please circle T for True or F for False.

1.	Women are apt to be less embarrassed and therefore more relaxed if no one familiar is around them in labor.	T	F
2.	Women with spontaneous rupture of membranes should remain in bed during labor.	T	F
3.	Newborns are generally too excited to breast-feed soon after birth. They should rest first before attempting to nurse.	T	F
4.	Women, while seeming to be out of control in labor, are in fact hyper-alert and retain what is said and done to them and are impacted by it after birth.	T	F
5.	Routine ultrasound in every pregnancy is an example of the inappropriate use of technology.	T	F
6.	Continuous electronic fetal monitoring has reduced fetal morbidity and mortality extensively.	T	F
7.	Epidural anesthesia has proven effective in reducing cesarian delivery in primiparas due to the increased relaxation.	T	F
8.	Use of the partograph during labor will assist with early detection of problems and complications.	T	F
9.	Perinatal infection is largely preventable with consistent hand washing and wearing of gloves.	T	F
10.	Allowing family members in street clothes into the labor and delivery unit of a hospital has not increased perinatal infection rates.	T	F
11.	Adults learn best when presented with data in a formal manner such as lecture and handouts.	T	F
12.	Women are significantly impacted by their labor and birth experiences and thus should be significantly involved in the decision-making aspect of their care.	T	F

APPENDIX C-2: DAY FIVE

PUEPERAL SEPSIS POST-TEST*

Q.1 What is puerperal sepsis?

Q.2 When the membranes rupture many hours before labor begins, what condition may develop?

Q.3 Following delivery, where might puerperal sepsis be localized?

Q.4 What are three life threatening conditions which may result from puerperal sepsis?

Q.5 What are three common signs of puerperal sepsis?

Q.6 What are four risk factors for puerperal sepsis which could be identified on history taking?

Q.7 What are three risk factors for puerperal sepsis which could be identified by physical examination?

Q.8 What is the purpose of taking a high vaginal swab?

Q.9 What are two organisms that commonly cause puerperal sepsis?

Q.10 What is the preferred route of administration for antibiotics in the case of puerperal sepsis and why?

*from "Safe Motherhood, Puerperal Sepsis Module" WHO/FRH/MSM/96.4

APPENDIX C-3: DAY FIVE

FCMC TOT POST TEST ANSWERS

Please circle T for True or F for False.

1.	Women are apt to be less embarrassed and therefore more relaxed if no one familiar is around them in labor.	F
2.	Women with spontaneous rupture of membranes should remain in bed during labor.	F
3.	Newborns are generally too excited to breast-feed soon after birth. They should rest first before attempting to nurse.	F
4.	Women, while seeming to be out of control in labor, are in fact hyper-alert and retain what is said and done to them and are impacted by it after birth.	T
5.	Routine ultrasound in every pregnancy is an example of the inappropriate use of technology.	T
6.	Continuous electronic fetal monitoring has reduced fetal morbidity and mortality extensively.	F
7.	Epidural anesthesia has proven effective in reducing cesarian delivery in primiparas due to the increased relaxation.	F
8.	Use of the partograph during labor will assist with early detection of problems and complications.	T
9.	Perinatal infection is largely preventable with consistent hand washing and wearing of gloves.	T
10.	Allowing family members in street clothes into the labor and delivery unit of a hospital has not increased perinatal infection rates.	T
11.	Adults learn best when presented with data in a formal manner such as lecture.	F
12.	Women are significantly impacted by their labor and birth experiences and thus should be significantly involved in the decision-making aspect of their care.	T

APPENDIX C-4: DAY FIVE

PUERPERAL SEPSIS TEST ANSWERS

A.1 An infection of the genital tract at any time between the onset of rupture of membranes or labor and the 42nd day following delivery or abortion.

A.2 Chorioamnionitis.

A.3 The perineum, vagina, cervix, or uterus.

A.4 Septicemia, septic shock, disseminated intravascular coagulation.

A.5 Fever, tender uterus, offensive lochia.

A.6 Any four of the following: prolonged rupture of membranes, prolonged labor, unskilled delivery attendant, unclean delivery equipment, insertion of harmful substances into the vagina, operative delivery, excessive hemorrhage after birth, presence of sexually transmitted disease during pregnancy, presence of diabetes or anemia, woman not immunized for tetanus.

A.7 Any three of the following: evidence of anemia (pale gums or conjunctiva), evidence of retained placental fragments, uterus soft and bulky with excessive lochia, unrepaired vaginal or cervical lacerations.

A.8 To determine whether there is an infection in the genital tract.

A.9 Any two of the following: streptococci, staphylococci, E.coli, clostridium tetani, clostridium welchii, chlamydia and gonococci.

A.10 The intravenous route because the effect of the antibiotics is more rapid than when administered by other routes.

APPENDIX D

Family-Centered Maternity Care
Training of Trainers
Clinical Skills Checklist - EVALUATION

Name:_____

Date:_____

Clinical skills are performed when indicated, in a timely manner, correctly, safely, and with consideration for the women's understanding, comfort, privacy and confidentiality.

	Date:							
	Client Number:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
I.	**SUPPORTIVE - DIRECT CARE ACTIVITIES**								
	a. Physical comfort measures								
	1. Use cool cloths, warm compresses								
	2. Assists with shower								
	3. Linen and underpad change- for women's comfort								
	4. Offer/encourage oral fluids								
	5. Position of comfort encouraged								
	6. Massage back or other body part								
	7. Assist with ambulation								
	8. Reassuring touch e.g. hand holding, stroking brow								
	b. Emotional Support								
	9. Reassurance, encouragement, praise								
	10. Stay with woman to keep company								
	11. Laughter, joking, social chat								
	c. Instruction/Information								
	12. Instruct/coach e.g. breathing, relaxation, pushing								
	13. Give advise e.g. suggest techniques to promote relaxation, comfort								
	14. Instruct/coach partner/labor support person in care								
	15. Explain, provide information e.g. progress, fetus								
	16. Explain physical findings e.g. exam, fetal position								
	d. Advocacy								
	17. Support woman's decisions								

	Date:								
	Client Number:	1	2	3	4	5	6	7	8
	18. Negotiate woman's wishes with other team members e.g. desire for natural childbirth, family present								
	19. Facilitate presence of family/support persons								
II.	**PHYSICAL EXAMINATION**								
	a. Abdominal exam								
	b. Fetal heart rate assessment								
	c. Vaginal exam								
	d. Enema and shave deferred								
	e. Partograph, charting								
III.	**LABOR PROGRESS CHALLENGE**								
	a. Power								
	b. Position								
	c. Passenger								
	d. Pelvis								
	e. Psychological								
	f. Physical								
	g. Partograph								
	h. Intervention								
	Comments:								
IV.	**SECOND STAGE AND BIRTH**								
	a. Position								
	1. Sitting/semi sitting								
	2. Standing								
	3. Squatting								
	4. Side-lying								
	5. Hands and knees								
	6. Lithotomy								
	7. Other								
V.	**MATERNAL/INFANT ATTACHMENT (BONDING)**								
	a. Skin-to-skin (keep infant warm)								
	b. Initiate breast-feeding prior to infant care								
	c. Facilitate maternal/infant/family attachment								

Family-Centered Maternity Care
Training of Trainers

INTRODUCTION for TRAINERS

The following Family-Centered Maternity Care Training of Trainers (FCMC TOT) is a two week theoretical and clinical course. This training has two purposes: to teach the actual family-centered maternity care model of care while also preparing the trainees to be FCMC trainers.

It is assumed that the trainers conducting this course will have experience in the clinical practice of family-centered maternity care. The training is designed to be conducted by a collaborative team of nurse-midwives and an obstetrician. The trainees are an interdisciplinary team of midwives, obstetricians and pediatricians. The mix of trainees will depend on the site. However, the emphasis is on the normalcy of pregnancy, labor and birth so the emphasis is on the training of the midwives. The physicians' presence is to be one of support and collaboration. The FCMC TOT curriculum is evidenced-based. The literature support is presented during the theoretical week and demonstrated during the clinical week.

The theoretical week is divided into five days. Each day starts with a concise outline of the learning objectives, topics, the allotted time and teaching methods. Further, the topic outline is then presented with detailed session notes. It is from the material covered in the daily session notes, the lecture overheads and the referenced appendices that the trainers create the theoretical training. Clarification of certain aspects for each day of the theoretical training and the clinical week are presented below.

Day One

The first day was designed as an overview of the entire FCMC TOT to be given to a large audience of those interested in the training e.g. local obstetricians, midwives, public health officials and administration. The format outlined in the curriculum reflects this objective. However, if a large interdisciplinary audience is not possible, the day may be presented in a similar manner with the small group of FCMC trainees. Adjustments to meet the individual needs of the specific FCMC trainee group should be considered.

Day Two

The FCMC trainee presentations of the scientific literature should follow the Guidelines for Presentation format provided in Appendix H - Day One . It is suggested that only some of the FCMC trainees do presentations as there will be other opportunities during the week of each one to participate.

Day Three

Teaching the use of the partograph may be facilitated by using the 60" x 48" laminated partograph. The laminated partograph may be ordered from

The American College of Nurse-Midwives
818 Connecticut Avenue N.W.
Suite 900
Washington, D.C. 20006
Tel: 202-728-9860
Fax: 202-728-9897

The complete W.H.O. modules on Preventing prolonged labour: a practical guide. The partograph. Part I (WHO/FHE/MSM/93.8), Part II (WHO/FHE/MSM/93.9), Part III (WHO/FHE/MSM/93.10) and Puerperal Sepsis (WHO/FRH/MSM/96.4) and other W.H.O publications are available free of charge from the:

Division of Family Health
World Health Organization
1211 Geneva, 27 Switzerland
Tel: 41 (22) 791-2111
Fax: 41 (22) 791-0746

Day Four

The implementation of FCMC at each maternity center will be evaluated using the identified clinical indicators and benchmarks agreed upon by the maternity center Technical Working Group. (See Day Four - Appendix D 1-6) As part of the "action plan" the FCMC trainees must review and become familiar with the clinical indicators, benchmarks, continuous improvement strategy, the FCMC questionnaires and monthly tally sheets for their facility. As the maternity center FCMC Trainers, they will be responsible for implementing the monitoring program.

Day Five

Role play will help prepare the FCMC trainees for the clinical week. It is suggested that the following strategy may be used to facilitate this interaction.

Set up 3 separate areas for role play. The FCMC trainees will be divided into 3 teams. They will rotate spending 45 minutes or more in each area.

- Area One will be for reviewing normal labor and supportive labor techniques. This

will be staffed by one CNM clinical preceptor. Here the FCMC trainees will practice massage, breathing techniques and ways to help the partner provide effective labor support. These practices have been reviewed during the theoretical week. (See Appendix A: Day Five)

- Area Two will be for reviewing labor complications . This will be staffed by the FCMC obstetrician and one CNM clinical preceptor. They will discuss labor complications and various management strategies with the FCMC trainees. The will role play collaborative management and midwife/obstetrician consultation for the trainees. Use of the partograph may be incorporated for these discussions. (See Appendix A: Day Five)

- Area Three will have the teaching models and aids available which were used during the theoretical week. The FCMC trainees will work independently to familiarize themselves with the teaching models and aids. These models may include but are not limited to: a pelvis and doll model with placenta, cord and amnion/chorion attached, the pelvic exam model, the infant model for breastfeeding demonstrations, a breast model for teaching about lactation, various teaching materials and charts on labor positions, squatting and cervical dilatation.

CLINICAL WEEK

The purpose of the clinical week is to demonstrate the FCMC practices and management for labor, birth and the immediate postpartum that have been discussed during the theoretical week. The certified nurse-midwives (CNMs) will be the clinical preceptors. The obstetrician (OB) will provide on-site consultation services for the nurse-midwives during the clinical week. Further, the nurse-midwives and obstetrician will role model the collaborative relationship between a midwife and physician. Coordination between the FCMC trainee teams and the maternity center clinical staff is imperative. Consultation between the FCMC team and the maternity center clinical staff will be needed when the clinical management of a woman's care includes oxytocin augmentation, instrument delivery or cesarean section. The maternity center clinical staff will assume care for any woman in the FCMC model of care who requires an instrument delivery or cesarean section. The FCMC team will continue to provide supportive care, breastfeeding assistance and postpartum instruction in these cases.

Antenatal Preparation

The maternity center staff is responsible for providing childbirth education and training for couples who will desire participation in the FCMC clinical week. However, couples that do no receive any education will still be encouraged to participate if they meet the admission criteria.

Maternity Center FCMC Room Preparation

405

The maternity center is responsible for preparing the FCMC clinical room(s). The FCMC room should be as home-like as possible. There should be a labor bed, some chairs and/or sofa for the woman and her family. Privacy must be ensured. The room must be for only one woman. The necessary emergency equipment should be available but not prominent in the room surroundings. The room must be warm enough to accommodate the newborn. An infant warmer with the necessary resuscitation equipment should be immediately available if it is not in the room.

FCMC Clinical Week Supplies

It is suggested that the organization conducting the FCMC TOT should provide the basic clinical supplies for the clinical week. This will ensure that the needed equipment is available and that humanitarian aid is not used for the clinical training. The necessary supplies to include should be based on the results of the FCMC TOT needs assessment. These may include but are not limited to: fetascopes, sterile single exam gloves, sterile gloves (paired) various sizes, non-sterile gloves, masks, eye shields or goggles, lubricant, local anesthesia, various suture materials, sterile needles and syringes, neonatal resuscitation bags, and antibacterial soap. An effort must be made to maintain universal precautions. However, do not include clinical supplies which cannot be replicated in some form by the maternity center staff. The FCMC clinical training must demonstrate how safely to do the most with a minimum of supplies.

FCMC Clinical Criteria

The admission criteria should be discussed with the maternity center director prior to beginning the clinical week to obtain agreement on this matter. Women will be accepted into the FCMC clinical demonstration for labor and birth if they had essentially low risk pregnancies or moderate risk pregnancies. The admission criteria outlined in Greulich, et.al. (1994) is used as the guideline for inclusion.

FCMC Admission for Labor and Birth

Women and their family members who come to the maternity center for evaluation of labor will be offered inclusion into the FCMC clinical training if the woman meets the FCMC admission criteria. This will ideally be done prior to being transferred to the labor area. Those women who want to participate and meet the admission criteria will not receive the traditional enema and shave. Women who choose to participate will be encouraged to have whomever they want to be present as a support person(s) for labor and birth. If a woman is alone or chooses not to have a family member present, a member of the FCMC trainee group will be the designated support person.

FCMC Labor and Birth

The FCMC trainee team will provide care for a woman during her labor and birth. One of the midwives will be the designated provider. The other team members will provide supportive care

to the laboring woman and family. When not providing actual supportive care, the FCMC trainee team will be observing the woman's labor process and the FCMC techniques used by the designated midwife and the CNM clinical preceptor. FCMC practices which an FCMC trainee either performs or observes are recorded on the Clinical Skills Checklist (See Day Five - Appendix D).

The FCMC designated midwife and trainee team will maintain a record of the clinical course for the woman's labor on the partograph. The CNM clinical preceptor will guide the FCMC designated midwife and trainee team through the labor and birth process. If there is need for consultation about the woman's labor, the FCMC OB will be consulted. The results of this consultation will determine whether there is a need for collaboration with the maternity center clinical team on duty.

The repair of lacerations and/or episiotomies will be done by the FCMC designated midwife guided by the CNM clinical preceptor. Any third or fourth degree lacerations will be repaired by the FCMC obstetrician as previously agreed to by the maternity center director.

The appropriate measures will be taken if neonatal resuscitation is anticipated for the birth. The FCMC OB and the maternity center clinical team on duty will be notified and the appropriate providers will be present for the birth.

FCMC Postpartum Care

The postpartum care for women in the FCMC clinical training and newborn care for their infants should be discussed with the maternity center director prior to the clinical week. This will help ensure cooperation and discourage interference with the postpartum and newborn clinical staff. The FCMC trainee team will make daily rounds on the FCMC women and infants. Postpartum teaching regarding breastfeeding will be provided.

FCMC Clinical Week Training Team Logistics

It is suggested the FCMC trainees be divided into (3) groups of 4 providers. Each trainee team will consist of 2 - 3 midwives, an obstetrician and/or neonatologist. If the trainees are from different maternity centers, it is strongly suggested that the teams be a mix from these centers. The trainee teams are rotated through 8 hour shifts with some overlapping during the clinical week. If a woman continues in labor into the late evening, the FCMC trainee group and CNM clinical preceptor caring for this woman will stay through the night for her birth and early postpartum. The clinical schedule for the next day is then adjusted accordingly. See the following for the proposed clinical schedule:

Sunday		Monday		Tuesday		Wednesday		Thursday	
Shift	Group	Shift	Group	Shift	Group	Shift	Group	Shift	Group
8 - 4	A	8 - 4	B	8 - 4	C	8 - 4	B	8 - 6	A
12 - 8	B	12 - 8	C	12 - 8	B	12 - 8	A	12 - 6	C
4 - 12	C	4- 12	A	4 - 12	A	4 - 12	C	12 - 6	B

The CNM clinical preceptors will work for 16 hours per day. This will allow for 2 FCMC clinical rooms to be going simultaneously and thus increase the number of clinical experiences for the trainees. As previously stated, a CNM clinical preceptor will stay with the FCMC trainee team and the laboring woman until her birth and early postpartum.

Low Census

All clinical experience for labor and birth has some quiet times and low census. During these periods, the obstetrician and nurse-midwives can use the time to review clinical cases using the partograph, practice labor support techniques, discuss more complicated obstetrical and newborn conditions and do postpartum teaching rounds especially focused on breastfeeding.

Completion of the FCMC Clinical Training and TOT

It is suggested that the clinical training ends at 1800 hours on the fifth day. The following morning a presentation of the FCMC clinical week statistics can be done for the maternity center staff and invited guests as desired. A representative midwife and physician from the FCMC trainee group and the trainers may speak about the experience of the FCMC training. A couple who received FCMC for labor and birth may be asked to present their experience. Finally, a presentation of the FCMC TOT certificates will complete the program and FCMC TOT.

408

HISTORY OF THE FCMC PROJECT

- In 1994, USAID and the Ukraine MOH entered into a cooperative agreement to provide a 3-4 year comprehensive Reproductive Health program in Ukraine.

GOAL OF THE REPRODUCTIVE HEALTH

- Improve quality of reproductive program health services in Ukraine
- Improve access to reproductive health services in Ukraine

GOAL OF THIS INITIATIVE

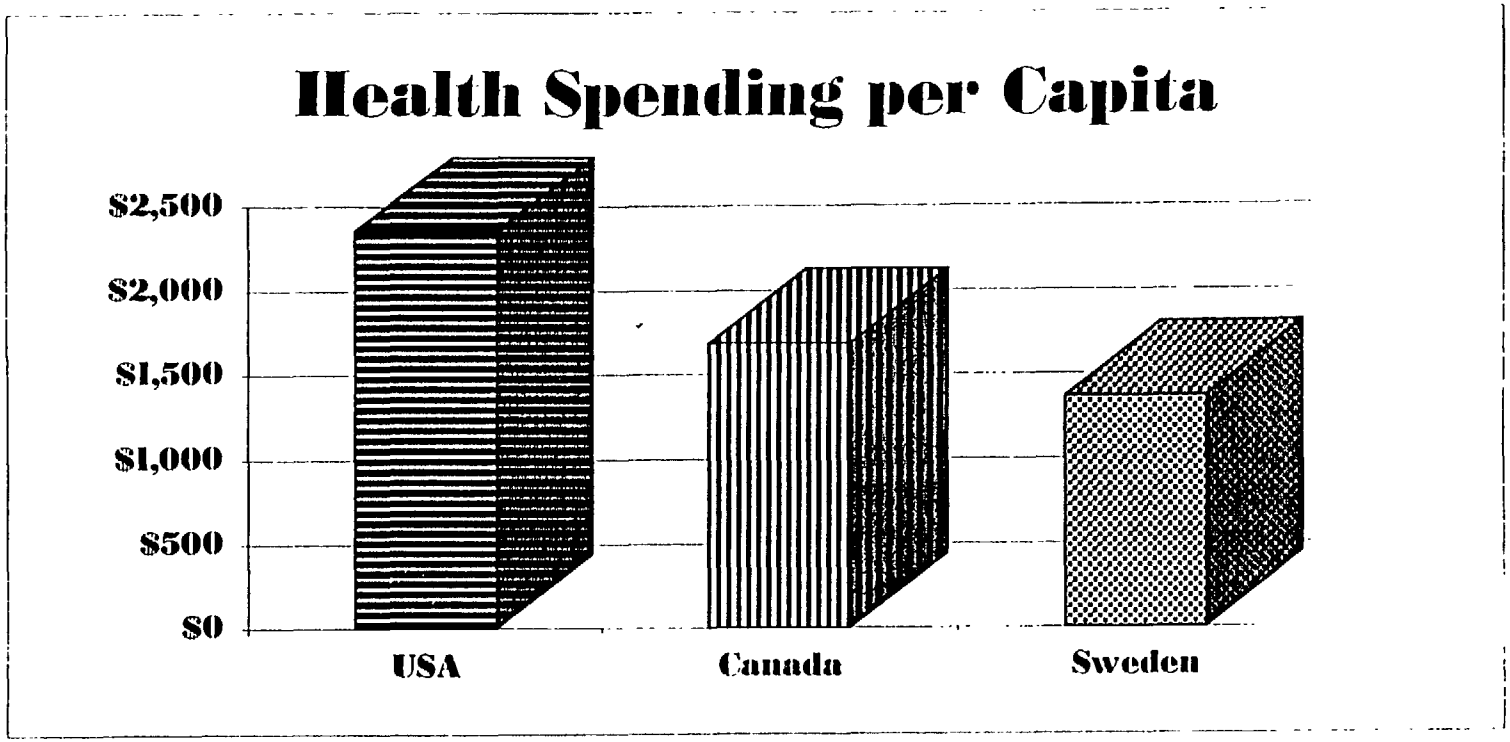
- Integrate FCMC philosophy and practices into the maternity care services in Ukraine

GOALS OF THE TOT

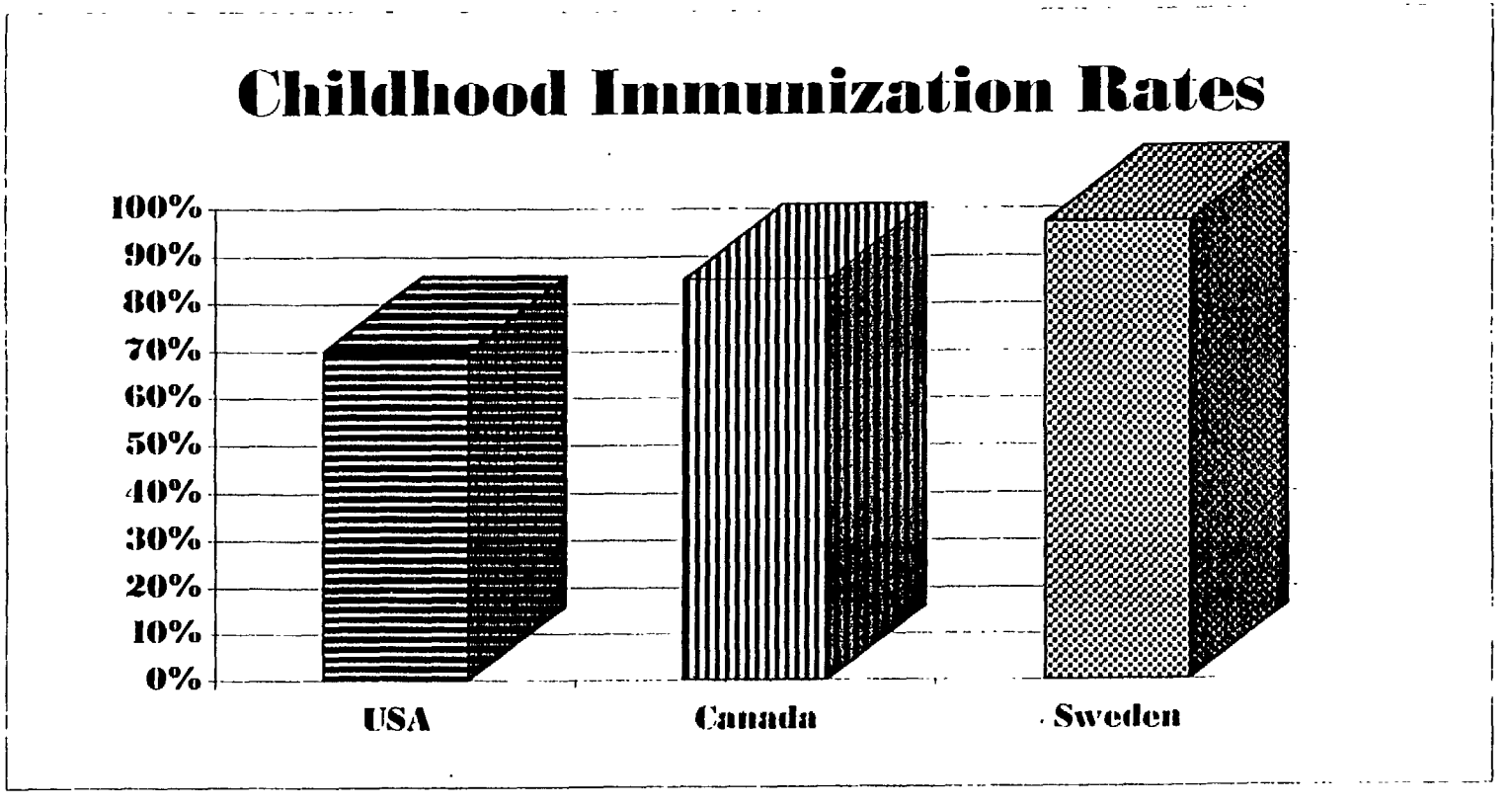
- Create a core group of FCMC trainers
- Develop action plans for FCMC implementation into each training site
- Develop training strategies for conducting FCMC TOT's at their institutions and others

GOALS OF THE TOT

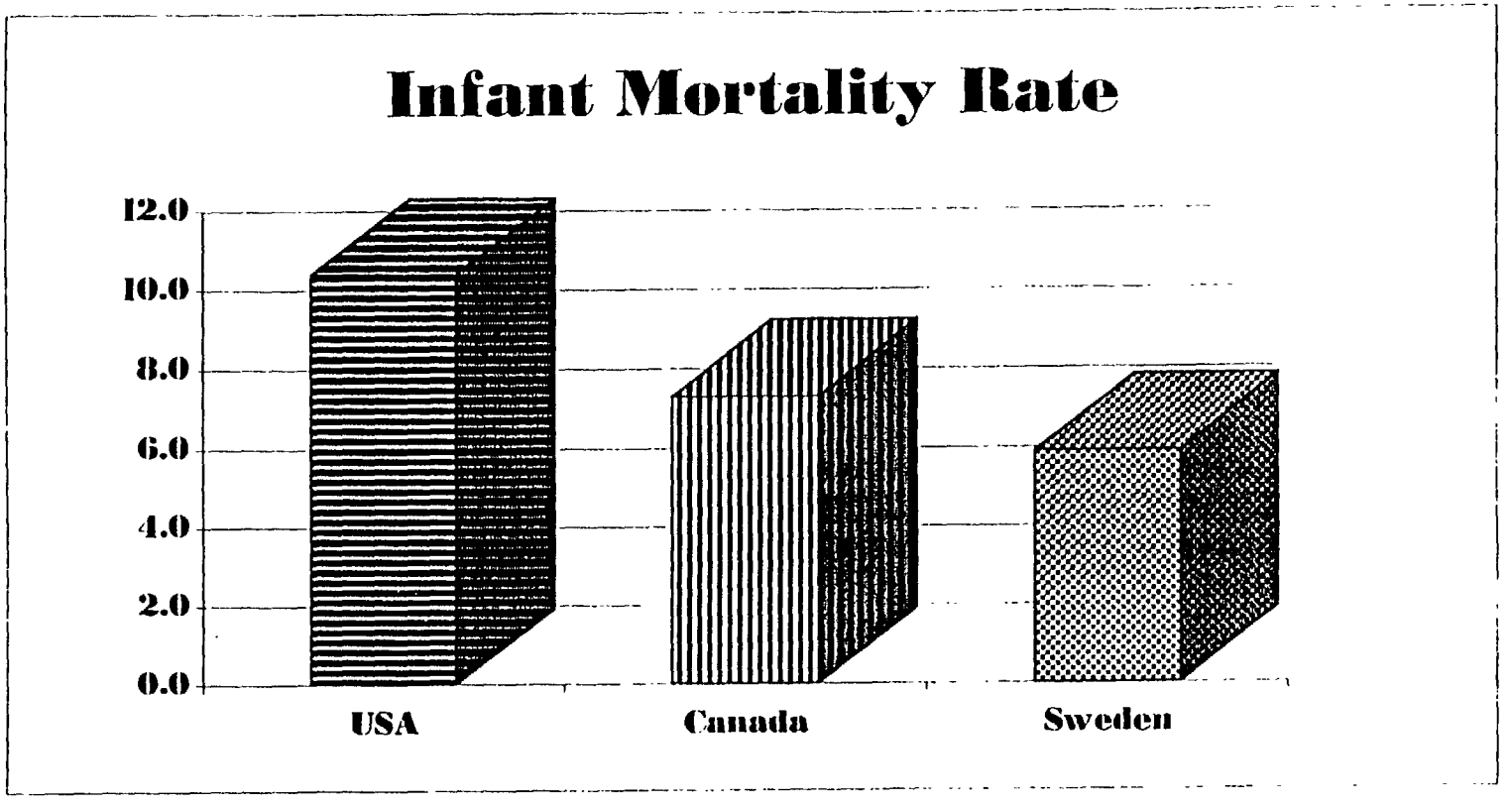
- Motivate and attain commitment from TOT Trainers to establish a demonstration model for FCMC at their various institutions.
- Develop strategies to reduce barriers to implementation of FCMC.
- Maintain technical working groups to



Conclusion : The countries with the greatest use of Obstetric Technologies are associated with the highest **Per Capita Spending.**

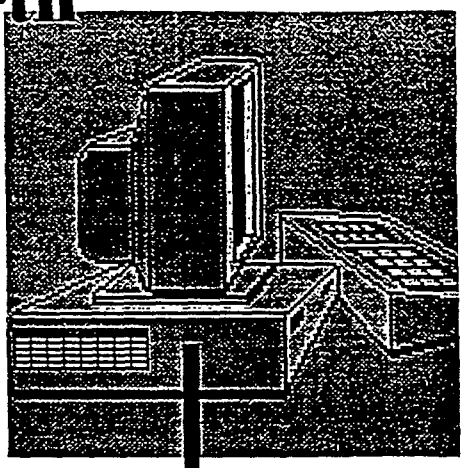


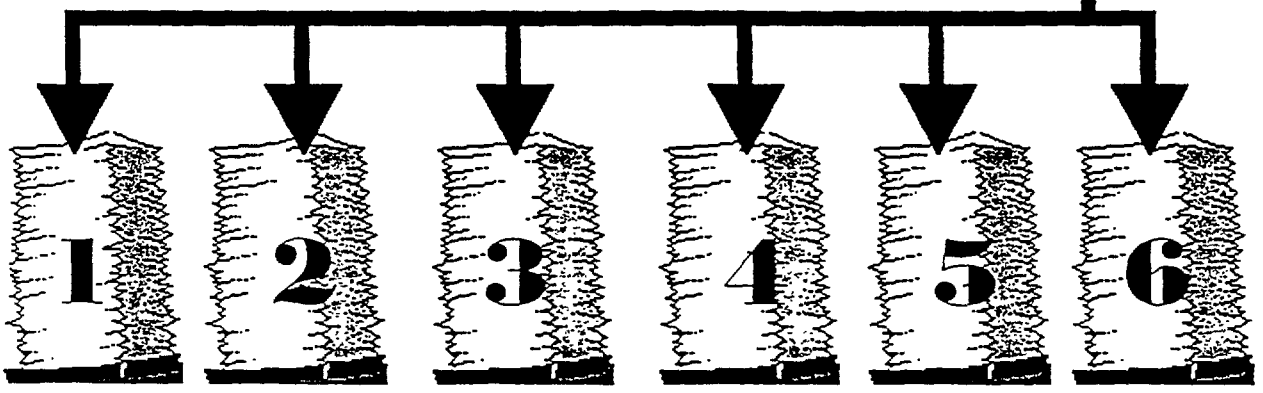
Conclusion : The countries with the highest cost and the greatest use of Obstetric Technologies are associated with the poorest **Immunization Rates**.



Conclusion : The countries with the highest cost and the greatest use of Obstetric Technologies are not associated with the best **Infant Mortality Rates**.

Effective Care in Pregnancy and ChildBirth





Beneficial

1. ~~Benficial~~

2. Likely Beneficial

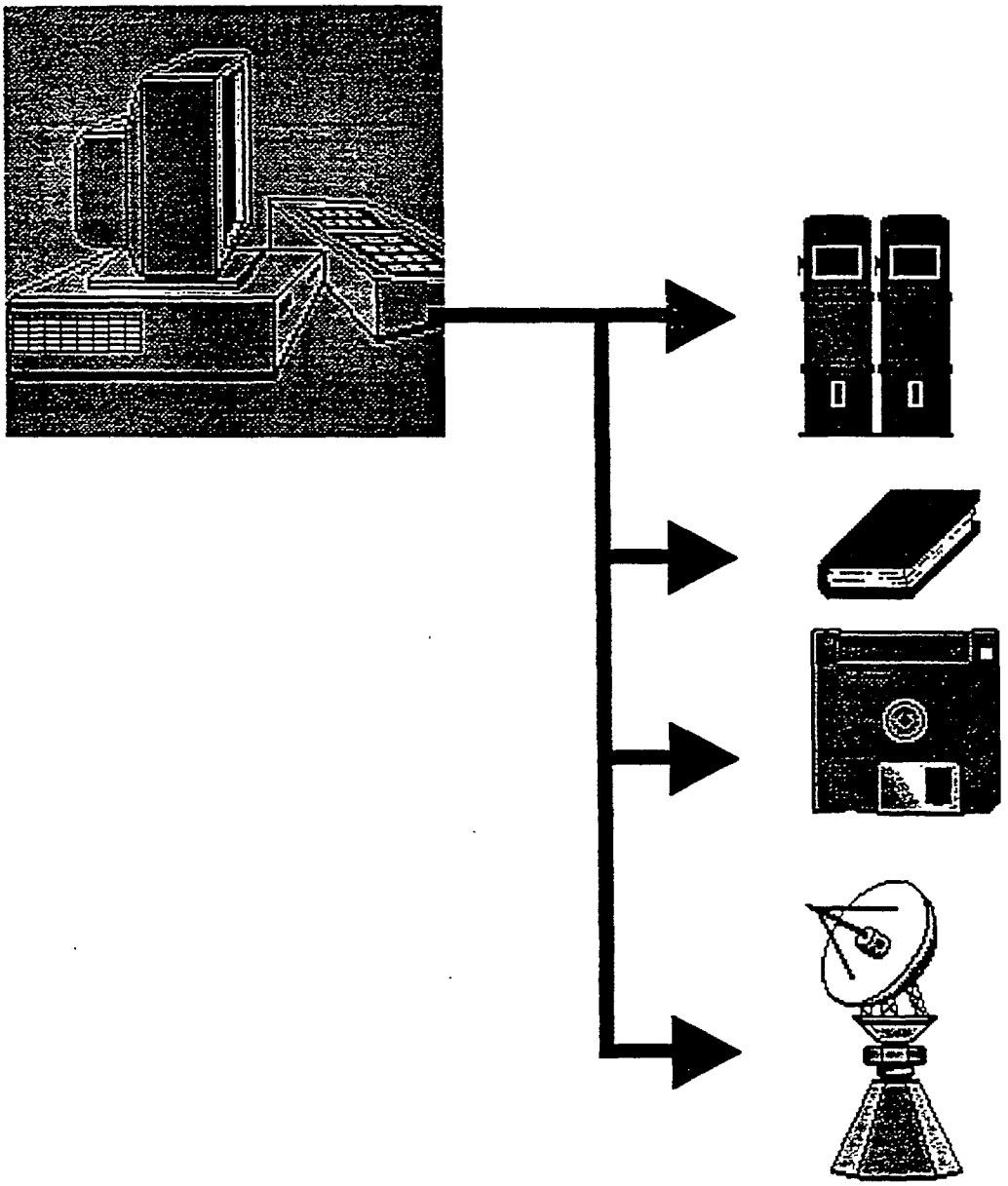
3. Both Beneficial and Adverse

4. Unknown

5. Unlikely of Benefit

6. Ineffective or Harmful

Effective Care in Pregnancy and ChildBirth



Conclusion : The literature reviews on **Effective Care in Pregnancy and ChildBirth** are continuously being updated and the information is disseminated in **4 ways**

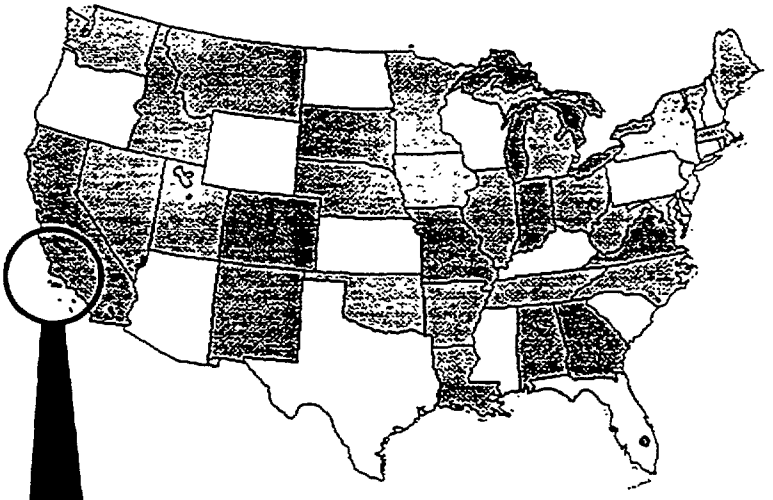
Netherlands

	Nurse Midwife Care	Obstetrician Care
cesarean section	5.9%	16%
oxytocin use	4.5%	21.3%
Perinatal Mortality	0.7%	0.7%

Conclusion : The **routine** use of **specialized care** is associated with more frequent **interventions**, but **not** with improved **outcomes**.

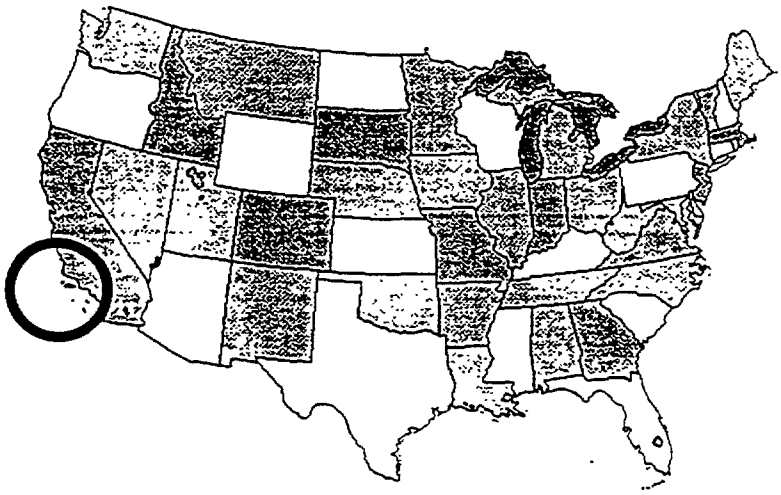
Sharp The BirthPlace

San Diego, California



417

USA



	Birth Center	California Hospitals
routine care by Obstetrician specialist	5%	96%
cesarean section	13%	23%
ıospital stay	1.3 days	2.2 days
low birthweight	4.7%	5.9%
perinatal mortality	0.8%	1.1%

together with

Conclusion:

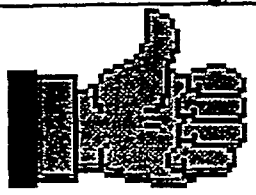
Family Centered Maternity Care for all pregnancies, ~~and~~ the selective use of **Specialization and Technology** is associated with the best outcomes.

Obstetric Technologies

1. **Obstetrician Specialty care**
2. **Hi-Risk Maternity Hospital care**
3. **Cesarean Section**
4. **Pitocin**
5. **Fetal heart rate Monitoring**
6. **Continuous Epidural Anesthesia**

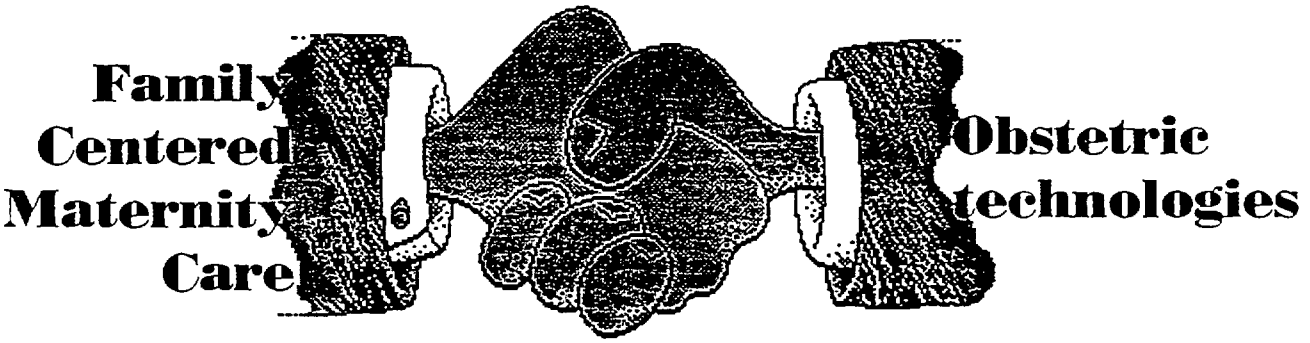
Conclusion : The extensive and routine use of Obstetric Technologies in normal pregnancy **has not** been associated with the best outcomes.

Family Centered Maternity Care



1. **Family Support**
2. **Family Informed Decisions**
3. **Ambulation in Labor**
4. **Breast Feeding emphasized**
5. **Newborn Rooming-In**

Conclusion : The routine use of Family Centered Maternity Care in all pregnancies **has been** associated with improved outcomes.



- **Conclusion :** The best outcomes are associated with the **routine** use of Family Centered Maternity Care ~~and~~ together with the **selective** use of Obstetric Specialization and Technology

MCH TRENDS:SWEDEN

- Health care access for all
- Primarily hospital births
- IMR is 5.9/1000 live births (ranks 3rd)
- Boasts a very high rate of prenatal visits (average 14 per pregnancy) conducted by midwives

MCH TRENDS: NETHERLANDS

- Health care access for all
- About one-half midwife-attended births
  36% of all births at home
- IMR is 7.06/1000 live births (ranks 10th)
- Offers choice of birth site
- Utilizes national risk assessment criteria for determination of type of provider and site of care

422

MCH TRENDS:UNITED KINGDOM

- Health care access for all
- Midwife-attended hospital births
- IMR is ~~7.8~~ 6.2/1000 live births (ranks 17th)
- Undergoing major evaluation and revision of their current MCH practices

MCH TRENDS:UNITED STATES

- Inadequate access to health care for a large portion of the population
- Primarily hospital births, 5% midwife-attended
- IMR is 9.22/1000 live births (ranks 24th)
- High use of technology with high cesarian section rates
- In the midst of a major health care reform for both policy and provision of care

EVALUATION OF MATERNITY CARE SERVICES

- Chalmers et al review maternity care studies internationally for:
  - efficacy of study
  - effectiveness of particular maternity care practice
- Maternity care practices are classified as:
  - beneficial
  - likely beneficial
  - trade-off: beneficial vs. adverse effects
  - unkown effectiveness
  - unlikely beneficial
  - ineffective or harmful

5/1

EVALUATION OF MATERNITY CARE PRACTICES

- Publications:
  - Chalmers,I et al (eds) (1989) *Effective Care in Pregnancy and Childbirth.* Vol I&II, Oxford University Press. Oxford.
  - Enkin,M et al (eds) (1995) *A Guide to Effective Care in Pregnancy and Childbirth.* Oxford University Press. Oxford.
  - *The Cochrane pregnancy and childbirth database* (regularly updated electronic database of reviews)
- United Kingdom using Chalmers to review and change current maternity care practices

5/.

BENEFICIAL PRACTICES

- Emotional and psychological support during labor and birth
- Maternal mobility and choice of position in labor and birth
- Free mobility during labor to augment slow labor
- Consistent support for breastfeeding mothers
- Unrestricted breastfeeding

5/3

425

LIKELY BENEFICIAL

- Midwife care for women with no serious risk factors
- Antenatal classes for women and their partners who want them
- Respecting women's choice of companions during labor and birth
- Respecting women's choice of place of birth
- Presence of a companion on admission to the hospital
- Giving women as much information as they desire

5/5

LIKELY BENEFICIAL

- To relieve pain in labor:
  - maternal movement and position change
  - counter pressure
  - superficial heat or cold
  - touch and massage
  - music and audio-analgesia
  - attention focusing and distraction
- Woman's choice of position for second stage of labor and /or giving birth
- Encouraging early mother-infant contact

5/5

BENEFICIAL/LIKELY BENEFICIAL

- Beneficial:
  - fetal acid-base assessment as an adjunct to fetal heart rate monitoring in labor
- Likely beneficial:
  - Selective use of ultrasound
  - Trial of labor after previous lower-segment cesarian section

5/6

TRADE-OFF BETWEEN BENEFICAL AND ADVERSE EFFECTS

- Continuity of caregiver for childbearing women
- Formal systems of risk scoring
- Routine early ultrasound
- Continuous electronic fetal monitoring plus scalp sampling versus intermittent auscultation during labor

5/7

427

UNLIKELY BENEFICIAL

- Routinely involving physicians/obstetricians in the care of women during pregnancy and childbirth
- Not involving obstetricians in the care of women with serious risk factors
- Routine withholding of food and drink from women in labor
- Routine intravenous infusion in labor
- Restriction of sibling visits to babies in the hospital

5/8

INEFFECTIVE OR HARMFUL

- Routine enema in labor
- Routine pubic shave in preparation for delivery
- Electronic fetal monitoring without access to fetal scalp sampling during labor
- Routine episiotomy for birth
- Routine use of the lithotomy position for the second stage of labor

5/9

428

INEFFECTIVE OR HARMFUL

- Limitation of suckling time for breastfeeding babies

- Routine restriction of mother-infant contact

- Routine nursery care for babies in the hospital

5/10

IMPACT OF ULTRASOUND

- <u>POSITIVE IMPACT</u>: *Selective use* for specific indications during pregnancy is likely beneficial

- <u>NEGATIVE IMPACT</u>: *Safety* has *not* been convicingly established and *routine use* in pregnancy has *not* been shown to imporove fetal outcomes

5/11

429

IMPACT OF CONTINUOUS ELECTRONIC FETAL MONITORING

- POSITIVE IMPACT: Effective in detecting *specific* fetal compromised conditions

- NEGATIVE IMPACT: Has *not* improved overall fetal outcome; interpretation of fetal heart rate tracings open to *wide variation*, and has significantly *increased* the rates of both cesarian sections and operative vaginal deliveries

IMPACT OF INCREASED CESARIAN SECTION RATES

- POSITIVE IMPACT: Cesarian sections are life saving for *unequivocal* indications such as placenta previa and transverse lie

- NEGATIVE IMPACT: Cesarian sections *increase* maternal and infant morbidity rates and elective repeat cesarian section without trial of labor still practiced

IMPACT OF EPIDURAL ANALGESIA

- POSITIVE IMPACT: Pain *relief* for women during labor and birth

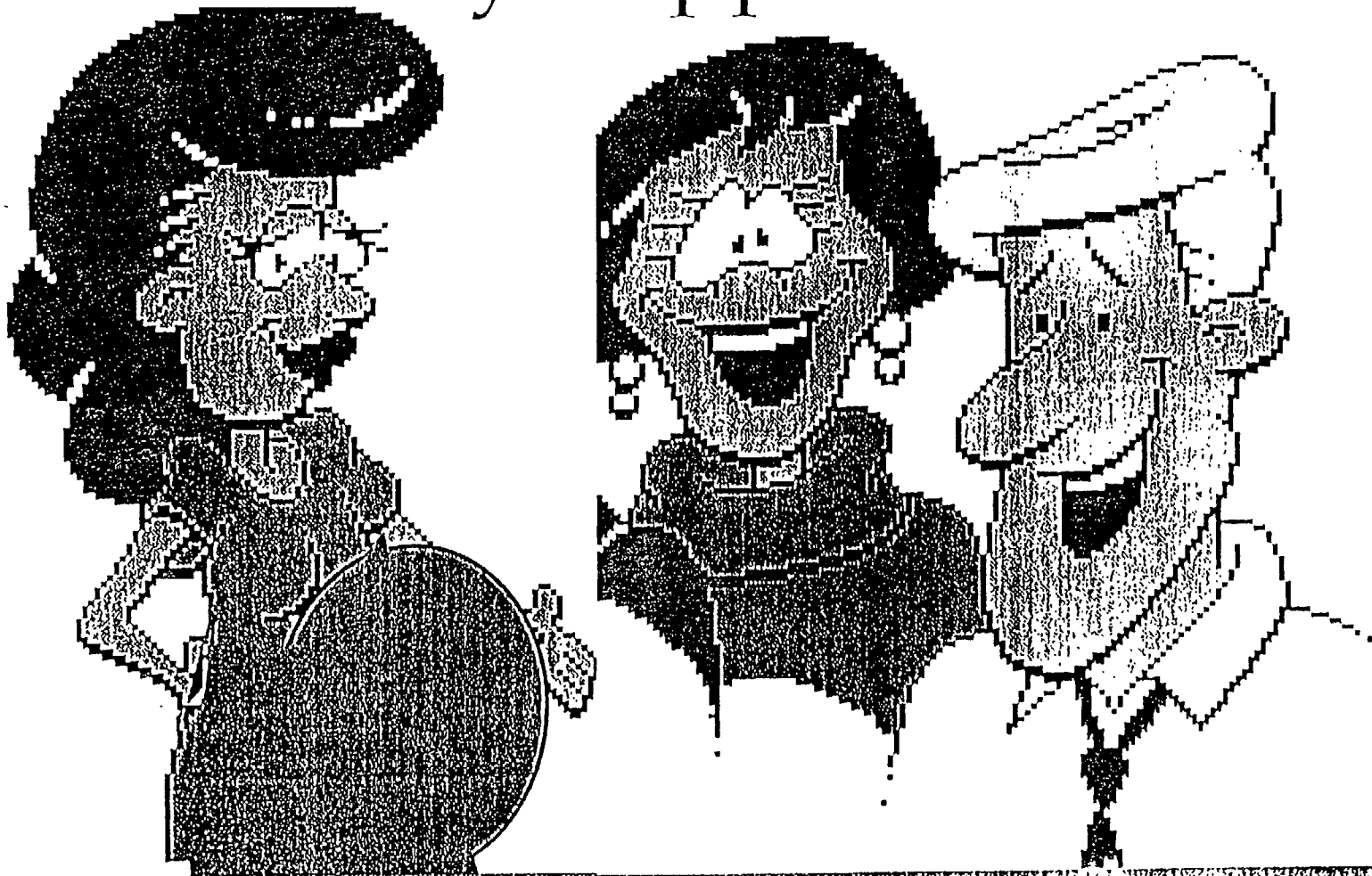
- NEGATIVE IMPACT: *Increased* use of oxytocin and *increased* risk of cesarian section and operative vaginal deliveries

IMPACT OF OXYTOCIN STIMULATION

- POSITIVE IMPACT: Oxytocin use to augment labor with premature rupture of membranes may subsequently *reduce* the rate of infection and when accompanied by amniotomy, oxytocin use can reduce morbidity in cases such as post-datism

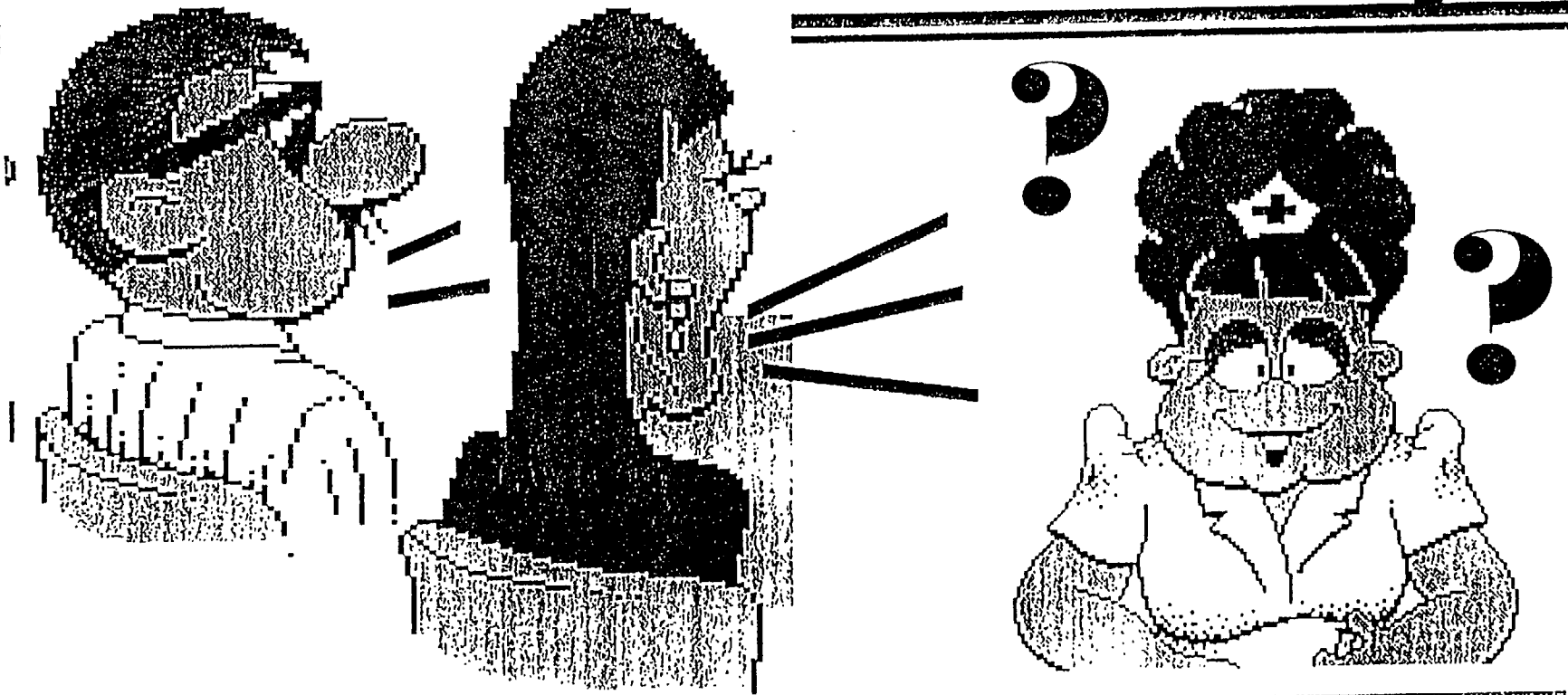
- NEGATIVE IMPACT: *Hyperstimulation* may lead to reduced fetal oxygenation and induction of labor with oxytocin *increases* the incidence of neonatal hyperbilirubinemia

Family Support in Labor



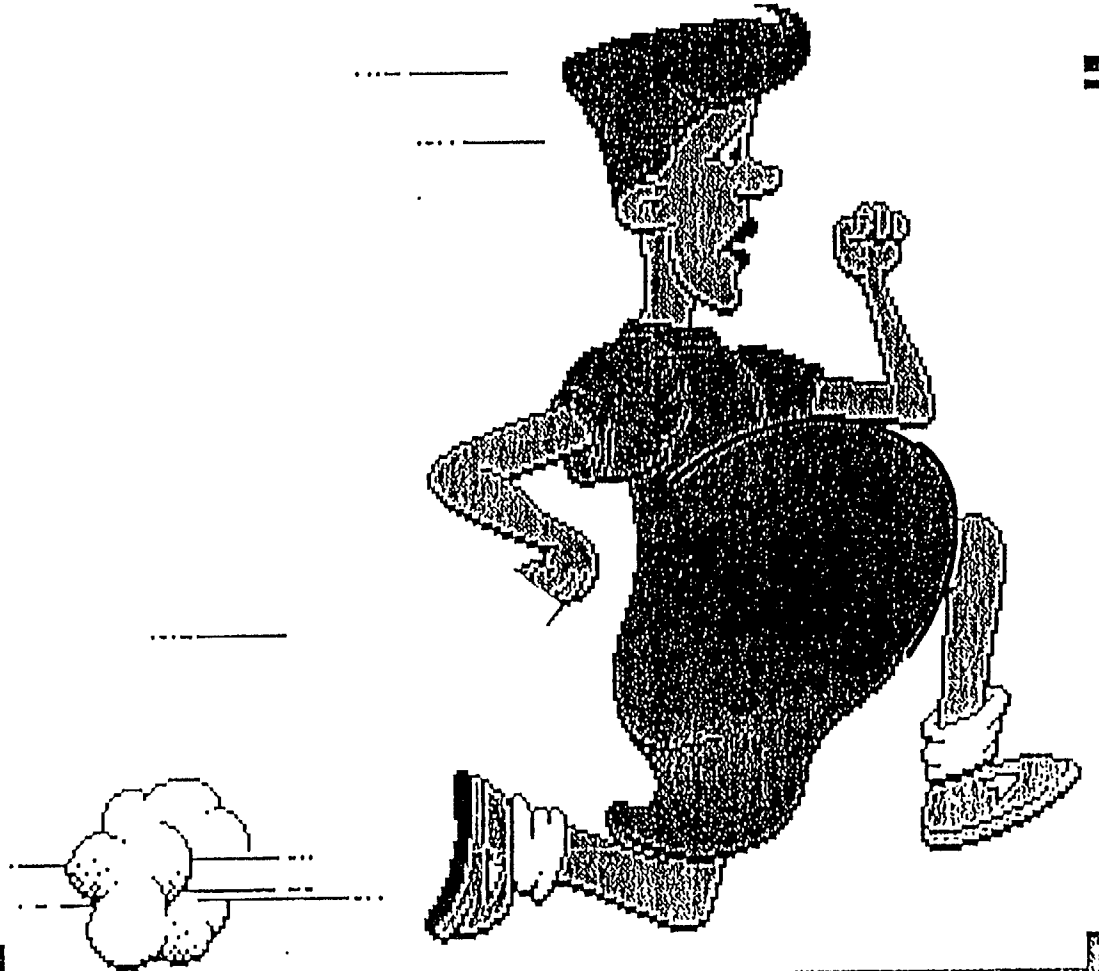
Conclusion: More than 95% of women will receive Family Support in labor.

Decisions !!!



Conclusion : The Maternity Staff will assist families to play an active in the Decisions about their Obstetric care

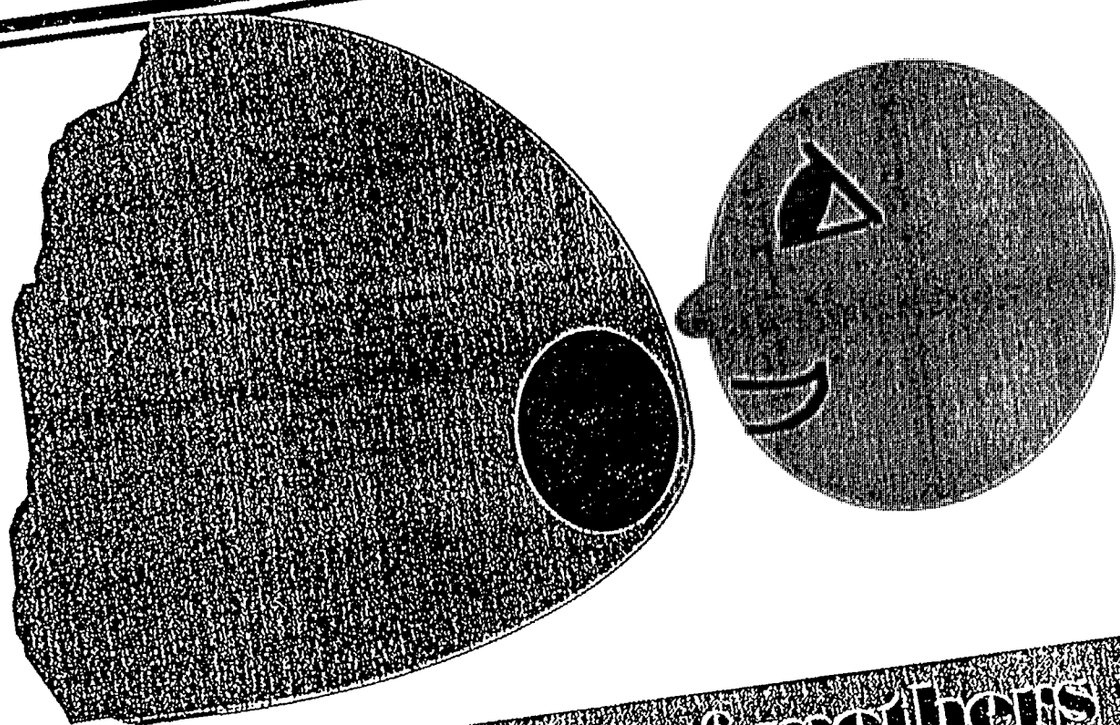
Ambulation in Labor



Conclusion: More than 60% of women will Ambulate significantly in labor

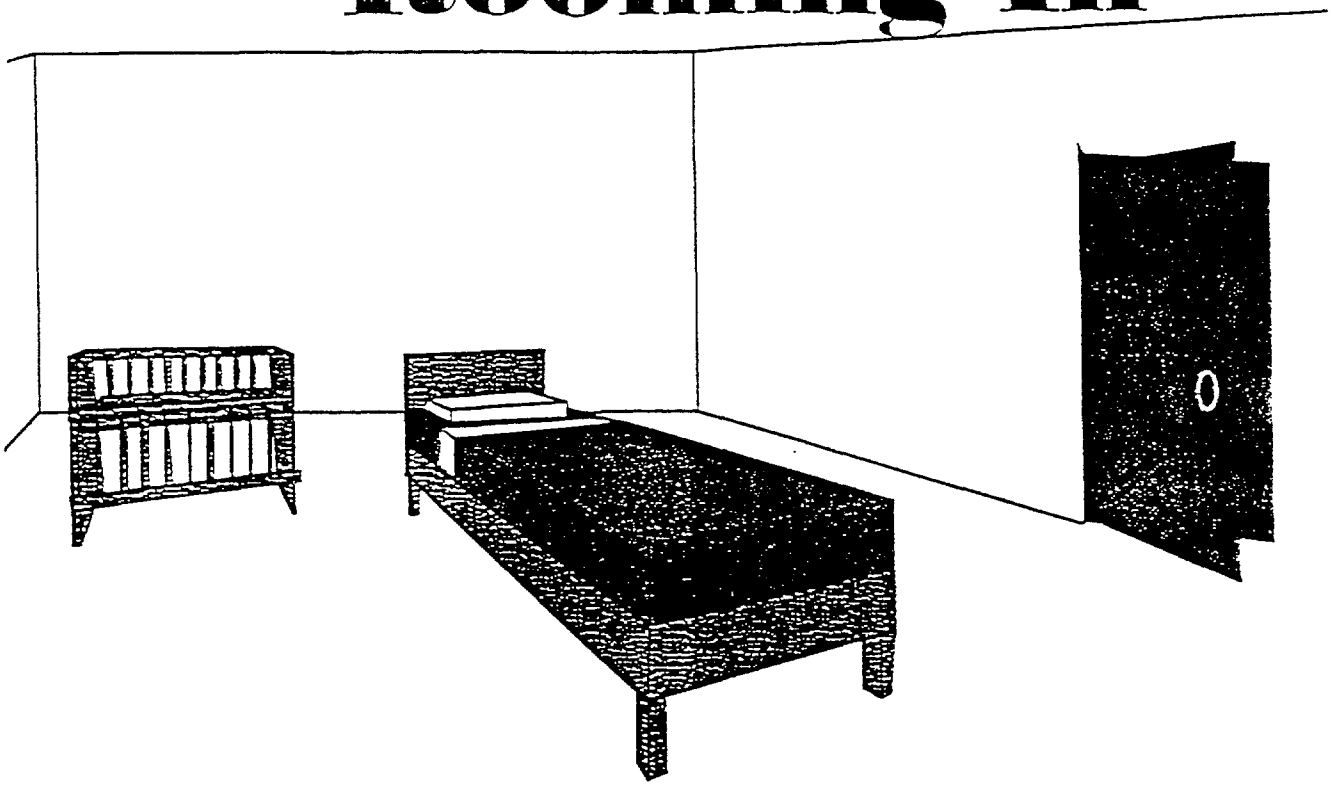
during most of their

Breast Feeding



Conclusion: 80% of mothers will begin Breast Feeding in the delivery room.

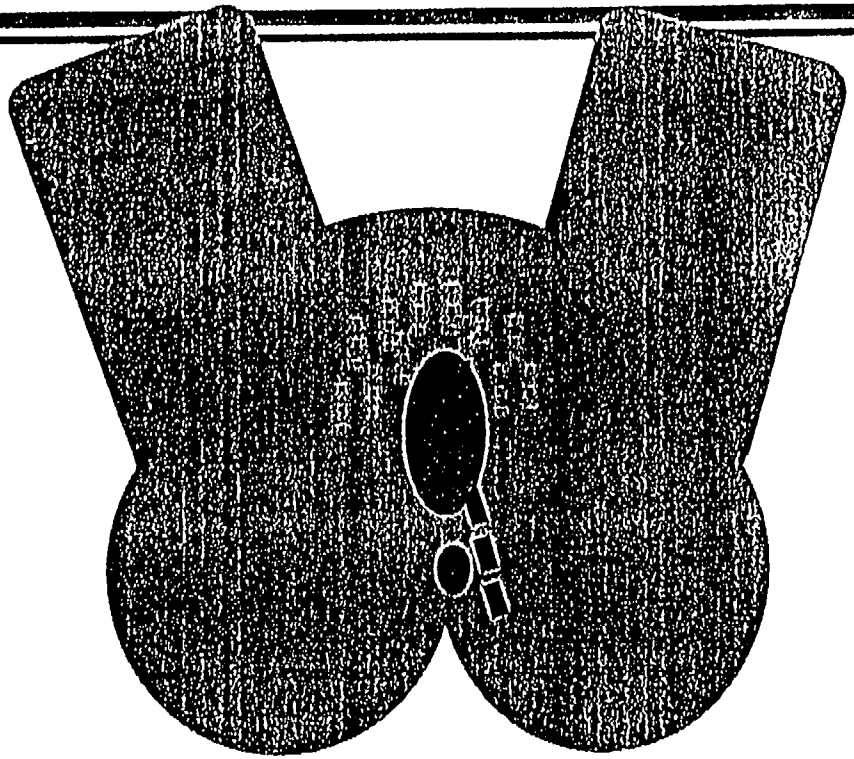
Rooming-In



Conclusion : 90% of Mothers will **Room-In** ~~together~~ during their entire hospital stay.

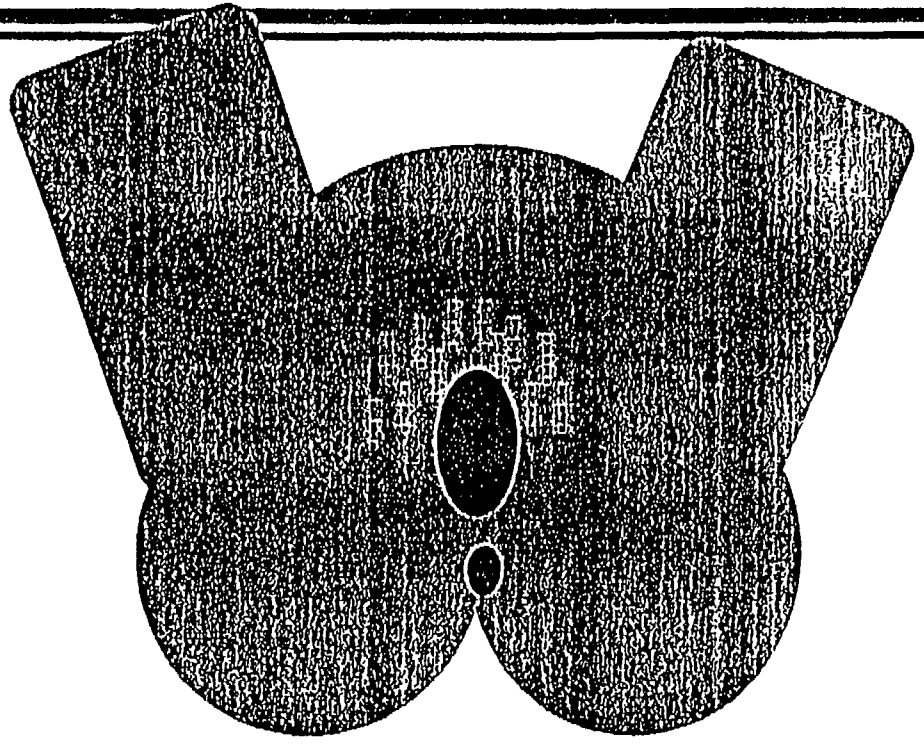
with their baby

Episiotomy



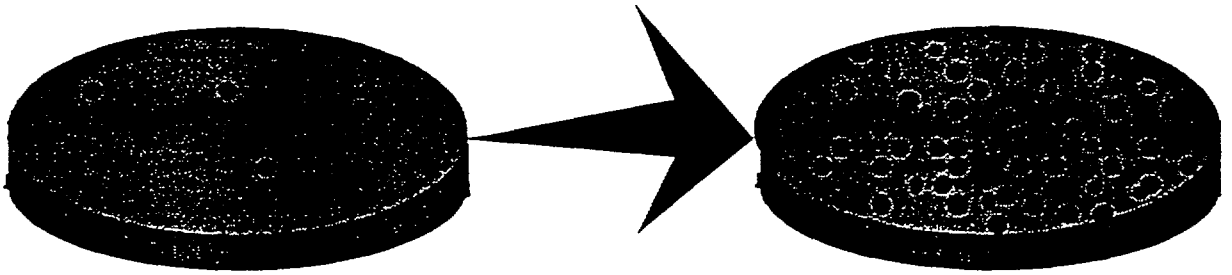
Conclusion: less than 10% of women will have an Episiotomy

Shaving

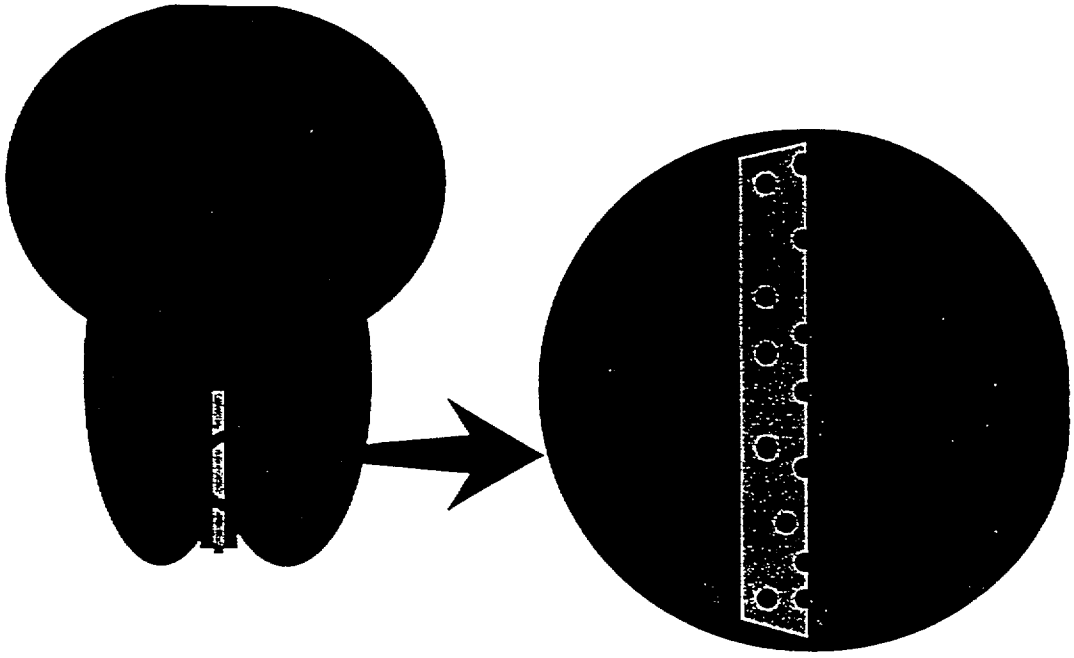


Conclusion: Less than 5% of women will have a Perineal Shave

Definition of Clinical Infection



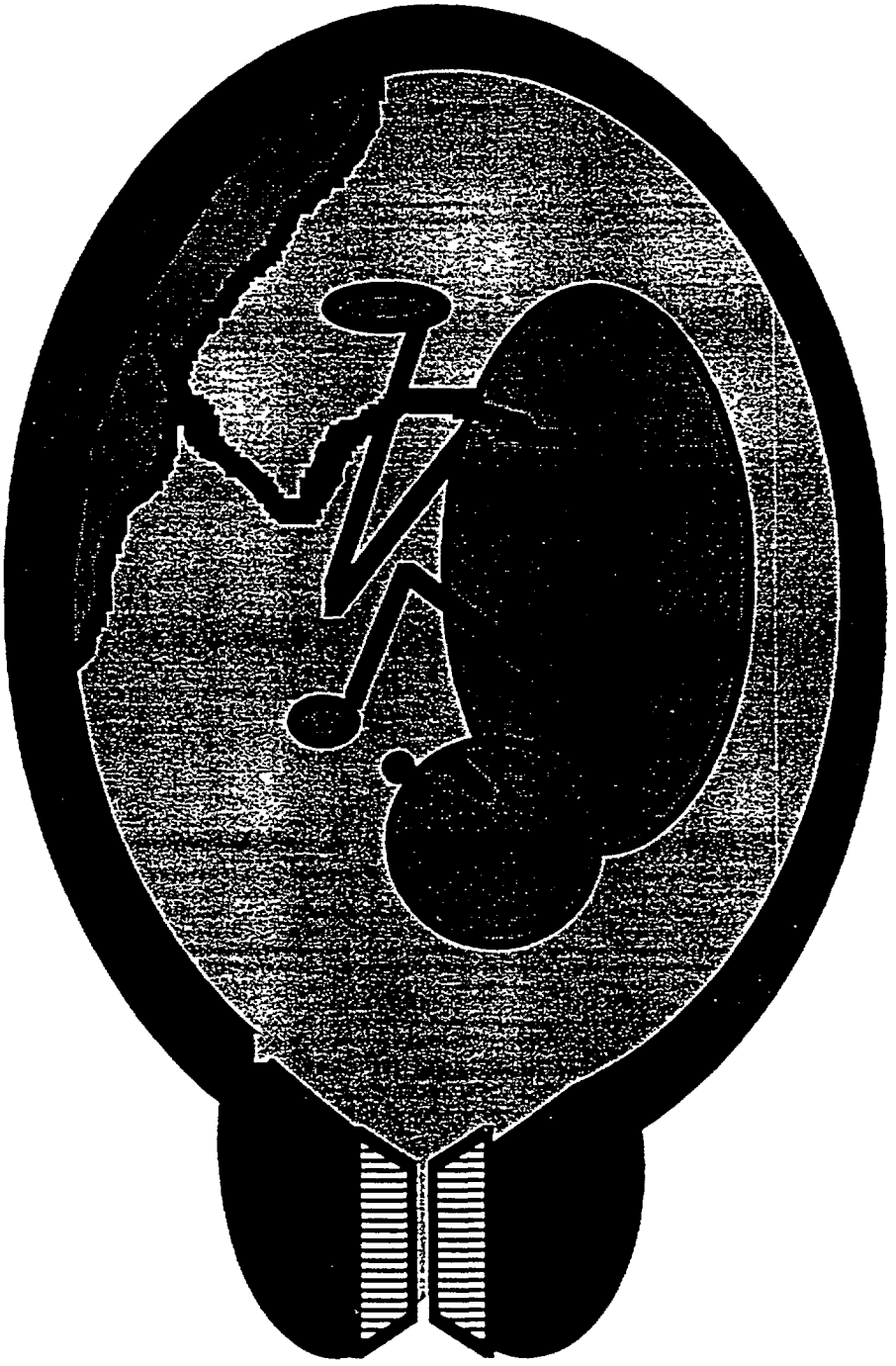
Conclusion : When bacteria grow to exceed 100,000 colonies per cc of fluid, or gram of tissue, clinical infection becomes apparent - redness, heat, pain, fever, etc.



Conclusion : Whether or not bacterial contamination will progress to a clinical infection is dependant upon ;

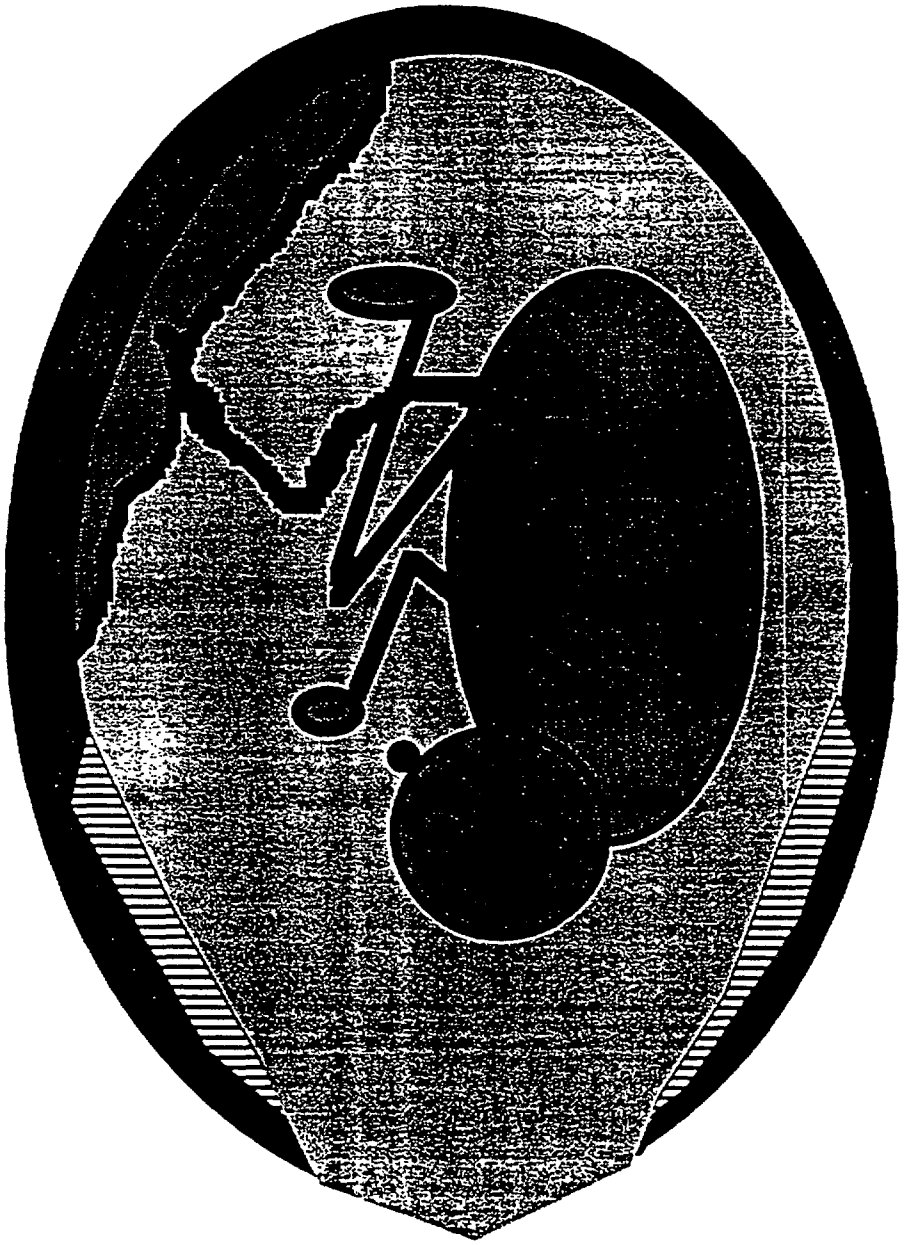
1. the numbers and virulence of the **bacteria**
2. a **portal of entry**
3. a suitable **culture medium**
4. **host resistance** factors

Endocervical Contamination



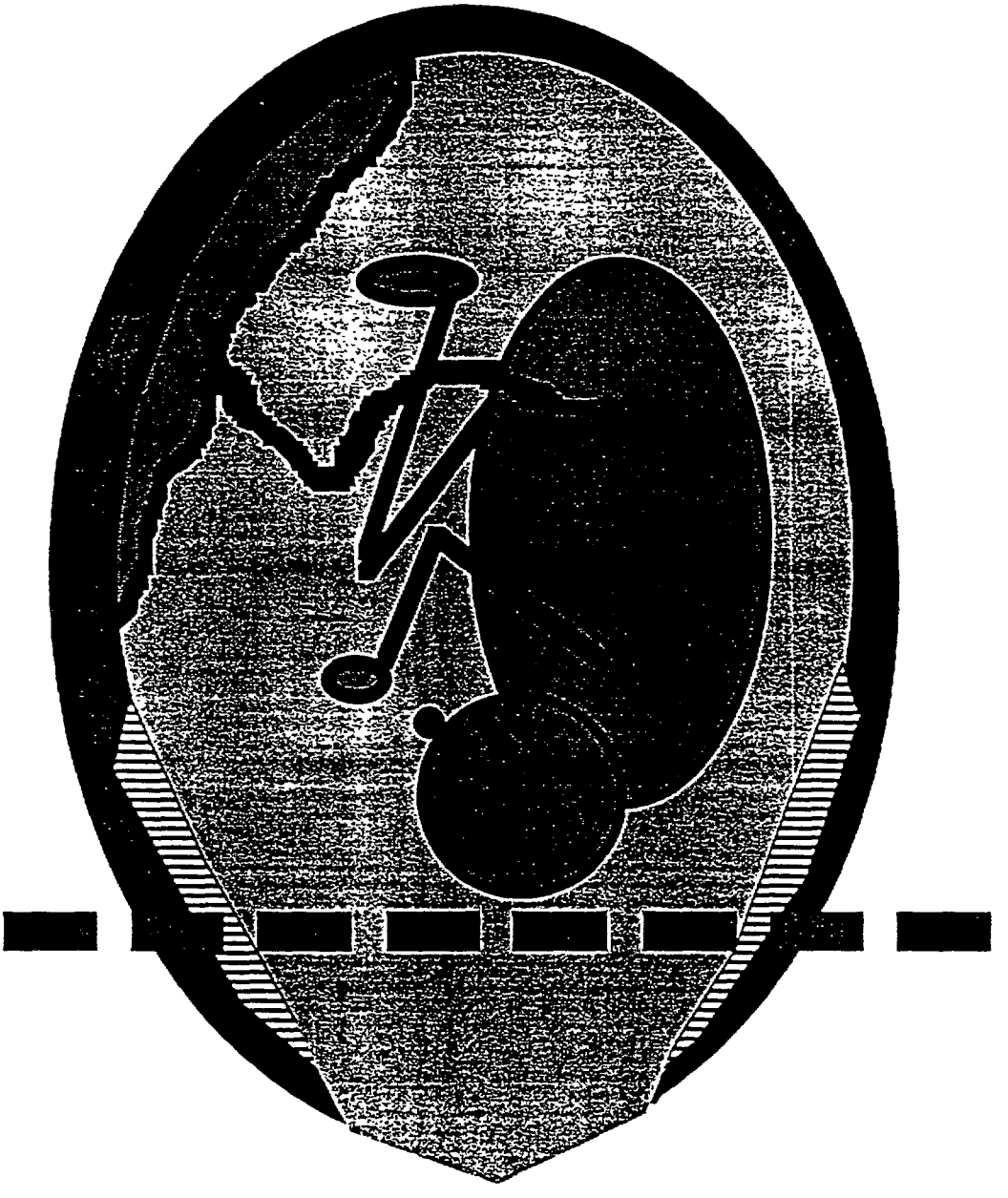
Conclusion : The Endocervix is routinely **contaminated** with gram positive and gram negative bacteria.

Effacement of Labor



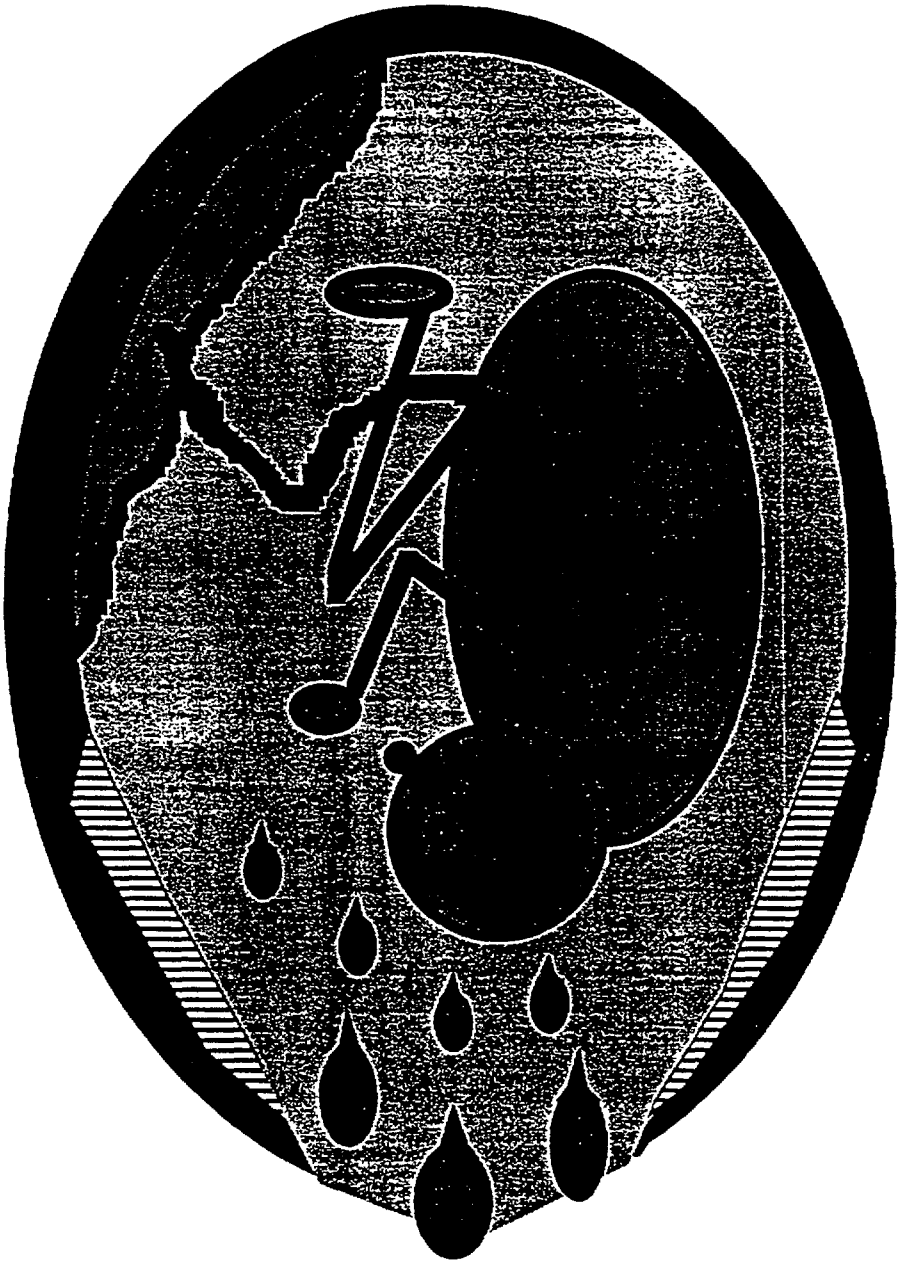
Conclusion : The cervical effacement of labor and rupture of the membranes routinely contaminate the lower uterus and amnion with endocervical bacteria.

Lower Segment C-Section



Conclusion : A Lower segment Cesarean section performed in active labor, routinely incises and sutures through tissues contaminated with Endocervical bacteria.

Rupture of the Membranes and Labor



Conclusion : Rupture of the Membranes followed by More than 12 hours of labor, is routinely associated with contamination of the amniotic fluid and the fetus with Endocervical bacteria (especially **Group B streptoccus**).

INSTITUTIONAL BARRIERS TO FCMC

- Regulations/policies which contradict FCMC practices

- Administrative concerns:
  - compliance with national regulations
  - provider/staff response
  - consumer response
  - facility impact
  - costs

PROVIDER BARRIERS TO FCMC

- Comfortable with known practices

- Reluctant to change current practices

- Resistant to accept effectiveness of certain practices which challenge current beliefs

CONSUMER BARRIERS TO FCMC

- Lack of knowledge about safety
- Lack of trust for new medical procedures/ policies
- Lack of experience with or questioning of medical care practices and providers

EVOLUTION OF FCMC PRACTICES

- Women's movement with attention to birth practices
- Increased consumer awareness of impact of medical care practices
- Chalmer's text and others questioning legitimacy of current practices
- Peer reviewed studies evaluating current accepted standards of practice and birth technology

BENEFITS OF FCMC: INSTITUTIONS AND MEDICAL CARE PROVIDERS

- Improved outcomes for mothers and babies
- Lower infection rates
- Personal job satisfaction
- Cost efficiency
- Improved provider-client relations

BENEFITS OF FCMC: WOMEN, INFANTS AND FAMILIES

- Clinical safety
- Promotion of family attachment (bonding)
- Personal and family satisfaction
- Increased maternal self esteem, autonomy and control

ESSENCE OF EFFECTIVE POSTPARTUM CARE

- Treat mother as responsible adult
- Give accurate and consistent information
- Let her make own decisions
- Support her in those decisions

Enkin, M. et al. A Guide to Effective Care in Pregnancy and Childbirth, 2nd Edition, 1995

VISITATION RESTRICTIONS

- Restricting visitation not supported as infection prevention
- Visitation of sibling does not effect infant colonization rate

Enkin, M. et al. A Guide to Effective Care in Pregnancy and Childbirth, 2nd Edition, 1995

BREASTFEEDING

Breastfeeding within the first 2 hours after birth increases the duration of breastfeeding compared to delayed initial feeding $\geq$ 4 hours.

Enkin, M. et al. A Guide to Effective Care in Pregnancy and Childbirth, 2nd edition, 1995

FASTING IN LABOR

- Based on tradition rather than current scientific research
- May result in dehydration and ketosis
- Doesn't ensure an empty stomach

Enkin, M. et al (1995)
Ludka & Roberts (1993)

SKIN - TO - SKIN CONTACT

- warmest babies - earliest skin-to-skin contact

- coolest babies - no skin-to-skin contact

($p < 0.001$)
($n = 51$ dyads)

Färdia, J.A., Journal of Nurse-Midwifery, 25(1), 1980

AMBULATION IN LABOR

Women randomized to the ambulatory group

- significantly shorter labor
- significantly less use of analgesia
- significantly less fetal heart rate abnormalities

(n = 34)

Flynn, A.M., et al, British Medical Journal, August 26, 1978

MATERNAL - INFANT BONDING

Extended contact for mothers & infants

- greater soothing behaviors
- significantly more eye contact and fondling

(n = 28)

Klaus, M. et al. New England Journal of Medicine, 286(6), 1971

Antepartum or Intrapartum

ELECTRONIC FETAL MONITORING

Continuous electronic fetal monitoring

- significantly increased caesarean sections
  BUT
- did <u>not</u> improve perinatal outcomes

Prospective clinical trial of 34,995 women

Leveno, K.J. et al. <u>The New England Journal of Medicine</u>, 315;1986

EATING & DRINKING IN LABOR

- Provides hydration & nourishment
- Reduces stress
- Provides comfort

Ludka, L.M. & Roberts, C.C. , Journal of Nurse-Midwifery, 38(4); 1993

456

SHAVING

- Evidence does not support as decreasing infection
- Compromises integrity of skin
- Causes itching and burning as hair grows back
- Humiliating procedure

Mahan, C. & McKay, S. Contemporary OB-Gyn, November, 1983

ENEMA

- Does not prevent fecal contamination
- Does not effect infection rates
- Do not use soapsuds
- Routine use not justified

Mahan & McKay, (1983)

trade-off

EPIDURAL

- significant increase in risk of caesarean section
- significant increase in risk of instrument delivery
- more effective for pain relief

Morton, S.C. et al, Obstetrics and Gynecology, 83(6), 1994

457

Ineffective
wasteful.

EPISIOTOMY

- Routine episiotomy does <u>not</u> decrease trauma
- Predispose to extensions into rectal sphincter and rectal mucosa
- Does not deter future pelvic relaxation

Thorp, J. & Bowes, W. <u>American Journal of Obstetrics and Gynecology</u>, 160(5) 1989.

The Adult Learner

Learns best when:

-the format is interactive

-there is recognized relevance to his/her role

The Adult Learner

Has responsibility to:

-to actively participate in learning

-to adequately prepare

-to accept responsibility for learning

-to communicate with faculty

Adult Learning Techniques

Audio-visual aides: tape, video, overhead
Role Play
Demonstration
Small group work
Case Studies
Team teach
Large group work
Discussion

Frustration

Persistence

CHANGE

Flexibility

Inaction

Realistic

464 5(

Insider

Advantages Disadvantages

OR

Outsider

Advantages Disadvantages

Lewin's Stages of Change

Stage I

UNFREEZING

- create disequilibrium

- avoid extremes

Lewin's Stages of Change

Stage II

MOVING

- provide environment conducive to behavioral change
- rewards - external / internal

Lewin's Stages of Change

Stage III

REFREEZING

- Stabilize change
- Positive feedback

OR

- Constructive criticism
- Ongoing evaluation

REINKMEYER'S
Model of change

7 Stages

- Develop need & desire
- Develop change relationship
- Clarify problem / objective
- Examine routes, goals, actions
- Intentions to Actions
- Stabilize
- End change relationship

Restraining Forces

CHANGE

Driving Forces

RESISTANCE

- Costs
- Status Quo
- Threat perceived
- Fear of failure

RESISTANCE

Positive Effect

- Forces clarity of purpose

CONFLICT RESOLUTION

- individuals or groups
- reflects value system
- lack of clarity
- open honest dialogue
- mediation / confrontation

MANAGEMENT OF PUERPERAL SEPSIS

Isolation and Barriers in Nursing of the Woman: To prevent the spread of infection to other women and their babies

- nurse the woman in a separate room, or in the corner of the ward, but separated from the other patients

- use a gown and gloves when attending to the woman and use this particular gown and gloves only when attending to her

- keep one set of equipment, dishes and other utensils exclusively for the use of this woman and not anyone else

- wash hands carefully before and after attending to this woman

- when possible a special midwife/nurse be allocated to care for this mother and her baby

- have a relative assist with their care after instruction in the basic principles of preventing the spread of infection

- limit visitors

MANAGEMENT OF PUERPERAL SEPSIS

ADMINISTRATION OF HIGH DOSES OF BROAD SPECTRUM ANTIBIOTICS

Choice of antibiotic: If the woman is not very sick
fever absent or low grade
pulse not very high
normal state of consciousness

AMOXICILLIN 1g stat orally: followed by 500 mg every 8 hours for 7 days

and

METRONIDAZOLE 400 or 500 mg every 8 hours for 7 days

OR

AMOXICILLIN 1g stat orally followed by 500 mg every 8 hours for 7 days

and

TETRACYCLINE* I g stat orally followed by 500 mg every 6 hours for 7 days

*NOTE: Tetracycline should only be given to breast feeding mothers if there is no suitable alternative antibiotic available.)

MANAGEMENT OF PUERPERAL SEPSIS

FIRST: ADMINISTRATION OF HIGH DOSES OF BROAD SPECTRUM ANTIBIOTICS

Choice of antibiotic: If the woman is not very sick
- fever absent or low grade
- pulse not very high
- normal state of consciousness

AMOXICILLIN 1g stat orally followed by 500 mg every 8 hours for 7 days, and
METRONIDAZOLE 400 or 500 mg every 8 hours for 7 days

OR

AMOXICILLIN 1g stat orally followed by 500 mg every 8 hours for 7 days and
TETRACYCLINE* I g stat orally followed by 500 mg every 6 hours for 7 days

*NOTE: *Tetracycline should only be given to breast feeding mothers if there is no suitable alternative antibiotic available.)*

ADMINISTRATION OF BROAD SPECTRUM ANTIBIOTICS

Choice of antibiotic: If the woman is very sick
- very high fever
- rapid pulse
- confused

BENZYLPENICILLIN 5 million IU IV stat
followed by 2 million iu every 6 hours, and
GENTAMICIN 100 mg stat im followed by
80 mg every 8 hours, and
METRONIDAZOLE 400 or 500 mg orally
every 8 hours

or

AMPICILLIN I g IV stat followed by 500 mg IM
every 6 hours, and
METRONIDAZOLE 400 or 500 mg orally
every 8 hours

or

BENZYLPENICILLIN 5 million IU IV stat
followed by 2 million iu every 6 hours, and
GENTAMICIN 100 mg stat im followed
by 80 mg every 8 hours

or

BENZYLPENICILLIN 5 million IU IV stat
followed by 2 million iu every 6 hours, and
CHLORAMPHENICOL' 500 mg IV every 6 hours.

FOLLOW-UP

ANTIBIOTICS MUST BE CHANGED IF:

- the woman does not improve after 48 hours

- or the laboratory report states that the bacteria are resistant to these antibiotics

Do not change the antibiotics until you have considered:

- is the original diagnosis correct?
- is there an abscess anywhere?

Intravenous therapy should continue until the woman has had no fever for at least 48 hours

Antibiotics can then be given orally for another week on an outpatient basis.

OTHER IMPORTANT MEASURES

GIVE PLENTY OF FLUIDS

prevents dehydration
helps to lower fever
give IV fluids at first
in mild cases, increase oral fluid intake

RULE OUT RETAINED PLACENTAL FRAGMENTS

Is uterus is soft and bulky?
Is lochia excessive with clots?
If suspected, need to transfer for currettage

PROVIDE SKILLED NURSING CARE

- advise woman to rest in bed
- monitor vital signs
- measure intake and output
- observe carefully
- keep accurate records
- prevent the spread of infection and cross-infection.
- be gentle both physically and emotionally.
- use a sensitive approach in speaking with the woman and her relatives
- demonstrate empathy

MANAGING COMPLICATIONS: PERITONITIS

Generalized peritonitis is inflammation of the whole of the peritoneum.

Diagnosis:
The following signs and symptoms are present in addition to fever:

- rebound tenderness *
- abdominal pain
- distended abdomen 3A days after 3 to 4 days
- vomiting
- poor bowel sounds
- diarrhea.

Management of generalized peritonitis:

- Treat actively if suspected, without waiting for confirmation of diagnosis

- Start antibiotics

- Give IV fluids

- Give analgesics (such as pethidine 50 to 100 mg IM every 6 hours)

- If available, pass a naso-gastric tube and aspirate the stomach contents.

- Ensure that the woman is transferred without delay to next referral level if necessary

SALPINGO-OOPHORITIS AND PARAMETRITIS

Diagnosis:

Salpingo-oophoritis: fever, bilateral pain and tenderness in the lower abdomen.

Parametritis: fever, pain or tenderness on one or both sides of the abdomen, marked tenderness on vaginal examination.

Management of salpingo-oophoritis or parametritis:

Start antibiotics such as gentamicin plus metronidazole

If necessary, give pain relief such as pethidine 50-100 mg TM every 6 hours.

If the woman does not improve in 2 or 3 days she should be transferred to the next level

SEPTICEMIA

Septicemia is the presence and multiplication of bacteria in the bloodstream.

Diagnosis:

- fever and chills
- fast pulse
- woman very sick

Management of septicemia:

Start antibiotics: benzylpenicillin + gentamicin + metronidazole

Refer the woman without delay to the district hospital.

Consideration may be given to starting Heparin if disseminated intravascular coagulation is suspected.

ABSCESSES

Diagnosis:

bulging, fluctuating mass on vaginal examination

severe pain and tenderness

fever not decreasing in spite of antibiotics

Management of abscesses:

Refer the woman to the hospital for a posterior colpotomy (surgical incision into the posterior wall of the vagina) for abscesses in the Pouch of Douglas (see Figure 5.1) or a laparotomy for abscesses elsewhere in the abdomen

PASTE FIGURE 5.1 HERE

Figure 5.1: Abscess in the Pouch of Douglas

MANAGEMENT OF INFECTIONS OF TEARS OF THE PERINEUM, VULVA, VAGINA, INFECTION OF EPISIOTOMY

Signs and symptoms

- pain
- swelling
- redness
- pus discharge
- fever.

Management

- antipyretics or analgesics
- sitz* baths three times daily
- clean wound with hydrogen peroxide or betadine twice daily after genital area has been cleaned with water.

* The woman sits in a tub of clean warm water for 10 to 15 minutes

If there is no improvement after 3 days

remove sutures if present, probe wound and drain clean wound with hydrogen peroxide or betadine twice daily

If after 3 more days there is still no improvement

refer to the district hospital for surgical exploration and debridement

MANAGING CHORIOAMNIONITIS

Signs and symptoms

- fever
- tender uterus on palpation
- foul smelling amniotic fluid draining
- fast pulse (above 90 per minute)
- the baby also has a fast heartbeat (above 160 per minute)
- there is history of prolonged rupture of membranes

Management

delivery should take place as soon as possible

set up an IV infusion and start IV fluids

start antibiotics

give an antipyretic

monitor for signs of shock

transfer the woman without delay as appropriate to the hospital where skilled obstetrical and pediatric help is available

be prepared for delivery and infant resuscitation during transfer

PREVENTION OF CHORIOAMNIONITIS

Advise all pregnant women to seek medical help as soon as they notice any fluid coming out from the birth canal

If the membranes are ruptured and the woman is not having contractions, do not do a vaginal examination

If labor does not begin within 12 hours after the membranes rupture

- give the mother prophylactic (preventive) antibiotic treatment
- use a broad spectrum antibiotic such as ampicillin 1 g stat IM then 300 mg IM every 6 hours or amoxicillin 500 mg orally ever 8 hours
- as an alternative, sulfamethoxazole/trimethoprine 800/160mg may be given twice daily

Refer to the next level of care after a maximum of 12 hours of no labor

PUERPERAL SEPSIS

- one of the major causes of maternal death
- causes chronic pelvic inflammatory disease (PID)
- causes infertility

DEFINITION

An infection of the genital tract at any time between the onset of rupture of membranes or labour and and the 42nd day following delivery or abortion in which two or more symptoms are present:

- pelvic pain
- fever of 38.5 degrees C or more measured orally on any one occasion;
- abnormal vaginal discharge
- abnormal smell, foul odour of discharge;
- delay in the rate of reduction of the size of the uterus

BACTERIA WHICH CAUSE PUERPERAL SEPSIS*

- streptococci
- staphylococci
- Escherichia coli (E.coli)
- Clostridium tetani
- Clostridium welchli
- chlamydia and gonococci

*most often a mixed infection with several kinds of bacteria

ENDOGENOUS BACTERIA:

- normally live in the vagina and rectum without causing harm

- (some kinds of streptococci and staphylococci, E. coli, Clostridium welchii).

EXOGENOUS BACTERIA:

- introduced into the vagina from the outside

- (streptococci, staphylococci, Clostridium tetani etc)

ENDOGENOUS BACTERIA

Even when a sterile technique is used for delivery, infection can still occur if:

- they are brought into the uterus by the examining finger or by instruments during pelvic examinations

- they are in the presence of bruised, lacerated or dead tissue (after a traumatic delivery or following obstructed labor)

- they go up into the uterus when there is prolonged rupture of membranes

EXOGENOUS BACTERIA

can be introduced into the vagina:

- by unclean hands and unsterile instruments

- by foreign substances that are inserted into the vagina;

- by sexual activity

SIGNS AND SYMPTOMS OF PUERPERAL SEPSIS

The woman usually has:

- fever
- pelvic pain
- uterus is tender
- lochia may be offensive
- delay in the rate of reduction of the size of the uterus
- swelling and pus discharge at the site of lacerations or episiotomy

Sites of Infection in Puerperal Sepsis

Most common site of infection in puerperal sepsis is the placental site

Other sites are tears of the cervix, vagina, perineum and site of episiotomy

RISK FACTORS FOR PUERPERAL SEPSIS

- poor hygiene
- poor aseptic technique
- manipulations high in the birth canal

- presence of dead tissue in the birth due to:
    - intrauterine death of fetus,
    - retained fragments of placenta or membranes,
    - shedding of dead tissue from vaginal wall after obstructed labor

- insertion of unsterile hand, instrument or packing
- pre-existing anemia and malnutrition
- prolonged/obstructed labor
- prolonged rupture of membranes
- frequent vaginal examinations
- cesarean section and other operative deliveries
- unrepaired vaginal or cervical lacerations
- pre-existing sexually transmitted diseases
- postpartum hemorrhage
- not being immunized against tetanus
- diabetes

OTHER RISK FACTORS FOR PUERPERAL SEPSIS

Community Risk Factors

- lack of transportation and resources;
- great distance from a woman's home to a health facility
- low socioeconomic status;
- cultural factors which delay care seeking behavior
- low status of women;
- lack of knowledge about signs and symptoms of puerperal sepsis.

Health Service Risk Factors

- inadequate monitoring of temperature in prolonged labor and after delivery
- lack of asepsis during delivery
- inadequate bacteriological investigations in women with puerperal sepsis
- shortage of blood for transfusion
- inadequate management with appropriate antibiotics or further operative intervention
- non-availability of appropriate antibiotics

EVALUATION

Program Monitoring "How to Proceed"

- Determine goals & objectives
- Describe how program "should" work
- Decide on type of evaluation
- Decide on level of measurement
- Identify indicators to measure

(Bertrand, J., 1995)

EVALUATION

Selection of Indicators

- Availability of data needed to measure indicator
- Amount of time allotted to the evaluation
- Financial support available
- Donor agency requirements

(Bertrand, J., 1995)

EVALUATION

Purpose

- determine if project goals achieved
- evaluate effectiveness
- influence future plans

EVALUATION

Validate
for

- internal community
- broader community

EVALUATION

Techniques

- Written questionnaire or survey
- In-person interview
- Pre- and Post-tests
- Focus groups
- On-site review

QUESTIONNAIRE

INTERVIEWS

PRE- AND POST-TESTS

FOCUS GROUPS

ON-SITE REVIEW

FOCUS GROUPS

Purpose

- Discuss specific topic
- Open-ended manner
- Facilitator necessary

FOCUS GROUPS

Method

- Facilitator - led
- May be audio or video taped
- Open-ended questions

OR

- Topic directed questions

500 71

CONSUMER INVOLVEMENT

Purpose

- Evaluate need from consumer perspective
- Increase identification with change
- Guide effectiveness & alterations

CONSUMER INVOLVEMENT

CON

(negative)

502

CONSUMER INVOLVEMENT

Pro

(positive)

503 7