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Cover Page

**Technical Guidelines  
for Child Survival Interventions  
in Bangladesh**

**Ministry of Health and Family Welfare**

**and**

**National Integrated Population and Health Program  
(NIPHP)**

A

**Technical Guidelines**  
**for Child Survival Interventions**  
**in Bangladesh**

**Immunizations**

**Vitamin A Supplementation**

**Promotion of Breastfeeding and Appropriate  
Infant Feeding Practices**

**Treatment of Acute Respiratory Tract Infection (ARI)**

**Control of Diarrhoeal Diseases (CDD)**

**Ministry of Health and Family Welfare  
and  
National Integrated Population and Health Program  
(NIPHP)**

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## Foreword

It is indeed a great pleasure for me to write the forwarding note on the Child Survival Guideline.

Child survival activities make up a key component of the Essential Services Package in Bangladesh's new Health and Population Sector Program. The need for a consolidated set of child survival guidelines has been recognized for a long time in Bangladesh. This document will fulfill this need. We look forward to its widespread use in the public and private sectors of Bangladesh.

This manual reflects the current consensus of technical experts and national programme leaders in Bangladesh. However, as our knowledge and experience broaden and as new information becomes available, the manual will require periodic updating.

I thank all national and international experts for their valuable contributions in developing the guideline which will help to improve the health and well being of millions of children in Bangladesh.

I congratulate that National Integrated Population and Health Program and its partners in this noble endeavor.

**Prof. A. K. M. Nurul Anwar**  
Director General of Health Services  
Ministry of Health and Family Welfare

## Preface

These child survival guidelines represent an important example of joint collaboration between the Ministry of Health and Family Welfare and the National Integrated Population and Health Program. We are confident that this manual will help to strengthen the quality of child survival services which are carried out throughout Bangladesh.

The manual reflects the current approach in health programmes for reducing infant and child mortality in Bangladesh. We look forward to the widespread distribution and utilization of this document throughout the country. There is no doubt that this manual will be of great help to health program leaders and managers, physicians, paramedics, nurses, field-level health workers, and private practitioners of all types in providing standardized, high-quality services to the children of our country.

I congratulate all who were involved in developing the guideline.

Our children deserve the best!

**Dr. Jahir Uddin Ahmed**

Director (Maternal and Child Health Services) and  
Line Director, Essential Services Package  
Directorate of Family Planning,  
Ministry of Health and Family Welfare, and  
Co-Chairman, Technical Review Committee

**Dr. Shamshul Haque**

Director (Primary Health Care and Disease Control) and  
Line Director, Essential Services Package  
Directorate of Health Services  
Ministry of Health and Family Welfare, and  
Co-Chairman, Technical Review Committee

## **Description of the Guideline Development Process and Acknowledgments**

The initial impetus for updating these guidelines was the need of the National Integrated Population and Health Program (NIPHP), supported by the US Agency for International Development (USAID), to clarify the responsibilities and training needs for the 1,000 paramedics and medical officers working throughout Bangladesh in maternal/child health and family planning activities with NGOs that receive support from NIPHP. In response to this need, a Child Survival Task Force (referred to hereafter as the Task Force) was established in 1997 by the Ministry of Health and Family Welfare to support the NIPHP partners in child survival activities. The Task Force is chaired by the Director of Primary Health Care and Disease Control of the Directorate of Health Services and the Director of Maternal and Child Health of the Directorate of Family Planning.

The role of the Task Force is to promote, coordinate, and strengthen child survival activities in Bangladesh and within the NIPHP. The following agencies are members of the Task Force:

- The Directorate of Health Services, Programme of Primary Health Care and Disease Control
- The Acute Respiratory Infection (ARI) Control Programme of the Ministry of Health and Family Welfare
- The Control of Diarrhoeal Diseases (CDD) Programme of the Ministry of Health and Family Welfare
- The Expanded Programme on Immunization (EPI) of the Ministry of Health and Family Welfare
- The Institute of Public Health Nutrition (IPHN) of the Ministry of Health and Family Welfare
- UNICEF
- The World Health Organization/Bangladesh (WHO)
- USAID
- BASICS (Basic Support for Institutionalizing Child Survival, a global USAID supported project) and Child Survival Technical Resource of NIPHP
- The Quality Improvement Partnership (QIP) of NIPHP
- The Rural Service Delivery Partnership (RSDP) of NIPHP
- The Urban Family Health Partnership (UFHP) of NIPHP
- BRAC (a member of the Rural Service Delivery Partnership of NIPHP)
- World Vision of Bangladesh (a member of the Quality Improvement Partnership of NIPHP)

- Helen Keller International/Bangladesh (HKI)
- The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) Operations Research Project of NIPHP

BASICS is the Secretariat of the Child Survival Task Force. One of the first major activities of the Task Force has been to review and update the existing guidelines for immunizations, vitamin A supplementation, promotion of breastfeeding and appropriate infant feeding, prevention and treatment of acute respiratory infection and, finally, prevention and treatment of diarrhoea. While these guidelines have been developed initially for use by NIPHP, they are also intended for use by other service providers throughout the country working in both governmental and private settings.

***Review process***

Beginning in the fall of 1997, four Working Groups were created. The agencies supporting these working groups were as follows:

- EPI Working Group: The National EPI Programme, BASICS, QIP/WVB
- Vitamin A Working Group: IPHN, HKI, WHO, the National Control of Diarrhoeal Diseases Programme, the National ARI Control Programme, BASICS, QIP/WVB, UNICEF
- Diarrhoeal Disease Working Group: The National Control of Diarrhoeal Diseases Programme, BASICS, ICDDR,B, QIP/WVB, WHO
- Acute Respiratory Infection Working Group: The National ARI Control Programme, BASICS, QIP/WVB, WHO

These Working Groups reviewed the existing guidelines available in the country and then presented their comments on these guidelines to the entire Task Force for its review. Each Working Group then

incorporated the views of the Task Force in its review and prepared a final draft of revised guidelines in March 1998. In May 1998, the Bangladesh Breastfeeding Foundation was invited to present the guidelines it had developed to the Task Force, and these were incorporated as well. The persons and their organizations contributing to this important work of the Task Force are listed in Appendix 2.

In May and June 1998, the draft guidelines were reviewed by technical experts in Bangladesh (listed in Appendix 3). Once these comments were received, the Technical Review Committee of the Ministry of Health and Family Welfare reviewed the guidelines and discussed them in June 1998. The members of this Committee are listed in Appendix 4.

In July 1998, a National Concurrence Workshop was held to review and discuss all of the guidelines for child survival which had been, so far, collaboratively developed. The Quality Improvement Partnership of NIPHP and the Technical Review Committee of the Ministry of Health and Family Welfare sponsored the workshop which was chaired by the Director of Primary Health Care and Disease Control, Dr. Zakir Hussain. At that time, the guidelines were reviewed by the broader group of programme leaders, policy makers, government officials, and service providers who attended the workshop. The recommendations of this group were incorporated into the guidelines. Even more recently, the Government made additional changes in its guidelines, and these have been incorporated as well. The final draft of these guidelines was reviewed again by most of the people listed in Appendix 2. In addition to these, there were several other reviewers of the final draft whose contributions we would like to acknowledge. These persons are:

- Dr. Shameen Ahmed, Health Scientist, ICDDR,B
- Dr. Abdullah Brooks, Health and Child Survival Advisor, ICDDR,B
- Ms. Rebecca Fields, Senior Technical Officer (EPI), BASICS/Washington
- Ms. Rae Galloway, Technical Officer (Nutrition), BASICS/Washington
- Dr. Rukhsana Haider, Associate Scientist, ICDDR,B
- Dr. Md. Kamruzzaman, Medical Officer, The Acute Respiratory Infection (ARI) Control Programme, Ministry of Health and Family Welfare
- Dr. Rokeya Khanam, Team Leader, Communications Support Project of the Bangladesh Integrated Nutrition Project
- Dr. Mugo Muita, Project Officer, Helen Keller International/Bangladesh
- Dr. Izaz Rasul, Urban Technical Officer, BASICS/Bangladesh

- Dr. S. K. Roy, Scientist, ICDDR,B
- Mr. Robert Steinglass, Immunization Coordinator, BASICS/Washington
- Dr. Youssef Tawfik, Technical Officer (Integrated Management of Childhood Illness),  
BASICS/Washington

To all of the persons and organizations that have contributed to the development of these guidelines, we express our deep appreciation on behalf of the Government of the People's Republic of Bangladesh, the Ministry of Health and Family Welfare, the National Integrated Population and Health Programme, USAID, BASICS, the Quality Improvement Partnership, and the mothers and children of Bangladesh.

**Dr. Henry Perry**

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Bangladesh

Editors

## Acronyms and Abbreviations

<b>AFP</b>	-	Acute flaccid paralysis
<b>ARI</b>	-	Acute respiratory infection
<b>AVSC</b>	-	Access to Voluntary and Safe Contraception
<b>BASICS</b>	-	Basic Support for Institutionalizing Child Survival
<b>BCG</b>	-	Bacillus of Calmette Guerin
<b>BRAC</b>	-	Bangladesh Rural Advancement Committee
<b>CDD</b>	-	Control of diarrhoeal diseases
<b>DGHS</b>	-	Directorate General of Health Services
<b>DPT</b>	-	Diphtheria/pertussis/tetanus
<b>DSFP</b>	-	Disease Surveillance Focal Person
<b>EPI</b>	-	Expanded Programme on Immunization
<b>GOB</b>	-	Government of Bangladesh
<b>ICDDR,B</b>	-	International Centre for Diarrhoeal Disease Research, Bangladesh
<b>IEC</b>	-	Information, education, and communication
<b>IM</b>	-	Intramuscular
<b>IMCI</b>	-	Integrated Management of Childhood Illness
<b>IPHN</b>	-	Institution of Public Health Nutrition
<b>Kg</b>	-	Kilogram
<b>ml</b>	-	Millilitre
<b>MSR</b>	-	Medical surgical requisite
<b>NGO</b>	-	Non-governmental organization
<b>NID</b>	-	National Immunization Day
<b>NIPHP</b>	-	National Integrated Population and Health Program
<b>NNT</b>	-	Neonatal tetanus
<b>OPV</b>	-	Oral polio vaccine
<b>ORS</b>	-	Oral rehydration solution
<b>ORT</b>	-	Oral rehydration therapy
<b>PHC</b>	-	Primary health care
<b>QIP</b>	-	Quality Improvement Partnership
<b>RR</b>	-	Respiratory rate
<b>TB</b>	-	Tuberculosis
<b>TT</b>	-	Tetanus toxoid
<b>UFHP</b>	-	Urban Family Health Partnership
<b>UNICEF</b>	-	United Nations International Children's Emergency Fund
<b>USAID</b>	-	United States Agency for International Development
<b>WHO</b>	-	World Health Organization
<b>WVB</b>	-	World Vision/Bangladesh

## **Introduction**

Of the approximately 20 million children under five years of age in Bangladesh, 380,000 die each year. Most of the deaths are from readily preventable or treatable conditions; 120,000 deaths are associated with symptoms of pneumonia, 95,000 with symptoms of diarrhoea, 20,000 with measles, and 20,000 with neonatal tetanus.<sup>1-4</sup> Protein-energy malnutrition is also a strong underlying cause of death from infectious diseases: 66 percent of childhood deaths in Bangladesh are currently attributable to malnutrition even though the immediate cause of death may have been due to pneumonia, diarrhoea, or a less common infectious disease.<sup>5,6</sup> Thus, each year 250,000 deaths among children under five years of age in Bangladesh can be attributed to malnutrition (more than 600 per day).

Two-thirds of children under five years of age are malnourished; the national child nutrition survey conducted in 1995-96 demonstrated that 60 percent of children 6-71 months of age are either stunted or wasted.<sup>7</sup> In the early 1980s, an estimated 30,000 Bangladeshi children were becoming completely blind (in both eyes) each year from vitamin A deficiency.<sup>8</sup> Even though dramatic progress has been made in reducing vitamin A deficiency among children in Bangladesh, and estimated 5,000 children are currently going blind each year from vitamin A deficiency.<sup>8</sup>

Current estimates of the infant mortality rate are in the range of 67 to 82 deaths per 1,000 live births and one in nine children dies before reaching the age of five years.<sup>9,10</sup> Among the poorest segments of the population, one in six children dies before reaching the age of five.<sup>10</sup> Most deaths among children under five years of age are from readily preventable or treatable causes such as pneumonia, diarrhoea, malnutrition, measles, and neonatal tetanus.<sup>3</sup>

The moral, civic, and professional responsibility of responding to the challenge which this tragedy represents must be met. The Government of Bangladesh and its Ministry of Health and Family Welfare, the NGO community, private practitioners, and the international donor community are all working together to improve the health of Bangladeshi children. This manual represents the results of one collaborative effort in response to the widespread, unnecessary suffering and death of children in Bangladesh

What follows is the most current set of guidelines available for the provision of child survival services in Bangladesh. They represent a broad consensus of technical and programmatic opinion, the implementation of which would provide an important step toward reducing the burden of mortality and serious morbidity from preventable and readily treatable conditions in Bangladesh. The implementation of these guidelines

will lead to better outcomes for the children of Bangladesh. Moreover, the implementation of these guidelines will also reduce expenditures for unnecessary and even harmful practices, such as the use of tinned milk and formula, the use of antibiotics for children with coughs and colds, and the use of antibiotics and other drugs for children with acute watery diarrhoea. More appropriate utilization of antibiotics will also eventually lead to fewer drug-resistant bacteria in the environment. Drug resistance from the widespread and inappropriate use of antibiotics has become a serious problem in developed countries and will probably become a serious problem in developing countries in the future as well.

This manual is designed for policy makers, programme managers, and service providers who are responsible for child survival activities in Bangladesh. This manual has also been written for anyone in Bangladesh who provides advice about the promotion of health and nutrition in infants and children and for all those who treat sick children. We hope that non-certified practitioners of all types who are working as health care providers in Bangladesh will access and make a practice of using this manual.

Thus, this manual is for government health workers, NGO health workers, self-employed health care providers, health care providers with no formal training, and volunteer community health workers. This manual is intended to be only what its title indicates – namely, a set of technical guidelines for child survival interventions. It should be kept in mind, however, that depending on the nature of each individual situation, there may in fact be good reasons for not adhering to the guidelines outlined here. However, for the vast majority of situations, these guidelines should be appropriate.

These guidelines are to be employed for children under five years of age. In specialized clinical settings with better diagnostic and treatment capabilities and with more highly trained and experienced health care providers, deviations from these guidelines may be warranted.

The guidelines are consistent with the Government of Bangladesh's current efforts to ensure that all Bangladeshi citizens, particularly mothers and their children who are under five years of age, can access an Essential Services Package which includes interventions for promoting child survival.

This manual is the first of what will certainly be a number of updated editions. As new findings emerge from biomedical research and community-based field trials, and as experience accrues in applying these guidelines in Bangladesh, updates will be required from time to time. For example, new vaccines against hepatitis, pneumonia-causing bacteria, and diarrhoea-causing viruses will almost certainly be eventually included in the National EPI Programme. Also, increased emphasis will almost certainly be given to eliminating other

types of micronutrient malnutrition in addition to vitamin A deficiency (such as iron, iodine, and zinc deficiency). Furthermore, since Bangladesh has one of the highest rates of childhood protein-energy malnutrition in the world, increased emphasis will most certainly be given to reducing the prevalence of this form of malnutrition as well.

The consolidation and updating of guidelines for child survival is a useful exercise for the country as it attempts to rationalize and standardize treatment of childhood illness and as it moves forward in the adaptation and widespread implementation of the Integrated Management of Childhood Illness (IMCI), a global approach to strengthening treatment management protocols for children in developing countries.<sup>11</sup> WHO and UNICEF are providing technical leadership for this effort globally, and USAID is providing a strong supporting role as well. The process of adaptation of the IMCI to the Bangladesh situation is now beginning. Several more years will elapse, however, before the IMCI will be ready for widespread implementation throughout the country.

No doubt, many difficulties will be encountered in implementing these guidelines. Training will be required, access to medicines, supplies, and other logistics will be required, and access to referral sites will also be necessary.

Even if all these hurdles are overcome, a mother or caretaker may indicate to the provider who recommends a treatment or behaviour in accordance with these guidelines that she is unable or unwilling to accept the advice. In such a case, the health care provider must use his or her judgement to make an alternate recommendation which will lead to the best outcome possible under the circumstances.

Moreover, the health care worker or facility may not have the appropriate equipment or medicine needed to implement the guidelines. Again, the health care provider will have to use his or her judgement to provide the best care under the given circumstances.

In higher-level facilities, where more highly skilled physicians and sophisticated diagnostic capabilities exist, some of the advice and treatments based on these guidelines may not be applicable. It is important to remember that the guidelines have been prepared for use in circumstances where the training of the health care provider is limited and where diagnostic and treatment capabilities are also limited. Finally, it should be emphasized that these guidelines are applicable only for children under five years of age.

In spite of all of the difficulties which will be encountered in implementing these guidelines, we believe that this manual represents an important advance in consolidating efforts in Bangladesh to improve the nutritional status of children, to prevent mortality from life-threatening illness, and to promote child survival.

## **Chapter 1. Communicable Diseases Preventable Through Immunization**

Immunization protects children against six major diseases that harm, cripple or kill thousands of children in Bangladesh each year. The Expanded Programme on Immunization (EPI) is a global programme which is directed in Bangladesh by the Ministry of Health and Family Welfare for the benefit of the entire population. As new vaccines are developed and as the price of these new vaccines declines, they will gradually become incorporated into the programme.

### ***Objectives and Strategies***

The objectives of the EPI Programme are to:

- Reduce morbidity, disability and mortality due to six common vaccine-preventable diseases (tuberculosis, polio, diphtheria, pertussis, tetanus, and measles) through immunization of women and children
- Eradicate polio
- Reduce maternal and neonatal mortality due to tetanus through immunization of women of reproductive age, and eliminate neonatal tetanus as a public health problem by reducing the incidence of the disease to less than one case per 1,000 live births in every district of Bangladesh and
- Control measles by reducing the number of cases by 90 percent (compared to 1985 levels) and by reducing the number of measles deaths by 95 percent (also compared to 1985 levels)

These objectives are to be attained by the year 2000 as a result of carrying out the following strategies:

- Achievement and maintenance of a coverage level of at least 90 percent for immunizations against tuberculosis, polio, tetanus, whooping cough, measles, and diphtheria among children by the time they complete their first year of life
- Achievement and maintenance of a coverage level of 90 percent against tetanus among all women of reproductive age through the administration of five doses of tetanus toxoid vaccine in order to protect women and their newborns against tetanus
- Surveillance throughout the entire country to identify geographic areas which have low coverage levels and/or high incidences of vaccine-preventable disease

- organization of supplementary immunization activities (National Immunization Days as well as “Mop-Up” Campaigns for administering OPV in high-priority areas, campaigns to administer measles and TT immunization in high priority areas)
- Mobilization of national support for EPI disease surveillance and for National Immunization Days (NIDs)

### ***The Six Major Vaccine-Preventable Diseases***

#### **Tetanus**

Tetanus is caused by bacteria which can survive for many years as spores in the soil or in other parts of the environment. These bacteria are commonly found in the intestinal tracts of animals and humans. In newborns who develop neonatal tetanus, the bacteria usually enter the body through the umbilical cord as a result of contamination from unsterile instruments or from the application of contaminated substances. Symptoms usually develop during the first two weeks of life: the baby ceases to suckle, becomes stiff, and develops spasms. The disease is usually fatal if left untreated and, even in the best treatment facilities, mortality is quite high. Most deaths from neonatal tetanus occur between four and 14 days after birth. Women themselves are also very susceptible to tetanus at the time of delivery or as a consequence of unsafe abortion.

#### **Tuberculosis**

Tuberculosis is also caused by bacteria. The disease usually spreads from an infected person to an uninfected person when the infected person coughs and produces invisible droplets of bacteria which float in the air and are inhaled by the uninfected person. Although infection usually begins in the lungs and is usually most damaging there, the infection can also spread to the brain, bones, intestine as well as any other part of the body. Chronic cough, fever, night sweats, loss of weight, and loss of appetite are common symptoms of tuberculosis.

#### **Polio**

Polio is caused by a virus that is usually transmitted from person to person as a result of faecal-oral transmission. Poliovirus resides and multiplies in the intestines of humans. When a person ingests food or water which has been contaminated with faecal matter containing live poliovirus, the poliovirus can replicate in that person’s intestinal tract and then the infection can later be transmitted to another person through the same process.

Children with symptomatic polio infection usually develop fever and a painful limb followed by paralysis. Other common symptoms of acute polio include fatigue, headache, vomiting, constipation, and stiffness in the neck. The muscles of the legs are more often affected than the arm muscles. Fatalities can occur as a result of the involvement of the brain leading to difficulties in breathing and swallowing. Once weakness or paralysis of an extremity develops as a result of polio, complete recovery rarely occurs.

Surprisingly, up to 90 percent of cases may remain unrecognized because infection most commonly produces only mild symptoms or none at all. Only in one percent of cases of poliovirus infection does paralysis actually occur. Persons with infection shed the live poliovirus in their stool for several weeks after the infection begins, leading to transmission of the virus to other persons when sanitation and hygiene are poor, particularly in those areas in which people are living in close proximity with one another.

### **Measles**

Measles is also caused by a virus which is spread by droplet infection (like tuberculosis) or by direct contact with the nasal or throat secretions of infected persons. A child suffering from measles usually has a fever along with a cough, a runny nose, red eyes, a generalized rash composed of small reddish spots which are not raised and do not contain fluid, and small white spots on the inside of the mouth (called Koplik's spots). These symptoms can be remembered easily as fever plus the "Five C's":

- cough
- coryza (runny nose)
- conjunctivitis (red eyes)
- confluent macular rash
- Koplik's spots (not exactly a "c" but it sounds like one)

Life-threatening complications such as pneumonia, severe diarrhoea, or blindness can develop, and the risk is much higher if the child has underlying malnutrition or vitamin A deficiency prior to developing measles. Fifty percent of measles cases occur in children below two years of age, and approximately four percent of children in Bangladesh with measles die from these complications.<sup>12</sup>

### **Diphtheria**

Diphtheria is caused by bacteria and usually spreads by droplet infection just as do tuberculosis and measles infections. The throat is the most common site of infection, but the skin can also be affected. The disease is characterized by fever, pain in the throat, swelling of the neck, runny nose, and a husky voice. A milky or greyish white membrane develops in the throat. The child can become severely ill quite quickly and die

from airway obstruction or from cardiac or renal failure. Children with diphtheria are usually sicker than one would think they should be if they just had a simple sore throat or an uncomplicated upper respiratory infection.

### **Whooping Cough**

Whooping cough (pertussis) is caused by bacteria. The infection spreads by direct contact with an infected person or by droplet infection. The illness characteristically lasts six weeks and passes through three stages, each two weeks in length. The first stage (the catarrhal stage) is similar to a common cold. In the second stage (the paroxysmal stage), the cough becomes frequent and paroxysmal (that is, coughing spells develop suddenly without warning). The characteristic “whoop” is caused by a deep, forced inspiration terminating the paroxysm. (However, this “whoop” may be absent in very young infants who have whooping cough.) Vomiting often follows the paroxysm of coughing. Severe coughing can result in elevation of the venous pressure, causing nosebleed, conjunctival haemorrhage, and swelling around the eyes. During the paroxysmal stage, children may have difficulty eating, and pneumonia may develop as a superinfection produced by other bacteria or viruses. In the third stage (the convalescent stage) all of the manifestations slowly resolve except paroxysms, which still continue to occur.

According to the national 1998 coverage evaluation survey, only 54 percent of children complete all of their recommended immunizations by one year of age, and only 61 percent of babies are born with protection against neonatal tetanus.<sup>13</sup> Therefore, an enormous challenge lies ahead if these readily preventable causes of death are to be eliminated in Bangladesh.

### **Guidelines**

The key policies and guidelines for the National EPI Programme are as follows:

- All children born in health facilities should receive immunization against tuberculosis with *Bacillus of Calmette Guerin* (BCG) vaccine and immunization against polio with oral polio vaccine (OPV) before they leave the facility for home. If a dose of OPV is given at a health facility at birth, this is not counted as one of the three doses which are required to achieve immunization (and therefore this dose when given at birth is referred to as OPV0). Since only four percent of births in Bangladesh take place in a health facility, this policy has limited application at present but it will become more relevant in the future as the percentage of births taking place in a health facility increases.

- All children should be brought to an EPI immunization site at six weeks of age to receive their first “official” dose of OPV (OPV1) and their first dose of diphtheria/pertussis/tetanus immunization (DPT1). The child should also receive BCG at this time if it was not given at birth. (If a dose of OPV is given at birth (OPV0), it is not counted as one of the four doses of OPV described below.)
- After receiving these first doses of OPV and DPT (OPV1 and DPT1), children should be brought back to the EPI site at four-week intervals to receive their second and third doses of OPV and DPT (OPV2/DPT2 and OPV3/DPT3).
- Measles vaccine should be provided regardless of prior history of rash to children as soon as possible after the child completes nine months of age. A fourth dose of OPV (OPV4) should be given at that time.
- Each child should receive at least one dose of BCG, four “official” doses of OPV (not counting the dose that possibly was given at birth and not counting the doses of OPV given at the time of a NID), three doses of DPT, and one dose of measles vaccine before the child’s first birthday. If a child has begun the series of OPV and DPT immunizations before completing his or her first birthday, the entire series should be completed according to the guidelines. If a child comes after his or her first birthday and has not received any previous immunizations the child should receive OPV, DPT, and measles immunizations during that visit. BCG is not generally recommended for children over 12 months of age because its effectiveness in older age groups is not well-established. However, if it is given, the dose is usually 0.1 ml rather than 0.05 ml. There is some difference of opinion about giving DPT to children over 12 months of age, but most experts would recommend that these children should receive the three doses of DPT together with three doses of OPV. The recommended dose schedule is shown in Tables 1 and 2.

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Tables 1 and 2 about here

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- All women of childbearing age (15-49 years of age) should receive a total of five doses of tetanus toxoid (TT) vaccine to obtain lifelong immunity against tetanus for themselves and for their newborns. The recommended dose schedule is shown in Table 3.

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Table 3 about here

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- Pregnant women who have not yet received any TT immunizations should receive their first TT immunization (TT1) between 16 and 24 weeks (that is, between 4 and 6 months) of pregnancy. The second TT immunization (TT2) should be given at least one month later but also no later than one month before the expected date of delivery to ensure protection of the newborn against neonatal tetanus.
- More than one type of immunization can be given to the child at the same visit (if indicated), but each vaccine should be given at a separate site. BCG is usually given in the left arm, and DPT and measles immunizations are usually given in either thigh. There is no need to re-start an interrupted immunization series if an interval longer than four weeks has lapsed since the previous dose of DPT or OPV. Give the next dose in the series.
- Every child and mother should have his or her immunization status checked during each encounter with a health care provider. Those in need of additional immunizations should receive them at that visit (if possible) or should be referred to a location where the needed immunizations can be obtained. The policy of the Ministry of Health and Family Welfare is to provide all vaccines at no cost. However, some municipalities and some NGOs do charge a small registration fee or service charge for those who are able and willing to pay.

**Table 1. Immunization Schedule for Children and for Women of Reproductive Age**

Disease	Vaccine	Dose	Number of doses	Age at which vaccination can be given	Interval between doses	Vaccination site	Route of administration
Tuberculosis	BCG <sup>1,2</sup>	0.05ml <sup>5</sup>	1	Anytime after birth	Not applicable	Upper left arm	Intradermal injection
Diphtheria, whooping cough, tetanus	DPT	0.5 ml	3	6 weeks (that is, once 6 weeks has been completed)	4 weeks	Outer and middle part of thigh	Intramuscular injection
Polio	OPV <sup>3,4</sup>	Two drops	4	6 weeks (that is, once 6 weeks has been completed)	4 weeks	Mouth	Oral administration
Measles	Measles <sup>1</sup>	0.5 ml	1	9 months (that is, once 9 months, 39 weeks, or 270 days has been completed)	Not applicable	Outer and middle part of thigh	Subcutaneous injection
Tetanus	TT	0.5 ml	5 (for women only)	15 years - (that is, once 15 years has been completed)	See schedule on following page	Arm	Intramuscular injection

<sup>1</sup> Since BCG and measles vaccine are stored as a powder, they need to be mixed with a diluent prior to administration.

<sup>2</sup> Only one dose of BCG is required. If it is not given at birth, it should be given at the time the first dose of DPT and OPV are given.

<sup>3</sup> OPV should be given at the same time DPT is given.

<sup>4</sup> At least four doses of OPV should be given according to the regular series schedule as shown above beginning at six weeks of age. OPV4 should be given at the time of measles immunization. These four doses do not include the doses given at the time of the National Immunization Days nor the dose given at the time of birth.

<sup>5</sup> One ml is a millilitre (that is, one-thousandth of a litre) and is the same as a cubic centimetre.

**Table 2. Ideal Infant Immunization Schedule by Age**

Age	Immunization(s)
birth	BCG, OPV0
6 weeks	DPT1, OPV1
10 weeks	DPT2, OPV2*
14 weeks	DPT3, OPV3*
39 weeks (270 days or 9 months)	measles, OPV4

\*As long as the above minimum intervals are observed, there is no need to repeat the previous dose or restart the entire series, even if there has been a considerably longer time between doses than the minimum recommended interval.

**Table 3. Tetanus Toxoid (TT) Immunization Dose Schedule for Women of Reproductive Age**

Dose	Interval between doses*	Remarks
TT 1	From 15 years of age and onward	Women who are pregnant and who have not yet received their TT1 dose should receive this at 4 months of pregnancy. TT1 does not produce any protection by itself.
TT2	4 weeks after TT1	Pregnant women should obtain their TT2 one month after TT1 but also at least one month <i>before</i> the expected date of delivery to ensure the protection of the newborn against neonatal tetanus. After TT2 has been obtained, the protective effect remains for up to 3 years.
TT3	6 months after TT2	After TT3 has been obtained, the protective effect remains for up to 5 years.
TT4	1 year after TT3	After TT4 has been obtained, the protective effect remains for up to 10 years.
TT5	1 year after TT4	After TT5 has been obtained, the protective effect remains for the remainder of the child-bearing period of the woman's life.

\* As long as the above minimum intervals are observed, there is no need to repeat the previous dose or restart the entire series, even if there has been a considerably longer time between doses than the minimum recommended interval.

### ***Polio Eradication Strategies (including National Immunization Days)***

The global polio eradication campaign is now being actively carried out in Bangladesh. Since 1991, polio has been eradicated from the Western hemisphere (which includes North and South America). One-half of the remaining cases of polio in the world are located in the South Asian subcontinent, which includes Bangladesh, India, Pakistan, and Nepal. Bangladesh has adopted the four strategies recommended by the World Health Organization for eliminating polio from within its boundaries:

- Achievement and maintenance of high coverage (at least 90 percent coverage with OPV immunization)
- Adoption of National Immunization Days
- Improvement in surveillance to detect and investigate possible polio cases
- Conduction of “Mop-Up” Immunization Campaigns

In order for the World Health Organization to be able to certify that Bangladesh has eliminated polio, it will have to verify that polio has been eliminated from the country for a minimum of three years.

#### **Achievement and maintenance of high coverage**

High coverage of OPV immunization is achieved and maintained through timely routine immunization services supplemented by National Immunization Days. Achievement and maintenance of high coverage with OPV is required in order to replace dangerous “wild” poliovirus in the environment with “friendly” vaccine virus. “Wild” poliovirus can be circulating in the community without it being apparent to anyone since less than one percent of infections produce paralysis.

#### **Adoption of National Immunization Days**

The World Health Organization recommends that countries that have not eradicated polio should conduct two rounds of National Immunization Days (NIDs) each year. On these days, all children under five years of age (regardless of the child’s previous immunization status and current geographic location) receive a dose of OPV. These days are usually spaced at an interval of 4-6 weeks.

The purpose of NIDs is to interrupt poliovirus transmission by replacing the poliovirus capable of causing disease (referred to as “wild” poliovirus) with vaccine virus. OPV is composed of live “attenuated”

poliovirus which does not cause disease. By circulating this virus in the community in massive doses at the time of the NIDs, any remaining wild virus still being excreted in the stools will be replaced by the attenuated virus being given to the children participating in the NID campaign, and this attenuated virus will also be passed on to their close contacts. NIDs typically take place during the winter months when the circulation of wild poliovirus is reduced and the vaccine is not exposed to the higher temperatures present during the remainder of the year. The second round of NID is four to six weeks after the first round so as to fully immunize any children who were not immunized during the first round and to rid the environment of wild poliovirus.

### **Surveillance and investigation of acute flaccid paralysis (AFP)**

In order for polio to be eradicated globally, every country has to be able to certify that it is polio-free for at least three consecutive years. The only way to be able to certify that no cases of polio exist in the country is to have a surveillance system in which all cases of acute flaccid paralysis (of which polio is one of several causes) are detected and reported to health authorities. These authorities then investigate the case to determine whether it is due to polio or not and also to determine what type of further actions are required by health authorities. The surveillance system must be sensitive enough to detect at least one case annually of non-polio acute flaccid paralysis among 100,000 children under 15 years of age, since this is the minimum rate of non-polio acute flaccid paralysis.

### **“Mop-Up” Immunization Campaigns**

In addition to the NIDs, two other types of supplemental immunization activities are taking place as part of the polio eradication programme. These are referred to as “Mop-Up” Immunization Campaigns since they are directed to high-risk areas.

- First of all, for every case of acute flaccid paralysis which is identified, at least 200 children under five years of age who live in the area surrounding the case should receive OPV.
- Secondly, in high-risk areas, such as areas where wild poliovirus has been previously isolated or where routine OPV3 coverage and NID coverage has been less than optimal, a “Mop-Up” Campaign will be conducted. “Mop-Up” Campaigns are similar to NIDs in that they target all 0-59 month-old children regardless of previous immunization status for two doses of OPV at a 4-6 week interval. Whereas NIDs are national in scope and are conducted from fixed sites, “Mop-Up” Campaigns are carried out in a thana or municipality and employ house-to-house immunization. “Mop-Up” Campaigns conducted thus far in Bangladesh have been held immediately after an NID. During these

campaigns, children 0-59 months of age who did not participate in the NID were identified and given OPV.

### ***Surveillance for Acute Flaccid Paralysis, Neonatal Tetanus, and Measles***

#### **General concepts**

Disease surveillance is the ongoing collection and analysis of information about cases of a disease as a basis for planning, implementing, and evaluating disease prevention and control activities. The type of information collected through disease surveillance activities consists of descriptive epidemiological characteristics of the case (age, sex, vaccination status, mortality), place (where infected), and time (date of onset of symptoms).

Disease surveillance may contain information which was collected actively or passively. Actively collected surveillance information refers to information obtained when a surveillance officer goes out into the community to collect information specifically for surveillance purposes or when the surveillance officer goes out to a health care facility to review information contained in registers or medical records.

Passively collected surveillance information refers to information about identified cases or potential cases which has been sent in to the surveillance office by health workers or others out in the field. Usually, surveillance which relies exclusively on passively collected information yields information on only a small percentage of cases that are actually occurring. Therefore, actively collected information is required to identify a meaningful portion of the occurring cases.

Disease surveillance may be facility-based or community-based. Facility-based disease surveillance involves the collection of data (either actively or passively acquired) from a health facility. Community-based disease surveillance involves the collection of data directly from individuals out in the community rather than from fixed facilities.

*Case definitions:* A “case definition” consists of a standard set of criteria used to classify a person as having a particular disease. Even though no case definition is likely to correctly diagnose all individual cases, it is extremely important to use standard case definitions rather than clinical impressions for disease reporting in order to minimize differences in interpretation from one surveillance officer to another and in order to allow for comparisons of data collected during different time periods or from different geographic areas. A case definition for the same disease may change over time depending on the stage of disease control and the prevalence of the disease.

A suspected case of **acute flaccid paralysis** is defined as a child below 15 years of age with *all* of the following clinical findings:

- Progression from weakness to paralysis over a period of 14 days or less (**acute**)
- A paralyzed extremity which is not stiff but floppy (**flaccid**)
- Inability to move at least one limb (**paralysis**)

A confirmed case of acute flaccid paralysis is defined as any suspected case which is confirmed by a surveillance Medical Officer as having acute flaccid paralysis and in which the paralysis was not present at birth nor the result of an injury.

A confirmed case of **polio** is defined as any confirmed acute flaccid paralysis case which meets any one of the following criteria:

- A laboratory-confirmed wild poliovirus infection (obtained from stool specimens)
- Residual paralysis 60 days after the initial identification of the case (since most cases of non-polio acute flaccid paralysis will resolve within 60 days);
- Death (from any cause)
- No follow-up information about the case has been obtained 60 days after identification of the case

A case of **neonatal tetanus** is defined as any neonate who:

- Suckles and cries normally during the first two days of life

and

- Becomes ill between three and 28 days of life and develops *both* an inability to suckle and diffuse muscle stiffness (rigidity)

A case of **measles** is defined as anyone with a fever and a rash of at least three days in duration who has one of the following three additional symptoms:

- Cough
- Coryza (runny nose)
- Conjunctivitis (red eyes)

*Surveillance System Management:* By its very nature, the management of disease surveillance must be decentralized. Table 4 lists the designated Disease Surveillance Focal Persons (DSFPs) and Local Surveillance Officers (LSOs) at the level of the thana, municipality, and city corporation as determined by consultation with local health authorities. The DSFP, who is a higher-level health authority, will designate the LSOs for his or her area. In most cases, the Medical Officer for Disease Control (MODC) is the LSO for a thana or for a municipality (if the municipality does not have a Municipal Medical Officer), while the Municipal Medical Office is usually the LSO if one is present in that municipality. In the city corporations, the LSO is an Assistant Health Officer (in the case of Dhaka City Corporation) or an EPI Medical Officer (in the case of Chittagong, Khulna, and Rajshahi City Corporations). The role of the LSO is to conduct case or outbreak investigations as well as case or outbreak response immunization. The role of the DSFP is to receive reports of possible cases and notify the appropriate LSO, to supervise the work of the LSOs, and to consolidate information about the work of the LSOs and submit this information to EPI Headquarters in Dhaka.

**Table 4. List of Designated Disease Surveillance Focal Persons (DSFPs) and Local Surveillance Officers (LSOs)**

Location	DSFP	LSO
Thanas (460 in all)	Thana Health and Family Planning Officer (THFPO)	Medical Officer for Disease Control (MODC)
Municipalities without Medical Officers	Civil Surgeon	Determined by Civil Surgeon (e.g., Medical Officer for Disease Control and Surveillance)
Municipalities with Medical Officers	Municipal Medical Officer	Municipal Medical Officer
City Corporations (Dhaka, Chittagong, Khulna, and Rajshahi)	Chief Health Officer	Assistant Health Officers or EPI Medical Officers

Throughout Bangladesh, thousands of local-level health staff from the government and from NGOs as well as volunteers from the community have received a half-day orientation regarding the case definitions of polio, neonatal tetanus, and measles, along with instructions regarding whom to contact should they identify

a child meeting these criteria. Community volunteers who have received training in the basic concepts of surveillance for acute flaccid paralysis, neonatal tetanus and measles are called **Key Informants**.

Disease Surveillance Coordinators (DSCs) have been designated for the districts and city corporations. They have been trained to assist the DSFPs and LSOs in case and/or outbreak investigations. DSCs include Divisional Surveillance Officers (DSOs) or Surveillance Medical Officers (SMOs) working with the World Health Organization in thanas within that division. DSOs also include Urban Operations Officers (UOOs) working with BASICS for major municipalities in each division and Urban Surveillance Officers (USOs) working with BASICS in each of the four city corporations.

The DSFP receives reports of cases of acute flaccid paralysis, cases of neonatal tetanus, and outbreaks of measles from health facilities, hospitals, private physicians, health and family planning field workers, NGO workers, surveillance volunteers designated as Key Informants, or from any concerned Bangladeshi citizen.

Anyone who identifies or suspects a case of acute flaccid paralysis or neonatal tetanus and anyone who identifies or suspects a measles outbreak should contact a health worker. The, a health worker who can communicate with the LSO is notified so that the case can be further investigated. All government and NGO health workers should know who to contact if they receive a report from someone in the community about these diseases.

Any suspected case of acute flaccid paralysis or neonatal tetanus that is reported to a lower level health worker should be quickly reported to the LSO of that area. The LSO is then responsible for visiting the household and obtaining additional information and, if acute flaccid paralysis is present, collecting stool specimens to be sent to the reference laboratory of the Institute of Public Health in Dhaka to determine if wild poliovirus is present. Therefore, all acute flaccid paralysis cases must be immediately reported and an investigation conducted within 48 hours so that two stool specimens can be obtained within 14 days of paralysis onset when there is still a good possibility of the presence of poliovirus in the stool.

At the same time the LSO visits the home to investigate a case of neonatal tetanus, he or she should give a TT immunization to the mother if the case of neonatal tetanus is confirmed. In addition, 19 other women of reproductive age living nearby who have not been fully immunized with TT vaccine should also receive a dose of TT vaccine.

Individual cases of measles are not investigated unless they are part of a measles outbreak. However, data

on measles cases presenting to health facilities (including NIPHP clinics) should be reported to the EPI Programme Headquarters on a monthly basis. The data to be provided include the name, address, age, sex and vaccination status of the case and the date of measles onset.

### ***Key Messages***

- Children should be protected as early in life as possible. Four visits (by 12 months of age) are necessary to complete all doses, and these visits should take place as soon as possible after the infant reaches the age at which each dose can be given.
- **Minor illness is not a contraindication to vaccination.** Vaccines can (and should) be given even if the woman or the child have a minor illness. A woman or child can be considered to have a minor illness if he or she is not so sick that hospitalization is necessary. Thus, if the person is well enough to go home, the person is well enough to receive an immunization.
- Low-grade fever and pain are common after all vaccinations, and ulcerations can develop at the site of BCG vaccination. These complications are all minor and temporary. If a child develops any serious illness, including convulsion or signs of serious infection at the injection site, the child should be taken for medical evaluation.
- The caretaker should preserve and bring the child's vaccination card at the time of each visit with a health care provider. A woman should bring her TT vaccination card with her at the time of each visit with a health care provider.
- Any person who detects a case of suspected neonatal tetanus or suspected acute flaccid paralysis or who detects an outbreak of measles (usually defined as 50 or more cases) should report this information immediately to the nearest health worker.
- All women of reproductive age (15-49 years) should complete the five-dose TT schedule as early as possible.
- Measles is a dangerous disease. Four out of every one hundred children in Bangladesh with measles die from complications such as post-measles pneumonia and post-measles diarrhoea, and blindness can develop in children with measles who are vitamin A deficient and who do not receive vitamin A supplementation promptly after developing measles. Therefore, it is very important for mothers

to obtain measles immunization for her child as soon as possible after the child has completed 9 months (39 weeks) of age.

### ***Summary***

Immunization of both mothers and children represents one of the most important and inexpensive opportunities that health workers have to prevent illness and death. Therefore, at each encounter with a woman of reproductive age or with a young child, the health worker should ask about immunization status and either provide needed immunizations needed at that visit or refer the mother or child for needed immunizations. The achievement of high coverage levels for all immunizations will make an important contribution to the reduction of preventable mortality in children. Moreover, the surveillance system utilized for polio eradication will become increasingly valuable for continuing the progress of reducing deaths caused by neonatal tetanus and measles. Nevertheless, enthusiastic support from all health workers in Bangladesh will be required if the goals of elimination of polio and marked reductions in the incidence in neonatal tetanus and measles are to be achieved.

## Chapter 2. Vitamin A Supplementation

Vitamin A deficiency is one of the major nutritional deficiencies in Bangladesh. This deficiency is produced by a lack of consumption of vitamin A-rich foods such as green leafy vegetables, yellow/orange fruits and vegetables, meat, liver, milk, fish, and eggs. There is now firm scientific evidence that children with vitamin A deficiency, including mild vitamin A deficiency, are at increased risk of death from infectious diseases, and that supplementation of deficient children with high-dose vitamin A capsules can reduce the mortality of these children by one-third or more.<sup>14</sup>

A national nutrition blindness survey conducted in 1982-1983 revealed that the prevalence of nightblindness was more than three times the value established by international experts to signal the presence of a problem of public health significance. At that time, the study estimated that more than 900,000 children in Bangladesh were suffering from xerophthalmia (described below) and that 30,000 children went blind each year because of vitamin A deficiency.<sup>15</sup> A programme of vitamin A supplementation for pre-school children has been underway in Bangladesh for more than two decades now. Prior to 1995, however, fewer than half of the children of Bangladesh actually received this supplementation on schedule.<sup>16</sup>

Beginning in 1995, the national programme for vitamin A supplementation was given more emphasis by administering vitamin A to 12-59-month-old children on the annual December National Immunization Day and then by holding a National Vitamin A week during June of each year when 12-59-month-old children again receive a supplemental dose of vitamin A. Since 1995, more than 80 percent of the children in this age group have received vitamin A supplementation during each campaign. However, in 1998 a full one-third of children 12-59 months of age did *not* receive both vitamin A supplements – during the June campaign and also during the December campaign at the time of the NID.<sup>14</sup>

A vitamin A survey conducted in late 1997 revealed that there has been a remarkable decline in xerophthalmia among pre-school children in rural Bangladesh. In fact, the prevalence of nightblindness has dropped more than five-fold to 0.7 percent, below the threshold of one percent which is used to determine if vitamin A deficiency is a significant public health problem in the population.<sup>8</sup> As a result of this important achievement which is attributable to the national vitamin A supplementation programme, approximately 125,000 lives are being saved each year, and the number of children going blind as a result of vitamin A deficiency has reduced six-fold from 30,000 per year 15 years ago to 5,000 at present.<sup>8</sup>

Even so, vitamin A deficiency has not been eliminated in Bangladesh. Five thousand children are still

estimated to become blind annually in Bangladesh as a result of vitamin A deficiency, and there are thousands of others who die from measles, pneumonia, and diarrhoea-related infections who would not have died if they had not been vitamin A deficient. Children who had not received a vitamin A capsule in the most recent campaign were almost twice as likely to have nightblindness as children who had received a vitamin A capsule.<sup>8</sup>

Several recent surveys have confirmed that dietary intake of vitamin A among children and women is still well below the daily minimum requirement. Therefore, the distribution of vitamin A capsules every six months at the time of a National Immunization Day (in December) and National Vitamin A Week (in June) is an essential component of the national effort to reduce child mortality and improve child health in Bangladesh. Simultaneous programmes to increase the availability and consumption of vitamin-A rich foods must also be expanded, however, to truly eliminate vitamin A deficiency in Bangladesh.

During the first six months of life, exclusively breast-fed infants can obtain adequate amounts of vitamin A from the mother's breast milk if the mother is not vitamin A-deficient herself. However, almost 50 percent of women in Bangladesh suffer from sub-clinical vitamin A deficiency. Therefore, for the benefit of their own health and the health of the infant, supplementation of mothers during the post-partum period is recommended. Programmes which encourage women of reproductive age to consume greater amounts of vitamin A-rich foods should also be initiated and expanded.

The national programme of vitamin A supplementation for children under five years of age will be necessary in Bangladesh until most children regularly receive adequate amounts of vitamin A in their diet. A high-dose vitamin A capsule provides protection against vitamin A deficiency for four to six months. Therefore, in order to obtain full protection against vitamin A deficiency, children should receive vitamin A supplementation twice a year – once during the December National Immunization Day and again during National Vitamin A Week in June. Without an adequate source of vitamin A in the diet, children whose vitamin A status has returned to normal after the administration of a high-dose vitamin A capsule will become deficient again after six months. At that time, they again become subject to the same risks of increased infection, corneal scarring, and increased mortality that other vitamin-A deficient children have.

### ***Objectives and Strategies***

The objective of the national vitamin A programme is to eliminate vitamin A deficiency among mothers and children and its detrimental effects on childhood vision, morbidity and mortality. This objective is to be achieved through:

- Providing every six months vitamin A supplementation to at least 90 percent of children between 12 and 59 months of age
- Providing vitamin A supplementation to at least 90 percent of post-partum mothers and to 90 percent of children at the time of measles immunization
- Providing vitamin A supplementation to children who have specific signs, symptoms and diseases for which vitamin A supplementation is recommended to be given urgently
- Increasing the production and consumption of vitamin-A rich foods

### ***Clinical Classification of Vitamin A Deficiency as Manifested by Xerophthalmia***

The eyes are quite sensitive to vitamin A deficiency. Those who have mild vitamin A deficiency develop nightblindness, and those with more severe cases of vitamin A deficiency develop xerophthalmia, which literally means “dry eyes.” Xerophthalmia can lead to corneal scarring and eventually blindness. Vitamin A deficiency is exacerbated by measles, persistent diarrhoea (14 or more days in duration), and protein-energy malnutrition. Thus, the changes observed in the eyes (as well as the increased risk of infection) produced by vitamin A deficiency become particularly pronounced in children with these health problems.

#### **Reversible eye changes produced by mild vitamin A deficiency: Nightblindness and Bitot’s spots**

Children with milder forms of clinical vitamin A deficiency have nightblindness and possibly Bitot’s spots. Children with nightblindness due to vitamin A deficiency are not able to see in the dark as well as children with normal vitamin A status. Vitamin A-deficient children may bump into objects in the dark that children who are not vitamin-A deficient do not bump into, or they may be more likely than children who are not vitamin-A deficient to search for their mother in the dark. Vitamin A-deficient children may also be unusually sensitive to daylight (a condition referred to as photosensitivity). These children have an abnormality in retinal function resulting from vitamin A deficiency.

Bitot’s spots are small, white, foamy or cheesy areas, usually on the medial and inferior portion of the bulbar conjunctiva (see Figure 1). These changes are completely reversible if the child receives vitamin A and the

deficiency is eliminated.

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Figure 1 about here

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### **Irreversible eye changes produced by more severe vitamin A deficiency: Keratomalacia and corneal scarring**

Children with more severe vitamin A deficiency develop corneal xerosis (or a haziness of the corneal surface), which is usually more noticeable if the eyelid is retracted and the tears have a chance to run off. With progression of the vitamin A deficiency, corneal scarring develops. This scarring is irreversible. Small spots on the cornea become ulcerated and later form a scar (see Figures 2 and 3). In more severe cases, however, the entire cornea can become scarred and even necrotic, leading to blindness and possibly a shrunken eye.

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Figures 2 and 3 about here

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## ***Guidelines***

### **Prevention of vitamin A deficiency**

*Among women who are pregnant:* During pregnancy, women have an increased need for vitamin A and many women in Bangladesh suffer from vitamin A deficiency. However, large doses of vitamin A during early pregnancy can be harmful to the foetus.<sup>14,17</sup> Therefore, pregnant women (or women who might become pregnant) should be advised NOT to take high-dose vitamin A capsules. They should, however, increase their consumption of vitamin A and frequently eat vitamin A-rich foods such as green leafy vegetables, yellow/orange fruits and vegetables, fish, eggs, milk, liver and meat throughout pregnancy to prevent vitamin A deficiency. They should also be informed that they should take a high-dose vitamin A capsule during the post-partum period. Multi-vitamins which contain daily supplements of vitamin A and other important vitamins and minerals can also be given.

*Among lactating mothers and children less than one year of age:* During the post-partum period, lactating mothers need to consume greater amounts of vitamin A for their own health as well as for their child's health. In order to improve the vitamin A status of lactating women, they should receive one high-dose vitamin A capsule (containing 200,000 international units) during the post-partum period. The current guideline of the

Ministry of Health and Family Welfare is to give this high-dose vitamin A capsule (containing 200,000 international units) to mothers during the first two weeks after giving birth. (However, the official recommendation of the World Health Organization and Helen Keller International is that this dose can be safely given up until the mother is 6-8 weeks post-partum.) The high-dose supplementation will ensure enough vitamin A in the mother's breast milk to meet the needs of the exclusively breast-fed infant during the first six months of life. Under *no* circumstance should a mother who is more than eight weeks post-partum receive a high-dose vitamin A capsules because there is a likelihood that the mother may be pregnant again and vitamin A in large doses can be harmful during the very first weeks of pregnancy. However, all lactating women should be encouraged to increase their consumption of (and their families should be encouraged to support them in increasing their consumption of) vitamin A-rich foods such as green leafy vegetables, yellow/orange fruits and vegetables and, if possible, small fish, eggs, liver, meat, and milk. Multi-vitamins that contain daily supplements of vitamin A and other important vitamins and minerals can also be given.

Colostrum (the secretions from the breast during the first few days after birth) contains high concentrations of vitamin A and, therefore, all mothers should be encouraged to initiate breastfeeding immediately after birth. Thereafter, exclusive breastfeeding should be continued until the infant reaches six months of age. Beginning at six months of age, the child should gradually be given complementary food, including vitamin-A rich foods (as described above) along with breast milk and other complementary foods.

At soon as possible after the child completes its first nine months of life (that is, when the child reaches nine months of age), 100,000 international units of vitamin A should be given along with his or her measles immunization. This can be administered either as four "puffs" from a liquid dispenser, as four drops squeezed from a high-dose vitamin A capsule containing 200,000 international units, or as a single capsule containing 100,000 international units.

*Among children 12- 59 months of age:* In Bangladesh, all children between one and five years of age (12-59 months) need to frequently consume foods rich in vitamin A. However, because the current dietary intake of vitamin A is so markedly deficient in vitamin A, vitamin A supplementation with high-dose capsules is required to ensure that vitamin A deficiency has been eliminated in the child. The recommended guideline for supplementation is given below, in Table 5.

**Table 5. Schedule for Vitamin A Supplementation of Children 12-59 Months of Age**

Age group	Dose	Frequency
1-5 years (12-59 months of age)	One vitamin A capsule containing 200,000 international units	Every six months

Supplemental vitamin A can be given as a liquid in “puffs” with a special dispenser (which gives 25,000 international units with each “puff”) or in a vitamin A capsule which contains 200,000 international units of vitamin A. These capsules are commonly referred to as high-potency vitamin A capsules. Each drop squeezed from the vitamin A capsule contains approximately 25,000 international units of vitamin A, and there are eight drops in each capsule.

Supplemental vitamin A, whether in liquid or capsule form, has an expiry date. Care should be taken to ensure that the expiry date has not passed.

In Bangladesh, high-potency vitamin A capsules are distributed by health workers and volunteers to children 12-59 months of age twice a year: once in or around December and again in or around June. In recent years, vitamin A distribution has taken place on one of the two National Immunization Days (NIDs), which take place during the winter months, and again during National Vitamin A Week in June.

*Among the general population:* Dietary intake of vitamin A is deficient in the general population of Bangladesh. Vegetables and fruits are the main sources of vitamin A in Bangladesh. However, the amount of fruits and vegetables currently available in Bangladesh is estimated to meet only 30-35 percent of the population’s daily requirement of vitamin A.<sup>18</sup> There is, therefore, a need to expand the production and consumption of green leafy vegetables and yellow/orange fruits and vegetables through homestead gardening. Often, at least some land is available, even around the homes of the poor, where vegetables can be grown. By establishing a homestead garden, a poor family can usually grow enough vegetables to meet its own needs and be left with a surplus which can be sold in the market to generate additional family income. Promotion of school gardening can play a similar role in preventing vitamin A deficiency among school-aged children in Bangladesh.

In addition to gardening, households should be encouraged to produce animal-based foods so the family can consume them. Very small amounts of egg, fish, milk and other animal-based foods can provide substantial amounts of vitamin A as well as other important nutrients. Those women and children who live in households with homestead gardens and who produce and consume eggs have been found to have the lowest rates of nightblindness.<sup>8</sup>

**Table 6. Examples of Commonly Available Foods in Bangladesh That Are Rich in Vitamin A**

<b>Very high amounts of vitamin A</b> <i>khasheer koliza</i> (goat liver) <i>mishti kumra</i> (yellow squash) <i>lal shak</i> (red amaranth) <i>aam</i> (mango) <i>mola mach</i> (mola fish) <i>palong shak</i> (spinach)
<b>Moderately high amounts of vitamin A</b> <i>mayer dudh</i> (human breast milk) <i>paka pepe</i> (ripe papaya) <i>murgeer dim</i> (chicken egg)

Source: Helen Keller International <sup>19,20</sup>

**Treatment of medical conditions associated with or caused by vitamin A deficiency**

Children in Bangladesh frequently suffer from various types of infections. Children with normal levels of vitamin A are better able to resist infections, and life-threatening infections in particular, than are children with vitamin A deficiency. The mortality of vitamin A deficient children with measles, post-measles pneumonia, or persistent diarrhoea is notably higher than for children with similar infections who are not vitamin A deficient. Severely malnourished children are also usually deficient in vitamin A and need supplementation. Children whose diets do not contain sufficient vitamin A may develop symptoms of vitamin A deficiency such as nightblindness, Bitot's spots, and dryness of the conjunctiva or cornea (conjunctival or corneal xerosis). All of these children are highly likely to be vitamin A-deficient and should receive vitamin A supplementation. The recommended treatment of children with these conditions is listed in Table 7.

**Table 7. Recommended Dose and Schedule for Vitamin A Capsule Supplementation for Treatment of Children with Specific Medical Conditions**

Medical condition <sup>1</sup>	Dosage According to Age			Dose schedule
	If the child is less than 6 months of age	If the child is 6-11 months of age	If the child is 12 months of age or older	
Nightblindness Bitot's spots Xerophthalmia	50,000 international units (i.u.) per dose (1 drop)	100,000 i.u. per dose (2 drops)	200,000 i.u. per dose (4 drops)	Three doses (one dose on the 1st day, another on the 2nd day, and a third on the 14th day)
Measles	50,000 i.u. per dose (1 drop)	100,000 i.u. per dose (2 drops)	200,000 i.u. per dose (4 drops)	Two doses (one dose on the 1st day and another dose on the 2nd day)
Persistent diarrhoea <sup>2</sup> Post-measles pneumonia Severe malnutrition	50,000 i.u. per dose (1 drop)	100,000 i.u. per dose (2 drops)	200,000 i.u. per dose (4 drops)	One dose after each episode (unless the child has post-measles pneumonia or severe malnutrition and vitamin A supplementation has been given during the previous 4 weeks)

<sup>1</sup> Children with symptoms of vitamin A deficiency (nightblindness, Bitot spots, or xerophthalmia) and children with measles should receive additional vitamin A as recommended regardless of the child's history of vitamin A supplementation. Children with persistent diarrhoea (whether or not malnutrition is apparent) should receive additional vitamin A regardless of the child's history of vitamin A supplementation. Children with post-measles pneumonia or severe malnutrition who have received vitamin A supplementation during the previous four weeks should not receive additional vitamin A.

<sup>2</sup>Diarrhoea is considered to be persistent if it lasts for 14 days or more.

**Key Messages**

- Newborn babies should be given vitamin A-rich colostrum immediately after birth. Exclusive breastfeeding should be continued until the child has completed six months of age. Breastfeeding should be continued until the child's second birthday (when the child will have completed 24 months of life).
- From the time the infant completes six months of life and onward, vitamin A-rich foods such as green leafy vegetables, yellow/orange fruits and vegetables (like papaya), fish, eggs, milk, liver and meat should be given along with breast milk and other complementary foods.
- During pregnancy and lactation, mothers should regularly eat green leafy vegetables, yellow/orange fruits and vegetables, fish, eggs, milk, liver and meat.
- All children should receive vitamin A supplementation (100,000 i.u.) when they reach nine months of age (at which time they will have completed nine months, or 39 weeks, of life). This should be administered at the time of measles vaccination. All children between one and five years of age (12-59 months) should receive a vitamin A capsule (200,000 i.u.) every six months to prevent the serious effects of vitamin A deficiency.
- Children with symptoms of vitamin A deficiency and children suffering from measles, persistent diarrhoea, post-measles pneumonia, or severe malnutrition should receive vitamin A supplementation according to the recommended schedule. Children with post-measles pneumonia and severe malnutrition should receive vitamin A supplementation only if they have not received any other doses of vitamin A during the past four weeks.
- Post-partum mothers should receive vitamin A supplementation within two weeks of delivery.
- Green leafy vegetables and yellow/orange fruits and vegetables should be cultivated around the home and school. Poultry and other homestead food production schemes should also be introduced. All family members, but particularly pregnant or lactating women as well as young children, should consume vitamin A-rich foods regularly.

**Summary**

The elimination of vitamin A deficiency through supplementation with high-dose capsules and through increased intake of vitamin A-rich foods in the diet represents, along with immunizations, one of the most cost-effective approaches for reducing childhood mortality from infection. It is also the most effective approach to preventing childhood blindness at this time in Bangladesh. The toxicity of large doses vitamin A must be well understood, however, and care must be taken to prevent harmful effects resulting from inappropriate administration of high-dose vitamin A capsules. Vitamin A supplementation is also an indispensable part of the treatment of children with eye signs of vitamin A deficiency (nightblindness, Bitot's spots, and xerophthalmia) as well as the treatment of measles, persistent diarrhoea, post-measles pneumonia, and severe malnutrition. The administration of vitamin A supplementation to mothers during the immediate post-partum period will help to eliminate vitamin A deficiency among infants during their first six months of life.

## **Chapter 3. Promotion of Breastfeeding and Appropriate Infant Feeding Practices**

Exclusive breastfeeding during the first six months of life and continued breastfeeding thereafter (with appropriate complementary feeding) until the child reaches his or her second birthday is one of the important means of promoting the health and development of children and reducing child mortality and morbidity. Breast milk is the optimal (and fully adequate) source of protein, energy, vitamins, and minerals during the infant's first six months of life. After the child reaches six months of age, however, complementary foods should be added in order to prevent malnutrition from developing since, at that point, the mother's breast milk is not able to meet all of the infant's nutritional needs.

Breast milk is rich in antibodies and other substances which reduce the chance of infection, and this protection continues if the child continues to breastfeed until his or her second birthday. Unlike many other sources of nutrition and liquids (including water) which may be given to an infant in Bangladesh, breast milk is free from contamination, has the right temperature, contains all necessary nutrients, is easily digested, and protects the child against infections. During the first six months of life, exclusively breastfed infants have much lower rates of morbidity from diarrhoea and ARI as well as mortality than do babies who are fed other liquids (including water) and other foods.<sup>21</sup>

The benefits of breastfeeding to both the mother and the child are so numerous and so significant that vigorous efforts to promote breastfeeding are justified. Table 8 lists some of these benefits.

Table 8. Benefits of Breastfeeding

Benefits to the child	Benefits to the mother
<p><b>Short-term benefits</b></p> <p>lower risk of death, serious illness, sudden infant death syndrome, neonatal sepsis, and hospitalization</p> <p>lower risk of diarrhoeal disease, gastrointestinal disease, giardia intestinal infection, respiratory disease, pneumonia, urinary tract infection, and ear infection</p>	<p><b>Short-term benefits</b></p> <p>promotion of uterine contractions immediately after childbirth, thereby reducing the chance of post-partum haemorrhage</p> <p>provision of natural contraception during the first 6 months if exclusive breastfeeding practiced</p> <p>promotion of bonding between mother and child</p> <p>provision of hormone-induced contentment</p> <p>enhancement of self-confidence and self-esteem</p> <p>convenience (because breast milk is clean, always available, and pre-warmed)</p> <p>lower risk of urinary tract infection, chronic hepatitis</p> <p>reduction in requirements for insulin among diabetic mothers</p> <p>cost savings</p> <p>promotion of household food security</p>
<p><b>Long-term benefits</b></p> <p>lower risk of allergies</p> <p>lower risk of heart disease and cancer later in life</p> <p>lower risk of obesity later in life</p> <p>lower risk of behavioural problems, learning disabilities, and psychological problems later in life</p>	<p><b>Long-term benefits</b></p> <p>lower risk of breast, ovarian, and cervical cancer later in life</p> <p>lower risk of osteoporosis and hip fractures later in life</p>

Source: Bangladesh Breastfeeding Foundation<sup>22</sup>

Unfortunately, many infant feeding practices throughout Bangladesh are less than desirable from the standpoint of optimal health and nutrition. Fewer than 10 percent of infants are exclusively breastfed during their first six months of life.<sup>21,23,24</sup> Although the great majority of infants are breastfed, other liquids in addition to breast milk are commonly given during this time as well. Ten to 20 percent of infants are bottle fed during this time as well.<sup>23</sup> The greatly increased rates of diarrhoea, pneumonia and mortality among bottle-fed infants in Bangladesh and elsewhere are well-documented.<sup>21</sup> Nevertheless, almost one-fifth of infants and children are being bottle fed in Bangladesh during their first two years of life.<sup>23</sup> The need for complementary foods beyond breast milk once an infant reaches six months of age is clearly established. However, only about half of the infants in Bangladesh begin to receive complementary foods at that age, and the quality of the food provided at that time is frequently inadequate.<sup>21,23</sup> The other half of infants are still

receiving at six months of age some combination of breast milk, other liquids, and bottle feeding.

### ***Objectives and Strategies***

The objective of infant and childhood nutrition interventions is to reduce the high levels of malnutrition in Bangladesh, thereby promoting health, well-being, and survival. The strategies for achieving this objective are as follows:

- Promote exclusive breastfeeding beginning immediately after birth and continuing until the infant has completed six months of life
- Promote appropriate and adequate complementary feeding, along with continued breastfeeding, from six months of age until the child's second birthday
- Improve the nutritional status of pregnant and lactating mothers

### ***Guidelines***

During the first six months of life, exclusive breastfeeding can meet all of the infant's needs for nutrition and fluids. Mothers commonly believe that they do not produce enough milk, but even malnourished mothers produce enough milk to meet their babies' needs.<sup>25</sup> In order for the mother to produce enough milk for her infant, however, she must breastfeed her infant frequently (10-12 times per day, including during the night). She must also refrain from giving the infant other foods or liquids (including water). Frequent suckling is necessary in order to stimulate the production of an adequate amount of milk, and infants who obtain food from other sources during the first six months of life will not be sufficiently hungry to suckle.

A mother can be assured that her infant is receiving sufficient nutrition while exclusively breastfeeding during the first six months of life if the infant is urinating at least every four hours. Urinating at least every four hours signifies that the infant is getting sufficient liquids from the breast milk (assuming that the infant has no other source of liquids, including water). And if the infant is getting enough liquids in the breast milk he or she is getting enough nutrition as well.

Figures 4 and 5 show the proper positioning and attachment for babies while breastfeeding. The mother and baby should be positioned comfortably, with the baby turned toward the mother. Most of the areola along with the nipple should be in the infant's mouth. The nose should not be pressed against the mother's breast since the infant must breathe through his or her nose while breastfeeding.

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Figures 4 and 5 about here

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Colostrum is rich in antibodies, proteins, vitamins and minerals and is therefore said to contain the first “disease fighting substances” (antibodies) that a newborn child can obtain. Allowing the infant to suckle immediately after birth enables him or her to receive this benefit. Moreover, colostrum acts as a laxative and helps to clear the newborn’s gastrointestinal tract of meconium, thereby lowering the incidence and severity of neonatal jaundice. Unfortunately, many mothers delay in giving colostrum to their newborn.

During their first six months of life, infants do not need any additional liquids (including water) beyond that provided by the mother’s breast milk. This is true even during the hot weather.<sup>25</sup> The addition of other liquids (including water) is dangerous for the infant since these liquids may be contaminated and cause diarrhoea. Therefore, infants during their first six months of life should not receive any liquids (including water) or foods other than breast milk. The only exceptions to this recommendation are if any medicines need to be administered by mouth, if oral rehydration fluid needs to be given for diarrhoea, or if the mother is ill or needs to be away from the baby for long periods of time and cannot provide expressed breast milk.

An important advantage of exclusive breastfeeding during the first six months of life is the contraceptive benefit which it provides. If the infant is fed 10-12 times per day (including during the nighttime) and is not taking any other food or liquids (including water), the chance of the mother becoming pregnant during this period is virtually eliminated as long as she has not resumed her menstrual period.

The infant should not suckle on a pacifier or on any other object since this may reduce the infant’s interest in suckling at the breast. Energetic and frequent suckling at the breast is required in order for the mother to produce an adequate supply of milk and in order to receive the full contraceptive benefit of exclusive breastfeeding.

Once the child has completed six months of life, the mother’s breast milk is insufficient for the baby’s needs, even if the mother is well-nourished. At this point in the baby’s life the administration of complementary foods is essential in order to prevent malnutrition. Many mothers know that breastfeeding is good for their baby, and they erroneously think that if they continue to breastfeed their baby without providing any complementary foods after the baby completes six months of age, their baby will remain healthy. After reaching six months of age, however, children should receive frequent feedings of foods that are rich in

protein, carbohydrates, minerals and vitamins (including vitamin A). Foods that are nutritious for young children after they reach six months of age include *khichuri* (a mixture of rice, pulses, vegetables, and oil), porridge, rice, lentils, green leafy vegetables, yellow/orange fruits and vegetables, eggs, fish, meat, liver, food rich in sugar or molasses, and fruits. Nuts are a highly nutritious food for children once they have teeth.

Infants less than six months of age should be fed at least 10-12 times a day. Infants six to nine months of age should be breastfed at least every eight hours (three feedings in each 24 hour period). Infants who are 6-8 months of age should be fed food from the family pot 2-3 times per day. Infants who are 9-11 months of age should be fed food from the family pot 3-4 times per day and children 12-23 months of age, 4-5 times per day. The infant or child should also be given extra foods such as eggs, fish, cooking oil, green leafy vegetables, and yellow/orange fruits and vegetables.

Inappropriate infant feeding practices are a common cause of childhood malnutrition. Administration of food and liquid (including water) other than breast milk to infants during their first six months of life *for any reason not given above* is unnecessary and can be harmful by exposing the infant to environmental pathogens. This can, in turn, produce infections such as diarrhoea and acute respiratory infection that may reduce the appetite of the child and lead to reduced suckling which, if prolonged, will eventually lead to a decrease in milk output by the mother and then to malnutrition in the infant.

The failure to complement breastfeeding with additional foods once the infant reaches six months of age will also eventually produce malnutrition. The risk of serious infection and death is greater among malnourished children than it is among well-nourished children. Therefore, promotion of appropriate feeding practices is one of the important strategies for improving child survival in Bangladesh.

Health workers can play an important role in convincing mothers that exclusive breastfeeding during the first six months of life is beneficial for their babies and also for the mothers as well. Health workers can also play an important role in convincing mothers with children over six months of age that they need frequent feeding with nutritious foods in addition to whatever breast milk or other non-human milk products are being provided. Health workers can play an important role in encouraging mothers to eat nutritious foods during their pregnancy and obtain extra rest.

Pregnant women in Bangladesh commonly believe that they should eat a minimum amount of food so that the baby will be small and the delivery “easy.” However, low-birth-weight babies are at increased risk of death from a variety of conditions, and there is no scientific evidence that eating less will lead to an easier

delivery.<sup>26</sup>

Pregnant women should receive, as part of their prenatal care, an orientation on (1) appropriate infant feeding; (2) the importance of exclusive breastfeeding during the first six months of life; (3) the importance of demand breastfeeding; (4) the importance of adding frequent complementary foods at six months of age; (5) the importance of continued breastfeeding during the first two years of life; (6) the proper technique of positioning and attachment (as shown in Figures 4 and 5); (7) the dangers of pre-lacteal foods and liquids (including water) and the dangers of bottle feeding; and (8) the reasons for low milk production among lactating mothers.

Health workers should encourage mothers to avoid closely spaced pregnancies. Pregnancies that are at least three years apart allow the mother to have ample time for child care including providing her infant with more nutritious food in appropriate quantities. In addition, pregnancies that are at least three years apart enable the mother to recover from the physical exhaustion and nutritional deterioration which can be associated with pregnancy, childbirth, and care of the young infant. Thus, birth spacing leads to healthier mothers and healthier babies.

Every effort should be made to continue breastfeeding even if the child is separated from the mother because of work or illness. Breast milk can and should be manually expressed, placed in a clean container, and later given to the infant. Breast milk can be left at room temperature for eight hours without becoming contaminated. If it is possible to refrigerate breast milk, it can be stored for longer periods and administered to the child without risk.

Breastfeeding should continue and even become more frequent than usual if the infant develops diarrhoea, acute respiratory infection, or any other illness. If a breastfed infant under one year of age is brought to a health facility because of illness and shows signs of malnutrition (that is, the infant is thin and wasted or edematous with light-coloured hair) or if the infant is having feeding problems, the health worker should observe the child at the mother's breast during that visit. Sometimes the technique of positioning and attachment of the baby to the mother's breast can be a cause of feeding problems, and these problems can be readily corrected.

Children under two years of age who are not feeding properly should be referred to a medical doctor for

further examination. Mothers who are having problems with breastfeeding should be informed about support groups that promote breastfeeding, and they should be encouraged to attend meetings of these support groups. If no local support groups are available, health workers should encourage their formation.

Health workers should recommend “baby-friendly” hospitals and health facilities where appropriate breastfeeding and child-care practices are promoted. The Bangladesh Breast Milk Substitute Code should be respected and knowledge about it should be promoted in the community. This Code calls for a halt of inappropriate marketing and promotion of breast milk substitutes through such practices as the provision of free or subsidized breast milk substitutes to hospitals, free distribution of leaflets in health facilities about breast milk substitutes, any encouragement of the use of breast milk substitutes at health facilities, and donations of breast milk substitutes to health care providers.

Health workers should take every available opportunity to promote breastfeeding in the community. Some of the ways this can be done are: (1) to encourage the formation and functioning of neighbourhood support groups to promote proper breastfeeding and child care practices in the community; (2) to encourage the community to recognize the importance of breastfeeding for the health and well-being of the child; and, (3) to assist women who have special needs which must be met in order to breastfeed successfully. Working women, in particular, face difficult challenges in breastfeeding. Thus, helping working mothers to identify ways that they can be relieved of work responsibilities during the first several months after birth or helping them to arrange circumstances in which they can breastfeed their children while at work can be important for the promotion of breastfeeding. For women who must be away from their babies, teaching them to express their breast milk so that they can feed this milk to the infant later can also be helpful.

The nutritional status of lactating mothers needs to be improved by all possible means in order to provide the infant with the best possible nutrition during the first six months of life.

### ***Key Messages***

- At the time of each prenatal contact of a health worker with a pregnant women, the pregnant woman should be given encouragement to exclusively breastfeed her infant during the first six months of life.

- Infants should stay in the same bed with the mother immediately after birth (“bedding-in”) to facilitate breastfeeding and infant-mother bonding. This recommendation also applies to infants born in health facilities.
- Breastfeeding should be initiated as soon as possible, preferably within one-half hour after birth. Colostrum (the first secretions from the breast after birth) should not be discarded, and it should be given without delay to the infant.
- No pre-lacteal foods should be given. That is to say, the newborn should receive nothing by mouth prior to the onset of breastfeeding. The infant should receive no supplements, no sugar water, no honey, no formula, no cow’s or goat’s milk, no mustard seed oil, and no plain water.
- The infant should be exclusively breastfed from birth until six months of life have been completed. No other foods or fluids should be given during this time, not even plain water. Liquid medicine and oral rehydration solution (for diarrhoea), however, should be given if needed for treatment of illness.
- Infants should be permitted to suckle frequently and freely at the breast whenever they want, without any fixed time schedule. Infants less than six months of age should be fed at least 10-12 times a day.
- Breastfeeding should continue after six months of age until the child reaches two years of age. During this time, however, the child should be fed frequently with complimentary foods.
- The baby should not be bottle fed nor given any artificial teat or pacifier.
- If a breastfeeding infant or child develops diarrhoea, acute respiratory infection, or any other illness, he or she should continue to be breastfed even more frequently if possible. If the infant is more than six months of age, he or she should also, if possible, be fed complementary foods more frequently than usual.

### ***Summary***

Exclusive breastfeeding during the first six months of life with the addition of frequent feedings of nutritious complementary foods when the infant reaches six months of age can greatly reduce malnutrition and

mortality among infants in Bangladesh. Colostrum should be given to the infant immediately after birth. Even malnourished women can produce adequate amounts of milk for their infants during the first six months of life if the infant does not obtain liquids or nutrition from any other source and does not suck on a pacifier of any kind. Health workers can help to convince mothers of the importance of breastfeeding for the health and well-being of their infants as well as for their own health and well-being. Health workers need to fully understand proper positioning and attachment of the infant to the breast so that they can teach mothers the proper technique of breastfeeding. Health workers also need to encourage mothers to provide continued feeding, in increased amounts if possible, to children when they are sick and during the several weeks following the episode of illness.

**Figure 4. Proper Positioning for Breastfeeding**

correct

(Breast tissue forms a long teat and the baby's tongue presses milk out of the sinuses.)

incorrect

(Only the nipple is in the baby's mouth. His tongue cannot reach the milk sinuses to press out the milk.)

**Figure 5. Correct and Incorrect Attachment for Breastfeeding**

## **Chapter 4. Prevention and Treatment of Acute Respiratory Infection (ARI)**

Acute respiratory infection (ARI) is associated with one-quarter of all childhood deaths in Bangladesh at present. Approximately 120,000 deaths annually among children under five years of age are attributable to ARI as the principal or as a contributory immediate cause of death.<sup>1-3</sup> Approximately one-fifth of children who die with symptoms of ARI also have symptoms of diarrhoea prior to death.<sup>3</sup> ARI appears to be the single most important cause of death among children in Bangladesh.

Most cases of ARI in children are simple “coughs and colds” and pose no serious threat to the child. These simple “coughs and colds” are usually self-limited and are caused by viral infections. Antibiotics and cough syrup do not improve the symptoms or reduce the period of sickness for children with simple “coughs and colds.” Even so, Bangladeshi children with simple “coughs and colds” frequently receive unnecessary antibiotics and cough syrup from a health care provider or pharmacist. In these cases, antibiotics and cough syrup are not only ineffective, but they present an unnecessary risk to the child (through possible side effects and allergic reactions). Moreover, the widespread use of unnecessary antibiotics encourages the development of bacteria in the environment which are resistant to the antibiotic, thereby increasing the likelihood that future bacterial infections will be resistant to available antibiotics. Bacterial infections which are resistant to treatment with antibiotics have now become a serious problem in developed countries, and antibiotic-resistant infections will most certainly become a serious problem in the future in developing countries like Bangladesh. However, reducing unnecessary antibiotic use can make this problem less severe. The final unfortunate consequence of inappropriate use of antibiotics is the wasted household expenditure of funds. This is not a small matter in a society such as Bangladesh’s, where poverty is so widespread.

The average Bangladeshi child suffers 7-9 episodes of ARI each year, and each episode lasts 7-14 days.<sup>27</sup> High population density, pollution of the air with smoke and other toxic airborne wastes, and poor underlying nutritional status all contribute to the high prevalence of ARI and the high mortality due to ARI in Bangladesh.

ARI that becomes fatal is almost always due to pneumonia. Many cases of pneumonia begin as a simple cough and cold and become more severe and widespread, involving the lungs. Children with poor immune resistance as a result of malnutrition, or children with more frequent episodes of ARI as a result of breathing irritants or infective organisms, are at greater risk of developing pneumonia. Pneumonia is caused by both viruses and bacteria. In many cases of pneumonia, both a viral infection and a bacterial infection are present at the same time. Moreover, bacterial superinfections of viral illnesses are common, particularly in

malnourished children whose immune system may not be functioning optimally. Studies have shown that prompt treatment with appropriate antibiotics can reduce mortality in children with pneumonia.<sup>28</sup> Therefore, antibiotics are recommended when children develop signs and symptoms consistent with pneumonia. In Bangladesh, the first drug of choice for treatment of children with pneumonia is Cotrimoxazole.

A child with pneumonia develops rapid respirations and can also have chest in-drawing, which indicates that he or she is having difficulty in breathing. The child may also have a fever or (particularly if the child is a young infant) low body temperature. Children with these symptoms need to be seen by a health worker and receive antibiotics.

Children (and also adults) with a chronic cough lasting more than one month should receive a medical assessment.

Children who have recently had measles are at increased risk of developing pneumonia (and they are also at increased risk of developing other infections and malnutrition as well). Consequently, achieving and maintaining a high level of measles immunization coverage in the population can make a significant contribution to the reduction of mortality from ARI.

### ***Objectives and Strategies***

The National ARI Control Programme has established a national objective of reducing the number of deaths from ARI among children under five years of age by one-third by the year 2000. The programme plans to achieve this objective by promoting appropriate case management, the rational use of antibiotics, and awareness in the community about warning signs for which treatment should be sought and the importance of early antibiotic treatment for those with signs of pneumonia. The national strategy for ARI control also includes preventive measures, namely the promotion of nutrition, clean air, and measles immunization.

### ***Prevention***

There is no effective immunization (other than measles and pertussis immunization since both measles and pertussis themselves can cause pneumonia) against pneumonia. Other preventive measures, however, can reduce morbidity and mortality from ARI. Efforts which reduce the amount of pollution in the air (including smoke within the household environment) and efforts to reduce malnutrition should lead to reductions in pneumonia among children.

**Reducing the effects of high population density**

The main reason that acute respiratory infections are more common in the wintertime is that people spend more time inside. When inside, they are in closer contact with other persons who might have ARI. Little can be done to prevent this except to improve ventilation in the house if possible. By keeping children away from crowds, exposure to ARI may also be reduced. Also, promoting hand washing can be beneficial since secretions from mucous membranes transmit infections very effectively. When a child is ill with an upper respiratory infection, the child commonly rubs his or her eyes and nose. Then the mother cleans the child's nasal secretions. Thus, hand washing is particularly important for mothers caring for one ill child when other non-ill children are in the household.

Parents should be advised to keep their infected children away from other children until the child has been afebrile for at least 24 consecutive hours or until the child has been on appropriate antibiotic therapy for at least 24 hours.

**Reducing the effects of air pollution**

Children should be kept away from smoke produced by cigarettes and from fires used for cooking. A well-ventilated room will reduce the effects of air pollution in the home.

**Prevention of malnutrition**

Well-nourished children are less likely to develop serious respiratory infections. Therefore, the promotion of good nutrition is one of the most important measures for preventing ARI mortality. Chapter 3 (Promotion of Breastfeeding and Appropriate Infant Feeding) describes the activities that can be undertaken to prevent malnutrition.

***Guidelines (Classification and Treatment)***

In accordance with the World Health Organization (WHO) guidelines, the National ARI Control Programme of the Ministry of Health and Family Welfare classifies ARI into four categories: "very severe disease," "severe pneumonia," "pneumonia," and "no pneumonia (cough or cold)." The criteria for classification differ somewhat depending on whether the child is less than two months of age (that is, a young infant) or 2-59 months of age. The signs and symptoms associated with each classification and the appropriate treatment for each classification are shown in Tables 9 and 10. Note that the main differences in the WHO classifications for these two age groups are as follows:

- There is no classification of “pneumonia” for children less than two months of age, only “severe pneumonia.” All children under two months of age with pneumonia should be referred to a hospital.
- “Severe chest in-drawing” is required to be present in a child under two months of age if a diagnosis of “severe pneumonia” is to be made. But for children 2-59 months of age, “chest in-drawing” (not necessarily severe) is required.
- Wheezing is a danger sign in children under two months of age but not in children 2-59 months of age.
- Fever or low body temperature is a danger sign in children under two months of age but not in children 2-59 months of age.
- The World Health Organization classification scheme currently used here in Bangladesh considers evidence of severe malnutrition as a danger sign in children 2-59 months of age but not in children less than two months of age.
- For infants under two months of age, “stopped feeding well” is a danger sign whereas for children 2-59 months of age, “not able to drink” is a danger sign.
- The rates required to classify the infant or child as having “fast breathing” decreases with increasing age of the infant or child. Thus, “fast breathing” in an infant less than two months of age is defined as 60 or more breaths per minute; “fast breathing” in an infant two months to less than 12 months of age is defined as 50 or more breaths per minute; and “fast breathing” in a child 12-59 months of age is defined as 40 or more breaths per minute.

Several important differences in the infants and children in these two age groups exist, making these differences in classification necessary:

- Infants under two months of age are more likely to die from pneumonia than older children, and they are likely to die soon after the onset of the illness. Therefore all cases of pneumonia in young infants should be referred to a hospital for treatment while in infants and children 2-59 months of age, only cases of severe pneumonia need to be referred to a hospital.
- Because the chest wall in infants under two months of age is less rigid than the chest wall of older

infants and children, mild chest in-drawing can be seen in perfectly normal young infants. For this reason, “severe chest in-drawing” is required to be seen in young infants while simply “chest in-drawing” is required to be seen in infants and children 2-59 months of age if a diagnosis of “severe pneumonia” is to be made (assuming no danger signs are present and fast breathing is also not present).

- Very young children who are quite ill with serious infection are more likely to develop a low body temperature (hypothermia) than a fever. Hypothermia is much less common in older infants and children with serious infection, however.
- Severe malnutrition which is clinically apparent (usually defined as “skin and bones” or “oedema and reddish hair”) is rarely detectable in infants under two years of age. Furthermore, severe malnutrition of any sort is rare in any infant less than two years of age unless it is not fed or is too sick to eat. (Figures 6 and 7 show examples of “skin and bones” and oedema secondary to severe protein-energy malnutrition.)
- “Stopped feeding well” is a sensitive as well as a specific indicator of serious illness in an infant less than two months of age while in older infants and children, it is a much less specific indicator of serious illness since older infants and children with minor illness also tend to stop eating well. In older infants and children, however, “not able to drink” is a highly specific sign of serious illness.
- The normal respiratory rate of infants and children decreases as age increases.

Even though wheezing is not a danger sign in children over two months of age, it can be an important complication of pneumonia which needs medical treatment. So if wheezing is present along with any of the other danger signs listed in Table 10, the child’s urgent referral to a hospital must not be delayed for any reason.

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Figures 6 and 7 about here

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Pages XX and XX contain the Protocol of the National ARI Control Programme of the Ministry of Health and Family Welfare for management of the child with cough or difficult breathing. Detailed information about the appropriate antibiotics and their dosages, treatment of fever and wheezing, and advice to give the mother for home care are outlined there.

**Table 9. Classification and Treatment of Acute Respiratory Infection in the Young Infant (Less Than Two Months of Age)**

Signs and symptoms	Classification	Treatment
Child with <i>any of the following danger signs</i> : 1. stopped feeding well 2. convulsions 3. abnormally sleepy or difficult to awake 4. stridor when calm 5. wheezing 6. fever or low body temperature	Very severe disease	Refer urgently to hospital, instruct mother to keep child warm, and give the first dose of antibiotic prior to leaving for the hospital
Child with <i>cough or difficult breathing and severe chest in-drawing or fast breathing</i> (defined as 60 or more breaths per minute) but <i>no danger signs</i>	Severe pneumonia	Refer urgently to hospital, instruct mother to keep child warm, and give the first dose of antibiotic prior to leaving for the hospital
Child with <i>cough or difficult breathing</i> who has <i>no fast breathing, no severe chest in-drawing, and no danger signs</i>	No pneumonia (cough and cold)	Advise mother to: 1. keep child warm 2. breastfeed frequently, and clear nose if it becomes blocked with secretions 3. return for re-examination if breathing becomes fast or more difficult, if feeding difficulties develop, or if child becomes sicker

**Table 10. Classification and Treatment of Acute Respiratory Infection in Children 2 - 59 Months of Age**

Signs and symptoms	Classification	Treatment
Child <i>with any of the following danger signs:</i> 1. not able to drink 2. convulsions 3. abnormally sleepy or difficult to awake 4. stridor when calm 5. severe malnutrition	Very severe disease	Refer urgently to hospital, give the first dose of antibiotic prior to leaving for the hospital, treat fever or wheezing if present, give an antimalarial if cerebral malaria is possible
Child has <i>cough or difficult breathing and chest in-drawing</i> (but <i>no danger signs</i> , as described above)	Severe pneumonia	Refer urgently to hospital, give the first dose of antibiotic prior to leaving for the hospital, and treat fever or wheezing if present
Child has <i>cough or difficult breathing and fast breathing</i> (defined as 50 or more breaths per minute if child 2-11 months of age and 40 or more breaths per minute if child 12-59 months of age) <i>but no chest in-drawing and no danger signs</i>	Pneumonia	Give an antibiotic, treat fever or wheezing (if present), advise mother to give home care (see below), and advise mother to return in 2 days (or sooner if the child is getting worse) for re-assessment
Child with <i>cough or difficult breathing</i> who has <i>no fast breathing and no chest in-drawing and no danger signs:</i>	No pneumonia (cough and cold)	Treat wheezing and fever if present; assess and treat ear problem or sore throat if present; assess and treat other problems; if cough present for more than 30 days, refer for assessment; advise mother to give home care:  1. keep child warm 2. breastfeed frequently and clear nose if it becomes blocked with secretions 3. return if breathing becomes fast or more difficult, if feeding difficulties develop, or if child becomes sicker

MOHFW ARI Case Management Protocol

MOHFW ARI Case Management Protocol

### ***Who Can Provide Assessment and Treatment?***

Any adolescent or adult can be taught the danger signs of ARI, the indications for seeking medical treatment, and the indications for recommending urgent referral to a hospital facility. This information should be disseminated widely to all health care providers as well as to field workers and parents. Outpatient treatment of “pneumonia” (as defined in these guidelines) in children 2-59 months of age should be limited to health workers who have been through a formal training programme for the treatment of ARI or to paramedics, nurses, or physicians. All infants under two months of age with “pneumonia,” as well as all infants or children 2-59 months of age with “severe pneumonia” and “severe disease,” should be referred urgently to a hospital facility for treatment.

### ***Key Messages***

- Pneumonia is the leading cause of death among children in Bangladesh.
- Any child with a cough or difficult breathing who has rapid respirations or chest in-drawing should be evaluated promptly by a health worker.
- The prompt administration of appropriate antibiotics for children with pneumonia can be life-saving.
- Children with severe pneumonia need to be hospitalized.
- For simple cough and cold, antibiotics are of no benefit.

### ***Summary***

The prompt and appropriate administration of antibiotics can be life-saving for children with pneumonia. Most cases of “no pneumonia (cough and cold)” do not progress to pneumonia nor do children with this type of infection benefit from antibiotics. Children whose symptoms and clinical findings are consistent with “pneumonia,” “severe pneumonia,” or “very severe disease” need medical evaluation and possibly hospitalization. Adherence to the treatment guidelines established by the Ministry of Health and Family Welfare can reduce mortality and also can reduce unnecessary expenditures for drugs.

## Chapter 5. Prevention and Treatment of Diarrhoeal Diseases

The commonly accepted definition of diarrhoea is three or more loose bowel movements (motions) during a 24-hour period. Diarrhoea is one of the leading public health problems in Bangladesh, accounting for frequent illness and death. Children average 3.5 episodes of diarrhoea a year in Bangladesh.<sup>29</sup> For one-quarter of the total number of children who die each year in Bangladesh (95,000 out of 380,000), diarrhoea is either the principal or a contributing immediate cause of death.<sup>1,3</sup>

Diarrhoea-related deaths are most commonly caused by dehydration associated with acute watery diarrhoea. Approximately one-third of diarrhoeal deaths, however, are due to persistent diarrhoea (of 14 or more days in duration). Another 10 percent of diarrhoeal-related deaths are due to dysentery, which is characterized by the passage of semi-solid stools with blood. Mucous may or may not be present. The blood that is passed may be quite dark in appearance because of alterations which occur to the blood before it is eliminated. One-third of children who die with symptoms of diarrhoea also have symptoms of ARI prior to death.<sup>3</sup>

The underlying causes of diarrhoea include consumption of contaminated food and water, unsanitary hygienic practices, bottle feeding, poor sanitation, and malnutrition. The actual biologic agents that cause diarrhoea include viruses, bacteria, bacterial toxins and parasites. These agents enter into the body mostly by means of contaminated food and water which is ingested.

Malnourished children are more likely to develop serious diarrhoea, and children with chronic dehydration are more likely to become malnourished. Thus, children with persistent diarrhoea not uncommonly develop a vicious cycle of worsening diarrhoea and malnutrition that eventually results in death. Children with diarrhoea and malnutrition are likely to have vitamin A deficiency as well, thereby increasing the likelihood of further serious infection and death.

Dysentery is usually caused by *Salmonella* or *Shigella* bacteria. The passage of blood usually signifies that an invasive infection is occurring and the physical integrity of the wall of the intestine has been damaged. Such an invasive infection can produce fever and also infection in the blood as well as in parts of the body beyond the intestinal tract. This type of diarrhoea requires treatment with antibiotics.

Most of the deaths caused by diarrhoea are due to acute dehydration. The loss of more than 10 percent of the body's fluid from diarrhoea, if not replaced, can lead to a lowering of the blood pressure and the failure of the blood to adequately perfuse all the vital organs. Death can also be caused by infection, however, in some children with diarrhoea – particularly in those who have persistent diarrhoea and malnutrition, those who have other infections at the same time (such as pneumonia), or those who have bloody diarrhoea.

### ***Objectives and Strategies***

The Government of Bangladesh has set, as a national objective, the achievement of a 50 percent reduction in the number of childhood deaths due to diarrhoea and a 25 percent reduction in the frequency of childhood diarrhoeal illnesses by the year 2000. Promoting behaviour change and improving service delivery by health workers are the main strategies for reducing diarrhoea mortality in children under five years of age in Bangladesh. At this time, the priorities of the Control of Diarrhoeal Diseases Programme in Bangladesh are (1) promoting behaviour change of caretakers/mothers so that they provide oral rehydration therapy (ORT) to prevent dehydration due to diarrhoea and (2) improving case management by health workers. However, simple and effective preventive measures should also be promoted. Local health care providers, government and NGO health workers, private practitioners (including village doctors and traditional providers), drug sellers, and community depot holders all need to have access to and promote ORT for the treatment of diarrhoea.

### ***Prevention***

At the time of each contact with a mother or caretaker, the health worker should emphasize the following messages which, if practiced, could reduce the frequency of diarrhoea in children (as well as in all other age groups):

- *Breastfeeding*  
Mothers should be advised to breastfeed exclusively for the first six months of life. The newborn should be given colostrum immediately after birth. Breastfeeding should be continued during the diarrhoeal episode.
  
- *Complementary feeding*  
Complementary foods should be provided along with breastfeeding after the child reaches six months of age. Sanitary hygienic practices should be maintained in the preparation of foods for children. This means that the food preparer should wash his or her hands before preparing the food, the food should be placed on a clean plate, and the child's hands should be washed before the food is consumed. Clean water should be used in food preparation, and clean water should be stored in clean, covered containers (to prevent contamination while it is being stored).

Cooked food which is not consumed immediately should be stored in clean containers with properly fitting covers away from direct sunlight. Unless an adequately cold or cool place is available (such as a refrigerator), cooked food should not be consumed if it has been left at room temperature for more than eight hours. Food which is left out longer than eight hours has a much higher risk of being contaminated with pathogens that can cause diarrhoea. Food which is not freshly prepared but

which has been left at room temperature for less than eight hours should be reheated again before consumption. Tap water can be safely used in cooking since it will boil during the cooking process.

- *Immunization*

All infants should be immunized against measles as soon as possible after completing nine months of life. Children who have just had measles are at increased risk of serious diarrhoea as well as at increased risk of serious respiratory infection for several months following the episode of measles.

- *Use of safe water*

Family members and caretakers should use safe water for drinking, for preparation of food and drinks, and, if possible, for hand washing. Tubewell water (assuming that it is arsenic-free) is safe for drinking and for cooking. Safe tubewell water should be used for all purposes, including bathing and washing, if possible.

Water obtained from a tap (and coming from some kind of water system other than directly from a tube well) is likely to be contaminated. Therefore, tap water should be boiled for at least 10 and preferably 20 minutes prior to consumption.

- *Hand washing*

Family members and caretakers should be advised to wash both of their hands with soap or at least ash before preparing, serving, or eating food; after defecating; and after cleaning a child who has defecated.

- *Use of latrine*

All family members, including children (when old enough), should use a latrine for defecating so that faeces in the vicinity of the house remain concentrated in only one place.

- *Disposal of faeces of young children*

Health workers should emphasize that the faeces of children are as likely to contaminate food and water around the house as are the faeces of adults and, therefore, they should be disposed of in order to reduce the likelihood of the child or anyone else in the household developing diarrhoea. For children who are unable to use a latrine, their faeces should be promptly removed and placed in a latrine, away from the house.

### **Guidelines (Classification and Treatment)**

Although the great majority of diarrhoeal episodes in children are self-limited, acute watery diarrhoea can, nevertheless, produce dehydration and death very quickly. Therefore, mothers need to be informed that, at the earliest sign of diarrhoea, they should begin to increase the child's fluid intake and begin to observe the child closely for signs of worsening dehydration.

There are two types of case management strategies to be employed for the management of diarrhoea. The first type of strategy – home management – is for the mother to use at home when her child develops diarrhoea. The second type of strategy – case management – is delivered by the health worker usually at a health facility, where the assistance of the health worker has been sought by the mother.

#### **Home management**

The basic principle of home management is to prevent dehydration by increasing fluid intake with oral rehydration fluid or some other suitable fluid as soon as the episode of diarrhoea starts. “The Three Golden Rules” of home management of diarrhoea are to:

- Increased the volume and frequency of fluid intake
- Continue feeding the child normally and, if the child is breastfeeding, continue breastfeeding and increase the frequency of breastfeeding
- If the child does not gradually improve, seek help from a health care provider

The recommended oral rehydration fluids for home therapy are:

- Oral rehydration solution (mixed from a packet of oral rehydration salts)
- Sugar and salt mixed in water (*lobon gur sharbat*, or LGS)
- Flatten, roasted rice mixed with water (*chira pani*)
- Lentil soup (*dahler pani*)
- Coconut water (*dahber pani*)
- Plain water (only if nothing else is available)

The child with diarrhoea should be brought to the nearest health facility or health worker if any of the following symptoms or signs develop:

- More frequent stools or an increasingly large volume of watery stools
- Frequent vomiting
- Sunken eyes (see Fig. 8)
- Marked thirst
- Inability to eat or drink normally
- High fever
- A sunken fontanelle (the “soft” spot of a young infant's head)

- Very loose skin (see Fig. 8)
- Blood in the stool
- Abnormal sleepiness or lethargy
- Convulsions
- Lack of improvement after three days

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Figure 8 about here

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### **Case Management of Diarrhoea in Children by Health Workers**

All children who arrive at a health facility with diarrhoea should be assessed for dehydration (Table 11). After a brief examination of a child with diarrhoea, a health worker can readily determine which of three levels of dehydration the child has: “*no dehydration*,” “*some dehydration*,” and “*severe dehydration*.” The treatment given depends partly upon the classification of the level of dehydration arising from this examination.

Table 11. Assessment of Level of Dehydration

Type of assessment	Findings according to level of dehydration		
	No dehydration	Some dehydration	Severe dehydration (see Fig. 8)
<i>Look:</i>			
General condition	Well, alert	Restless, irritable*	Lethargic or unconscious; floppy*
Eyes <sup>1</sup>	Normal	Sunken	Very sunken and dry*
Tears	Present	Absent	Absent
Mouth and tongue <sup>2</sup>	Moist	Dry	Very dry
Thirst	Drinks normally, not thirsty	Thirsty, drinks eagerly*	Drinks poorly or not able to drink*
<i>Feel:</i> skin pinch <sup>3</sup>	Skin goes back quickly	Skin goes back slowly*	Skin goes back very slowly*
<i>Decide:</i>	The patient has <b>No Signs of Dehydration</b> if all of the assessment findings are in this column	The patient has <b>Some Dehydration</b> if two or more of the assessment findings in this column are present, including at least one of the starred (*) signs in this column	The patient has <b>Severe Dehydration</b> if two or more of the assessment findings in this column are present, including at least one of the starred (*) signs in this column
<i>Treat:</i>	Use Treatment Plan A (described on page XX)	Weigh the patient, if possible, and use Treatment Plan B (described on page XX)	Weigh the patient, if possible, and <b>urgently</b> begin Treatment Plan C (described on page XX).

<sup>1</sup> In some infants and children, the eyes normally appear somewhat sunken. It is helpful to ask the mother if the child's eyes are normal or more sunken than usual.

<sup>2</sup> Dryness of the mouth and tongue can also be assessed by palpation with a clean finger. The mouth may be dry in a child who habitually breathes through the mouth and therefore may not represent dehydration. Conversely, the mouth may be wet in a dehydrated patient if the child has recently vomited or drunk fluid. Thus, this sign is not as reliable as the others.

<sup>3</sup> The skin pinch is less useful in infants or children who have marasmus (severe wasting), kwashiorkor (severe malnutrition with oedema), or obesity.

*Oral rehydration solution (ORS):* ORS should be given to all children with diarrhoea who have signs of dehydration who are able to drink. The contents of an ORS packet should be dissolved in water so that the total amount equals 500 ml. The health worker should show the mother or caretaker how to prepare and administer ORS. They should also tell the mother or caretaker to continue feeding the child and to give additional fluids in addition to ORS. At the time of discharge from the facility, the mother or caretaker should be given a sufficient number of ORS packets for the current episode. Usually, 3-5 packets of ORS are adequate for treatment of one episode of diarrhoea for young children. (An episode is considered to have ended if a child goes for three or more days without diarrhoea.) Children who are more than three years of age may need additional packets. A sufficient supply of ORS packets should be stored at health facilities, with community health workers, and with depot holders in the community. These packets should be distributed free of charge. If no ORS packets are available, substitute another ORS fluid described on page XX.

Mothers often complain that they are unable to administer ORS because of vomiting. The health worker should show the mother how to give ORS in small frequent amounts so that the child can obtain an adequate amount of fluid with reduced vomiting.

*Intravenous fluids:* Intravenous fluids (Cholera Saline, Ringer's Lactate, or Normal Saline) should be reserved for cases of severe dehydration. Children with two or more signs of severe dehydration should receive intravenous fluids or, if intravenous fluids cannot be administered, the child should be referred to the nearest health facility where intravenous fluids can be administered.

*Use of drugs:* Antibiotics are of no benefit for acute watery diarrhoea and they should not be used. If there is blood in the stool, however, the child has dysentery and requires treatment with an appropriate antibiotic. Mucous without blood is *not* dysentery and does *not* require antibiotics.

The antibiotic of choice depends upon the current patterns of antibiotic resistance as determined by laboratory tests. If no information to the contrary is available, the following guidelines should be followed:

- First use nalidixic acid (in the recommended dose) and review the patient's condition in 48 hours. If there is no improvement after 48 hours of treatment with nalidixic acid, the patient should be referred to a hospital for further evaluation and treatment.<sup>30</sup> The safety of nalidixic acid in children under three months of age has not been established. Therefore, cotrimoxazole or pivmecillinam should be used in this age group. Cotrimoxazole however, is not recommended for use in children who are less than one month of age who are jaundiced or who are premature. Children with dysentery who were born prematurely or who are jaundiced and less than one month of age should be referred to a hospital.

- If there is no clinical improvement after 48 hours, refer the patient to the nearest health centre.
- For suspected cases of cholera, use tetracycline or erythromycin (in the recommended dose). *Tetracycline should not be administered to children under 12 years of age*, however.
- Metronidazole (in the recommended dose) should be used only in patients in whom there is a strong clinical suspicion of amoebiasis or giardiasis. Diarrhoea with mucous is *not* specific for amoebiasis or giardiasis and these symptoms by themselves are not sufficient evidence to justify the use of metronidazole.
- Other drugs such as anti-emetics, anti-motility agents, anti-spasmodic agents, sedatives, and steroids are of no scientifically proven benefit and are potentially harmful. Therefore, *they should not be used*.

Infants with dysentery who are under two months of age should be referred to a doctor or hospital for further evaluation and treatment.

*Vitamin A:* If the child has persistent diarrhoea (of 14 or more days duration) or diarrhoea associated with severe malnutrition, then a dose of supplemental vitamin A should be given provided the child did not receive vitamin A during the previous four-week period. The dose is shown in Table 7 on page XX.

*Persistent diarrhoea:* Diarrhoea lasting for 14 days or more is considered to be persistent diarrhoea. If a child with persistent diarrhoea is under six months of age or has signs of dehydration, this child needs medical evaluation and treatment. The mother or caretaker should be advised to take the child to the nearest hospital.

If no signs of dehydration exist and the child is over six months of age, follow “The Three Golden Rules” of home therapy (described on page XX) along with the following feeding recommendations:

- If the child is still breastfeeding, give more frequent and longer breastfeeds (both day and night)
- If the child is taking other milk products, (1) replace these milk products with increased breastfeeding; or (2) replace these milk products with fermented milk products such as yogurt; or (3) replace half of the milk product with a nutrient-rich semi-solid food

### **Treatment Plan A (for Treating Cases with “No Dehydration”)**

If the child has been found, on clinical examination, to have “no dehydration” as determined by the criteria given on page XX, then Treatment Plan A should be initiated. Use this plan to teach the mother:

- How to continue treating her child’s current episode of diarrhoea at home
- How to provide appropriate home treatment for future episodes of diarrhoea.

This is carried out in as series of four steps.

**Step 1: Explain the “Three Golden Rules” for treating diarrhoea at home.**

*Rule 1. Give the child more fluids than usual to prevent dehydration:*

- Use ORS or a recommended home fluid (see page XX). If this is not possible, give plain water. Use ORS solution for children as described below (Table 12 on page XX)
- Give as much of these fluids as the child will take. Use the amounts of ORS shown below in Table 13 as a guide
- Continue giving these fluids until the diarrhoea stops

*Rule 2. Give the child plenty of food to prevent malnutrition:*

- If the child is breastfeeding, continue to breastfeed frequently and, in fact, breastfeed more frequently than normally
- If the child is not breastfeeding, give the usual foods, but give these more frequently than normally
- If the child is six months of age or older, or if the child is less than six months of age and already taking solid food:
  1. Also give cereal or another starchy food. If possible, mix this with pulses, vegetables, meat, or fish. Add 1-2 teaspoonfuls of vegetable oil to the food while cooking it.
  2. Give fresh fruit juice or a ripe banana to provide potassium.
  3. Give freshly prepared foods. Cook and then mash or grind the food well.
  4. Encourage the child to eat. Offer food at least six times a day.
  5. Give the same food after the diarrhoea stops, but give more by providing an extra meal each day for two weeks.

**Rule 3.** Take the child to the health worker or to any hospital/health facility if he or she does not improve after three days or develops any of the following:

- Many watery stools
- Repeated vomiting
- Marked thirst
- Inability to eat or drink
- Fever
- Blood in the stool
- A more severe illness

**Step 2:** If the child is to be given ORS solution at home, show the mother how much ORS to give after each loose stool and give her enough ORS packets for two days.

**Table 12. Amounts of ORS to Administer at Home**

Age of child	Amount of ORS to give after each loose stool	Amount of ORS to provide for use at home <sup>1</sup>
Under 2 years	50-100 ml	3 packets (which will provide 1 packet, or 500 ml of ORS, per day)
2 to 10 years	100-200 ml	6 packets (which will provide 2 packets, or 1,000 ml, of ORS per day)
10 years or more	As much as wanted	12 packets (which will provide 4 packets, or 2,000 ml, per day)
Describe and show the amount to be given after each stool using a local measure		

<sup>1</sup>A typical episode is assumed to last three days

**Step 3. Show the mother how to mix ORS.****Table 13. Instruction to the Mother for the Preparation of ORS**

Using ORS packets	Using <i>lobon-gur</i>
1. Wash your hands with soap and clean water.	1. Wash your hands with soap and clean water.
2. a. Take a half-litre container, a half- <i>seer</i> , or another type of container that will hold at least a half-litre of water and clean it. b. Put a half-litre of water or a half- <i>seer</i> of water into the container. c. Then put the contents of the ORS packet into the water. Be sure to empty the entire contents of the package into the water.	2. a. Take a half-litre container, a half- <i>seer</i> or another type of container that will hold at least a half-litre of water and clean it. b. Put a half-litre of water or a half- <i>seer</i> of water into the container. c. Then put a “pinch” of salt (using three fingers to make a pinch) and a “fistful” of sugar (see Fig. 9).
3. Stir the water containing the packet contents so that there is no remaining sediment in the water.	3. Stir the water containing the packet contents so that there is no remaining sediment in the water.
4. Taste the prepared solution. Correctly prepared solution tastes like tears.	4. Taste the prepared solution. Correctly prepared solution tastes like tears.
5. The solution can be left for up to 12 hours at room temperature. However, if the solution has been left at room temperature for longer than this, it should be discarded and new ORS fluid should be prepared.	5. The solution can be left for up to 6 hours at room temperature. However, if the solution has been left at room temperature for longer than this, it should be discarded and new ORS fluid should be prepared.

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Figure 9 about here

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**Step 4. Show the mother how to give ORS.**

- If the child is under two years of age, give a teaspoonful every 1-2 minutes.
- If the child is two years of age or older, give frequent sips from a cup.
- If the child vomits, wait 10 minutes. Then give the solution more slowly (for example, a spoonful every 2-3 minutes).
- If diarrhoea continues after the ORS packets are used up, tell the mother to give other home fluids as described on page XX or return for additional ORS packets.

## Treatment Plan B (for Treating Cases with “Some Dehydration”)

If the child has been found, on clinical examination, to have “some dehydration” as determined by the criteria given on page XX, then Treatment Plan B should be initiated. Treatment Plan B calls for giving the child ORS for a four hour period and observing the child’s status at the end of that four hours. Treatment Plan B should be provided by a health care provider who has received training in the management of diarrhoea and who has the supplies and time to provide the series of services called for.

### Step 1. Determine how much ORS should be given during the next four hours

Table 14 indicates how much ORS should be given during the four-hour period. The approximate amount of ORS required (in ml) can also be calculated by multiplying the patient’s weight (in grams) times 0.075. Use the patient’s age only if the child’s weight cannot be determined in order to determine how much ORS to give.

If the child wants more ORS than the amount shown in the table, give more. If the mother is breastfeeding the child, she should be encouraged to continue breastfeeding. If the child is less than six months of age and is not breastfeeding, also give 100-200 ml of clean water during this four-hour period.

**Table 14. Amount of Oral Rehydration Solution to Be Given during the First Four Hours**

Weight	Less than 5.0 kg <sup>1</sup>	5.0 - 7.9 kg	8.0 - 10.9 kg	11.0 - 15.9 kg	16.0 - 29.9 kg	30.0 kg or more
Age	Less than 4 months	4-11 months	12-23 months	2-4 years	5-14 years	15 years or older
Amount of fluid to be given during the first 4 hours	200-400 ml	400-600 ml	600-800 ml	800-1,200 ml	1,200-2,200 ml	2,200-4,000 ml

<sup>1</sup>kg refers to kilogram

### Step 2. Help the mother to start rehydrating her child.

At the beginning of the four-hour period, show the mother how much ORS to give her child. Show her how to give a teaspoonful every 1-2 minutes (if the child is less than two years of age) or how to take frequent sips from a cup (if the child is two years of age or older). Help the mother, initially, to give her child ORS solution. Show her how to make sure to that the child takes at least as much ORS as the volume of the child’s combined urine and stool output, to prevent further rehydration.

### Step 3. Monitor the child’s progress from time to time.

Check on the child from time to time to see if there are any problems. If the child vomits, wait 10 minutes and then continue giving ORS, but more slowly. For example, give a spoonful of ORS every 2-3 minutes instead of every 1-2 minutes. If the child’s eyelids become puffy or if the child develops respiratory

difficulty, stop giving the ORS and give plain water or breast milk. When these symptoms are gone, give ORS according to the recommendations outlined in Plan A.

*If the mother must leave before the four-hour period is over:*

- Show her how much ORS to give to finish the four-hour treatment at home.
- Give her enough ORS packets to complete rehydration and to provide for extra fluids for a total of three days if necessary (as shown in Plan A, page XX).
- Show her how to prepare ORS at home.
- Explain to her “The Three Golden Rules” in Plan A for treating her child at home (give ORS or another suitable fluid until the diarrhoea stops; feed the child; and bring the child back for further assessment and treatment if the child’s condition worsens or fails to improve).

**Step 4. At the end of the four hour period, reassess the child’s level of dehydration.**

At the end of the four-hour period, re-examine the child to determine the child’s current level of dehydration using the Assessment Chart (Table 11, page XX). Then, depending on the child’s level of dehydration, select Plan A, Plan B, or Plan C and continue treatment as outlined in these plans.

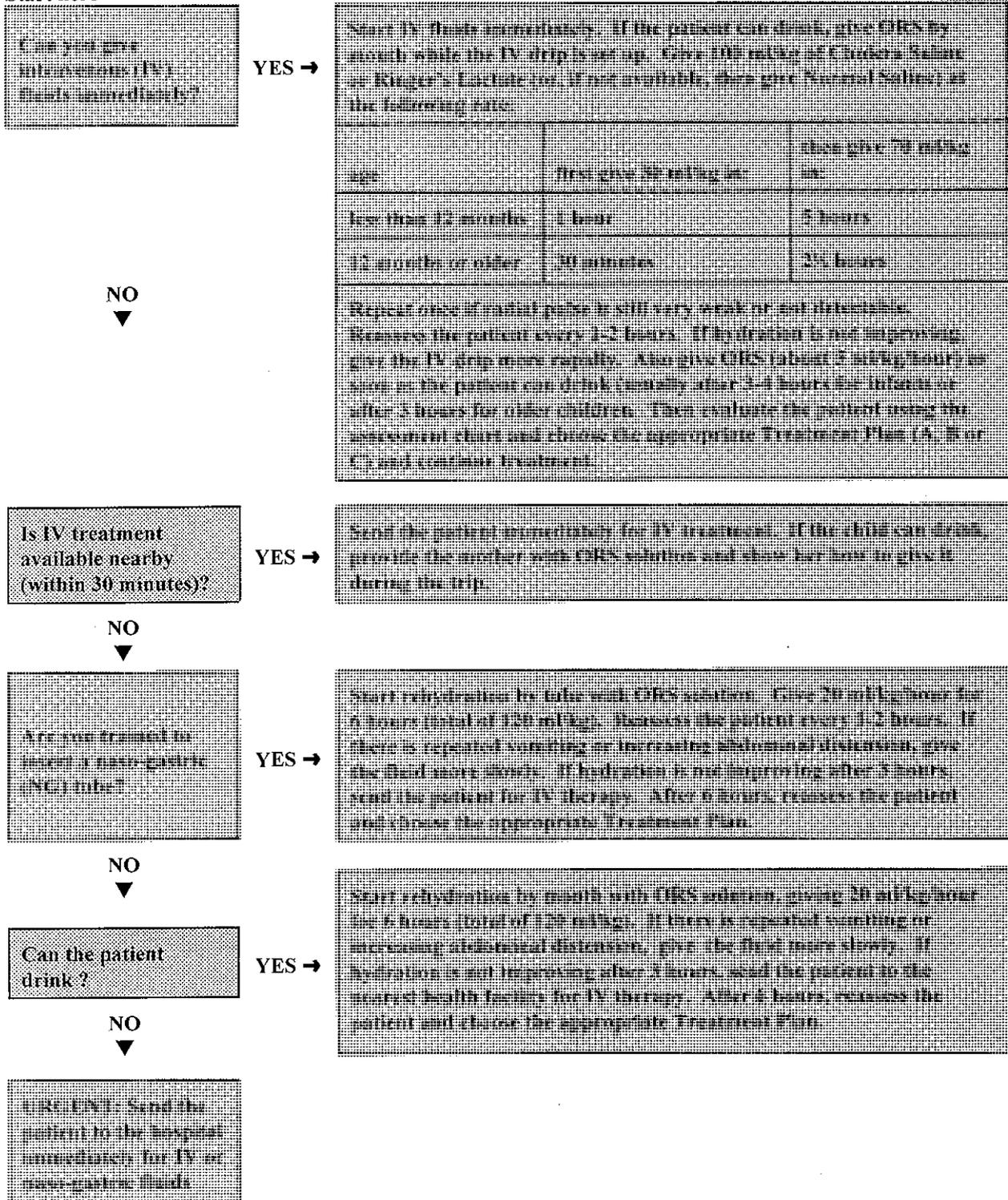
If there are no signs of dehydration, shift to Plan A. When the child’s dehydration has been corrected, the child usually passes urine and may also fall asleep.

If clinical examination again shows that “some dehydration” is still present, repeat Plan B. Begin, also, to offer food, milk, or juice as described in Plan A.

If clinical examination shows that “severe dehydration” has developed, shift to Plan C.

## Treatment Plan C (for Treating Cases with “Severe Dehydration”)

Follow the Arrows. If the answer is “yes,” go across the chart. If the answer is “no,” go down the chart.  
Start here



Special instructions: (1) If possible, observe the patient at least six hours after rehydration to be sure the mother can maintain hydration by giving ORS solution orally. (2) If the patient is two years of age or older and there is cholera in your area, give an appropriate oral antibiotic for cholera (such as erythromycin).

### **Special Care Once the Diarrhoea Has Stopped**

Considerable scientific evidence indicates that, in general, children who are already malnourished are more likely to develop diarrhoea. In addition, diarrhoea worsens the nutritional status of the child, making already malnourished children even more malnourished. The more severe the malnutrition, the greater the likelihood that the child will die, usually from some type of infection.

In order to try to reverse this “downward spiral” in the child’s overall condition after diarrhoea develops, early nutritional rehabilitation is extremely important. Once the diarrhoeal episode has ceased, the child should continue to receive more frequent feedings than usual for at least two weeks. The child should be encouraged to take as much food as possible during this time. Foods that should be given during the convalescent period include:

- those which are rich in energy and protein, such as *khichuri* (a mixture of rice, pulses, vegetables, and oil), eggs, fish, and meat
- those which are rich in sugar or molasses
- seasonal fruits

Adding cooking oil to the child’s food is one way of adding additional energy which will be beneficial during the recovery period, which may last several weeks or more.

### ***Who Can Provide Assessment and Treatment?***

All adolescents and adults should know the danger signs of diarrhoea and dehydration, the indications for seeking medical treatment, and the indications for urgent referral to a hospital facility. This information as it pertains to children should be disseminated widely to all health care providers as well as to field workers and parents. Only paramedics, nurses, and physicians or health workers who have been through a formal training programme for the treatment of diarrhoea should administer Plan B and Plan C and prescribe antibiotic treatment for dysentery in children.

### ***Key Messages***

- Many cases of childhood diarrhoea can be prevented if exclusive breastfeeding is practiced during the first six months of life, if complementary foods are hygienically prepared, if only safe water is consumed, if hands are washed regularly, if a latrine is used, and if the child’s faeces are disposed of properly.
- As soon as a child develops diarrhoea, the mother should begin to increase the child’s fluid intake. Rehydration is best carried out with oral rehydration solution or *lobon gur sharbat*, but rice water, lentil soup, and coconut water are also effective.

- The child should continue to be fed throughout the diarrhoeal episode and, once the diarrhoea has stopped, increased amounts of food should be given.
- If a child with diarrhoea develops signs of severe dehydration (sunken eyes, marked thirst, very loose skin, or lethargy), medical attention should be sought urgently.
- Children with diarrhoea should not be given any medicines unless prescribed by a doctor or other appropriately trained health care provider. Drugs are rarely indicated for the treatment of diarrhoea. In most cases, drugs are of no benefit and can even be harmful. A child who has blood in his or her stool, however, needs antibiotics and should undergo medical evaluation.

### ***Summary***

Proper preventive measures can reduce the number of cases of childhood diarrhoea in Bangladesh. Proper home management and proper case management at health facilities can reduce mortality among children who do develop diarrhoea. The practice of exclusive breastfeeding is one of the simplest and most effective approaches to preventing diarrhoea in infants under six months of age. Frequent feeding with nutritious foods is an essential adjunct to rehydration in the management of children with diarrhoea, and once the diarrhoea has stopped, children need more frequent feeding than usual in order to achieve nutritional rehabilitation.

## **Chapter 6. The Sick Child Case Record Form**

In order to incorporate most of the guidelines for EPI, vitamin A, nutrition, ARI, and CDD into a single protocol that can be followed each time a sick child is seen by a health worker, a sick child case record form has been developed. Comparable forms are currently in use in other countries where the IMCI (Integrated Management of Childhood Illness) strategy has already been adapted for the country and is being implemented on a widespread basis. Since only the initial adaptation process is currently underway in Bangladesh, IMCI will not be ready for widespread implementation for several more years. At that time, a similar sick child case record form will be used on a widespread basis. In the meantime, the current Sick Child Case Record form incorporates all of the current standards as they now exist. This form has been developed with the cooperation of many technical experts and trainers in Bangladesh and has been used extensively in the training of paramedics and medical officers employed by NGOs supported by the USAID-financed NIPHP.

This form can be reproduced for use at health facilities. Health care providers are encouraged to use this form. Copies can be photocopied from this manual or additional copies can be obtained through requests to the BASICS office in Dhaka (see address and phone number on page XX)..

**Sick Child Case Record Form**

**Sick Child Case Record Form**

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first. Pivmecillinam, however, is not widely available and is much more expensive than either nalidixic acid or cotrimoxazole.

## Appendix 1. Supplies and Equipment Needed

### Conducting EPI Sessions at Static Clinics and EPI Outreach Centres

- At least one large vaccine carrier with four ice packs for collecting vaccines from the government EPI office (if vaccines are kept overnight at the clinic, proper refrigeration with backup is required according to EPI standards)
- Signboard mentioning day and time of vaccination
- One set of vaccination equipment for each team of vaccinators which includes:
  - vaccine carrier with two packs
  - one steam sterilizer with syringes, needles and forceps
  - timer
  - soap, soap box and nail brush
  - plastic bowl (blue colour)
  - sterilizer carry bag
  - glass ampule cutter
  - two containers to keep cotton (one for dry cotton buds and one for soaked cotton buds)
  - two cloth dusters
  - plastic bag to keep empty vials and used ampules
  - moni* table cloth
  - safety match box
  - extra carry bag
- One stove (electric, gas, or kerosene)
- Communication materials:
  - moni* flag
  - poster for routine EPI and for disease surveillance
  - EPI flip chart
  - IPC pocket book
  - IPC festoon
  - other communication materials such as audio-visual materials on EPI
- Vaccinators' badge or gown
- Record-keeping materials:
  - vaccination cards for infants and women
  - registration book for infants and for women
  - tally sheets, forms and registers
  - monthly report book
  - vaccine stock register
  - other EPI logistics stock register
  - EPI session supervision checklist
- Stationeries:
  - pen
  - paper
  - carbon paper
  - government calender

- All five types of vaccine, polio vaccine dropper and diluents (for measles and BCG)
- Liquid vitamin A bottle with dispenser
- Cotton

#### **Administering Vitamin A**

- Vitamin A capsules
- Small scissors (for cutting the capsule)
- Register for record keeping

#### **Treatment of Diarrhoea**

- For facilities that provide Plan A only: ORS packets
- For facilities that provide Plan B: an ORT corner
- For facilities that provide Plan C: intravenous fluids as well as the needles, tubing and other equipment required to insert the needle and administer the fluid
- Nalidixic acid
- Cotrimoxazole

#### **Assessment and Treatment of Acute Respiratory Infection**

- ARI timer
- Thermometer
- Cotrimoxazole tablets (in pediatric dose, if possible) and syrup
- Amoxicillin (or less preferably ampicillin) tablets and syrup
- ARI record keeping register
- ARI case management chart
- ARI tally sheet
- Flipchart/IEC materials

## Appendix 2. Trade Names of Drugs Mentioned in the Guidelines<sup>29</sup>

<i>Generic name</i>	<i>Trade names</i>	
<b>Amoxicillin</b>	Almoxil	Moxacil
	Ambeexin	Moxapen
	Amocap	Moxilin
	Amolin	Moxin
	Amoxapen	Navamox
	Amoxicillin-E	Omnimox
	Amox	Orixyl
	Amoxi	Pamoxil
	Amoxicap	Pentamox
	Amoxin	Pharmoxyl
	Amoxisyrup	Remamox
	Amoxon	Remoxin
	Aristomox	S-Amoxy
	Avlomox	Sapox
	Bactamox	Seemaxyl
	Bitoxil	Servimox
	Cemoxin	Sinamox
	Demoxil	SK-Mox
	Fimoxyl	Skymoxin
	G-Amoxicillin	Tycil
	Genamox	Tymox
	Hiconcil	Unimox
	Jamoxil	Versamox
	Monamox	

**Generic name****Trade names****Ampicillin**

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Acmeceilin	Ficillin
Alpicin	Ficillin
Amacilin	G-Ampicillin
Amblosin	Navacillin
Ampen	Omnacillin
Ampexin	Penacillin
Ampicin	Pen-A
Ampirex	Pentacillin
Ampisina	Polycillin
Amposin	Semicillin
Avlocillin	Simpicillin
Bactopen	Skycillin
Centacilin	Synthetin
Duplocin	Theracillin
Epacillin	

<i>Generic name</i>	<i>Trade names</i>	
<b>Cotrimoxazole</b>	Alcot	MegatrimMegatrim-DS
	Alcot-DS	Methotrin
	Avlotrin	Napatrim
	Avlotrin-DS	Navatrim
	Bactacin	Neoset
	Bactacin-DS	Octrim
	Bactazol	Octrim-DS
	Bactazol-S	Omnatrim
	Bactipront	Orgastran
	Bactipront-DS	Pharmatrim
	Bitrim	Politrim
	Bitrim-DS	Politrim-DS
	Centrim	Regtin
	Chemotrim	Regtin-DS
	Chemozole	Satrim
	Contrim	Seematrim
	Cosat	Servitrim
	Cosat-DS	Servitrim-DS
	Cotrilin	Sinatrim
	Cotrim	Sinatrim-DS
	Cotrim-DS	Skytrin
	Cots-DS	Strim
	Ditrim	Sulphatrim
	Ditrim-DS	Sulprim
	Doctrim	Sulprim-DS
	Doctrim-DS	Sumetrolim
	Epatrim	Supro
	Fisat	Synac
	Fisat-DS	Theratrim
	Foltrim	Tricot
	Gentrim	Tricot-DS
	G-Co-Trimoxazole	Trimeton
	Jasotrim	Trimoprim
	Maktrim	Trimox
	Meditrim	Trizole
	Meditrim-DS	Utrim
	Megaset-DS	

<i>Generic name</i>	<i>Trade names</i>	
<b>Erythromycin</b>	A-mycin	Eromycin
	Arthomycin	ErythroX
	Emycin	Etrocin
	Erocin	Macrocin
	Eromycin	Servitrocin
	Erocin	
<b>Metronidazole</b>	Ameryl	MetrodolMetrogyl
	Amobin	Metro
	Amodis	Metrolin
	Amotrex	Metropill
	Anamet	Metrozole
	Anzole	Metryl
	Ashfazol	Metsina
	Bendazole	Mezol
	Benmet	Nalox
	Epatol	Nelagyl
	Filmet	Nida
	Flagyl	Nida-S
	G-Metronidazole	Nidazil
	Klion	Nidazol
	Librazol	Nipazol
	Mecozol	Omnes-400
	Mecozol	Penazole
	Melagyl	Phidazole
	Menilet	Protec
	Menzolin	Remagyl
	Metagut	Qugyl
	Metason	Secozyl
	Metco	Seemagyl
	Metrion	Somet
	Metro-A	Varizil
	Metrocon	

<i>Generic name</i>	<i>Trade names</i>	
<b>Nalidixic acid</b>	Degram	Naligram
	Dixicon	Nalix
	Nalidex	Utin
	Nalidixin	Utirex
	Nalid	
<b>Pivmecillinam</b>	Selixid	
<b>Procaine Penicillin</b>	Erapen	Penicillin-G Sodium
	Dipen	Pronapen
	Hostacillin	Propen
	Pen-G	
<b>Salbutamol</b>	Asmatol	Pulmolin
	Asmolex	Respolin
	Asthmanil	Salbo
	Asthmarol	Sabunil
	Asthmolin	Salbut
	Azmasol	Salbutal
	Brodil	Salmol
	Broncolin	Salmolin
	Bronkolax	Saltolin
	Butamax	Saltolin-SR
	Cybutol	Ventil
	Cyclohaler	Ventol
	D-Butamol	Ventolin
	G. Salbutamol	Ventolin-SR
	Koptolin	Ventrin

**Generic name****Trade names**

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<b>Tetracycline</b>	Bitacyn	Teracilin
	Epacycline	Tetracycline-R
	G-tetracycline	Tetracyn
	Hostacycline	Tetragen
	Jmycin	Tetralin
	JP-Tetra	Tetram
	Petracin	Tetramet
	Servitet	Tetramin
	S-Tetracycline	Tetrasina
	Taracycline	Tetrax

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\*The titles shown are those at the time these guidelines were initially developed during late 1997 and early 1998.

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Ministry of Health and Family Welfare

- Acute Respiratory Infection Control Programme
- Control of Diarrhoeal Diseases Programme
- Directorate of Health Services
- Directorate of Family Planning
- Expanded Programme on Immunization
- Institute of Public Health Nutrition
- Programme of Primary Health Care and Disease Control

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UNICEF

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