



# OBSERVATION AND RECOMMENDATIONS REGARDING NEONATAL NURSING AT THE NEONATAL INTENSIVE CARE UNITS OF RAFIDIA HOSPITAL AND THE PALESTINE MEDICAL COMPLEX

## **PALESTINIAN HEALTH SECTOR REFORM AND DEVELOPMENT PROJECT (FLAGSHIP PROJECT)**

### **SHORT-TERM TECHNICAL ASSISTANCE REPORT (FINAL)**

Prepared by:

**Dorothy E. Forde, RNC, BSN, MSNc**  
*Clinical Educator, Neonatal Intensive Care Unit*  
Loma Linda University Children's Hospital

**AND**

**Harry Gunkel, MD**  
*Pediatric Consultant*  
The Flagship Project

**Submitted on 13 AUGUST 2010**

**Contract No. 294-C-00-08-00225-00**

# CONTENTS

Acronyms .....	3
Abstract .....	4
Summary of Recommendations.....	5
Section I: Introduction.....	7
Section II: Activities Conducted.....	8
Section III: Findings, Challenges, Recommendations, and Next Steps.....	9
Annex A: Scope of Work.....	28
Annex B: Assignment Schedule .....	30
Annex C: Consultant CV.....	31
Annex D: Bibliography of Documents Collected and Reviewed.....	34
Annex E: List and Copy of Materials Utilized During Assignment.....	35

# ACRONYMS

BP – Blood Pressure

CMV – Conventional Mechanical Ventilation

CPAP – Continuous Positive Airway Pressure

Fr – French (unit of tubing diameter)

HFJV – High Frequency Jet Ventilation

HFOV – High Frequency Oscillatory Ventilation

ICU – Intensive Care Unit

IMV – Intermittent Mandatory Ventilation

IPPV – Intermittent Positive Pressure Ventilation

LLUCH – Loma Linda University Children’s Hospital

LLUMC – Loma Linda University Medical Center

MoH – Ministry of Health

NICU – Neonatal Intensive Care Unit

NRP – Neonatal Resuscitation Program

PICC – Percutaneously Inserted Central Catheter

PICU – Pediatric Intensive Care Unit

PMC – Palestine Medical Complex

RH – Rafidia Hospital

RMG – Ramallah General Hospital

RN – Registered Nurse

RT – Respiratory Therapist

SIMV – Synchronized Intermittent Mandatory Ventilation

USAID – United States Agency for International Development

## **ABSTRACT**

The consultant is a Clinical Educator for the Neonatal Intensive Care Unit (NICU) at Loma Linda University Children's Hospital who consulted for the Flagship Project July 4-24, 2010. She was part of a 3-person NICU consultant team that also consisted of a neonatologist and respiratory therapist. The team employed a multidisciplinary team approach to provide technical advice to physicians and nurses that would improve the overall NICU structure and processes.

This consultation included evaluation of the current status and examination of indicators of quality of care at the NICUs at Rafidia Hospital (RH) in Nablus and the Palestine Medical Complex (PMC) in Ramallah. A variety of educational lectures and presentations were provided for staff. Direct clinical supervision and bedside education was provided regarding critically ill children and neonates. Assistance was also given concerning USAID donated medical equipment for direct patient application.

Overall, the nurses were found to be very hard working and eager to learn. Improving staffing levels to a more reasonable nurse:patient ratio for the NICU will help to improve patient care and the functionality of the intensive care unit. Training and follow-up is the one most important component that would energize and give them confidence in their abilities. Trained nurses are able to assess quicker, move faster, and have improved confidence. Nurses that are trained in their field of specialty are more clinically competent, deliver better quality of patient care, and communicate better within a multidisciplinary team context. In the West Bank, a specially trained NICU nurse a relatively new concept that still needs to be defined, but is important to the success of increasing the level of care for the intensive care unit.

## SUMMARY OF RECOMMENDATIONS

### Within the next month:

- Flagship Project to begin making plans for a second neonatal multidisciplinary consultant team with a nurse certified as an neonatal resuscitation program (NRP) instructor and S.T.A.B.L.E. program instructor to begin the train-the-trainer model to ensure ongoing education and evaluation and follow up of education materials that were introduced by the consultant.
- Identify consultant(s) to begin working on the schedule to present the curriculum
- Head nurse at RH and the director of nursing at PMC to look at the thermoregulation protocol that was provided by the consultant and begin adopting and implementing a thermoregulation policy that will guide the nurses in facilitating a consistent neutral thermal environment for the NICU infant.
- Flagship Project nurse and physician counterparts to work with Head nurse at RH and the director of nursing at PMC to strengthen the policy formation for hand hygiene, using the WHO Guide to Implementation of the WHO Multimodal Hand Hygiene Improvement Strategy ([http://whqlibdoc.who.int/hq/2009/WHO\\_IER\\_PSP\\_2009.02\\_eng.pdf](http://whqlibdoc.who.int/hq/2009/WHO_IER_PSP_2009.02_eng.pdf)). This is a low-cost/high-benefit strategy that would strengthen the clinical outcomes and highlight the goal of patient safety.
- Flagship Project nurse and physician counterparts to present to the physician and nursing staff free online medical journal resources to strengthen the ability of staff to research for evidence based practices or best practices. Go to <http://libguides.llu.edu/freeresources>, click on Journals tab, click on Free Medical Journals, click on Topics, click on Pediatrics. The Fetal and Neonatal edition is accessible at <http://fn.bmj.com/>.

### Within the next six months:

- Return consultant to conduct train-the-trainer programs in NRP and the S.T.A.B.L.E. program.
- Flagship Project to work with the MoH and RH and PMC hospital administrators to identify supply chain and process for obtaining needed NICU supplies and sterile water for humidification of ventilators and incubators – listed in Section III.
- Identify a schedule for consultants to teach and train on specific topics according to the core competencies needed to assist in the goal of establishing a high functioning ICU.
- Return consultant to train staff at RH regarding the Gestational Age Assessment. The Gestational Age Assessment should be incorporated at both RH and PMC into the physical assessment and all infants are assessed within 12 hours of birth and the growth curve plotted in the chart.
- Head nurse at RH and the director of nursing at PMC to use Joint Commission International standards of patient care as a guideline for establishing policies that will focus written patient safety goals.
- Flagship Project nurse and physician counterparts to work with RH and PMC staff to develop a policy with goals to manage monitor and ventilator alarms effectively.
- Flagship Project procurement team to help RH and PMC identify and acquire a refrigerator with freezer to be used for storing breast milk to be used for trophic and enteral feedings for NICU inpatients.

**Within the next year:**

- Trained and certified staff in NRP and the S.T.A.B.L.E. program begin training all staff.
- Constant observation and continuous cardiopulmonary support for each infant should be provided in the NICU.
- Purchasing the I-Stat machine for immediate blood gas and electrolyte testing in the NICU. In both PMC and RH, the results of blood gas analyses should be available shortly after sample collection.
- Begin training on pain management, developmental care, and kangaroo care as wholistic components of care to the developing brain of the neonate in the NICU.
- A formal competency-based orientation program be developed and initiated for new nurses and physicians at RH and PMC.

## SECTION I: INTRODUCTION

The Flagship Project is a five-year initiative funded by the U.S. Agency for International Development (USAID), designed and implemented in close collaboration with the Palestinian Ministry of Health (MoH). The Project's main objective is to support the MoH, selected non-governmental organizations, and selected educational and professional institutions in strengthening their institutional capacities and performance to support a functional and democratic Palestinian health sector able to meet its priority public health needs. The Project works to achieve this goal through three components: (1) supporting health sector reform and management, (2) strengthening clinical and community-based health, and (3) supporting procurement of health and humanitarian assistance commodities.

The consultant was the first NICU nurse consultant to provide assessment and training. She worked alongside the head nurse of RH and the director of nursing at the PMC, as well as with staff nurses and physicians to demonstrate the benefits and strengths of a multidisciplinary team approach in patient care.

A brief introduction was given to physicians and nurses of some mechanisms to reduce errors using the Joint Commission International standards in collaboration with World Health Organization (WHO) to improve team communication, and standardize processes of care that can impact short and long term neonatal outcomes. PMC pediatric staff were given an interactive presentation on the Neonatal Resuscitation Program (NRP) as a means of standardizing training of all healthcare staff in the care of very sick babies and as a comprehensive team approach that can improve patient safety and ultimately improve care to sick and vulnerable infants at this facility. A variety of educational material was given to both RH and PMC for future referencing.

There were several discussions with the Flagship Project regarding the Project and how to continue to meet the needs of these two hospitals and effectively place resources in order to optimize the positive outcomes that would be beneficial at all levels of administrative and clinical care healthcare. A large number of NICU hospital policies and protocols were given to the Flagship Project, and copied to the share drive at the Flagship office. Copies of these documents were given to PMC and Rafidia Hospital administrators in both medicine and nursing. These documents are listed in Annex E of this document.

This report contributes to Flagship Project Component 2, Objective 2.1: Improving the Quality of Essential Health Services for Palestinians. This consultancy also contributed to the MoH IDP module number 1, Create a Center of Excellence at the Palestine Medical Complex; and module number 12, Improve the Quality of Clinical Services in the Palestinian MoH Hospital System.

## **SECTION II: ACTIVITIES CONDUCTED**

The consultants used the Joint Commission International Patient Safety Goals 2010 in conjunction with The World Health Organization as a guide to determine recommended improvement strategies for evaluating care in the NICU, and developing a standardized process of care using a multidisciplinary team approach to improve quality of care and ultimately infant outcomes. Recognizing that this was a thriving unit, consultants focused on considering steps that could improve the quality of care delivered to patients in the NICU.

The consultant performed an assessment in the NICUs of RH and PMC related to nursing training, processes, quality of care, patient acuity, and available and needed resources. The nurses recognized the need for and welcomed training. The consultant observed “gaps in knowledge” meaning that nurses had a good grasp of the general nursing information they had been trained on, but had not received training in certain key neonatal areas which prevented them from fully having a global view of the patient.

The consultant provided technical assistance and training at the bedside to nurses and physicians. She rounded with nurses and physicians daily and discussed the diagnosis, prognosis, treatment, and medical and nursing management for each patient. She also interacted with fellow consultants to model multidisciplinary team collaboration and communication. The consultant provided visual demonstrations, lectures, and resources for ongoing learning in the field of neonatal nursing.

Several equipment and supply needs were identified. Section III further details the importance of the recommended equipment and supplies needed to elevate the functionality of the NICU. The Flagship Project was notified of the needed items, and discussion took place regarding the logistics of how to obtain supplies in the MoH system. Further investigation will take place between the Flagship Project, hospital administrators, and the MoH to identify the most feasible process of procurement.

## SECTION III: FINDINGS, CHALLENGES, RECOMMENDATIONS, AND NEXT STEPS

- **Findings**

**Rafidia Hospital (RH)** is located in Nablus, serving the people that reside in Nablus and the surrounding suburbs. The NICU is a thriving and developing unit, but lacked some very important and fundamental resources that would facilitate and affirm the increasing functionality of the unit. The NICU has a capacity for 20–25 patients but frequently treats 30 – 34 patients due to the increased need for NICU services, which in turn adds to the workload of the physicians and nurses.

**The Palestine Medical Complex (PMC) Children’s Wing** is a new and modern facility located in Ramallah. It has just recently opened and has the potential to be a highly functional Children’s Hospital with modern equipment that will serve the needs of the population of Ramallah and neighboring cities. A multidisciplinary team approach in the strategic planning by examining the physical structure and optimizing the training of staff and placement of equipment in order to facilitate and improve care to very critical and vulnerable infants in Ramallah is key to optimizing the functionality of this unit.

Ramallah General Hospital is located on the same campus as PMC and houses the current NICU. The NICU is a small unit with 6 -8 beds that are functional and sometimes has 10-12 patients. Overcrowding and poorly designed workspace disrupt workflow and cause added stress for nurses and physicians, which is compounded by the insufficient family space, another contributing factor. There are currently blueprints and a plan to relocate the present NICU, which would provide caregivers with an environment that lowers stress and improves job performance, safety, and satisfaction.

### **Staffing and Staff Development**

Physicians are trained in general pediatrics and there are currently no physicians trained in the subspecialty of neonatology on staff at RH or PMC.

Nurses are primarily practical nurses with two years of general training. In the nursing training programs, there is no specific program for pediatric or neonatal nursing. Instead, training takes place on the floor in the course of their work. It was observed that the nurses have good general experience, and their experience would be improved with focused NICU training. They would benefit by a system where they can become registered nurses after 5 years of experience and with extra on-the-job training. At RH the nurse: patient ratio ranges from 1:7 to 1:10. At the PMC the nurse: patient ratio is 1:7. Nursing staff are utilized to clean equipment, stock supplies, and other non-nursing tasks.

In speaking with the staff nurses at RH and PMC, it was discovered that there are no processes in place to provide ongoing training for nurse leaders. The nurses asked if they could be helped to develop a plan for ongoing leadership training.

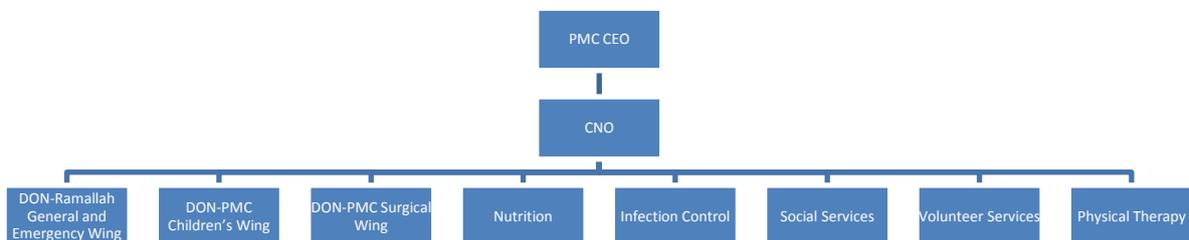
There is one respiratory therapist (RT) in the West Bank who works at the PMC primarily with adult patients. Respiratory therapists are essential to assist the physicians and nurse in recommending best practices in ventilator management. This is a specialized training that is

focused on respiratory physiology, mechanics, and troubleshooting equipment. This expertise would significantly improve patient outcomes of critically ill newborns. Physicians and nurses tried to operate the ventilators but didn't understand the technical function and operation based on patient disease processes. It was observed that this lack of understanding led to clinical deterioration in at least one severely ill infant.

RH needs a RT as well. There was no RT on staff although there was mechanical ventilation provided for critically ill infants. There were insufficient cardio respiratory monitors to meet the needs of the patient load on the unit in both RH and PMC. There were monitors present but not being used on patients. The reason for this is unclear.

### **PMC Nursing Organization**

The consultant was requested to evaluate and suggest a nursing management organizational structure for the PMC. Currently, the organizational structure is as follows:



## Hand Hygiene

Blueprints for the PMC indicate potential opportunities for adding extra sinks in the new NICU unit on the top floor of the Emergency Wing. There were a few sinks observed at RH and PMC. At RH, there is a soap dispenser and towel dispenser near the sink that are frequently empty. Nurses indicated that they are responsible for these tasks, but because they become busy with patient care, it is difficult to keep them supplied. There is currently no other process for having a consistent supply of soap and paper towels. It was observed that garbage cans are hand operated which contaminates the hands after washing.

Hand Hygiene. Hand Hygiene is the primary measure to reduce infections. A simple action, perhaps, but the lack of compliance among healthcare workers is problematic worldwide. On the basis of World Health Organization and Joint Commission International Guidelines 2009 and a worldwide initiative - a written policy and hand hygiene guidelines should be established in both Rafidia NICU and the NICU at Ramallah General Hospital.

RH staff indicated that alcohol based cleaners had been delivered to the hospital, but none were visible. The NICU at the PMC had no alcohol based hand cleaners visible in the unit. Alcohol based hand cleaners can be made available to staff in several forms. Two recommendations are to either provide wall mounted containers or small containers that are carried individually by staff.

## Infrastructure Systems and Processes

The consultant was requested to bring policies, standards, procedures, and techniques to share with medical staff at RH and PMC and serve as a guideline for developing their own policies. There are currently no written protocols or policies for the NICU.

The consultant observed that the PICU at the PMC had a bedside patient flowchart that clearly reflected vital signs and cares that were given to the patient. This form was very easy to read and chart on. Nurses at RH do not have a standard bedside flowchart for charting.

A hospital morbidity and mortality (M&M) reporting system is helpful to identify issues and errors in patient care and discuss resolution and processes to diminish such occurrences. An M&M process is not currently functioning. The consultant provided examples of the benefits of a M&M process. Follow-up NICU consultant teams should help facilitate a core group comprised of physicians and nurses to initiate their own M&M system.

Radiology services are basic at RH and PMC and often require transport to other facilities to obtain necessary diagnostic tests (i.e. barium enema). Upgrading may be available for existing equipment to expand services. A radiology consult should provide an assessment in this area.

A uniform, standardized process of care and a comprehensive team approach can improve patient safety and ultimately infant outcomes. There is no quality improvement (QI) process in place. The goal of a QI program is to provide important, evidenced-based information that can be used to improve delivery of safe care, and quality care to sick and vulnerable infants. Mechanisms to reduce errors including standardizing processes of care, avoiding a reliance on just memory and communicating in clear direct ways. Appropriate, timely, and correctly executed actions can impact short and long term neonatal outcomes.

Presently, there are no gestational age assessment for fetal maturity that follows a predictable, organized course. Physicians or nurses can be trained and should do a gestational age assessment, using the new Ballard Score which is expanded to include extremely premature infants. It consists of a tool that measures 6 neuromuscular maturity factors and physical maturity factors. PMC physicians were given a lecture on how to assess gestational age using the New Ballard Scoring Tool and the scoring tools were left at the hospital for future use and at the Flagship Project office. The training PowerPoint presentation was left with the physicians and nurses at RH, but due to lack of time, training did not take place. This should be followed up on by future consultants.

Nurses, physicians, and assistants asked for additional training and resources to help stabilize a critically ill baby. The S.T.A.B.L.E. program is internationally used in more than 45 countries and provides training for all neonatal healthcare professionals in six assessment and care modules. S.T.A.B.L.E. is a mnemonic for:

1. Sugar
2. Temperature
3. Airway
4. Blood Pressure
5. Lab Work
6. Emotional Support

In the new Children's Wing, there is a room that was originally intended to be the NICU but is currently used to store incubators and NICU equipment. It is recommended that this room be used as a step-down NICU for recovering grower/feeder babies that have graduated from the NICU and are convalescing. This intermediate nursery could be used to house the premature babies that are now mixed in with the pediatric population after leaving the ICU. This configuration could be viable in terms of income generation for the ICU instead of going to the general pediatric ward. The distance separating the NICU from the step-down NICU should not be a factor as staffing would be separate and involve nurses specially trained for a level II NICU function. Physician coverage could be provided by a pediatrician. There is another attached room to the current NICU storage area that could be for the teaching and use of breast-feeding mothers.

### **Patient Safety and Equipment**

The NICU struggles to operate with inadequate equipment and staff resources to facilitate a highly functioning NICU. A higher functioning NICU is possible by providing the equipment needed to maintain the level of NICU care according to the acuity of the patients.

The consultant observed pain was not assessed along with vital signs and that there was no current standard for assessing and managing pain in neonates. Consultant discussed with staff the evidence-based pharmacologic and non-pharmacologic approaches to management of pain in neonates. Staff indicated that pain is not usually treated. Pain that is not treated or undertreated can result in the following physiologic and biochemical sequelae:

1. Hyperglycemia
2. Increased protein catabolism
3. Increased oxygen consumption
4. Decreased gut motility
5. Increased heart rate and blood pressure

## 6. Decreased transcutaneous oxygenation

Sterile water was not being used at the RH or PMC for ventilators, humidifiers, or incubators. After further discussion with staff, it was discovered that sterile water may be available in the West Bank, but the hospitals have not been able to acquire it. Sterile water is necessary because the humidification of isolettes significantly decreases insensible water and energy loss in the low birth weight infant. It is also very unsafe to run ventilator circuits without humidification. Gases should be humidified during ventilation to prevent damage to the lungs. Instead of sterile water, staff do not use any water for ventilation of any kind. Distilled water would suffice and is available through the pharmacy.

In the NICU, monitors (cardiorespiratory and ventilators) alarmed frequently. The consultant observed that staff largely did not respond to the alarms. This could be due to staff being desensitized or no standardized approach in responding to alarms.

Neonatal nasal cannulae are more consistent for delivery of oxygen because of the ease in keeping in place during nursing cares. The cannulae that are available at RH and PMC are too large for the neonates nares and a smaller cannulae is necessary for premature infants.

Oxygen is delivered at only 100%. A stand alone oxygen blender mixes room air with oxygen so that oxygen can be regulated and provided an appropriate percentage. High percentage of oxygen is damaging to both the baby's eyes causing retinopathy of prematurity and blindness and damaging to the lungs.

Bulb syringes are not currently available in both RH and PMC. During deliveries, suction that has been used for the mother is also used on the baby. Bulb syringes are useful to suction after delivery, at the bedside while an inpatient, and may be discharged with the baby to be used at home.

The radiance between the bilirubin light and the baby is not currently being measured. In order to know if the light is being effective in breaking down the bilirubin, a bili-meter irradiance measuring instrument measures the irradiance of phototherapy equipment.

Adult pulse oximeter clips are being used, which are much too large for the babies and cuts off circulation to their hands or feet. because they are inappropriately clipped to the whole hand or forefoot of the premature infant. Pulse oximeter disposable probes would be preferred, but are also available in reusable probes which could be more cost effective.

Premature babies' arms were observed to be in the sprawled position and their legs in the "frog leg" position. There were no boundaries and so they were free to roll around the isolettes. Babies need to be in the same midline and tucked position as they were in the womb so that they will have a more developmentally appropriate outcome in terms of brain development. A developmental bunting holds them in an appropriate position.

Babies typically remain in their isolettes or the mother may hold them periodically. Kangaroo care entails consistent skin-to-skin contact and would be beneficial if culturally acceptable. This method of contact promotes stabilization of vital signs and improved short-term and long-term developmental outcomes.

Mothers are utilizing a hand breast pump which is not as effective for milk let down and milk production. Nurses can teach and offer assistance to mothers to breast feed and also pump their milk for trophic and enteral feeds. A hospital grade electric breast pump would be helpful to mothers while they are at the hospital. Storage of breast milk requires a refrigerator with freezer.

Blood from babies is routinely drawn from a peripheral arterial stick. Radial, brachial, and femoral arteries are frequently used for routine blood draws. Umbilical artery catheters would promote fewer painful procedures and allow for the baby to stabilize more effectively. It also allows for continuous arterial blood pressure monitoring (transducer that works with the cardiac monitor is also needed), frequent arterial blood gas evaluation, and blood analyses. The most appropriate catheter size for premature babies is:

- <1.5 kg = 3.5 fr.
- >1.5 kg = 5 fr.

All neonatal healthcare workers were not trained in the Neonatal Resuscitation Program (NRP). At RH, an NRP book was found as a resource and staff could further benefit from actual instruction. The consultants left an inflatable infant mannequin at RH for staff to practice on. Ideally, a mannequin that can be intubated and provide opportunity to practice chest compressions would be the best teaching aid for mock codes and NRP certification. Two mannequins are recommended to be provided – one to RH and one to PMC.

The purpose of NRP is to teach an evidence-based approach to resuscitation of the newborn and to standardize the knowledge and skill base needed in a hospital. A NRP instructor is needed for both RH and the PMC to provide instruction and certification. It is recommended that a second specialized NICU consultant team return to provide a train-the-trainer model with a physician and a nurse from each site to be trained and certified as NRP instructors.

The current method of securing an umbilical vein catheter with gauze and tape is ineffective because personnel cannot visualize the insertion site for bleeding, infection, etc. All umbilical lines need to be secured with a bridge made from tape in order to monitor for dislodgement and to minimize accidental displacement which may result in significant blood loss. Monitor for accidental catheter migration by noting the centimeter marking at the skin after placement of an umbilical artery or vein catheter. Report any changes in line insertion depth to the physician. It is important that these catheters do not migrate to an unsafe position.

Chest tubes are being secured with excessive tape and gauze, prohibiting visualization of the insertion site. Chest tubes should be secured with surgical transparent dressing and secured at more than 3 points from the insertion site

Accurate intake and output is hindered because there are no diaper scales at RH and the PMC.

Nurses are unable to obtain stat blood gasses and electrolytes and send sample to the clinical lab for processing. However, the long delay causes the blood to continue to metabolize and provides erroneous results. At the PMC, there is a blood gas analyzer in the CCU that is not accessible to other areas of the hospital. An I-Stat machine provides portable point of care blood gas and electrolytes analysis with a minimal amount of blood.

Currently no nasal jejunal feeding is done at RH or PMC. In babies who are having difficulty with enteral feedings, a Corpak enteral feeding tube with stylet (size 6 fr) can be inserted in baby's jejunum, bypassing the stomach to provide nutrition and promote the motility of the digestive tract without invasive procedures. The consultant demonstrated this procedure to the physicians at the PMC and left a standardized procedure for placement of a nasal jejunal tube and provided some Corpaks for use. Future consultants with the appropriate expertise should provide similar instruction to physicians at RH.

It was observed that there is no means to administer high caloric, high protein, high dextrose total parenteral nutrition to babies to provide good nutrition for brain and body development. Peripherally inserted central catheters (PICC) minimize the need for surgery to place a central line and optimizes the nutritional intake necessary for optimal growth and development.

- **Challenges**

The quality of patient care can be optimized by more collaborative communication between physicians and nurses, such as joint rounds, a platform for sharing information learned in conferences and other settings. Limited access to critical supplies is due to a non-standardized or consistent system of ordering supplies from the MoH. Hospital and Flagship Project staff have indicated that it is difficult to determine what supplies are consistently available and may be acquired locally. While there are no written guidelines and procedures or protocols to guide staff in uniform patient care, the consultant provided resources that could be used to begin a system for protocol development.

The lack of consistent evidence based processes for basic NICU functions is also a challenge. While staff are willing, it will be challenging for the nurses to build processes and policies and procedures from nothing. Overall, the challenges observed during this consultancy are not insurmountable.

- **Recommendations**

#### **Staffing and Staff Development**

International nursing standards recommend that nurse:patient ratio in an intensive care unit should be 1:2 or 1:1 ([http://www.icn.ch/images/stories/documents/publications/fact\\_sheets/9c\\_FS-Nurse\\_Patient\\_Ratio.pdf](http://www.icn.ch/images/stories/documents/publications/fact_sheets/9c_FS-Nurse_Patient_Ratio.pdf)). A more realistic nurse patient ratio for the West Bank should be 1:3 or 1:4.

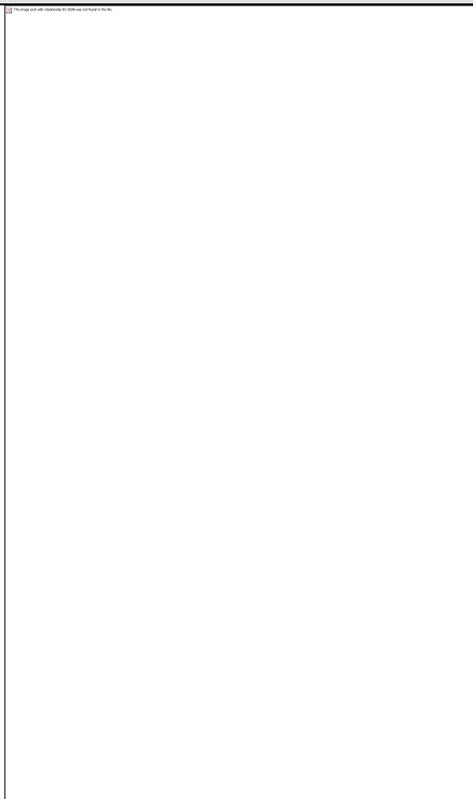
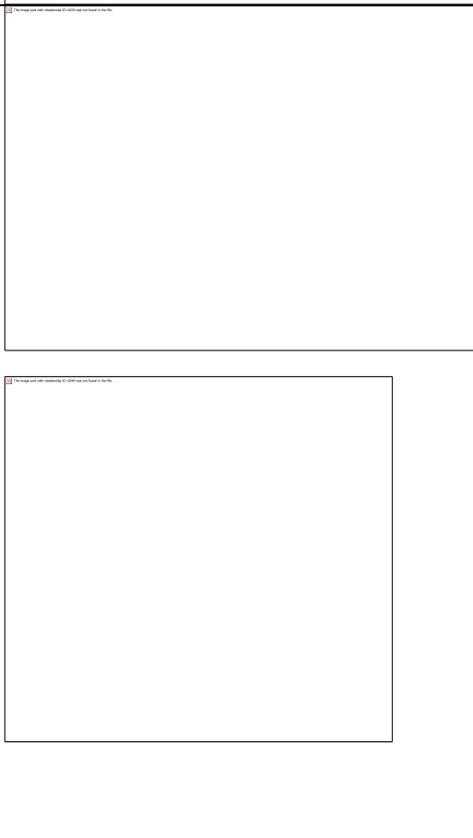
The consultant spent some time with the director of nursing for the PMC. The time was insufficient to determine the scope of on-the-job training that is currently given to nurses working in the NICU. The goal is to help the PMC adopt and develop a program that will strengthen the training and preparation capacity of neonatal nurses.

## Patient Safety and Equipment

Recommendation	Purpose	Illustration
Oxygen blender	To mix room air with oxygen so that oxygen can be regulated and provided an appropriate percentage and avoid damage to babies that is caused by 100% oxygen.	
Bulb suction	To provide suction after delivery, at the bedside while an inpatient, and discharged with the baby to be used at home.	
Bili-meter irradiance measuring instrument	To ascertain if light is being effective in breaking down the bilirubin of the baby.	
Neonate-size pulse oximeter probes	Disposable probes would be preferred, but are also available in reusable probes which could be more cost effective.	
Bunting	Bunting holds them in an appropriate position. Babies need to be in the same midline and tucked position as they were in the womb so that they will have a more developmentally appropriate outcome in terms of brain development.	

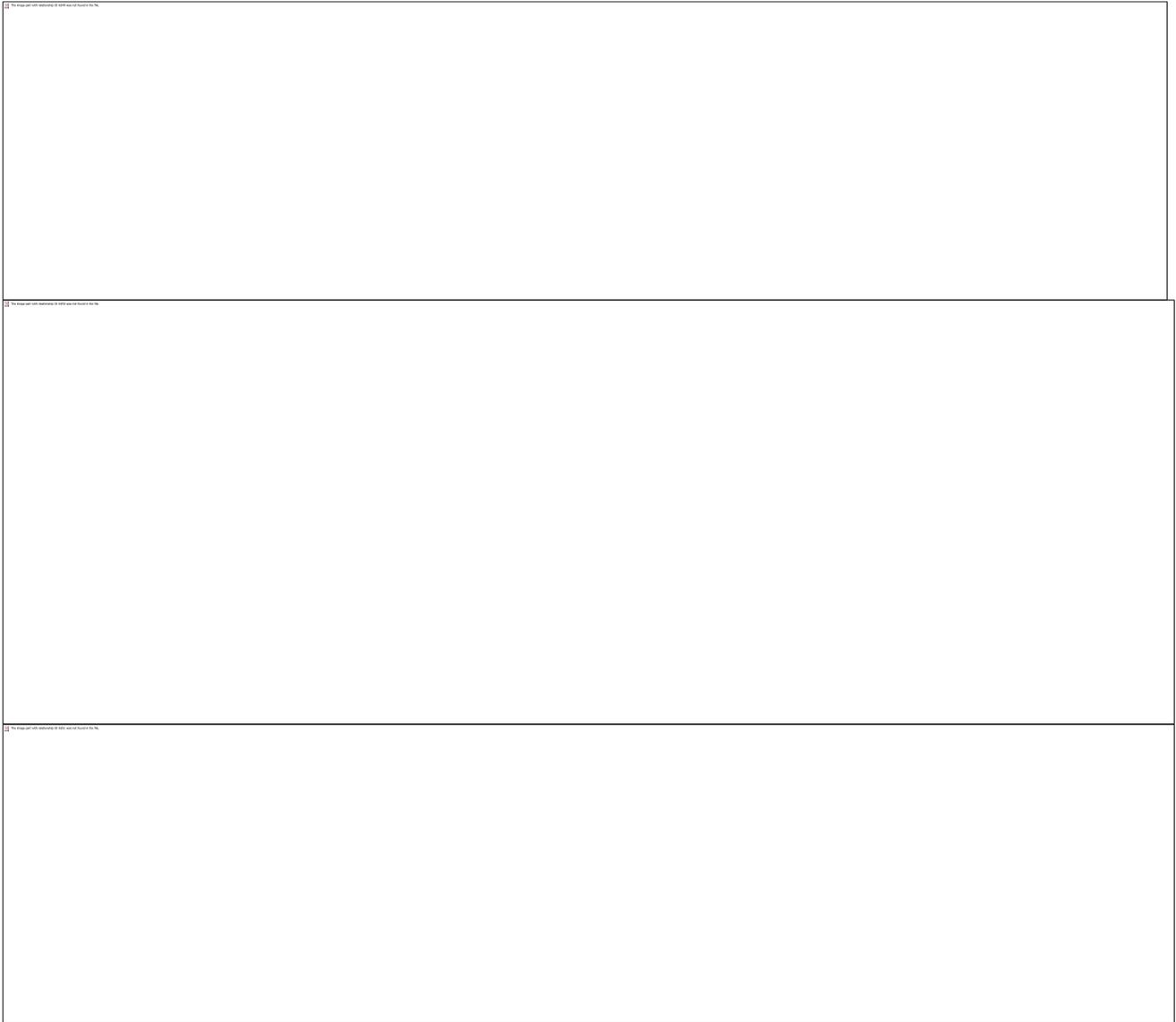
Recommendation	Purpose	Illustration
Kangaroo Care	If culturally acceptable, kangaroo care entails consistent skin-to-skin contact and is a beneficial method of contact to promote stabilization of vital signs and improved developmental outcomes.	
Hospital grade breast pump	Nurses can teach mothers to breast feed and also pump their milk for trophic feeds.	
Umbilical artery catheter (size 3.5 fr or 5 fr)	Umbilical artery catheters would promote fewer painful procedures and allow for the baby to stabilize more effectively.	
Diaper Scale	Scales would enable nurses to more accurately measure urine output.	

Recommendation	Purpose	Illustration
I-Stat machine	An I-Stat machine provides portable point of care blood gas and electrolytes analysis with a minimal amount of blood.	
Corpak enteral feeding tube with stylet (size 6 fr)	Bypassing the stomach, to provide nutrition and promote the motility of the digestive tract without invasive procedures.	
Mannequin – head	<p>To practice intubation. A mannequin that would be a good option to conduct training with is the Neonatal Intubation Trainer by Laerdal.</p> <p><b>Laerdal Neonatal Intubation Trainer</b> allows teaching of intubation skills on the newborn baby. Robust and realistic, this model allows students to undertake training that is directly transferable to the clinical setting.</p> <ul style="list-style-type: none"> <li>- Realistic anatomy of a newborn baby</li> <li>- Intubation (oral and nasal) Bag-Valve-Mask ventilation</li> <li>- Correct tube placement can be checked by practical inflation test.</li> </ul> <p><a href="http://www.laerdal.co.uk/doc/10926237/Laerdal-Neonatal-Intubation.html">http://www.laerdal.co.uk/doc/10926237/Laerdal-Neonatal-Intubation.html</a></p>	

Recommendation	Purpose	Illustration
Simulation Mannequin	<p>The mannequin model should allow participants to practice intubation, umbilical artery/vein placement, and chest compression skills.</p> <p>A good teaching model is the NewBorn Anne by Laerdal.</p> <p><b>NewBorn Anne</b>            With features specifically designed to meet key Neonatal Resuscitation Program (NRP) course skills, NewBorn Anne has a realistic airway for training in all aspects of newborn airway management, chest rise with manual ventilations, and needle decompression. Circulation features include a patent umbilicus with manually generated pulse that can be assessed cut, and catheterised for IV access and I/O access in both legs.</p> <p><a href="http://www.laerdal.co.uk/doc/42333315/Paediatric-skills-training.html">http://www.laerdal.co.uk/doc/42333315/Paediatric-skills-training.html</a></p>	
Alcohol based hand cleaners	<p>Alcohol based hand cleaners should be &gt; 65% and up to 90% alcohol..</p>	

Recommendation	Purpose	Illustration
PICC line	Peripherally inserted central catheters (PICC) minimize the need for surgery to place a central line and optimizes the nutritional intake necessary for optimal growth and development	
10 NRP books per facility	Necessary for providing NRP training and certification. Ideally, there should be one NRP book per person.	
10 S.T.A.B.L.E. books and accompanying materials per facility	Necessary for providing S.T.A.B.L.E. program training and instruction. Ideally, there should be one S.T.A.B.L.E. book and accompanying materials per person.	

The consultant is certified as a S.T.A.B.L.E. instructor and provided full course training materials and resources to RH and PMC. Time constraints precluded any formal training to be conducted, but a train-the-trainer model should be adopted in the next consultancy. This program is considered to be the follow-up program to NRP and is an essential component of education for neonatal healthcare workers. The components of S.T.A.B.L.E. are:

Pain is considered as the fifth vital sign and should be assessed routinely. The “golden rule” of pain assessment must be what is painful to an adult is painful to an infant until proven otherwise. This rule with other tools must be used in the assessment and intervention of pain. There are multiple pain assessment instruments available – all are effective and one should be adopted at the RH and PMC. Some pain assessments are:

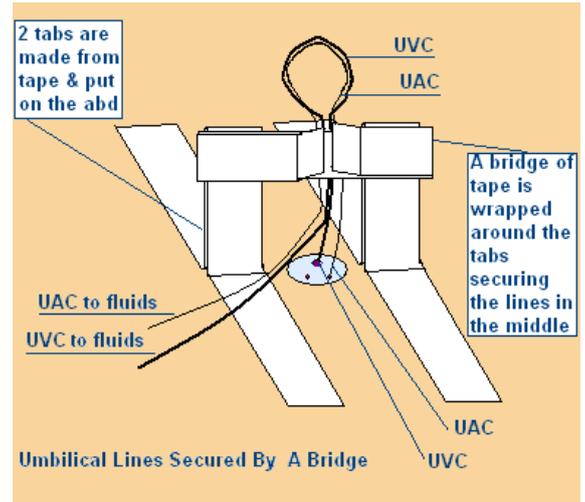
- NIPS – Neonatal Infant Pain Scale
- PIPP – Premature Infant Pain Profile
- CRIES – Crying Requires O<sub>2</sub>, Increased vs. Expression and Sleepless
- FLACC – Face, Legs, Activity, Cry, Consolability
- N-PASS – Neonatal Pain, Agitation, and Sedation Scale

The consultant recommends that RH and the PMC develop a policy with goals to manage alarms effectively. The goals of effective management are to:

1. Minimize recurring alarms that obscure, desensitize, or distract clinicians
2. Simplify and standardize alarm management approach
3. Assess educational needs of clinicians regarding bedside monitoring

4. Assess new technology and systems to improve alarm management

All umbilical lines need to be secured with a bridge made from tape in order to monitor for dislodgement and to minimize accidental displacement which may result in significant blood loss. Monitor for accidental catheter migration by noting the centimeter marking at the skin after placement of an umbilical artery or vein catheter. Report any changes in line insertion depth to the physician. It is important that these catheters do not migrate to an unsafe position.



Gestational Age Assessment should be done on every infant admitted to the NICU. This should be done by the admitting physician team within 12 hours of birth and placed on the infant's chart unless there are circumstances that prevent this, i.e. if the baby is severely ill, hypoxic ischemia, or if the baby is reacting to mother's narcotic treatment during labor and delivery. Nurses can also be trained to do Gestational Assessment efficiently. At the PMC a lecture was given to physicians and charting and charting tools left with PMC medical administration which can be photocopied to continue the usage and usefulness of this tool. Copies of this tool were also left with Flagship Project counterparts and could be shared with RH staff. RH staff was given a training PowerPoint and educational lecture notes that can be used for future training and implementation.

Nasal cannula should be available in the appropriate size for premature infants. There are two purposes for the use of a nasal cannula: 1) stable oxygen delivery and 2) pressure delivery. If the size is not appropriate, it cannot be used on the baby. The flowsheet below guides the user in correct nasal cannula usage:

It is recommended that future neonatal consultants remain onsite for 4-6 weeks embedded in the NICU at RH and PMC to implement recommendations and train staff. This longer time period is essential in impacting and improving patient care and system outcomes. It is also important for consultants to come as a team rather than individually to continue modeling a multidisciplinary approach and effect improvement in multiple aspects of the NICU. It is recommended that the team composition consist of a neonatologist, nurse, respiratory therapist, and possibly a nurse practitioner who could effectively teach both physicians and nurses.

Holy Family Hospital in Bethlehem has a functioning NICU that could serve as a model for the West Bank. Future consultants should visit this site to evaluate how systems used by this hospital could be implemented at RH and PMC.

### **Infrastructure and Systems**

The nurses at RH would benefit from the use of a bedside flowchart, similar to that of the PICU at the PMC. It is recommended that the Flagship Project physician and nurse counterpart help to obtain and share the PICU flowchart with RH as a standardized charting form.

### **Team Building Systems**

The consultant was asked to recommend systems to improve team collaboration among physicians and nurses. The recommendations are as follows:

1. Conducting daily morning rounds with physicians and nurses
2. Instituting chief rounds once per week with physicians and nursing represented
3. Adopting JCI patient safety goals

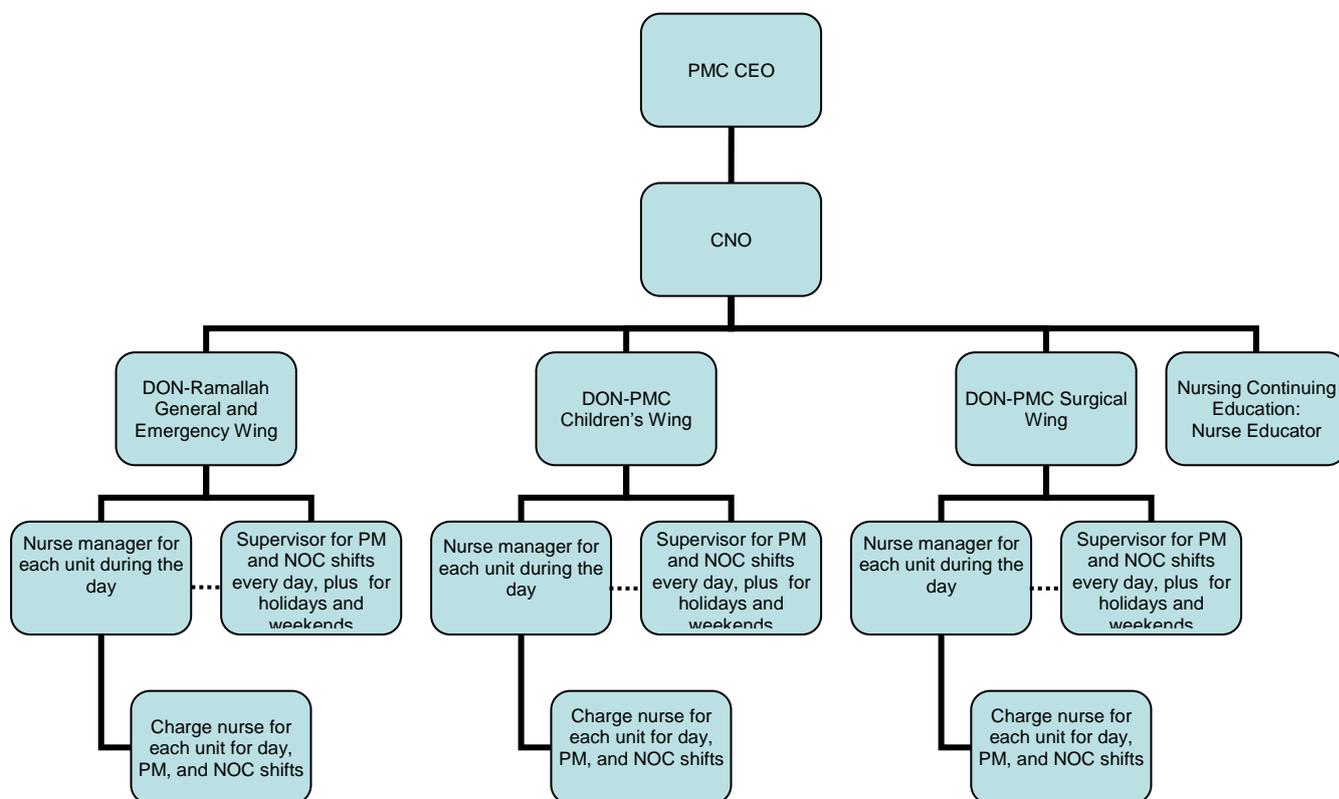
4. Beginning SBAR communication techniques
5. Distributing a research article of the month given to staff which will be discussed in Chief Rounds
6. Setting quality improvement goals to improve:
  - a. Oxygenation
  - b. Circulation
  - c. Warmth
  - d. Glucose stability
7. Recognizing the need for temperature to be maintained on servo mode on both isolettes and radiant warmers to maintain a temperature of:
  - a. Term: axillary 36.5 °C–37.5 °C; skin 36 °C–36.5 °C
  - b. Preterm: axillary 36.3 °C–36.9 °C; skin 36.2 °C–37.2 °C

The World Health Organisation classifies a core body temperature for newborns of 36 to 36.4 °C as mild hypothermia, 32 to 35.9 °C as moderate and < 32 °C as severe (WHO 1997). The preterm infant has the combined disadvantages of decreased fat for heat production and insulation, decreased glycogen stores, immature skin which increases water loss and poor vascular control. They experience even higher evaporative heat losses than term infants in the first day, especially at low ambient relative humidities

8. Comprehending the consequences of thermal instability that are detrimental to the premature infant
  - a. Hypothermia
  - b. Hyperthermia

## PMC Nursing Organization

The consultant recommends that the PMC organizational chart reflect the following position and reporting relationship structure:



The departments of nutrition, infection control, social services, volunteer services, and physical therapy will also report to the CNO. It is recommended that a respiratory therapy department be started, which can also report to the CNO. It is important for continuing education for nurses to report to the CNO to ensure accountability and appropriate training.

### • Next Steps

The Flagship Project physician and nurse counterparts are best poised to help the RH and PMC adapt and implement the use of simple standardized processes of care to train all maternal child care healthcare providers. A strategic plan is necessary to provide the following:

1. Neonatal Resuscitation Program (NRP)
2. S.T.A.B.L.E. Program
3. Written procedures, protocols, and guidelines. The consultant wrote a thermoregulation protocol (see Annex E).

Standardized processes will do several things.

1. It will bring everyone together on the same page so that everyone can work in concert with each other
2. It will allow for evaluation of care and isolate any deviation from program guidelines

3. At times, it is necessary to change or modify care provided to sick infants, however, inappropriate deviations are easier to identify when everyone is using the same general approach.

Flagship Project physician and nurse counterparts and future consultants should continue to strive to model collaboration and communication. Clear communication is key a successful patient management.

1. Written and verbal communication must be clear, unambiguous, and timely
2. When a verbal order is given it should be repeated back to the person giving the order to be sure that it was heard correctly
3. JCI recommends that all organizations conduct team training in perinatal areas to teach staff to work together and communicate more effectively

The consultant presented a presentation at RH and PMC on SBAR communication and left an electronic copy for future training for all staff.

There are two specific videos on patient safety that are recommended to be used in patient safety training for both physicians and nurses. These were left at the Flagship Project Office:

1. Josie King Story
2. Sue Sheridan Story

# ANNEX A: SCOPE OF WORK

## Short-Term Consultancy Agreement Scope of Work

SOW Title: Neonatal Nurse Consultancy

SOW Date: May 19, 2010

SOW Status: Final

Consultant Name: Dorothy Forde, RN

Job Classification: Short-Term US Expatriate Neonatal Nursing Clinical Consultant

Reporting to: Paul Rader, MHA, Ph.D., Advisor, Hospital Management

### I. Flagship Project Objective

The Flagship Project is a five-year initiative funded by the U.S. Agency of International Development (USAID), and designed in close collaboration with the Palestinian Ministry of Health (MoH). The Project's main objective is to support the MoH, select non-governmental organizations, and select educational and professional institutions in strengthening their institutional capacities and performance to support a functional, democratic Palestinian health sector able to meet its priority public health needs. The project works to achieve this goal through three components: (1) supporting health sector reform and management, (2) strengthening clinical and community-based health, and (3) supporting procurement of health and humanitarian assistance commodities.

The Flagship Project will support the MoH in implementing health sector reforms needed for quality, sustainability, and equity in the health sector. By addressing key issues in governance, health finance, human resources, health service delivery, pharmaceutical management, and health information systems, the Ministry will strengthen its dual role as a regulator and main health service provider. The Flagship Project will also focus on improving the health status of Palestinians in priority areas to the Ministry and public, including mother and child health, chronic diseases, injury prevention, safe hygiene and water use, and breast cancer screening for women.

### II. Specific Challenges to Be Addressed by this Consultancy

The quality of Palestinian health services has been compromised by fragmentation among health service providers, resulting in multiple and varying clinical standards and norms. There has been little citizen participation and feedback solicited by the MoH, resulting in a gap between citizen expectations and MoH delivery of services. Improvement of pediatric services in MoH hospitals is a priority of the MoH and Flagship staff is committed to help initiate change and necessary reforms to deliver better secondary health care services to the Palestinian people.

### III. Objective of this Consultancy

This consultancy will focus on improving MoH Neonatal Intensive Care Unit (NICU) services at the secondary health care level.

### IV. Specific Tasks of the Consultant

Under this Scope of Work, the Consultant shall perform, but not be limited to, the specific tasks specified under the following categories:

- A. **Background Reading Related to Understanding the Work and Its Context.** The Consultant shall read, but is not limited to, the following materials related to fully understanding the work specified under this consultancy:
- Previous Flagship Project technical reports, Work Plan, etc.
  - MOH National Strategic Health Plan
  - USAID Flagship Project Quarterly Reports
  - USAID Needs Assessment Report, December 2008
  - USAID MOH Institutional Development Plan
- B. **Background Interviews Related to Understanding the Work and Its Context.** The Consultant shall interview, but is not limited to, the following individuals or groups of individuals in order to fully understand the work specified under this consultancy:
- Chemonics Project Management Unit (PMU), if appropriate
  - Chemonics Field Office Staff, as needed
  - Appropriate MOH Staff and others appropriate

- Hospital Emergency Staff and others as appropriate
- LLU Palestine Project leadership

- C. Tasks Related to Accomplishing the Consultancy's Objectives.** The Consultant shall use his/her education, considerable experience and additional understanding gleaned from the tasks specified in A. and B. above to:
- Work as a clinical nursing consultant to help integrate and enhance neonatal intensive care services for the designated MOH hospital(s)
  - Mentor and advise MOH nursing staff while providing on-the-job clinical training in nursing
  - Conduct training and/or lecture on relevant neonatal intensive care nursing topics
  - Mentor and advise MOH medical and nursing staffs on interdisciplinary approach to NICU care
  - Contribute to the ongoing review, recommendation, and development of policies, procedures, guidelines, and educational materials for neonatal services
  - Assess and make recommendations regarding professional nursing development at MOH hospitals
  - Assess and recommend improvements to NICU unit filing systems, protocols, guidelines, organizational structure, and training programs
  - If requested, conduct assessments at other MOH facilities of neonatal intensive care nursing services
  - Work closely with MOH nursing staff to create ways to improve neonatal intensive care nursing services and the standard of care at MOH facilities
  - Assess and make recommendations regarding nurse staffing at MOH hospitals
  - Prepare assessment reports of any sites visited
  - In the event that new priority tasks are introduced during the consultancy, the consultant will work with the Flagship project staff to revise the tasks and expected products to accommodate for the new priorities
  - In addition to the above-listed tasks, the Flagship Project welcomes additional contributions and creative ideas in support of the Flagship objectives
  - The consultant is encouraged to support the identification of additional STTA and scopes of work to help accomplish Flagship goals and objective where possible

**V. Expected Products.**

- Within four days of the consultant's arrival, the consultant should provide the methodology for successfully completing the work (using Annex I: STTA Methodology).
- The substance of, findings on, and recommendations with respect to the above-mentioned tasks shall be delivered by the Consultant in a written report that includes a policy statement, strategy, action plan, training materials, etc., for submission to USAID (using Annex II: the Flagship-provided STTA report template). A **draft** of this trip report is due prior to the consultant's departure. The final version of the report is to be completed no later than 7 business days after the consultant's departure.

**VI. Timeframe for the Consultancy.**

The timeframe for this consultancy is on or about July 4, 2010 to on or about July 24, 2010 in the West Bank.

**VII. LOE for the Consultancy.**

The days of level of effort are estimated to be 2 days for travel and 24 days for work in the West Bank (6 day work week maximum). Unless otherwise specified, up to two (2) days may be allocated for preparation of the work and up to two (2) days upon conclusion of work in West Bank to complete the assignment.

**VIII. Consultant Qualifications.**

The Consultant shall have the following minimum qualifications to be considered for this consultancy:

Educational Qualifications

- Shall be a currently licensed physician in good standing
- Shall be board certified in Pediatrics and sub-board certified in Neonatal/Perinatal Medicine

Work Experience Qualifications

- Minimum of three years of work in neonatal intensive care
- Successful involvement and participation in international health and/or development

## ANNEX B: ASSIGNMENT SCHEDULE

<b>Date</b>	<b>Meeting</b>	<b>Agenda/discussion</b>
July 12, 2010	Team Meeting with MoH Representative	<ul style="list-style-type: none"> <li>• Welcome to West Bank</li> <li>• Findings from RH</li> <li>• Nursing shortage and the nursing patient ratio</li> </ul>
July 13, 2010	Team Meeting with Flagship Project Leadership	<ul style="list-style-type: none"> <li>• Ideas that are easy to implement yet progressively reaching the goals of enhancing communication and teamwork between physicians and nurses</li> <li>• Nursing staff to patient ratio</li> <li>• Housekeeping</li> <li>• SBAR communication and video</li> <li>• JCI Presentation</li> <li>• Team composition of next consultants</li> </ul>
July 16, 2010	Team Meeting with Flagship Project Counterparts	<ul style="list-style-type: none"> <li>• Palestine Medical Complex</li> <li>• Holy Family Hospital</li> </ul>
July 19, 2010	Presentation at the PMC	<ul style="list-style-type: none"> <li>• Topic: NRP Video and Discussion</li> </ul>
July 21, 2010	Meeting with Flagship Project Counterparts	<ul style="list-style-type: none"> <li>• Recommendations and fine-tuned STTA report</li> </ul>
July 22, 2010	Presentation at the PMC	<ul style="list-style-type: none"> <li>• Topic: JCI Guidelines</li> </ul>
July 23, 2010	Meeting with USAID	<ul style="list-style-type: none"> <li>• Consultancy findings and recommendations</li> </ul>

## ANNEX C: CONSULTANT CV

**Name:** Dorothy E. Forde, RNC, BSN

**Email:** [REDACTED] or [dforde@llu.edu](mailto:dforde@llu.edu)

**Home Address:** [REDACTED]  
[REDACTED]

**Work Address:** Loma Linda University Medical Center  
Children's Hospital  
Neonatal Intensive Care Unit  
11234 Anderson Street  
Loma Linda, California 92354.

**Date Of Birth:** [REDACTED]  
[REDACTED]

**Occupation:** Registered professional Nurse

**License:** State of California

**License Number:** [REDACTED]

**Certifications:** CPR, NRP, CLE,  
NACOG

### CAREER OBJECTIVES:

My goal is to become a clinical nurse specialist.

### EDUCATION:

Loma Linda University School of Nursing --- January 2000 – to present  
Course of Study: Bachelor of Science in Nursing **Magna Cum Laude**  
Master of Science in Nursing

University of South Africa --- January 1998 - January 2000  
Course of Study: Bachelor of Arts in Nursing Science  
Majoring in: Health Service Administration and Community Health

Oakwood College, - September 1976 – June 1978  
Huntsville, Alabama

Course of Study: Assoc. of Science  
Major: Nursing - **Summa cum Laude**

Champlain Regional College, - September 1971 – June 1973  
Montreal, Quebec,  
Canada.

Course of Study: Diplome d'Education du Quebec  
Major: Social Sciences

## **PROFESSIONAL EXPERIENCE:**

**Humana Medical Center: Position: Staff Nurse:** Medical/ Surgical Unit -

July 1978- July 1979

Huntsville, Alabama.

**Duties entailed:** Nurse in charge of the unit, staffing and assigning immediate duty roster.

**Loma Linda University Medical Center; Position: NICU Staff Nurse:**

Loma Linda, California. January 1980 – July 1983.

**Duties Entailed:** Team Leader in charge of the Unit, transport nurse, Infant CPR Instructor, Resuscitate team – Labor and Delivery

**General Conference of Seventh Day Adventists**

Silver Spring, Maryland

**Duties entailed:** Credentialed missionary to the country of Zaire, Africa 1983 – 1989

Credentialed missionary to the country of Zimbabwe, Africa 1989 – 1999

**Consulate of the United States of America: Position: Consulate Nurse**

Lubumbashi, Zaire. June 1984 – June 1989.

**Duties entailed:** Primary care practitioner for the American Diplomats in my immediate consular district including: Americans working with United States Information Service, Americans connected to United States Agency for International Development, Peace Corps Volunteers; Responsibilities included: assessment, diagnosing, treatment, and prescriptive privileges, in charge of developing a 'walking blood bank', for the diplomatic corps, in charge of medical evacuation, and served as a resource for all Americans including missionaries and business associates: liaison and collaboration with local and diplomatic physicians, and to State Department in Washington DC. Consulate representative to the Board for developing: The English Speaking School of Lubumbashi, Zaire; a school primarily for American and European children who primary language was English.

**Zambezi Union Mission**

**Fairview Primary School: Elementary School Teacher:**

January 1990 – December 1995.

**Duties Entailed:** Developing a curriculum for elementary grades 1-7, Teacher for Grades 1-2, Health Science Instructor Grades 5-7. Music Teacher for Grades 1-7.

**Loma Linda University Medical Center: NICU Staff Nurse:** August 1999 – present

**Duties entailed:** Bedside nurse team leading, personal team leader for new graduates.

**Loma Linda University Children's Hospital: NICU Clinical Educator**

**2005- Present**

**Duties:** Responsible for Staff Development and Education, teaching, Collaboration with Pediatric Residency program, In-service Education on unit, Orientation of new nurses to unit, etc

**Neonatal Resuscitation Instructor (NRP)-American Academy of Pediatrics 2006-present**

**ACHIEVEMENTS/AWARDS:**

**Subject of biographical record in:** WHO'S WHO IN THE WORLD

Tenth Edition 1991-1992

**Reason:** For outstanding work done overseas as United States Consulate Nurse

**Invitation and induction into:** SIGMA THETA TAU  
INTERNATIONAL HONOR SOCIETY OF NURSING

*GAMMA ALPHA CHAPTER*

JANUARY 2001

**Reason:** Scholastic Achievement at Loma Linda University School of Nursing

**Preceptor/Mentor Award:** RN Residency Program, Loma Linda University  
Children's Hospital

*December 2004*

**Reason:** For support to - The Pediatric Residency Program,

**Short-Term Mission Service:**

**February 2007**

Guest Speaker for Nursing Conference sponsored by AHI in Ile Ibe, Nigeria, Africa.

**May 2007**

Organized with Dr. Peter Yorgin and Dr. Andrew Hopper a trip to China with a Neonatal team providing education and clinical consultation to hospitals in Kunming, Mengzi, and Beijing. Coordinated lectures and power points for that trip.

**ORGANIZATIONS:**

Inland Counties Association of Neonatal Nurse- President -2006-2007.

Inland Counties Association of Neonatal Nurses - President-Elect 2005-2006.

National Association of Neonatal Nurses 1999- present

The Academy of Neonatal Nursing 2005 – present

Sigma Theta Thau – 2001 -present

## **ANNEX D: BIBLIOGRAPHY OF DOCUMENTS COLLECTED AND REVIEWED**

1. Nurse to Patient Ratio -  
[http://www.icn.ch/images/stories/documents/publications/fact\\_sheets/9c\\_FS-Nurse\\_Patient\\_Ratio.pdf](http://www.icn.ch/images/stories/documents/publications/fact_sheets/9c_FS-Nurse_Patient_Ratio.pdf)
2. Guidelines for Perinatal Care, Sixth Edition. American Academy of Pediatrics and the American College of Obstetricians and Gynecologists. 2007.
3. Verklan, M.T., Walden, M. Core Curriculum for Neonatal Intensive Care Nursing, Third Edition. Elsevier Saunders. 2004.
4. Joint Commission International Standards
5. World Health Organization (WHO) Guide to Implementation of the WHO Multimodal Hand Hygiene Improvement Strategy  
[http://whqlibdoc.who.int/hq/2009/WHO\\_IER\\_PSP\\_2009.02\\_eng.pdf](http://whqlibdoc.who.int/hq/2009/WHO_IER_PSP_2009.02_eng.pdf)
6. S.T.A.B.L.E. Program – [www.stableprogram.org](http://www.stableprogram.org)

## ANNEX E: LIST OF MATERIALS DEVELOPED AND/OR UTILIZED DURING ASSIGNMENT

1. **Presentations** – documents on file at the Flagship Project office, RH, and PMC:
  - a. Joint Commission International Patient Safety Goals
  - b. SBAR and Communication
  - c. NRP
  - d. Resuscitation Video
2. **Policies, Procedures, and Techniques Provided** – documents on file at the Flagship Project office, RH, and PMC

### 3. List of Books and Supplies Provided:

Item	Number
Guidelines for Perinatal care	2
Emergency Medicine Text Books	1
Perinatal and Pediatric. Respiratory Care	2
Neo Natal Resuscitation Textbook	2
Core Curriculum NICU Nursing	1
Care of the High Risk Neo natal	2
Manual of Neo natal Care	2
Egan's Fundamentals of Respiratory Care	2
NICU Manuals	9
Manual of Neonatal Care	2
Certification and Reviews Neonatal Intensive Care Nursing	2
Neonatology Management Procedures	2
Adult Laryngoscope	3
Neonatal Laryngoscope	2
Perinatal and Pediatric Respiratory Care	1
Core Curriculum Neonatal Intensive Care Nursing	1
Feeding tubes	90
Enteral feeding tube with stylet	12
Emergency Medicine Textbook	1
S.T.A.B.L.E. materials:	
Learner Manuals	10
Cardiac manuals	2
Learner CD ROMs	2
Physical Exam/Gestational Age CD ROMs	2
Cardiac CD ROMs	2
Bedside Card Sets	10
Blood Gas Interpretation Monograms	10

4. **Loma Linda University Children's Hospital Protocols, Techniques, Policies, and Manuals, and Other Reference Material**
  - a. NICU Nutrition Manual
  - b. NICU Resident's Manual
  - c. Clinical Guideline – HFOV

- d. Clinical Guideline – Infant Formula
- e. Clinical Guideline – SIMV
- f. NICU Case Study – Neonatal Case 1
- g. NICU Case Study – Neonatal Case 2
- h. NICU Case Study – Ventilator Management
- i. NICU Policies
- j. NICU Standardized Procedures
- k. NICU Pocket Manual
- l. Mosby’s Nursing Skills
  - i. Breast Milk Collection and Storage
  - ii. Chest Drainage Systems Neonatal
  - iii. Chest Tube Insertion Advanced Practice Neonatal
  - iv. Closed Suctioning Neonatal
  - v. Delivery Room Assessment and Stabilization of the Preterm Infant Neonatal
  - vi. Developmental Care Neonatal
  - vii. Endotracheal Intubation Neonatal
  - viii. Endotracheal Tube Closed Suctioning Neonatal
  - ix. Endotracheal Tube Open Suctioning Neonatal
  - x. Extracorporeal Membrane Oxygenation Neonatal
  - xi. Eye Examinations Neonatal
  - xii. Heel Stick Neonatal
  - xiii. Lumbar Puncture Advanced Practice Neonatal
  - xiv. Lumbar Puncture Neonatal
  - xv. Pain Assessment Neonatal
  - xvi. PDA Ligation Neonatal
  - xvii. Peripheral Intravenous Catheters Neonatal
  - xviii. Positioning Neonatal
  - xix. Radial Artery Puncture Advanced Practice
  - xx. Skin Assessment Neonatal
  - xxi. Skin-to-Skin Contact Neonatal
  - xxii. Thermoregulation Neonatal
  - xxiii. Tube Feedings Neonatal
  - xxiv. Umbilical Vessel Catheter Drawing Blood Neonatal
  - xxv. Umbilical Vessel Catheter Insertion Advanced Practice Neonatal
  - xxvi. Umbilical Vessel Catheter Securing Neonatal
  - xxvii. Urine Specimen Female Catheterization Neonatal
  - xxviii. Urine Specimen Male Catheterization Neonatal

## **5. Protocols**

- a. Thermoregulation Protocol - follows

## Thermoregulation Protocol

1. Ensure that the family understands the procedure, and answer their questions.
2. Identify the neonate using two patient identifiers.
3. Verify the prescribing practitioner's order.
4. Gather and prepare needed supplies and equipment.
5. Perform hand hygiene.

### In the Delivery Room

6. If the temperature of the room can be adjusted, warm the delivery room to above 25° C (78.8° F). Also, close doors and adjust vents in the room.
7. Before delivery of the high-risk or preterm neonate, place a radiant warmer in the delivery room.
8. If the stabilization nursery is not next door to the delivery room, prewarm a transport incubator for use in moving the neonate to the nursery.
9. Place the radiant warmer in the delivery room, out of the way so that it is not in a walkway or near air drafts.
10. Turn on and prewarm the radiant warmer with manual settings to a temperature of 36.5° to 37° C (97.7°-98.6° F).
11. Place all supplies that will be used for resuscitation or will touch the neonate on the warmer. Warm the hands and stethoscopes.
12. Ensure that a head covering more than ½-inch thick is available.
13. Ensure that blankets from a nearby blanket warmer are available.
14. Once the neonate is born, catch or place the neonate in a warmed sterile towel or blanket.
15. If medically indicated, stop momentarily for the mother and family to see and touch the neonate, and then proceed to place the neonate in the radiant warmer.
16. If needed, use additional warming techniques, such as an occlusive polyethylene body bag or plastic wrap, immediately after delivery and during stabilization for a very-low-birth-weight neonate.
17. Dry the neonate quickly, remove the wet towels or blankets from the bed space, and wrap the neonate in dry warmed blankets. Cover the neonate's head with a ½-inch thick hat.
18. Allow the parents to touch the neonate, after warming their hands, if possible.
19. Provide oxygen support as needed.
20. Transport the neonate in a prewarmed double-walled incubator to the NICU.
21. On entry into the NICU, weigh the neonate. If the incubator does not come equipped with a scale, place a heater over the freestanding scale, and prewarm the cover on the scale. Perform the weight measurement quickly and smoothly, and place the neonate in an incubator or on a radiant warmer.

### Use of a Double-Walled Incubator

22. Once the decision to bring the neonate to the NICU has been made, prewarm a double-walled incubator or radiant warmer on air control (manual) at 37° C (99° F). Then set the incubator to the thermoneutral range (differs for age and size). Once the neonate has been placed in the incubator, set the air control inside the incubator according to the gestational and postnatal age of the neonate. Place the neonate less than 1500 grams or thermally unstable on skin temperature

- control. Always set radiant warmers on skin or servo mode to prevent overheating.
23. Place the double-walled incubator in a bed space that is free of drafts and away from doorways or air vents and, if in the winter season, outside windows.
  24. Secure the temperature probe on the abdomen in accordance with the manufacturer's guidelines. Choose a site that is away from bony areas and where the neonate will not be positioned or lying on top of the probe. Switch the incubator to skin (servo) control, and set at 36.5° C (97.7° F).
  25. Take an axillary temperature for routine monitoring of core temperature. Hold the probe in place for 3 minutes or longer or in accordance with the manufacturer's recommendations for an accurate reading.
  26. Place all supplies that will be used to care for the neonate or will touch the neonate in the incubator. Warm the hands and stethoscopes.
  27. In a neonate of less than 30 weeks of gestation, add 70% to 90% humidity to a double-walled incubator for the first 7 days of life (depending on the gestation and the permeability of the neonate's skin). After the first week, continue humidity at 50% to 60% until the neonate reaches 30 to 32 weeks of postconception age.
  28. If recommended by the manufacturer, use sleeves on portholes, especially if the neonate is premature, is of low birth weight, or exhibits thermal instability.
  29. Perform more frequent monitoring of temperature regulation when the incubator is covered with blankets or is covered and then uncovered.

### **Use of a Radiant Warmer**

30. Secure the temperature probe on the neonate's abdomen using a foil-backed shield in accordance with the manufacturer's guidelines. Choose a site that is away from bony areas and brown fat deposits; the neonate should not be positioned on top of the probe. Switch the radiant warmer to skin (servo) control set at 36.5° C (97.7° F).
31. Place all supplies that will be used to care for the neonate or will touch the neonate in the warmer. Warm the hands and stethoscopes.
32. Place a commercially approved chemical mattress or commercially approved warming pad with controlled heat settings under a neonate in a radiant warmer or incubator if an additional source of heat is required to maintain the neonate's temperature.
33. If needed, place a polyethylene bag or plastic wrapping over the neonate from chin to feet.

<http://app44.webinservice.com/NursingSkills/ContentPlayer/SkillContentInIFrame.aspx?...>  
07/02/2010

### **Rewarming a Hypothermic Infant**

34. Closely monitor the neonate's vital signs, level of consciousness, and acid-base status during rewarming.
35. If using an incubator for rewarming set the air temperature 0.5° to 1° C (0.9°-1.8° F) above the neonate's rectal temperature. Once the core temperature reaches the air temperature and the neonate remains stable, increase the air temperature 0.5° to 1.5° C (0.9°-1.8° F) again. Continue the process until the neonate's temperature is normothermic.
36. If using a radiant warmer for rewarming, set the servo control temperature at 36.5° C (97.7° F). Do not place a temperature probe over a bony surface.

## **Treating Hyperthermia**

37. If a neonate becomes hyperthermic (a temperature over 37.5° C [99.5° F]), identify the cause (i.e., environment, dehydration, withdrawing, sepsis, maternal hyperthermia).
38. Closely monitor the hyperthermic neonate, and perform interventions to decrease temperature to normothermic range depending on the cause. (Decrease the temperature of the incubator or warmer, partially undress or uncover the neonate, remove positioning devices to allow for extension, and evaluate and treat for dehydration and infection.)

## **Skin-to-Skin Contact**

39. If medically indicated, encourage skin-to-skin contact (SSC) in full-term and preterm neonates for mild hypothermia of 36° to 36.4° C (96.8°-97.5° F).
40. Have the mother wear clothing with the opening in the front. Place the neonate on the mother's bare chest between the breasts, upright, with head turned to the side in contact with the mother's skin, wearing only a diaper. Place a warm blanket over the neonate, and a hat on the neonate's head.

## **Bathing the Neonate**

41. Delay bathing until the neonate's temperature has been stabilized in the normal range for 2 to 4 hours; consider the metabolic effects of temperature stability such as glucose needs and oxygen requirements. Remove excess vernix, but the removal of all vernix is not necessary for hygienic purposes.
42. Monitor temperature closely before, during, and after the bath. Ensure that warmed towels and bedding are available, and discontinue the bath if the neonate displays distress. Encourage SSC directly after the bath if medically indicated.

## **Weaning to an Open Crib**

43. Carry out weaning to an open crib slowly. Decrease the incubator temperature by 1° to 2° C (1.8°-3.6° F) every 12 to 24 hours until the incubator is at room temperature.
44. During weaning, dress the neonate with a hat and two blankets.
45. Place the neonate in an open crib, and keep the neonate away from drafts. Monitor the axillary temperature closely during this time.
46. Document the procedure in the neonate's record.

Excerpted and adapted from Verger, J.T., & Lebet, R.M. (Eds.) (2007). *AACN procedure manual for pediatric acute and critical care*. St. Louis: Saunders.

Last Reviewed: November 2009

## **ALERT**

The following findings in the neonate should be reported if they persist despite nursing interventions<sup>21</sup> :

- **Axillary core temperature less than 36.5° C (97.7° F)**
- **Incubator air temperature greater than 37.5°C (99.5° F)**
- **Increase of oxygen needs above baseline**
- **Weight loss or consistent inability to gain weight**
- **Temperature instability (hypothermia and hyperthermia)**

## **OVERVIEW**

High-risk and preterm neonates are often unable to stabilize and maintain body temperature without support; providing a neutral thermal environment allows conservation of limited resources for other necessary bodily functions.

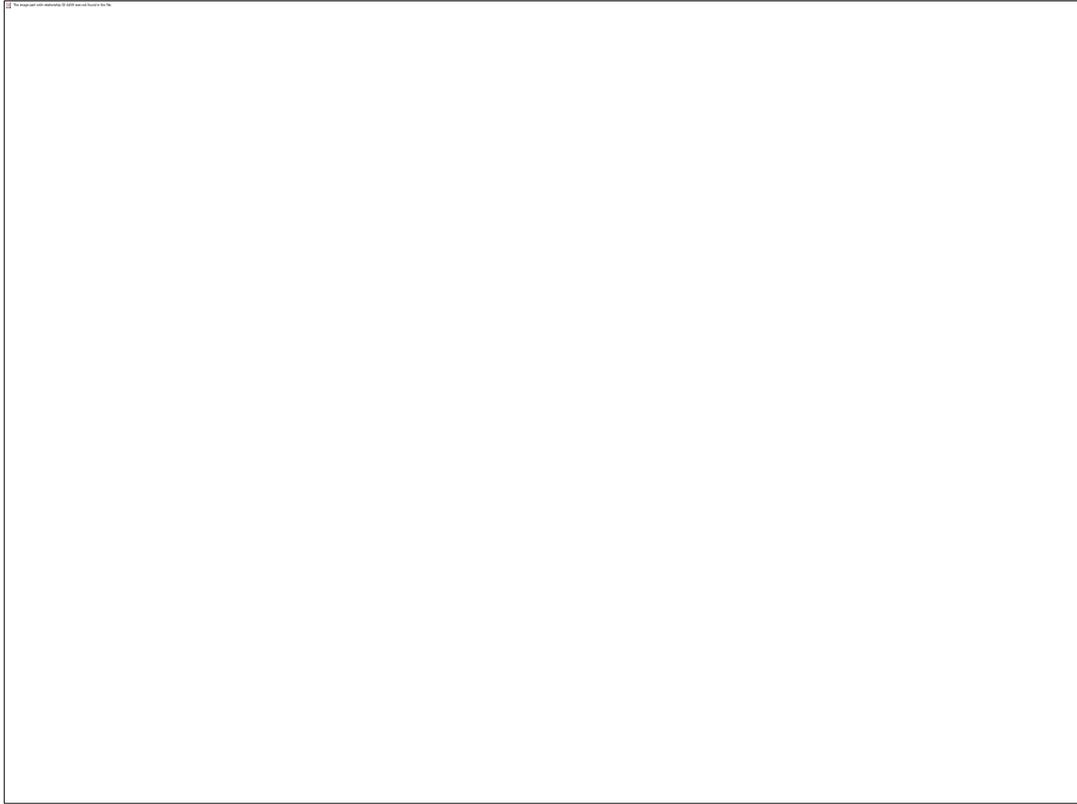
Infants at risk for developing hypothermia include those who are premature, small for gestational age, critically ill, or hypoglycemic; those with sepsis, electrolyte imbalance, nutritional issues, or open skin defects; and those receiving<sup>17</sup> neuromuscular blocking agents.

The practitioner must be familiar with the anatomic and physiologic characteristics of the infant's skin. Some important risk factors for thermoinstability in infants include a large surfaceto-weight ratio, limited brown fat stores, prematurity, and<sup>7,10,17,21</sup> transepidermal water loss.

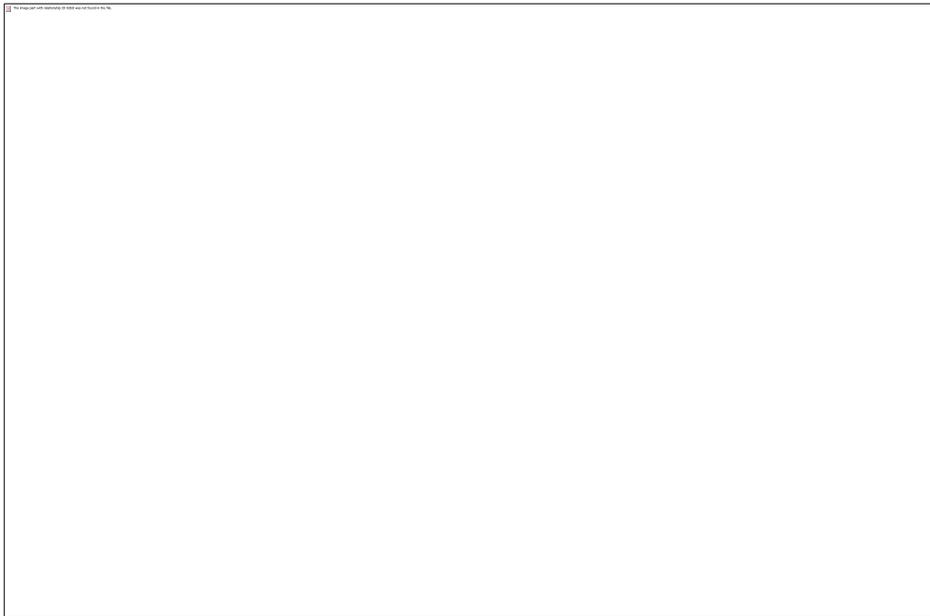
Understanding the principles of heat loss through the neonate's skin is important. Neonates can lose or gain heat through four different mechanisms: (1) heat transfer via direct contact with hot or cold surfaces, or conduction; (2) heat transfer via air flow over a large body mass, or convection; (3) heat transmission through absorption via indirect contact from emission of infrared rays, or radiation; and (4) heat loss that converts liquid into vapor, or<sup>7,10,14,17,19,21</sup> evaporation. (Figure 1)

Newborns use nonshivering thermogenesis to generate<sup>7,14,17,19,21</sup> heat. This process is accomplished by the metabolism of brown fat stores located in the neck area, around the kidneys, in the mediastinum, and in the scapular region.<sup>7,10,14,17,19</sup> Although nonshivering thermogenesis is an efficient method of





Reviewing the resource materials provided.



The nurses were receptive and eager for training and coaching.



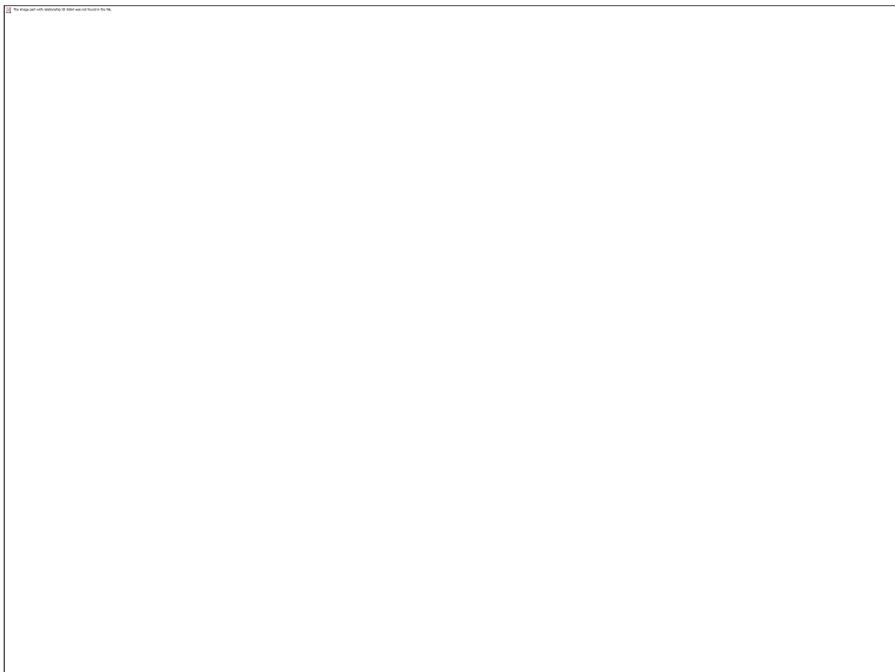
With the PMC team.



Carter Tong, RT rounding in the PICU.



Dr. Deming teaching physicians at the PMC.



With a nurse colleague.