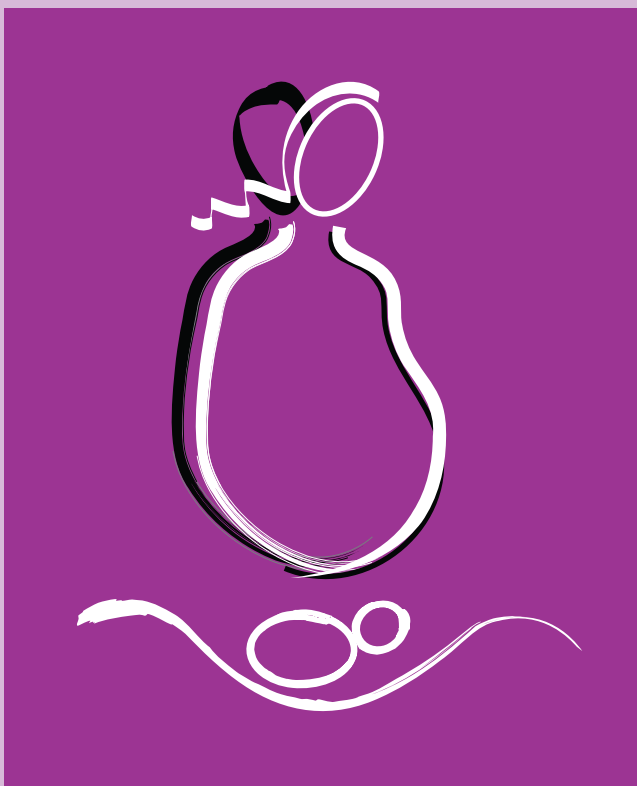


Managing Newborn Problems:

A guide for doctors, nurses,
and midwives



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Organization



The World Bank
Group



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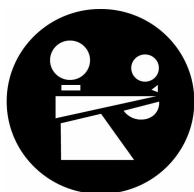
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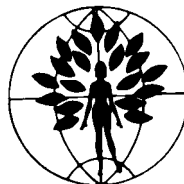
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This guide represents a common understanding between WHO, UNFPA, UNICEF, and the World Bank of key elements of an approach to reducing newborn deaths and disabilities. These agencies cooperate closely in efforts to reduce maternal and neonatal mortality and morbidity. The principles and policies of each agency are governed by the relevant decisions of each agency's governing body, and each agency implements the interventions described in this document in accordance with these principles and policies and within the scope of its mandate.

The guide has also been reviewed and endorsed by the International Pediatric Association, the International Confederation of Midwives, and the International Federation of Gynecology and Obstetrics.



International Pediatric
Association



International Federation of
Gynecology and Obstetrics

The financial support towards the preparation and production of this document, provided by the Governments of Australia, Japan, and the United States of America, is gratefully acknowledged, as is financial support received from The World Bank. In addition, WHO's Making Pregnancy Safer initiative is grateful for the programme support received from the UNFPA and the Governments of The Netherlands, Norway, Sweden, and the United Kingdom of Great Britain and Northern Ireland.

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WORKING TO IMPROVE THE HEALTH OF WOMEN AND FAMILIES THROUGHOUT THE WORLD

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In modern times, improvements in knowledge and technology have greatly improved the health of mothers and children. However, the past decade was marked by limited progress in reducing maternal mortality and a slow-down in the steady decline of childhood mortality observed since the mid 1950s in many countries, the latter being largely due to a failure to reduce neonatal mortality.

Every year, more than four million babies less than one month of age die, most of them during the critical first week of life; for every newborn who dies, another is stillborn. Most of these deaths are a consequence of the poor health and nutritional status of the mother coupled with inadequate care before, during, and after childbirth. Unfortunately, the problem remains unrecognized or—even worse—accepted as inevitable in many societies, in large part because it is so common.

Recognizing the large burden of maternal and neonatal ill-health on the development capacity of individuals, communities, and societies, world leaders reaffirmed their commitment to invest in mothers and children by adopting specific goals and targets to reduce maternal and childhood-infant mortality as part of the Millennium Declaration.

There is a widely shared but mistaken idea that improvements in newborn health require advanced technologies and highly specialized staff. The reality is that many conditions that result in perinatal death can be prevented or treated without sophisticated and expensive technology. What is required is essential care during pregnancy, the assistance of a person with midwifery skills during childbirth and the immediate postpartum period, and a few critical interventions for the newborn during the first days of life.

It is against this background that we are proud to present the document *Managing Newborn Problems: A Guide for Doctors, Nurses, and Midwives* as a new addition to the Integrated Management of Pregnancy and Childbirth tool kit. The guide provides a full range of updated, evidence-based norms and standards that will enable health care providers to give high quality care during the newborn period, considering the needs of the mother and her newborn baby.

We anticipate that the guide will help decision makers, programme managers, and health care providers to chart their course towards meeting the health needs of all newborn babies. We have the knowledge; our major challenge now is to translate this into action and to reach those mothers and babies who are most in need.



Dr. Tomris Türmen
Executive Director
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This guide has been produced by the World Health Organization to assist countries with limited resources in their efforts to reduce neonatal mortality and to ensure care for newborn babies with problems due to complications of pregnancy and childbirth, such as asphyxia, sepsis, and low birth weight or preterm birth.

The main section of this guide is arranged by clinical signs or findings, which facilitates early identification of illness, and provides up-to-date guidelines for clinical management. Use of these guidelines is essential in promoting and assessing the quality of health services and training providers and supporting quality services through supervision and feedback on performance.

The interventions in this guide are based on the latest available scientific evidence and the guide will be updated as new information is acquired. In addition, the diagnostic and management guidelines in this guide are consistent with the other WHO materials in the Integrated Management of Pregnancy and Childbirth (IMPAC) series, including *Pregnancy, Childbirth, Postpartum and Newborn Care: A Guide for Essential Practice* and *Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors*. This guide is complementary to the Integrated Management of Childhood Illness (IMCI) guidelines for care of the sick young infant: the major illnesses emphasized in this guide originate at birth or during the first week of life, while the illnesses covered in the IMCI guidelines generally originate after that period.

It is hoped that this guide will be readily available whenever a doctor, nurse, or midwife is confronted with a sick or small newborn baby. In addition, all of the guides in the IMPAC series can be used by national ministries of health to help ensure that countries have state-of-the-art information upon which to base their national policy standards, pre-service training, and service delivery guidelines.

For the guide to be fully effective, its users should also be trained in a setting where skills can be practised. Many training packages and job aids are available to accompany the guides in the IMPAC series.

A newborn baby who is small or has a potentially life-threatening problem is in an emergency situation requiring immediate diagnosis and management. Delay in identification of the problem or in providing the correct management may be fatal. This guide provides up-to-date, authoritative clinical guidelines for use at the first referral level in low-resource settings by the doctors, nurses, midwives, and other health care workers who are responsible for the care of newborn babies with problems during the first week(s) of life. The guide can also be used to identify less common conditions that require referral to a higher level.

To effectively apply these guidelines for care of the sick or small newborn baby, a general medical officer and nurses with skills in caring for newborn babies should be available at the hospital 24 hours per day. In addition, basic support systems are necessary, including:

- Basic laboratory capabilities for measurement of haemoglobin or haematocrit (erythrocyte volume fraction), blood glucose, and serum bilirubin, as well as culture and sensitivity of blood, pus, and cerebrospinal fluid;
- Selected essential drugs, including key antibiotics such as ampicillin and gentamicin;
- Essential equipment and supplies, including accurate weighing scales and a microdropper for infusions;
- Capability to provide safe blood transfusion.

In certain settings, these requirements may not be available; this guide allows for these situations and provides alternative methods of assessment or management where possible. However, all health care workers and policy-makers are encouraged to strive for wider availability of these basic standards to enable effective care of sick and small newborn babies.

HOW TO USE THE GUIDE

The emphasis of the guide is on rapid assessment and decision-making, in order to prioritize the sickest babies and the most urgent actions.

- The first priority is to immediately assess all babies for emergency (life-threatening) signs and identify those who require immediate management.

- A further assessment, including history and a complete examination, is then necessary to guide the health care worker in identifying appropriate management for the specific problem(s) identified.

The main text of the guide is arranged primarily by **clinical signs or findings** (e.g. breathing difficulty). Because this approach is different from most medical texts, which are arranged by disease categories, a list of diagnoses with the page number of the corresponding diagnosis table is provided. The guide comprises four sections, each numbered separately and designated with a letter code. Cross-referencing is used extensively throughout the text to allow the reader to quickly find the relevant information in all sections of the manual.

Section 1, Assessment, Findings, and Management (designated by the letter “F” in page numbers), contains a short chapter used to identify those babies at risk of dying very soon and provides initial guidance on immediate management necessary to stabilize the baby’s condition. This section also includes a description of the further assessment necessary to identify the baby’s specific problem(s) and includes relevant history questions and a complete physical examination. A table guides the health care worker through the examination, provides guidance on initial management when necessary, and then directs the health care worker to the most appropriate chapter(s) for management of the specific problem(s). The following chapters, with a few exceptions, explore each sign or finding separately.

Most chapters begin with general management (where appropriate) followed by a differential diagnosis table that guides the health care worker to the most probable diagnosis that is causing the problem. The findings from the history, examination, and laboratory investigations (or other known diagnoses) are listed separately in each table. To help the user determine the significance of the possible findings, italics and bold text are used to distinguish between findings: a diagnosis cannot be made if a finding listed in bold text is absent in the baby. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italicized text is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

Simplified management protocols follow the diagnosis tables. Where there are several choices of therapy, the most effective and inexpensive is chosen. Clear guidance on drugs and dosages, as well as alternatives, is provided. Conditions requiring referral to a higher level are included in the examination table and in individual chapters where appropriate.

Section 2, Principles of Newborn Baby Care (designated by the letter “C” in page numbers), outlines the general principles of managing sick or small newborn babies. This section includes the general principles of ongoing care, including feeding, maintaining normal body temperature, preventing infection, giving immunizations, and assessing growth. Other chapters provide guidance on giving oxygen, antibiotics, and blood transfusion. Guidance on emotional support, visitation, and discharge and follow-up is also included.

Section 3, Procedures (designated by the letter “P” in page numbers), describes the procedures that may be necessary in the care of the sick or small baby. These procedures are not intended to be detailed “how-to” instructions, but rather a summary of the main steps associated with each procedure. Because the general principles of care are summarized in Section 2, these are not repeated for each procedure unless specific to the procedure.

Section 4, Appendix (designated by the letter “A” in page numbers), contains sample records and a list of essential equipment, supplies, and drugs. An index is included and is organized so that it can be used in an emergency situation to find relevant material quickly. The most critical information, including diagnosis, management, and relevant procedure(s), is listed first in bold. Other entries follow in alphabetical order. Only the pages containing critical or relevant information are included, rather than listing every page that contains the word or phrase.

LIST OF ABBREVIATIONS

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ABO	the major human blood type system
AIDS	acquired immunodeficiency syndrome
BCG	bacille Calmette-Guérin (for immunization against tuberculosis)
CSF	cerebrospinal fluid
DPT	diphtheria, pertussis, and tetanus vaccine
F	French scale
G6PD	glucose-6-phosphate dehydrogenase
HbsAg	hepatitis B surface antigen
HBV	hepatitis B virus
HIV	human immunodeficiency virus
IM	intramuscular
IV	intravenous
KMC	kangaroo mother care
OPV	oral polio vaccine
ORS	oral rehydration solution
Rh	Rhesus
°C	degrees Celsius
μmol	micromolar/micromole
dl	decilitre
g	gram
kg	kilogram
l	litre
mg	milligram
ml	millilitre
mmol	millimolar/millimole

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Cephalohaematoma	F-124	Mother with diabetes	F-156
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Cleft lip or palate	F-151	Mother with history of rupture	
Club foot	F-152	of membranes for more	
Coagulopathy	F-119	than 18 hours before birth	F-55
Congenital heart abnormality	F-52	Mother with history of uterine	
Congenital syphilis	F-46	infection or fever during	
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SECTION 1: ASSESSMENT, FINDINGS, AND MANAGEMENT

ORGANIZING CARE OF THE SICK OR SMALL NEWBORN BABY

F-1

Whether babies who need care are brought to the health care facility from home, transferred from another institution or ward, or brought from the delivery room as a result of a complicated birth, managing their care involves a cycle of planning, implementing, and evaluating care based on ongoing assessment of the baby's condition. The care that the baby receives at the health care facility is divided into several steps, as described below.

Follow infection prevention principles and practices (page C-37) at all times when examining and treating babies, especially if the baby has diarrhoea or a possible infection of the skin, eye, or umbilicus.

This guide provides for care of a sick or small baby in two situations:

- The baby has been observed in a health care facility since birth: The course of the problem after birth is known, and reliable information about the baby, as well as the history of the mother, pregnancy, and birth, are available.
- The baby was admitted from home: There is no available or reliable information about the baby's condition from birth to the present time, and/or the history of the mother, pregnancy, and birth is unavailable or unreliable. Very often these babies will be seen at an advanced stage of illness.

ARRIVAL, RAPID ASSESSMENT, AND IMMEDIATE MANAGEMENT

- Instruct staff to call a health care provider as soon as a baby less than one week old is brought to the facility. Do not let the baby wait to receive care.
- Ensure that the admission and reception area is organized so that every baby can be seen quickly.
- Assess all sick or small babies before doing any of the usual administrative procedures to admit the baby.
- Immediately upon the baby's arrival, assess the baby for emergency signs that indicate that the baby is in critical condition and at risk of dying within minutes (**page F-5**):
 - While looking for emergency signs, introduce yourself to the mother and ask her (or whoever brought the baby in):

- What is wrong with the baby?
- When did the problem(s) first start?
- What are the names of the mother and baby?
- How old is the baby?
- Was the baby brought in from outside the health care facility?
- Keep the baby with the mother, if possible, and allow her to be present during the assessment and for any procedures, if appropriate.
- Provide immediate management for any life-threatening emergency signs, as directed in **Table F-1 (page F-6)**, before continuing with the further assessment.

Give priority to stabilizing the sick or small baby before assessing and treating the underlying cause of the problem.

FURTHER ASSESSMENT AND MANAGEMENT

- Once the baby has received immediate management, obtain the history of the mother and the baby. Then use **Table F-2 (page F-11)** to complete a thorough examination to determine the underlying problem(s), and admit the baby (**page F-21**), if necessary.
- Provide specific management for the problem(s) identified, if necessary, following the guidelines in **Table F-2 (page F-11)** to determine which chapter(s) to use.
- Arrange for transfer and referral (**page C-63**), if necessary.

ONGOING CARE

In addition to specific care for the baby's problem(s), provide general and ongoing care.

- Develop a general plan of care that takes into account the special needs of the baby.
- Monitor the baby's progress and recovery by performing ongoing general assessments (group assessments together to disturb the baby as little as possible) including:

- respiratory rate;
 - heart rate;
 - colour;
 - temperature;
 - weight;
 - rate and volume of IV fluid;
 - frequency and volume of feeds.
- Be prepared to change the plan of care according to changes in the baby's condition, determined from the findings of the ongoing general assessments and any other specific assessments required for the particular problem.
 - Provide emotional support to the mother and other family members (**page C-57**).

DOCUMENTING CARE

- Record the necessary treatment in a written plan of care, and communicate this plan to the medical team and other staff involved in the care of the baby.
- Document any changes in the baby's condition, and communicate them to appropriate staff.
- Ensure that information is communicated between on-call medical officers and new staff on different shifts.

DISCHARGE AND FOLLOW-UP

- Follow guidance in the individual problem chapters in determining when to discharge the baby.
- Plan the discharge:
 - Provide any immunizations necessary (**page C-51**);
 - Provide instructions for general home care;
 - Advise on breastfeeding, and ensure that the baby is feeding well.

- Discharge the baby (**page C-67**) and schedule follow-up visits, if necessary, for specific conditions and to monitor feeding and growth.

RAPID ASSESSMENT AND IMMEDIATE MANAGEMENT F-5

Assess every baby for emergency signs as soon as the baby arrives, regardless of whether the baby is coming from another ward in the health care facility, is transferred from another health care facility, or is brought from home. A few babies may have emergency signs that indicate a problem that is so serious the baby may die within minutes if not immediately treated. Use this chapter to rapidly assess babies for emergency signs and provide immediate management.

Examine the baby immediately for the following emergency signs, and provide immediate management (Table F-1, page F-6) if found:

- **Not breathing at all, even when stimulated; gasping; or respiratory rate less than 20 breaths per minute; OR**
- **Bleeding; OR**
- **Shock (pallor, cold to the touch, heart rate more than 180 beats per minute, extremely lethargic or unconscious).**

RAPID ASSESSMENT

- Place the baby on a warm surface under a radiant warmer and under good light.
- Immediately resuscitate the baby using a bag and mask (**page P-1**) if the baby:
 - is not breathing at all, even when stimulated; OR
 - is gasping; OR
 - has a respiratory rate less than 20 breaths per minute.
- If the **baby is having a convulsion or spasm**, treat any emergency sign(s) first. Then provide initial management of the convulsion or spasm (**page F-59**) before continuing with the further assessment.

IMMEDIATE MANAGEMENT

- Weigh the baby (**page C-53**).
- Establish an IV line (**page P-21**).
- Provide immediate management (**Table F-1, page F-6**).

- Once immediate management has been completed, continue with the further assessment (**page F-7**).

TABLE F-1 Immediate management of emergency signs

Emergency Sign	Immediate Management
• Not breathing at all, even when stimulated; OR • Gaspings; OR • Respiratory rate less than 20 breaths per minute	1. Resuscitate the baby using a bag and mask (page P-1). 2. Give oxygen (page C-25) at a high flow rate.
• Bleeding	1. Stop visible bleeding, if possible (e.g. if the bleeding is from the umbilicus, reclamp or retie the umbilical stump; if the bleeding is from a cut or male circumcision site, press on the bleeding site with a sterile compress). 2. Give vitamin K₁ (phytomenadione) 1 mg IV (or IM if an IV line has not yet been established). 3. Take a blood sample (page P-9) to type and cross-match, and measure haemoglobin. 4. Provide general management of bleeding (page F-114).
• Shock	If bleeding is the likely cause of shock: 1. Infuse normal saline or Ringer's lactate 10 ml/kg body weight over 10 minutes, and repeat once after 20 minutes if signs of shock continue. Then infuse 10% glucose at maintenance volume according to the baby's age (Table C-4, page C-22). 2. Immediately give a blood transfusion (page P-31) using type O, Rh-negative blood. 3. Give oxygen at a high flow rate (page C-25). 4. Ensure warmth (page C-1). If bleeding is not the likely cause of shock: 1. Infuse IV fluid 20 ml/kg body weight over the first hour, and then continue IV fluid at maintenance volume according to the baby's age (Table C-4, page C-22). 2. Ensure warmth (page C-1). 3. Treat for sepsis (page F-41).

After examining for emergency signs (i.e. not breathing, gasping, respiratory rate less than 20 breaths per minute, bleeding, or shock) and providing immediate management (**Table F-1, page F-6**), continue to assess the baby and make a list of findings.

- Obtain the history of the baby and the mother (below).
- Examine the baby completely (**Table F-2, page F-11**).
- Use the findings from the history and examination to choose the most appropriate chapter(s) in this section of the guide.
- Complete additional examinations, if necessary, and determine the required laboratory investigations as directed in the chapter(s) in this section of the guide.
- Perform appropriate laboratory investigations, and treat the baby (and/or the mother or her partner(s), if necessary).
- Record all information, including:
 - the findings of the history, examination, and laboratory investigations;
 - treatment given;
 - changes in the baby's condition.

HISTORY

Review the referral notes or records of the birth, if available. Ask the following questions about the mother and baby and use the answers, together with the findings of the examination and laboratory investigations, to determine the probable diagnosis.

BABY

Ask the mother (or whoever brought the baby in):

- What is the problem? Why is the baby here?
- What kind of care, including specific treatment, has the baby already received?
- How old is the baby?
- How much did the baby weigh at birth?
- Was the baby born at term? If not, at how many weeks gestation was the

baby born?

- Where was the baby born? Did anybody assist the birth?
- How was the baby immediately after birth?
 - Did the baby spontaneously breathe at birth?
 - Did the baby require resuscitation? If so, what was the length of time before spontaneous breathing was established?
 - Did the baby move and cry normally?
- When did the problem first start?
- Has the baby's condition changed since the problem was first noted? Is the problem getting worse? If so, how rapidly and in what way?
- Is the baby having problems feeding, including any of the following?
 - poor or no feeding since birth or after a period of feeding normally;
 - coughing or choking during feeding;
 - vomiting after a feeding.

MOTHER

- Review the mother's medical, obstetric, and social history.
- Ask the mother if she has any questions or concerns (e.g. special concerns or anxiety about breastfeeding).
- If the **mother is not present**, determine where she is, what her condition is, and whether she will be able to care for the baby, including breastfeeding or expressing breast milk.

PREGNANCY

- Ask the mother the following questions regarding her pregnancy:
 - What was the duration of your pregnancy?
 - Did you have any chronic diseases during the pregnancy, including hepatitis B, tuberculosis, diabetes, or syphilis (symptomatic or seropositive)?
 - Do you know your HIV status? If so, can you tell me?
 - Did you have any complications during your pregnancy? If so, what, if any, treatment did you receive?

- If the **mother has hepatitis B, tuberculosis, diabetes, or syphilis**, complete the examination in **Table F-2 (page F-11)**, and treat any specific problem(s) the baby has. If the **baby is asymptomatic** (no findings of illness), see **page F-155** for appropriate treatment based on the mother's problem.
- If the **mother is HIV positive**, complete the examination in **Table F-2 (page F-11)**, and treat any specific problem(s) the baby has. Then see **page F-159** for appropriate treatment based on the mother's problem.

LABOUR AND BIRTH

- Ask the mother the following questions about her labour and birth:
 - Did you develop any complications, such as uterine infection or fever any time from the onset of labour to three days after birth?
 - Were your membranes ruptured for more than 18 hours before birth?
 - Was the labour or birth difficult or complicated, including any of the following?
 - fetal distress;
 - prolonged labour;
 - caesarean section;
 - instrumental vaginal delivery (e.g. forceps or vacuum extraction);
 - malposition or malpresentation of the baby (e.g. breech);
 - any other complications.
 - Did you develop any complications after the birth?
- If the **mother had a uterine infection or fever any time from the onset of labour to three days after birth, or rupture of membranes for more than 18 hours before birth**, continue taking the history, complete the examination (**Table F-2, page F-11**), and treat any specific problem(s). Then see **page F-55** for appropriate treatment based on the mother's problem.

EXAMINATION

- Continue any immediate management that was started for an emergency sign (not breathing, gasping, respiratory rate less than 20 breaths per minute, bleeding, or shock; **Table F-1, page F-6**). If the **baby develops an emergency sign during the examination**, return to **Table F-1** for immediate management, and proceed with the examination once the baby's condition is stable.
- Examine the baby as directed in **Table F-2 (page F-11)**:
 - Examine the baby under a radiant warmer unless it is clear that the baby has been overheated;
 - Allow the mother to be present during the examination;
 - If the **baby has not been weighed yet**, weigh the baby (**page C-53**), and record the weight;
 - While talking to the mother and before undressing the baby, observe the baby for:
 - colour;
 - respiratory rate;
 - posture;
 - movement;
 - reaction to stimuli;
 - obvious abnormalities.
 - As you proceed in the examination, explain the findings to the mother in simple terms and point out abnormalities (**page C-57**). Obtain informed consent before performing an invasive procedure;
 - A newborn baby can have more than one problem. While performing the examination, provide only the treatment specifically listed in the following table (i.e. after the statement "ACT NOW"). Wait until the entire examination is complete before beginning specific management of the baby's problems, treating the problems designated as priorities first.

TABLE F-2 Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
RESPIRATORY RATE	- Respiratory rate consistently more than 60 or less than 30 breaths per minute - Grunting on expiration - Chest indrawing (Fig. F-3, page F-47)	ACT NOW: Give oxygen at a moderate flow rate (page C-25). For management of breathing difficulty, see page F-47.
	Apnoea (spontaneous cessation of breathing for more than 20 seconds)	ACT NOW: Stimulate the baby to breathe by rubbing the baby's back for 10 seconds. If the baby does not begin to breathe immediately, resuscitate the baby using a bag and mask (page P-1). For management of apnoea, see page F-52.
<i>The normal respiratory rate of a newborn baby is 30 to 60 breaths per minute with no chest indrawing or grunting on expiration; however, small babies (less than 2.5 kg at birth or born before 37 weeks gestation) may have some mild chest indrawing, and it is not abnormal for a baby to periodically stop breathing for a few seconds. When determining the respiratory rate, count the number of breaths taken during a full minute, as babies may breathe irregularly (up to 80 breaths per minute) for short periods of time. If unsure of the respiratory rate, repeat the count.</i>		
COLOUR	Pallor	For management of pallor and possible bleeding, see page F-113 .
	Jaundice (yellow)	For management of jaundice, see page F-77 .
	Central cyanosis (blue tongue and lips; note that blue skin in addition to blue tongue and lips indicates a very serious problem)	ACT NOW: Give oxygen at a high flow rate (page C-25). For management of central cyanosis, see page F-47.
<i>Babies born at term appear paler than preterm babies because their skin is thicker.</i>		

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
HEART RATE (as determined using a stethoscope)	Heart rate consistently more than 160 or less than 100 beats per minute	During the examination, look closely for other problems that could cause an abnormal heart rate (e.g. abnormal body temperature, bleeding, breathing difficulty).
<i>The normal heart rate of a newborn baby is 100 to 160 beats per minute, but it is not uncommon for the heart rate to be more than 160 beats per minute for short periods of time during the first few days of life, especially if the baby is distressed. If unsure of the heart rate, repeat the count.</i>		
BODY TEMPERATURE	Less than 36.5 °C	ACT NOW: Begin rewarming the baby (page C-1). To classify and manage low body temperature, see page F-69 . Management of a body temperature less than 32 °C is a priority once the examination is complete (page F-71).
	More than 37.5 °C	To classify and manage elevated body temperature, see page F-69 .
POSTURE AND MOVEMENTS (observed or history of)	Opisthotonos (extreme hyperextension of the body, with the head and heels bent backward and the body arched forward; Fig. F-4B, page F-60)	During the examination, look closely for signs of other problems that could cause opisthotonos (e.g. tetanus, meningitis, bilirubin encephalopathy [kernicterus]). ACT NOW: If the baby has a bulging anterior fontanelle, immediately begin treatment for meningitis. See pages F-41 and F-43.

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
POSTURE AND MOVEMENTS (observed or history of) (<i>cont.</i>)	Irregular, jerky movements of the body, limbs, or face (convulsion or spasm)	ACT NOW: If the baby is currently having a convulsion or spasm, see page F-59. If the baby has a bulging anterior fontanelle, immediately begin treatment for meningitis. See pages F-41 and F-43. Additional management of a baby with convulsions/spasms or a history of convulsions/spasms is a priority once the examination is complete (page F-59).
	Jitteriness (rapid and repetitive movements that are caused by sudden handling of the baby or loud noises and can be stopped by cuddling, feeding, or flexing a limb)	During the examination, look for other, more specific signs. If more specific signs are not found, see page F-87.

The normal resting posture of a term newborn baby includes loosely clenched fists and flexed arms, hips, and knees (Fig. F-1B, page F-23). The limbs may be extended in small babies (less than 2.5 kg at birth or born before 37 weeks gestation; Fig. F-1A, page F-23). Babies who were in a breech position may have fully flexed hips and knees, and the feet may be near the mouth; alternatively, the legs and feet may be to the side of the baby (Fig. F-12, page F-146).

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
MUSCLE TONE AND LEVEL OF ALERTNESS	• Lethargy (decreased level of consciousness from which the baby can be roused only with difficulty) • Floppiness (weak muscle tone; limbs fall loosely when picked up and released) • Irritability (abnormally sensitive to stimuli; cries frequently and excessively with little observable cause) • Drowsiness (sluggish) • Reduced activity	Handle the baby carefully during the examination to prevent injury. During the examination, look for other, more specific signs. If more specific signs are not found, see page F-87.
	• Unconscious (profound sleep; unresponsive to stimuli; no reaction to painful procedures)	If unconsciousness is not caused by shock (page F-6), it is most likely caused by sepsis or asphyxia (page F-35). Management of the cause of unconsciousness is a priority once the examination is complete.
<i>The normal newborn baby ranges from quiet to alert and is consolable when upset. The baby is arousable when quiet or asleep.</i>		
LIMBS	• Abnormal position and movement of limbs (e.g. Fig. F-10, page F-145) • Baby's arms or legs move asymmetrically • Baby cries when a leg, arm, or shoulder is touched or moved • Bone is displaced from its normal position	To evaluate further for birth injury, see page F-145.

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
LIMBS (<i>cont.</i>)	• Club foot (foot is twisted out of shape or position; e.g. heel is turned inward or outward from the midline of the leg) • Extra finger(s) or toe(s)	For management of the birth defect, see page F-151 .
SKIN	• Redness or swelling of skin or soft tissues • Pustules or blisters	Strictly follow infection prevention principles (page C-37) when handling the baby. For management of the skin problem, see page F-127 .
	• Blistering skin rash on palms and soles	For management of the skin problem, see page F-127 .
	• Cut or abrasion	For management of the cut or abrasion, see page F-132 .
	• Bruise (bluish discolouration without a break in the skin, usually seen on the presenting part, e.g. buttocks in breech presentation)	If the bruise appeared spontaneously but there is no evidence of trauma at birth, see page F-113 to evaluate further for a bleeding disorder. If the bruise is from trauma at birth, reassure the mother that no specific treatment is needed for the bruise and that it will resolve spontaneously in a few weeks.
	• Birth mark or skin tag (abnormal spot, mark, or raised area of the skin)	For management of the birth mark or skin tag see page F-151 .
	• Loss of elasticity	Treat for dehydration if there are additional signs, such as sunken eyes or fontanelle, or dry tongue and mucous membranes (page C-23).

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
SKIN (cont.)	• Thrush (bright red patches on skin in napkin area on buttocks, often scaly in appearance or with small white centres)	To confirm diagnosis of thrush, see page F-128 .
<i>Some skin conditions are common and should not cause concern as long as the baby is otherwise normal. These include milia (white spots around the nose), typically seen on day 1 or later, and erythema toxicum (red spots with tiny white centres), seen on the face, trunk, and back on day 2 or later. In addition, it is not abnormal for the baby's skin on the trunk, abdomen, and back to peel after the first day.</i>		
UMBILICUS	• Umbilicus is red, swollen, draining pus, or foul smelling • Skin around umbilicus is red and hardened	For management of the infection of the umbilicus, see page F-135 .
	• Bleeding from umbilicus	ACT NOW: Reclamp or retie the umbilical cord, if necessary. For management of bleeding, see page F-113.
<i>The normal umbilicus is bluish-white in colour on day 1. It then begins to dry and shrink and falls off after 7 to 10 days.</i>		
EYES	• Pus draining from eye • Red or swollen eyelids	For management of the eye problem, see page F-139 .
	• Subconjunctival bleeding (bright red spot under the conjunctiva of one or both eyes)	Reassure the mother that no specific treatment is needed and that the problem will resolve spontaneously.

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
HEAD AND FACE	Hydrocephalus (large head with bulging fontanelle and widened sutures)	Organize transfer (page C-63) and refer the baby to a tertiary hospital or specialized centre for surgery, if possible.
	Bulging anterior fontanelle	ACT NOW: If the baby has a bulging anterior fontanelle, immediately begin treatment for meningitis. See pages F-41 and F-43.
	Sunken fontanelle	Treat for dehydration if there are additional signs, such as sunken eyes, loss of skin elasticity, or dry tongue and mucous membranes (page C-23).
	Swelling on scalp that is not restricted to the area over the fontanelles	For management of the scalp swelling, see page F-121 .
	Unable to wrinkle forehead or close eye on one side; angle of mouth pulled to one side (facial paralysis; Fig. F-11, page F-145)	To evaluate further for facial paralysis, see page F-145 .
	Unable to breastfeed without dribbling milk	

*The normal newborn baby's head may be moulded from a vertex birth; this will resolve spontaneously over a period of three to four weeks (**Fig. F-7, page F-121**).*

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
MOUTH AND NOSE	• Cleft lip (split in lip) • Cleft palate (hole in upper palate connecting mouth and nasal passages)	For management of the cleft lip or palate, see page F-151 .
	• Thrush (thick white patches on tongue or inside mouth)	To confirm diagnosis of thrush, see page F-128 .
	• Central cyanosis (blue tongue and lips)	ACT NOW: Give oxygen at a high flow rate (page C-25). For management of central cyanosis, see page F-47 .
	• Profuse nasal discharge (“snuffles”)	To evaluate further for congenital syphilis, see page F-35 .
	• Dry tongue and mucous membranes	Treat for dehydration if there are additional signs, such as loss of skin elasticity, sunken eyes or fontanelle (page C-23).
ABDOMEN AND BACK	• Abdominal distension (Fig. F-6, page F-99)	For management of the abdominal distension, see page F-99 .
	• Gastroschisis/omphalocele (defect of abdominal wall or umbilicus through which bowel or other abdominal organs may protrude)	For management of the gastroschisis/omphalocele, see page F-152 .
	• Spina bifida/myelomeningocele (defect in back through which the meninges and/or spinal cord may protrude)	For management of the spina bifida/myelomeningocele, see page F-152 .

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
WEIGHT	• Birth weight less than 2.5 kg	During the examination, look closely for problems the baby may have due to small size, and see page F-23 to review special considerations for the care of small babies.
	• Birth weight more than 4.0 kg	Anticipate the need to prevent and treat for low blood glucose (page F-91), and examine closely for possible birth injury.
	• Not gaining weight (proven or suspected)	To evaluate further for feeding difficulty, see page F-93 .
URINE AND STOOL	• Passes urine less than six times per day after day 2	Assess feeding and/or fluid volumes (page C-22).
	• Diarrhoea (increased frequency of loose stools as observed or reported by the mother; stool is watery or green, or contains mucus or blood)	For management of diarrhoea, see page F-107 .
	• Has not passed meconium within 24 hours after birth	Check for imperforate anus: • If the anus is imperforate, see page F-153. • If the anus is normal, see page F-102 to determine if the baby has a suspected gastrointestinal malformation or obstruction.

It is normal for a baby to have six to eight watery stools per day. Vaginal bleeding in the female newborn baby may occur for a few days during the first week of life and is not a sign of a problem.

TABLE F-2 Cont. Examination of the newborn baby

Look at	Look for	Immediate Action(s) Required and Relevant Chapter for Treatment after Completion of Examination
FEEDING	• Baby fed well at birth but is now feeding poorly or has stopped feeding • Baby has not fed well since birth • Baby is not gaining weight (proven or suspected) • Mother has not been able to breastfeed successfully • Baby is having difficulty feeding and is small or a twin	For general management of the feeding problem, see page F-93. If the baby is small, see page F-26 for fluid and feeding management of small babies.
	• Baby is vomiting forcefully, regardless of the method of feeding after every feeding, or is vomiting bile or blood	For management of vomiting, see page F-99.

IMMEDIATE ACTIONS ONCE EXAMINATION IS COMPLETE

- Determine appropriate management:
 - Categorize the findings from the examination and treat priority findings first (temperature less than 32 °C, convulsions/spasms, unconsciousness);
 - Continue to treat emergency signs (i.e. respiratory rate less than 20 breaths per minute, gasping, not breathing, bleeding, or shock) and continue any treatment started during the examination (i.e. “ACT NOW”);
 - Note that most of the chapters that follow in this section explore each sign or finding separately and lead to appropriate management pathways. In some cases, more than one finding of illness may be identified upon further assessment, and these “clusters” of findings may all point to a single serious problem. **If the assessment reveals more than one finding, first see the chapter *Multiple Findings (Most Often Sepsis or Asphyxia)* (page F-35) to rule out asphyxia,**

sepsis, congenital syphilis, or problems due to small size, and then use any other chapter(s) necessary;

- Keep in mind that you may be able to treat several problems at the same time.
- If a **specific problem is not identified and the only finding is lethargy or another non-specific sign** (i.e. drowsiness, reduced activity, floppiness, irritability, or jitteriness), or the baby “looks ill,” see the chapter *Lethargy and Other Non-Specific Signs* (**page F-87**).
- Perform the following before beginning specific treatment, or as soon as possible:
 - If the **baby is less than one hour old**, give eye prophylaxis (1% silver nitrate, 2.5% polyvidone iodine solution, or 1% tetracycline ointment);
 - Give vitamin K₁ (phytomenadione) 1 mg IM once (or IV if an IV line has already been established) if the baby has not already been given it.

The mother, who is constantly with the baby, may notice subtle changes in the baby’s condition. Listen to her comments and re-examine the baby at any time if there is concern.

NEXT STEPS

- Review the findings with the mother and obtain informed consent before performing additional procedures.
- Continue any treatment already started.
- Determine what procedures and laboratory investigations are required. Be sure to draw enough blood at one time to perform all the necessary investigations.

ADMITTING THE BABY TO THE HEALTH CARE FACILITY

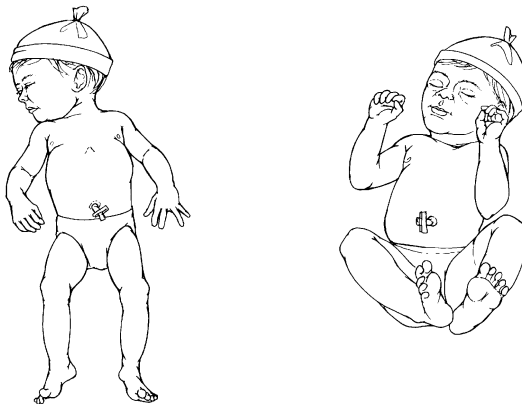
- If **treatment of the baby requires admitting the baby to the health care facility**, ensure the following:
 - Explain the baby’s condition to the mother and the reason(s) why the baby needs to be admitted. Answer any questions she may have;

- Check that the baby is properly identified with a name tag on the wrist or ankle;
- Check that the umbilical cord is securely clamped/tied;
- Carry out necessary administrative procedures (e.g. record keeping, **page A-1**);
- Care for the baby in the newborn special care unit, if one is available:
 - If a **newborn special care unit is not available**, keep the baby with the mother in an area that is close to the nursing station;
 - Keep babies with infections separate from babies with non-infectious problems, and follow infection prevention practices at all times (**page C-37**);
 - Admit the mother, if necessary, to keep her with the baby to allow breastfeeding or to provide expressed breast milk (**page C-15**). The mother does not have to be admitted if she is able to stay nearby;
 - If the **mother and baby are separated**, help the mother to visit the baby, if possible, and provide a comfortable chair for her;
 - If the **mother is not able to visit the baby**, inform her of the baby's condition at least twice daily.
- Review the list of differential diagnoses again after receiving the results of the initial investigations (e.g. blood glucose) and after observing the baby's response to initial treatment. Make any changes in treatment that may be necessary.

Preterm babies (born before 37 weeks gestation) tend to have more problems than term babies who are small (less than 2.5 kg at birth). However, because the baby's gestational age is not always known, this guide refers to preterm babies and small term babies collectively as "small babies." If the **baby's gestational age is known**, use this, when possible, to guide diagnosis and management decisions. Remember that the more preterm or the smaller the baby is, the more likely the baby is to have problems.

- After completing the examination in **Table F-2 (page F-11)**, review relevant differential diagnosis tables carefully to determine the diagnosis that most closely matches the baby's findings, keeping in mind that a small baby can have any problem that a term baby can have. Note that a small baby:
 - may have a problem that is specific to small babies (e.g. jaundice of prematurity) but may also have any other problem that a full-size, term baby can have (e.g. jaundice associated with sepsis);
 - has a different resting posture (**Fig. F-1A**) than a term baby (**Fig. F-1B**), and this is not necessarily an indication of a problem (e.g. floppiness).

FIGURE F-1 Normal resting posture of small (A) and term (B) babies



- Small babies are prone to complications. Some problems that small babies are particularly susceptible to include:
 - feeding difficulty (Feeding difficulty is a common problem; as the baby grows, feeding ability improves.);

- abnormal body temperature (**page F-69**; Kangaroo mother care [**page F-30**] is the recommended method of maintaining a small baby's body temperature. This method of care is recommended for babies who do not have a serious illness, and particularly for those who weigh less than 1.8 kg.);
 - breathing difficulty (**page F-47**), such as respiratory distress syndrome and apnoea;
 - necrotizing enterocolitis (**page F-104**);
 - jaundice of prematurity (**page F-82**);
 - intraventricular bleeding (**page F-66**);
 - anaemia (**page F-119**; To prevent iron deficiency anaemia, give small babies an oral iron preparation to give elemental iron 2 mg/kg body weight once daily from two months of age up to 23 months of age);
 - low blood glucose (**page F-91**).
- Because a small baby typically has multiple findings—which may be because the baby is small or because the baby has a more severe problem—review the chapter *Multiple Findings (Most Often Sepsis or Asphyxia)* (**page F-35**), looking especially for signs of sepsis or asphyxia. Note that small babies often develop new findings during the first days and weeks of life.
 - Regardless of what other problems they may have, all small babies require special considerations for feeding, fluid management, and maintenance of normal body temperature (ideally using kangaroo mother care), which are described below. In addition, review the chapters in the *Newborn Care Principles* section for general management instructions applicable to all newborn babies.

FEEDING AND FLUID MANAGEMENT OF SMALL BABIES

GENERAL PRINCIPLES OF FEEDING SMALL BABIES

Small babies often have difficulty feeding simply because they are not mature enough to feed well. Good feeding ability can usually be established by 34 to 35 weeks post-menstrual age. Until that time, substantial effort may be needed to ensure adequate feeding. Provide special support and attention to the mother during this difficult period.

- Explain to the mother that:
 - her breast milk is the best food for the baby;
 - breastfeeding is especially important for a small baby;
 - it may take longer for a small baby to establish breastfeeding;
 - it is usually normal if the baby:
 - tires easily and suckles weakly at first;
 - suckles for shorter periods of time before resting;
 - falls asleep during feeding;
 - pauses for long periods between suckling.
- Have the mother keep the baby at the breast for a longer period of time and allow long pauses between suckling, or a long, slow feed. Assure the mother that breastfeeding will become easier once the baby becomes bigger.
- Have the mother follow the general principles of exclusive breastfeeding (**page C-11**).
- Ensure that the baby is fed frequently:
 - If the **baby weighs 1.25 to 2.5 kg**, feed the baby at least eight times in 24 hours (i.e. every three hours);
 - If the **baby weighs less than 1.25 kg**, feed the baby at least 12 times in 24 hours (i.e. every two hours);
 - Follow the guidelines in **Tables F-3 to F-8 (pages F-27 to F-29)** to determine the required daily volume of feeds and/or fluid.
- If the **baby is not suckling well enough to receive an adequate volume of milk**:
 - Encourage the mother to give expressed breast milk using an alternative feeding method (**page C-14**);
 - Be sure the mother always attempts to breastfeed the baby before offering expressed breast milk, unless the baby cannot be breastfed;
 - If necessary, the mother can improve the flow of milk by expressing a small amount of milk before allowing the baby to attach to the breast.

- Ensure that the baby is receiving enough milk by assessing the baby's growth (**page C-53**).
- If the **baby is not gaining weight adequately** (less than 15 g/kg body weight per day over three days), have the mother express breast milk (**page C-15**) into two different cups. Have her give the contents of the second cup, which contains more of the fat-rich hind milk, to the baby first, and then supplement with whatever is required from the first cup.
- If the **baby is vomiting or has abdominal distension or episodes of apnoea or if more than 20% of the previous feed is retained in the stomach (gastric residual) just before the next feed** (when fed by gastric tube):
 - Stop feeding. Establish an IV line (**page P-21**), and give IV fluid at maintenance volume according to the baby's weight and age (**Tables F-3 to F-8, page F-27 to F-29**) for 12 hours;
 - Reassess the baby after 12 hours:
 - If the **baby's condition is improving**, restart feeds, observing carefully;
 - If the **baby's condition is not improving**, continue giving IV fluid at maintenance volume for another 12 hours. Then restart feeds, giving the same volume as the last feed and observing the baby carefully.
- If the **baby is being fed by gastric tube and there is an increasing volume of gastric residuals** (milk remaining in the stomach from the previous feed), suspect necrotizing enterocolitis (**page F-104**).

FEED AND FLUID VOLUMES FOR SMALL BABIES

Small babies require different feed and fluid volumes based on their condition and weight. Review the categories below to determine the appropriate total daily fluid and feed volumes for the baby.

BABIES WITHOUT MAJOR ILLNESS

1.75 TO 2.5 KG

- Allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**). Use **Table C-4 (page C-22)** to determine the required volume of milk for the feed based on the baby's age.

1.5 TO 1.749 KG

- Give expressed breast milk using an alternative feeding method (**page C-14**) every three hours according to **Table F-3** until the baby is able to breastfeed.

TABLE F-3 Volumes of breast milk for a baby weighing 1.5 to 1.749 kg without major illness

	Day of Life						
	1	2	3	4	5	6	7
Feed volume every three hours (ml/feed)	12	18	22	26	30	33	35

1.25 TO 1.49 KG

- Give expressed breast milk by gastric tube (**page C-18**) every three hours according to **Table F-4**.
- Progress to feeding by cup/spoon (**page C-16**) as soon as the baby can swallow without coughing or spitting.

TABLE F-4 Volumes of breast milk for a baby weighing 1.25 to 1.49 kg without major illness

	Day of Life						
	1	2	3	4	5	6	7
Feed volume every three hours (ml/feed)	10	15	18	22	26	28	30

LESS THAN 1.25 KG

- Establish an IV line (**page P-21**), and give only IV fluid (according to **Table F-5, page F-28**) for the first 48 hours.
- Give expressed breast milk by gastric tube (**page C-18**) every two hours starting on day 3, or later if the baby’s condition is not yet stable, and slowly decrease the volume of IV fluid while increasing the volume of oral feeds according to **Table F-5 (page F-28)**.
- Progress to feeding by cup/spoon (**page C-16**) as soon as the baby can swallow without coughing or spitting.

TABLE F-5 Volumes of IV fluid and breast milk for all babies weighing less than 1.25 kg

	Day of Life						
	1	2	3	4	5	6	7
IV fluid rate (ml/hour or microdrops/minute)	4	4	3	3	2	2	0
Feed volume every two hours (ml/feed)	0	0	3	5	8	11	15

SICK BABIES

1.75 TO 2.5 KG

- If the **baby does not initially require IV fluid** (according to the relevant chapter for the baby's problem), allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**). Determine the required volume of milk for the feed based on the baby's age (**Table C-4, page C-22**).
- If the **baby requires IV fluid**:
 - Establish an IV line (**page P-21**), and give only IV fluid (according to **Table F-6**) for the first 24 hours;
 - Give expressed breast milk using an alternative feeding method (**page C-14**) every three hours starting on day 2, or later if the baby's condition is not yet stable, and slowly decrease the volume of IV fluid while increasing the volume of oral feeds according to **Table F-6**.

TABLE F-6 Volumes of IV fluid and breast milk for a sick baby weighing 1.75 kg to 2.5 kg

	Day of Life						
	1	2	3	4	5	6	7
IV fluid rate (ml/hour or microdrops/minute)	5	4	3	2	0	0	0
Feed volume every three hours (ml/feed)	0	6	14	22	30	35	38

1.5 TO 1.749 KG

- Establish an IV line (**page P-21**), and give only IV fluid (according to **Table F-7**) for the first 24 hours.
- Give expressed breast milk by gastric tube (**page C-18**) every three hours starting on day 2, or later if the baby’s condition is not yet stable, and slowly decrease the volume of IV fluid while increasing the volume of oral feeds according to **Table F-7**.
- Progress to feeding by cup/spoon (**page C-16**) as soon as the baby can swallow without coughing or spitting.

TABLE F-7 Volumes of IV fluid and breast milk for a sick baby weighing 1.5 to 1.749 kg

	Day of Life						
	1	2	3	4	5	6	7
IV fluid rate (ml/hour or microdrops/minute)	4	4	3	2	2	0	0
Feed volume every three hours (ml/feed)	0	6	13	20	24	33	35

1.25 TO 1.49 KG

- Establish an IV line (**page P-21**), and give only IV fluid (according to **Table F-8**) for the first 24 hours.
- Give expressed breast milk by gastric tube (**page C-18**) every three hours starting on day 2, or later if the baby’s condition is not yet stable, and slowly decrease the volume of IV fluid while increasing the volume of oral feeds according to **Table F-8**.
- Progress to feeding by cup/spoon (**page C-16**) as soon as the baby can swallow without coughing or spitting.

TABLE F-8 Volumes of IV fluid and breast milk for a sick baby weighing 1.25 to 1.49 kg

	Day of Life						
	1	2	3	4	5	6	7
IV fluid rate (ml/hour or microdrops/minute)	3	3	3	2	2	0	0
Feed volume every three hours (ml/feed)	0	6	9	16	20	28	30

LESS THAN 1.25 KG

- Give feeds and fluid as described for a well baby less than 1.25 kg (**page F-27**).

WEIGHT GAIN AND FEEDING AFTER SEVEN DAYS OF AGE

- It is normal for small babies to lose weight during the first 7 to 10 days of life. Birth weight is usually regained by 14 days of life unless the baby has been sick.
- Assess the baby's growth (**page C-53**) to ensure that the baby is gaining weight adequately.
- If the **baby still requires feeding using an alternative feeding method but is on full milk feeds**:
 - Increase the volume of milk in increments of 20 ml/kg body weight per day until the baby reaches 180 ml/kg body weight of breast milk per day;
 - Continue to increase the volume of milk as the baby's weight increases to maintain a volume of 180 ml/kg body weight of breast milk per day.
- If **weight gain is inadequate** (less than 15 g/kg body weight per day over three days):
 - Increase the volume of milk to 200 ml/kg body weight per day;
 - If **weight gain is inadequate for more than one week and the baby has been taking 200 ml/kg body weight breast milk per day**, treat for inadequate weight gain (**page F-96**).

KANGAROO MOTHER CARE

Kangaroo mother care (KMC) is care of a small baby who is continuously carried in skin-to-skin contact by the mother and exclusively breastfed (ideally). It is the best way to keep a small baby warm and it also helps establish breastfeeding. KMC can be started in the hospital as soon as the baby's condition permits (i.e. the baby does not require special treatment, such as oxygen or IV fluid). KMC, however, requires that the mother stay with the baby or spend most of the day at the hospital.

- Ensure that the mother is fully recovered from any childbirth complications before she begins KMC.

- Ensure that the mother has support from her family to stay at the hospital or return when the baby is ready for KMC and to deal with responsibilities at home. Discuss with the family, if possible, how they can support the mother so she can provide KMC.
- Explain to the mother that KMC may be the best way for her to care for her baby once the baby's condition permits:
 - the baby will be warm;
 - the baby will feed more easily;
 - episodes of apnoea will be less frequent.
- Take the baby away from the mother only to change napkins (diapers), bathe, and assess for clinical findings according to the hospital's schedule, or as necessary.
- Babies can be cared for using KMC until they are about 2.5 kg or 40 weeks post-menstrual age.

BEGINNING KMC

- While the baby is recovering from an illness, the mother can begin to hold the baby in skin-to-skin contact for short periods of time (one to three hours at a time).
- Once the baby's condition is stable and the baby does not require special treatment (e.g. oxygen or IV fluid), the mother can begin continuous KMC.
- When the baby is ready for KMC, arrange with the mother a time that is convenient for her. Ask her to wear light, loose clothing that is comfortable in the ambient temperature, provided the clothing can accommodate the baby.
- Ensure that the room is at least 25 °C.
- While the mother is holding the baby, describe to her each step of KMC, demonstrate them, and then allow her to go through the steps herself.
- Clothe the baby with a pre-warmed shirt open at the front, a napkin, a hat, and socks.
- Place the baby on the mother's chest:
 - Place the baby in an upright position directly against the mother's skin;

- Ensure that the baby's hips and elbows are flexed into a frog-like position and the baby's head and chest are on the mother's chest, with the head in a slightly extended position.
- Place the baby on the mother's chest under the mother's clothes (**Fig. F-2**) and cover with a pre-warmed blanket:
 - Special garments are not needed as long as the mother's clothes keep the baby firmly and comfortably in contact with her skin;
 - Use a soft piece of fabric (about 1 square metre), folded diagonally in two and secured with a knot. Make sure it is tied firmly enough to prevent the baby from sliding out if the mother stands, but not so tightly that it obstructs the baby's breathing or movement.
- After positioning the baby, allow the mother to rest with the baby, and encourage her to move around when she is ready.

FIGURE F-2 Baby in kangaroo mother care position under mother's clothes



BREASTFEEDING

- Have the mother attempt to breastfeed either when the baby is waking from sleep or when awake and alert.
- Have the mother sit comfortably, and help her with correct positioning and attachment (**page C-12**), if necessary.
- If the **baby cannot be breastfed**, have the mother give expressed breast milk using an alternative feeding method (**page C-14**).

DAILY LIFE FOR THE MOTHER

- Emphasize to the mother that it is important that she wash her hands frequently.
- During the day, the mother can do whatever she likes: she can walk, stand, sit, or lie down.
- The best sleeping position for the mother during KMC is a reclining position. If the **mother's bed is not adjustable**, she can use several pillows to prop herself up. She may also sleep on her side.
- When the mother needs time away from the baby for hygiene or for any other reason, either:
 - have a family member carry the baby in skin-to-skin contact while the mother is unavailable; or
 - dress the baby, place in a warm bed, and cover until the mother or a family member is available to carry the baby in skin-to-skin contact.

MONITORING THE BABY'S CONDITION

- If the **baby is in continuous KMC**, measure the baby's temperature twice daily.
- Teach the mother to observe the baby's breathing pattern, and explain the normal variations. If the **baby stops breathing**, have the mother stimulate the baby to breathe by rubbing the baby's back for 10 seconds. If the baby does not begin to breathe immediately, resuscitate the baby using a bag and mask (**page P-1**).
- Teach the mother to recognize danger signs (e.g. apnoea, decreased movement, lethargy, or poor feeding).
- Respond to any concerns the mother may have. If the **baby is feeding poorly**, determine if the mother's technique is incorrect (**page C-12**), the baby is still too immature, or the baby is becoming ill (repeat examination, **Table F-2** [**page F-11**], if necessary).

DISCHARGE AND FOLLOW-UP

- When the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**). This may be in a few

days to weeks, depending on the initial size of the baby and other problems the baby may have.

- Ensure that the mother is comfortable with her ability to care for the baby and continue KMC at home and is able to come regularly for follow-up visits.
- During the first week after discharge from the hospital, weigh the baby daily, if possible, and discuss any problems with the mother. Provide support and encouragement to the mother.
- After the first week, see the mother and the baby twice weekly until around 40 weeks post-menstrual age or when the baby weighs more than 2.5 kg. Weigh the baby and advise the mother to begin to wean the baby off KMC as soon as the baby becomes less tolerant of the position.
- Once the baby is weaned from KMC, continue to follow up monthly to monitor feeding, growth, and development until the baby is several months old.

MULTIPLE FINDINGS (MOST OFTEN SEPSIS OR ASPHYXIA)

F-35

- Keep the following points in mind regarding multiple findings:
 - A single health problem in a baby may be indicated by many signs (e.g. a baby with asphyxia may have convulsions, poor feeding, and breathing difficulty), while a single sign may point to many health problems (e.g. poor feeding may be a sign of sepsis, asphyxia, or small size);
 - Even when multiple signs point to a single problem, the signs themselves often need to be treated; therefore, it is necessary to look for further guidance in the chapter corresponding to each sign that the baby has. For example, if a baby with asphyxia or sepsis is having both breathing difficulty and convulsions, ensure that management includes treatment for both problems.
- Problems that typically produce multiple signs include asphyxia, sepsis, and small size (less than 2.5 kg at birth or born before 37 weeks gestation). Congenital syphilis, a specific kind of sepsis, may also produce multiple findings, which are described below. Remember:
 - There is considerable overlap between the signs of asphyxia and sepsis, yet distinguishing between them is important for their appropriate management;
 - Babies who are small may present with multiple signs, some of which overlap with the signs of asphyxia and sepsis;
 - Congenital syphilis is much rarer than the other three problems, even in areas where the prevalence of sexually transmitted infections is high.

PROBLEMS

- More than one finding was identified upon assessment, increasing the likelihood that the baby has a problem related to small size or has sepsis, asphyxia, or congenital syphilis.
- A single finding was identified upon assessment, but the baby later developed additional signs of illness.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), looking especially for a history of:
 - Complicated or difficult labour or birth (e.g. fetal distress);
 - Prolonged labour;
 - Failure of baby to spontaneously breathe at birth;
 - Resuscitation of baby at birth;
 - Maternal uterine infection or fever any time from the onset of labour to three days after birth;
 - Rupture of the mother's membranes for more than 18 hours before birth;
 - Small baby (less than 2.5 kg at birth or born before 37 weeks gestation);
 - Positive serologic test for syphilis during pregnancy or after birth;
 - Syphilis (of the mother or partner) during pregnancy. If the **mother or her partner had syphilis during pregnancy**, ask whether it was untreated, inadequately treated, or if the treatment status is unknown.
- Measure blood glucose (**page P-13**). If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**). Return to this chapter for further evaluation if the problems persist after treatment.
- Categorize the findings (below).

CATEGORIZE THE FINDINGS

- Look for the baby's findings in the tables below, which list the findings that are common to asphyxia and sepsis (**Table F-9, page F-37**) and the findings characteristic of babies who are small or have congenital syphilis (**Table F-10, page F-37**). If the **baby's findings are common to asphyxia and sepsis**, determine which of the baby's findings are Category A or Category B, and use this information to select appropriate management (**page F-38**).

TABLE F-9 Findings common to sepsis and asphyxia

Category A Findings	Category B Findings
• Breathing difficulty (e.g. respiratory rate more than 60 or less than 30 breaths per minute, grunting on expiration, chest indrawing, or central cyanosis [blue tongue and lips]) • Failure of baby to spontaneously breathe at birth, usually requiring resuscitation (favours asphyxia) • Apnoea • Convulsions • Unconsciousness • Abnormal body temperature since birth and not responding to treatment, unstable temperature after three or more normal temperature readings, or temperature more than 39 °C not caused by overheating (favours sepsis) • Condition worsens rapidly and dramatically (favours sepsis) • Signs starting after day 4 of life (favours sepsis) • Maternal history of uterine infection or fever any time from the onset of labour to three days after birth, or rupture of membranes for more than 18 hours before birth (favours sepsis)	• Lethargy or floppiness • Drowsiness or reduced activity • Vomiting (favours sepsis) • Abdominal distension • Poor or no feeding after having fed well (favours sepsis) • Signs starting at birth or on day 1 of life (favours asphyxia) • Prolonged labour (favours sepsis) • Unclean birth (favours sepsis) • Complicated or difficult labour or birth (fetal distress; favours asphyxia)

TABLE F-10 Findings characteristic of babies who are small or have congenital syphilis

Findings	Characteristic of
• Less than 2.5 kg at birth or born before 37 weeks gestation • Body temperature less than 36.5 °C • Apnoea • Respiratory distress syndrome (moderate to severe breathing difficulty starting at birth. The baby’s condition worsens during the first two days of life, does not change for the next one to two days, and begins to improve during the next four to seven days.) • Feeding difficulty • Floppiness	Small baby (see page F-40)
• Generalized oedema (body swelling) • Abdominal distension (from enlarged liver and/or spleen or from fluid in abdomen) • Blistering skin rash on palms and soles • Profuse nasal discharge (“snuffles”)	Congenital syphilis (see page F-41)

SELECTING APPROPRIATE MANAGEMENT

Keep in mind the following points when selecting appropriate management for the baby, and particularly when differentiating between sepsis and asphyxia:

- Sepsis can appear any time from birth to the end of the newborn period:
 - Suspect sepsis (below) in babies with multiple findings, especially if sepsis cannot be ruled out or another diagnosis is not certain;
 - When sepsis occurs within the first three days of life, it is usually related to rupture of the mother's membranes for more than 18 hours before birth or the presence of a uterine infection or fever any time from the onset of labour to three days after birth. If this **history is present in addition to clinical signs**, suspect sepsis (below);
 - If the **baby did not become ill until day 4 or later**, the presence or absence of maternal history findings no longer helps to distinguish sepsis from other problems. However, if **reliable information about the pregnancy, birth, and postnatal period is not available and the baby is more than three days old**, suspect sepsis (below);
- Asphyxia is associated with a history of difficult or prolonged labour or birth (e.g. fetal distress) and/or failure of the baby to breathe spontaneously at birth, usually requiring resuscitation. If these events occurred, suspect asphyxia (**page F-39**).
- If the **baby is small**, see **page F-40**.
- If the **baby has findings characteristic of syphilis and the mother or her partner has a history of syphilis during the pregnancy or the mother had a positive serologic test for syphilis during pregnancy**, suspect congenital syphilis (**page F-41**).

IF SEPSIS IS SUSPECTED

Review the two main bullets below, and choose the one that is more appropriate based on the baby's findings. See **Table F-11 (page F-40)** for a summary of the decision-making pathway to distinguish sepsis from asphyxia.

- If the **baby is three days old or less and the maternal history IS indicative of sepsis**, treat for sepsis (**page F-41**), and treat any specific sign (e.g. breathing difficulty).

- If the **baby is three days old or less and the maternal history IS NOT indicative of sepsis OR if the baby was more than three days old when signs of illness were first noted** (regardless of maternal history):
 - If the **baby has two or more Category A findings OR three or more Category B findings**, treat for sepsis (**page F-41**), and treat any specific sign (e.g. breathing difficulty);
 - If the **baby has one Category A finding and one Category B finding OR two Category B findings**, treat any specific sign (e.g. breathing difficulty) but do not begin treatment for sepsis. Observe the baby for additional signs of sepsis, reassessing the baby every two hours for 12 hours:
 - If **additional signs of sepsis are found at any time during the observation period**, treat for sepsis (**page F-41**);
 - If **no additional signs of sepsis are found during the observation period but the initial signs have not improved**, continue observation for 12 more hours;
 - If the **initial signs of sepsis improved during the observation period**, reassess the baby every four hours for an additional 24 hours. If improvement continues, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

IF ASPHYXIA IS SUSPECTED

Review the two main bullets below and choose the one that is more appropriate based on the baby's findings. See **Table F-11 (page F-40)** for a summary of the decision-making pathway to distinguish sepsis from asphyxia.

- If the **baby is three days old or less and the maternal history IS indicative of sepsis** (see above), treat the baby for both asphyxia (**page F-44**) and sepsis (**page F-41**), and treat any specific sign (e.g. breathing difficulty).
- If the **baby is three days old or less and the maternal history IS NOT indicative of sepsis OR if the baby was more than three days old when signs of illness were first noted** (regardless of maternal history), treat for asphyxia (**page F-44**), and treat any specific sign (e.g. breathing difficulty).

TABLE F-11 Summary of decision-making pathway to distinguish sepsis from asphyxia

Baby's Age and Mother's History	Findings More Consistent with	Treat for
Baby three days old or less and maternal history suggestive of sepsis	Asphyxia	Sepsis (page F-41) and asphyxia (page F-44)
	Sepsis	Sepsis (page F-41)
Baby three days old or less and maternal history not suggestive of sepsis OR Baby became ill on day 4 or later	Asphyxia	Asphyxia (page F-44)
	Sepsis	Possible sepsis (review for presence of Category A or B findings; Table F-9, page F-37)

IF THE BABY IS SMALL

- If the **baby is small and has findings characteristic of sepsis or asphyxia** (see **Table F-9, page F-37**):
 - Treat for sepsis and/or asphyxia as needed (see above), treat any specific sign (e.g. breathing difficulty), and provide general care for the small baby (**page F-23**);
 - If the **baby's findings include occasional apnoea, floppiness, feeding difficulty, and/or breathing difficulty that is consistent with the pattern of respiratory distress syndrome (RDS), with no maternal history suggestive of sepsis**:
 - See **pages F-51 and F-52** for management of RDS and apnoea, respectively;
 - Do not treat for sepsis unless instructed to do so in the management section for RDS or apnoea;
 - Provide general care for the small baby (**page F-23**).
- If the **baby does not have findings characteristic of sepsis or asphyxia**:
 - Provide general care for the small baby (**page F-23**);
 - Note that small babies often develop new findings during the first days and weeks of life; return to this chapter any time the baby shows multiple findings consistent with sepsis or asphyxia.

IF CONGENITAL SYPHILIS IS SUSPECTED

- If the **baby has findings characteristic of syphilis OR the mother or her partner has a history of syphilis during the mother's pregnancy**, perform a serologic test for syphilis on the mother and baby:
 - If the **mother's or baby's test for syphilis is positive**, treat for congenital syphilis (**page F-46**);
 - If the **serologic test for syphilis is not possible, the mother was not treated at least 30 days before giving birth or was treated inadequately, or if the mother's treatment status is unknown**, treat for congenital syphilis (**page F-46**).
- If the **mother had a positive serologic test for syphilis during pregnancy**, determine if the mother was treated:
 - If the **mother was treated adequately and the treatment started at least 30 days before birth**, no treatment is necessary;
 - If the **mother was not treated at least 30 days before giving birth or was treated inadequately, or if the mother's treatment status is unknown**, treat for congenital syphilis (**page F-46**).

MANAGEMENT

SEPSIS

- Establish an IV line (**page P-21**), and give only IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**) for the first 12 hours.
- Take a blood sample (**page P-9**), and send it to the laboratory for culture and sensitivity, if possible, and to measure haemoglobin.
- If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**).
- If the **baby has convulsions, opisthotonos, or a bulging anterior fontanelle**, suspect meningitis:
 - Treat convulsions, if present (**page F-59**);
 - Perform a lumbar puncture (**page P-37**);

- Send a sample of the cerebrospinal fluid (CSF) to the laboratory for cell count, Gram stain, culture, and sensitivity;
- Begin treatment for meningitis (**page F-43**) while awaiting laboratory confirmation.
- If **meningitis is not suspected**, give ampicillin and gentamicin IV according to the baby's age and weight (**Table C-9, pages C-34 to C-35**).
- Assess the baby's condition every six hours for signs of improvement:
 - If the **baby's condition is improving after three days of treatment with antibiotics**:
 - If the **blood culture is negative**, discontinue ampicillin and gentamicin after five days of treatment;
 - If the **blood culture is not possible or is positive**, continue ampicillin and gentamicin to complete 10 days of treatment.
 - If the **baby's condition is not improving after three days of treatment with antibiotics**:
 - If the **blood culture is positive**, change antibiotics according to the results of the culture and sensitivity, and give antibiotics for seven days after signs of improvement are first noted;
 - If the **blood culture is not possible or the organism cannot be identified**, discontinue ampicillin. Give cefotaxime IV according to the baby's age (**Table C-9, page C-34**), in addition to gentamicin, for seven days after signs of improvement are first noted.
- After 12 hours of treatment with antibiotics or when the baby's condition begins to improve, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- Measure haemoglobin twice weekly during hospitalization and again at discharge. If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**).
- Observe the baby for 24 hours after discontinuing antibiotics:
 - If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**);
 - If **signs of sepsis recur**, repeat the culture and sensitivity, and treat with additional antibiotics as necessary.

MENINGITIS

- Perform a lumbar puncture (**page P-37**) if not already done (see **page F-41**).
- Give ampicillin (for meningitis) and gentamicin IV according to the baby's age and weight (**Table C-9, pages C-34 to C-35**). Note that the dose of ampicillin given for meningitis is double the dose given for sepsis.
- Confirm the diagnosis of meningitis if the:
 - white blood cell count in the cerebrospinal fluid (CSF) is $20/\text{mm}^3$ or more if the baby is less than seven days old, or $10/\text{mm}^3$ or more if the baby is seven days or older; OR
 - culture or Gram stain of the CSF is positive.
- After 12 hours of treatment with antibiotics or when the baby's condition begins to improve, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- If the **baby's condition is improving after 48 hours of treatment with antibiotics**, continue antibiotics for 14 days or for seven days after signs of improvement are first noted, whichever is longer.
- If the **baby's condition is not improving after 48 hours of treatment with antibiotics**, repeat the lumbar puncture:
 - If **organisms are seen on Gram stain of the CSF**, change antibiotics according to the organism identified, and treat for 14 days or for seven days after signs of improvement are first noted, whichever is longer;
 - If the **organism cannot be identified**, discontinue ampicillin. Give cefotaxime (for meningitis) IV according to the baby's age (**Table C-9, page C-34**), in addition to gentamicin, for 14 days or for seven days after signs of improvement are first noted, whichever is longer.
- Measure haemoglobin every three days during hospitalization and again at discharge. If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**).
- Observe the baby for 24 hours after discontinuing antibiotics:
 - If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**);

- If **signs of sepsis recur**, repeat the culture and sensitivity, and treat with additional antibiotics as necessary.

ASPHYXIA

- If **convulsions occur**, treat promptly (**page F-64**) to prevent worsening of the baby's condition.
- Treat breathing difficulty, if present (**page F-47**).
- Classify the severity of asphyxia:
 - In mild cases of asphyxia, the baby may be jittery or hyperalert, with increased muscle tone, poor feeding, and a normal or rapid respiratory rate. These findings typically last for 24 to 48 hours before resolving spontaneously;
 - In moderate cases, the baby may be lethargic and have feeding difficulty. The baby may have occasional episodes of apnoea and/or convulsions for a few days. These problems usually resolve within one week, but long-term neurodevelopmental problems are possible;
 - In severe cases, the baby may be floppy or unconscious and does not feed. Convulsions may occur for several days, and severe and frequent episodes of apnoea are common. The baby may improve over several weeks or may not improve at all; if these babies survive, they usually suffer permanent brain damage.
- If the **asphyxia is mild**:
 - If the **baby is not receiving oxygen**, allow the baby to begin breastfeeding (**page C-11**);
 - If the **baby is receiving oxygen or otherwise cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**);
 - Provide ongoing care (**page F-45**).
- If the **asphyxia is moderate or severe**:
 - Establish an IV line (**page P-21**), and give only IV fluid for the first 12 hours:
 - Restrict the volume of fluid to 60 ml/kg body weight for the first day, and monitor urine output;

- If the **baby urinates less than six times daily or produces no urine:**
 - Do not increase the volume of fluid on the next day;
 - When the amount of urine begins to increase, increase the volume of IV fluid daily according to the progression of fluid volumes in **Table C-4, page C-22**, regardless of the baby's day of age (i.e. for a four-day-old baby, progress from 60 ml/kg to 80 ml/kg to 100 ml/kg, etc.; do not go directly to 120 ml/kg on the first day).
- Once the convulsions are controlled and the baby shows signs of increased responsiveness, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**);
- Provide ongoing care (below).

ONGOING CARE OF BABIES WITH ASPHYXIA

- Assess the baby every two hours:
 - If the **baby's temperature is less than 36.5 °C or more than 37.5 °C**, treat for abnormal body temperature (**page F-69**);
 - Treat for convulsions (**page F-64**) or breathing difficulty (**page F-47**) as necessary.
- Encourage the mother to hold and cuddle the baby.
- If the **baby is unconscious, lethargic, or floppy**, handle and move the baby gently to prevent injury when the baby's muscle tone is low. Support the baby's entire body, especially the head.
- If the **baby's condition is not improving after three days**, assess again for signs of sepsis (**Table F-9, page F-37**).
- If the **baby's condition does not improve after one week** (baby continues to be lethargic, is not breastfeeding or is feeding poorly, or is still having convulsions) **but the baby is no longer receiving treatment at the hospital or the treatment can be continued at home**, discuss with the mother the possibility of caring for her baby at home.
- If the **baby has not had a convulsion for three days after discontinuing phenobarbital**, the mother is able to feed the baby, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**):

- Discuss with the mother the baby's prognosis and how to deal with the problems the baby may have at home;
- Follow up in one week, or earlier if the mother notes serious problems (e.g. feeding difficulty, convulsions);
- Help the mother find the best method to feed the baby if the baby is not breastfeeding well. If the **baby is feeding slowly**, have the mother feed more frequently.

CONGENITAL SYPHILIS

- Perform a lumbar puncture (**page P-37**).
- Examine the white blood cell count in the cerebrospinal fluid (CSF) to determine if the central nervous system (CNS) is involved (i.e. white blood cell count in the CSF is more than 25/mm³):
 - If the **CNS is involved or the lumbar puncture is not possible or the CSF is bloody**, give benzylpenicillin IV or IM (**Table C-9, page C-34**) for 10 days;
 - If the **CNS is not involved**, give procaine benzylpenicillin (or benzathine benzylpenicillin) IM (**Table C-9, pages C-34 to C-35**) for 10 days. (If an **IV line is already in place**, give benzylpenicillin IV [**Table C-9, page C-34**] for 10 days.)
- If **jaundice is present**, explain to the mother that it may take up to three months to resolve.
- Give the mother and her partner(s) benzathine benzylpenicillin 1.8 g (2.4 million units) IM as two injections at separate sites.
- Refer the mother and her partner(s) for follow-up to a clinic offering services for sexually transmitted infections.
- Observe the baby for 24 hours after discontinuing antibiotics.
- If the baby remains well, is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**):
 - Follow up in four weeks to examine the baby for growth and signs of congenital syphilis;
 - Report the case to authorities, if required.

Immediately resuscitate the baby using a bag and mask (page P-1) if the baby:

- **is not breathing at all, even when stimulated; OR**
- **is gasping; OR**
- **has a respiratory rate less than 20 breaths per minute.**

PROBLEMS

- The baby's respiratory rate is more than 60 breaths per minute.
- The baby's respiratory rate is less than 30 breaths per minute.
- The baby has central cyanosis (blue tongue and lips).
- The baby has chest indrawing (**Fig. F-3**).
- The baby is grunting on expiration.
- The baby has apnoea (spontaneous cessation of breathing for more than 20 seconds).

FIGURE F-3 Chest indrawing



FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and use the information to classify the breathing difficulty (**Table F-12, page F-49**).
- Provide general management, below.

GENERAL MANAGEMENT

- Give oxygen (**page C-25**) at a moderate flow rate.
- If the **baby's respiratory rate is less than 30 breaths per minute**, observe the baby carefully. If the **respiratory rate is less than 20 breaths per minute at any time**, resuscitate the baby using a bag and mask (**page P-1**).
- If the **baby has apnoea**:
 - Stimulate the baby to breathe by rubbing the baby's back for 10 seconds;
 - If the **baby does not begin to breathe immediately**, resuscitate the baby using a bag and mask (**page P-1**);
 - See **page F-52** for additional management of apnoea.
- Measure blood glucose (**page P-13**). If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**).
- If **there are any signs in addition to difficulty breathing**, see *Multiple Findings (Most Often Sepsis or Asphyxia)* (**page F-35**) to determine if the baby's problems are due to small size or if the baby has asphyxia, sepsis, or congenital syphilis, and continue to treat for difficulty breathing.
- If the **baby's respiratory rate is more than 60 breaths per minute and the baby has central cyanosis** (even if receiving oxygen at a high flow rate) **but no chest indrawing or grunting on expiration**, suspect a congenital heart abnormality (**page F-52**).
- Classify the breathing difficulty as severe, moderate, or mild (**Table F-12, page F-49**), and manage accordingly.

TABLE F-12 Classification of breathing difficulty^a

Respiratory Rate (breaths per minute)	Grunting or Chest Indrawing	Classification
More than 90	Present	Severe
More than 90	Absent	Moderate
60 to 90	Present	Moderate
60 to 90	Absent	Mild

^a Respiratory distress syndrome (RDS) results in breathing difficulty, including chest indrawing and grunting, often associated with apnoea. The baby's condition worsens during the first two days, does not change for the next one to two days, and begins to improve during the next four to seven days. RDS is typically seen in small babies (less than 2.5 kg at birth or born before 37 weeks gestation) and starts within hours of birth. If a **small baby with breathing difficulty has findings consistent with this pattern**, treat for moderate breathing difficulty due to RDS (**page F-51**).

SPECIFIC MANAGEMENT

SEVERE BREATHING DIFFICULTY

- Insert a gastric tube (**page P-33**) to empty the stomach of air and secretions.
- Treat for sepsis (**page F-41**).
- Monitor and record the baby's respiratory rate, presence of chest indrawing or grunting on expiration, and episodes of apnoea every three hours until the baby no longer requires oxygen and then for an additional 24 hours.
- Monitor the baby's response to oxygen (**page C-29**).
- When the baby begins to show signs of improvement:
 - Give expressed breast milk by gastric tube (**page C-18**);
 - When oxygen is no longer needed, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- If the **baby's breathing difficulty worsens or the baby has central cyanosis**:

- Give oxygen (**page C-25**) at a high flow rate;
- If **breathing difficulty is so severe that the baby has central cyanosis even in 100% oxygen**, organize transfer (**page C-63**) and urgently refer the baby to a tertiary hospital or specialized centre capable of assisted ventilation, if possible.
- Observe the baby for 24 hours after discontinuing antibiotics.
- If the baby's tongue and lips have remained pink without oxygen for at least two days, the baby has no difficulty breathing and is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

MODERATE BREATHING DIFFICULTY

MODERATE BREATHING DIFFICULTY NOT DUE TO RDS

- Establish an IV line (**page P-21**), and give only IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**) for the first 12 hours.
- Monitor and record the baby's respiratory rate, presence of chest indrawing or grunting on expiration, and episodes of apnoea every three hours until the baby no longer requires oxygen and then for an additional 24 hours.
- If the **baby's breathing difficulty does not improve or worsens after two hours**, manage for severe breathing difficulty (**page F-49**).
- Monitor the baby's response to oxygen (**page C-29**).
- When the baby begins to show signs of improvement:
 - Give expressed breast milk by gastric tube (**page C-18**);
 - When oxygen is no longer needed, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- If the baby's tongue and lips have remained pink without oxygen for at least one day, the baby has no difficulty breathing and is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

MODERATE BREATHING DIFFICULTY DUE TO RESPIRATORY DISTRESS SYNDROME

- Establish an IV line (**page P-21**), and give only IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**) for the first 12 hours.
- Monitor and record the baby's respiratory rate, presence of chest indrawing or grunting on expiration, and episodes of apnoea every three hours until the baby no longer requires oxygen and then for an additional 24 hours.
- If the **baby's condition does not stabilize after two days**, manage as for severe breathing difficulty (**page F-49**).
- Monitor the baby's response to oxygen (**page C-29**).
- When the baby begins to show signs of improvement:
 - Give expressed breast milk by gastric tube (**page C-18**);
 - When oxygen is no longer needed, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- If the baby's tongue and lips have remained pink without oxygen for at least one day, the baby has no difficulty breathing and is feeding well, and there are no other problems requiring special treatment, provide routine care for a small baby (**page F-23**) until the baby is ready to be discharged (**page C-67**).

MILD BREATHING DIFFICULTY

- Give expressed breast milk by gastric tube (**page C-18**).
- Monitor and record the baby's respiratory rate, presence of chest indrawing or grunting on expiration, and episodes of apnoea every three hours until the baby no longer requires oxygen and then for an additional 24 hours.
- Monitor the baby's response to oxygen (**page C-29**).
- When oxygen is no longer needed, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, continue giving expressed breast milk using an alternative feeding method (**page C-14**).

- If the **breathing difficulty worsens at any time during the observation period**:
 - If the **baby has the typical pattern of RDS**, treat for moderate breathing difficulty caused by RDS (**page F-51**);
 - If the **baby does NOT have the typical pattern of RDS**, look for signs of sepsis (**Table F-9, page F-37**) and treat if found (**page F-41**), and manage moderate (**page F-50**) or severe (**page F-49**) breathing difficulty as necessary.
- If the baby's tongue and lips have remained pink without oxygen for at least one day, the baby has no difficulty breathing and is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

CONGENITAL HEART ABNORMALITY

The diagnosis of a heart abnormality is made by exclusion of other diagnoses.

- Give oxygen (**page C-25**) at a high flow rate.
- Give expressed breast milk by gastric tube (**page C-18**).
- If the **baby cannot tolerate feeding**, establish an IV line (**page P-21**), and give IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**).
- Organize transfer (**page C-63**), and refer the baby to a tertiary hospital or specialized centre for further evaluation, if possible.

APNOEA

SMALL BABY

Small babies are prone to episodes of apnoea, which are more frequent in very small babies (less than 1.5 kg at birth or born before 32 weeks gestation) but they become less frequent as the baby grows.

- Teach the mother to observe the baby closely for further episodes of apnoea. If the **baby stops breathing**, have the mother stimulate the baby to breathe by rubbing the baby's back for 10 seconds. If the **baby does not begin to breathe immediately**, resuscitate the baby using a bag and mask (**page P-1**).

- Review the general principles of feeding and fluid management of small babies (**page F-26**).
- Encourage the use of kangaroo mother care (**page F-30**), if possible. Babies cared for in this way have fewer apnoeic episodes, and the mother is able to observe the baby closely.
- If the **apnoeic episodes become more frequent**, treat for sepsis (**page F-41**).
- If the baby has not had an episode of apnoea for seven days, is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

TERM BABY

- If a **term baby has had only a single episode of apnoea**:
 - Observe the baby closely for further episodes of apnoea for 24 hours, and teach the mother how to do so. If the **baby does not have another apnoeic episode in 24 hours**, is feeding well, and has no other problems requiring hospitalization, discharge the baby (**page C-67**);
 - If **apnoea recurs**, manage for multiple episodes of apnoea, below.
- If a **term baby has had multiple episodes of apnoea**:
 - Treat for sepsis (**page F-41**);
 - If the **baby has not had an episode of apnoea in the past seven days**, is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

MOTHER WITH HISTORY OF UTERINE INFECTION OR FEVER DURING LABOUR OR AFTER BIRTH, OR RUPTURE OF MEMBRANES FOR MORE THAN 18 HOURS BEFORE BIRTH

F-55

A baby born to a mother with a uterine infection or fever any time from the onset of labour to three days after birth, or rupture of membranes for more than 18 hours before birth, is often normal at birth but can develop a problem later. The management suggested in this chapter is intended to prevent sepsis from occurring in a baby who does not have signs of illness at birth. If the **baby has ANY sign**, follow the appropriate sign chapter. If a **baby has multiple findings of illness** (e.g. breathing difficulty, vomiting, and lethargy), see the chapter *Multiple Findings (Most Often Sepsis or Asphyxia)* (**page F-35**).

PROBLEMS

- The baby's mother has or had a uterine infection or fever any time from the onset of labour to three days after birth.
- The baby's mother's membranes were ruptured for more than 18 hours before birth.

MANAGEMENT

- If the **baby is more than three days old** (regardless of gestational age), no treatment (e.g. antibiotics) or observation is needed. Explain to the mother the signs of sepsis (e.g. **Table F-9, page F-37**), and ask her to return with the baby if the baby develops any signs of sepsis.
- If the **baby is three days old or less**, treat according to gestational age (below).

GESTATIONAL AGE 35 WEEKS OR MORE (BORN LESS THAN ONE MONTH EARLY) OR BIRTH WEIGHT 2 KG OR MORE

UTERINE INFECTION OR FEVER, WITH OR WITHOUT RUPTURE OF MEMBRANES

- Treat for sepsis (**page F-41**) with the following modifications:
 - If the **blood culture is positive** or if the **baby develops signs of sepsis**, continue antibiotics to complete 10 days of treatment;

- If the **blood culture is negative and the baby still has no signs of sepsis after five days of treatment with antibiotics**, discontinue antibiotics;
- If the **blood culture is not possible but the baby still has no signs of sepsis after five days of treatment with antibiotics**, discontinue antibiotics.
- Observe the baby for 24 hours after discontinuing antibiotics:
 - If the baby remains well, is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**);
 - Explain to the mother the signs of sepsis (e.g. **Table F-9, page F-37**), and ask her to return with the baby if the baby develops any signs of sepsis.

RUPTURE OF MEMBRANES WITHOUT UTERINE INFECTION OR FEVER

- Take a blood sample (**page P-9**), and send it to the laboratory for culture and sensitivity, if possible, but do not start antibiotics.
- Observe for signs of sepsis (e.g. poor feeding, vomiting, breathing difficulty; **Table F-9, page F-37**) every four hours for 48 hours.
- If the **blood culture is negative**, the baby still has no signs of sepsis after 48 hours and is feeding well, and there are no other problems requiring hospitalization:
 - Discharge the baby (**page C-67**);
 - Explain to the mother the signs of sepsis (e.g. **Table F-9, page F-37**), and ask her to return with the baby if the baby develops any signs of sepsis.
- If the **blood culture is positive** or if the **baby develops signs of sepsis**, treat for sepsis (**page F-41**).
- If the **blood culture is not possible**, observe the baby for an additional three days. If the baby remains well during this time, discharge the baby (**page C-67**). Explain to the mother the signs of sepsis (e.g. **Table F-9, page F-37**), and ask her to return with the baby if the baby develops any signs of sepsis.

GESTATIONAL AGE LESS THAN 35 WEEKS (BORN ONE MONTH OR MORE EARLY) OR BIRTH WEIGHT LESS THAN 2 KG

- Treat for sepsis (**page F-41**) with the following modifications:
 - If the **blood culture is positive** or if the **baby develops signs of sepsis**, continue antibiotics to complete 10 days of treatment;
 - If the **blood culture is negative and the baby still has no signs of sepsis after five days of treatment with antibiotics**, discontinue antibiotics;
 - If the **blood culture is not possible but the baby still has no signs of sepsis after five days of treatment with antibiotics**, discontinue antibiotics.
- Observe the baby for 24 hours after discontinuing antibiotics:
 - If the baby remains well, is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**);
 - Explain to the mother the signs of sepsis (e.g. **Table F-9, page F-37**), and ask her to return with the baby if the baby develops any signs of sepsis.

F-58

Mother with history of uterine infection or fever during labour or after birth,
or rupture of membranes for more than 18 hours before birth

Convulsions can be due to asphyxia, birth injury, or hypoglycaemia and are also a sign of meningitis or neurologic problems. Between the convulsions, the baby may appear normal or may be unconscious, lethargic, or irritable.

The spasms of neonatal tetanus may superficially resemble convulsions, but the two need to be distinguished from each other because the treatment of tetanus differs from that of convulsions.

PROBLEMS

- The baby is having a convulsion or spasm.
- The baby has a history of convulsions or spasms.

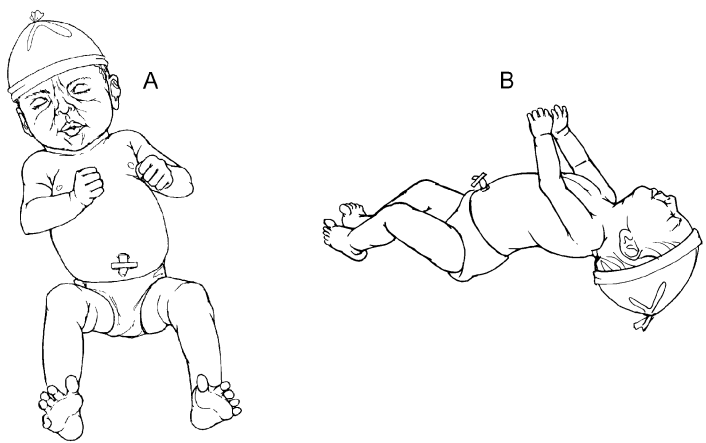
FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information.
- If the **baby is currently having a convulsion/spasm**, look for distinguishing features (**Table F-13, page F-60**).
- If the **baby is not currently having a convulsion/spasm**, ask the mother (or whoever brought the baby in):
 - Can you describe the type of abnormal movements the baby had? Were they triggered by noise or handling? (Use **Table F-13, page F-60** to differentiate between a convulsion and a spasm.)
 - Did the baby's condition suddenly deteriorate?
 - Did the baby suddenly become pale?
 - Did you receive the complete immunization schedule for tetanus?
 - Was the birth unclean or were unclean or harmful substances (e.g. animal dung) applied to the baby's umbilicus?
 - Did the baby have jaundice early (on or before day 2 of life)? If so, was the baby treated?
- Measure blood glucose (**page P-13**). If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**).
- Determine the probable diagnosis (**Table F-14, page F-62**).

TABLE F-13 Distinguishing features of convulsions and spasms

Problem	Typical Findings
Generalized convulsion ^a	• Repetitive jerking movements of limbs or face • Continuous extension or flexion of arms and legs, either synchronous or asynchronous • Apnoea (spontaneous cessation of breathing for more than 20 seconds) • Baby may appear unconscious or awake but unresponsive)
Subtle convulsion ^a	• Repetitive blinking, eye deviation, or staring • Repetitive movements of mouth or tongue • Purposeless movement of the limbs, as if bicycling or swimming • Apnoea • Baby may be conscious
Spasm	• Involuntary contraction of muscles (Fig. F-4A) that lasts a few seconds to several minutes • Fists often persistently and tightly clenched (Fig. F-4A) • Trismus (tight jaw; the baby’s mouth cannot be opened and the lips may be pursed together in a “fish mouth” expression; Fig. F-4A) • Opisthotonos (extreme hyperextension of the body, with the head and heels bent backward and the body arched forward; Fig. F-4B) • Triggered by touch, light, or sound • Baby is conscious throughout, often crying with pain

FIGURE F-4 Babies with spasms of the face and limbs (A) and opisthotonos (B)



^a Note that generalized and subtle convulsions are both managed in the same way.

Ensure that the baby is having a convulsion or a spasm and is not just jittery:

- **Like convulsions, jitteriness is characterized by rapid, repetitive movements; however, in a jittery baby, these movements are of the same amplitude and in the same direction.**
- **Like spasms, jitteriness can be precipitated by sudden handling of the baby or by loud noises, but it is usually stopped by cuddling, feeding, or flexing the baby's limb.**

DIFFERENTIAL DIAGNOSIS

TABLE F-14 Differential diagnosis of convulsions or spasms

History	Findings ^a		Probable Diagnosis
	Examination	Investigations or Other Known Diagnoses	
• Time of onset day 1 to 3 • History of maternal diabetes • Poor or no feeding	• Convulsions, jitteriness, lethargy, or unconsciousness • Small baby (less than 2.5 kg at birth or born before 37 weeks gestation) • Large baby (more than 4 kg at birth)	• <i>Blood glucose less than 45 mg/dl (2.6 mmol/l)</i>	Low blood glucose, page F-91
• Mother not immunized with tetanus toxoid • Poor or no feeding after having fed well • Time of onset day 3 to 14 • Unclean birth • Application of unclean or harmful substances (e.g. animal dung) to umbilicus	• Spasms	• Infection of umbilicus	Tetanus, page F-66
• Time of onset day 2 or later	• Convulsions or unconsciousness • <i>Bulging anterior fontanelle</i> • Lethargy	• Sepsis	Possible meningitis Treat for convulsions (page F-64) and meningitis (page F-43).

TABLE F-14 Cont. Differential diagnosis of convulsions or spasms

Findings ^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Complicated or difficult labour or birth (fetal distress) • Failure of baby to spontaneously breathe at birth • Resuscitation at birth • Time of onset within 24 hours of birth	• Convulsions or unconsciousness • Lethargy or floppiness • Breathing difficulty • Abnormal body temperature • Drowsiness or reduced activity • Irritability		Asphyxia or other brain injury Treat for convulsions (page F-64) and asphyxia (page F-44).
• Time of onset day 1 to 7 • Sudden deterioration of condition • Sudden pallor	• Convulsions or unconsciousness • Small baby (less than 2.5 kg at birth or born before 37 weeks gestation) • Severe breathing difficulty		Intraventricular bleeding, page F-66
• Time of onset of encephalopathy day 3 to 7 • Serious jaundice • Late or no treatment of serious jaundice	• Convulsions • Opisthotonos • Poor or no feeding • Lethargy or floppiness	• Positive Coombs test	Bilirubin encephalopathy (kernicterus) Treat for convulsions (page F-64) and bilirubin encephalopathy (page F-83).

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italics is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

CONVULSIONS

INITIAL MANAGEMENT OF CONVULSIONS

- Establish an IV line (**page P-21**), and give only IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**) for the first 12 hours. If the convulsions are due to asphyxia, see **page F-44** for guidelines on fluid volume.
- If the **baby's blood glucose was less than 45 mg/dl (2.6 mmol/l)**, ensure that the baby was treated for low blood glucose (**page F-91**) before continuing with management of the convulsion (below) to rule out hypoglycaemia as the cause of the convulsions.
- If the **baby is currently having a convulsion or the baby had a convulsion within the last hour**, give phenobarbital 20 mg/kg body weight IV slowly over five minutes:
 - If an **IV line has not yet been established**, give phenobarbital 20 mg/kg body weight as a single IM injection;
 - If **convulsions do not stop within 30 minutes**, give another dose of phenobarbital 10 mg/kg body weight IV slowly over five minutes (or IM if an IV line still has not yet been established). Repeat one more time after another 30 minutes, if necessary;
 - If **convulsions continue or if they recur within six hours**, give phenytoin 20 mg/kg body weight IV, noting the following:
 - Give phenytoin IV only;
 - Mix the total dose of phenytoin in 15 ml of normal saline and infuse at the rate of 0.5 ml per minute over 30 minutes. Use only normal saline to infuse phenytoin, as all other fluid will cause the phenytoin to crystallize.

CAUTION

Do not use diazepam for convulsions; diazepam given in addition to phenobarbital will increase the risk of circulatory collapse and respiratory failure.

- If the **baby has central cyanosis (blue tongue and lips) or other signs of breathing difficulty**, give oxygen (**page C-25**) at a moderate flow rate.

ONGOING CARE OF BABIES WHO HAVE HAD CONVULSIONS

- Observe the baby for recurrence of convulsions, looking especially for subtle convulsions (**Table F-13, page F-60**).
- If **convulsions recur within two days**, give phenobarbital 5 mg/kg body weight once daily by mouth until the baby has not had a convulsion for seven days.
- If **convulsions recur after two days without convulsions**, repeat treatment with phenobarbital as described for initial management of convulsions (**page F-64**) and again follow with phenobarbital 5 mg/kg body weight once daily by mouth until the baby has not had a convulsion for seven days.
- If the **baby is receiving daily phenobarbital**:
 - Continue phenobarbital for seven days after the last convulsion;
 - Once phenobarbital is discontinued, observe the baby for an additional three days.
- Continue IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**). If the **convulsions are due to asphyxia**, see **page F-44** for guidelines on fluid volume.
- Once the baby's condition is stable, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- Provide general care for the baby:
 - Encourage the mother to hold the baby, but avoid overstimulation by noise and excessive handling;
 - Handle and move the baby gently to prevent injury when the baby's muscle tone is low. Support the baby's entire body, especially the head;
 - Explain to the mother that the phenobarbital will make the baby very sleepy for several days.
- Explain to the mother that if convulsions stop and the baby feeds well by seven days of age, recovery will probably be complete.
- If the **baby's condition does not improve after one week** (baby continues to be lethargic, is not breastfeeding or is feeding poorly, or is still having convulsions) **but the baby is no longer receiving treatment**

at the hospital or the treatment can be continued at home, discuss with the mother the possibility of caring for her baby at home.

- If the **baby has not had a convulsion for three days after discontinuing phenobarbital**, the mother is able to feed the baby, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**):
 - Discuss with the mother the baby's prognosis and how to deal with the problems the baby may have at home;
 - Follow up in one week, or earlier if the mother notes serious problems (e.g. feeding difficulty, convulsions);
 - Help the mother find the best method to feed the baby if the baby is not breastfeeding well. If the **baby is feeding slowly**, have the mother feed more frequently.

MANAGEMENT OF SPECIFIC CONDITIONS

INTRAVENTRICULAR BLEEDING

Intraventricular bleeding is difficult to distinguish from meningitis, especially in a baby with other problems during the first days of life. Therefore, treat for meningitis until infection can be ruled out as the cause of convulsions.

- Provide general management for bleeding (**page F-114**).
- Treat for convulsions (**page F-64**).
- Treat for meningitis (**page F-43**) until infection can be ruled out as the cause of the convulsions.

TETANUS

- Establish an IV line (**page P-21**), and give IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**).
- Give diazepam 1 mg/kg body weight IV slowly over three minutes:
 - If an **IV line cannot be established**, insert a gastric tube (**page P-33**), and give the diazepam via the tube;

- If **diazepam is not available**, give paraldehyde 0.3 ml/kg body weight in arachis oil rectally (**page P-41**). Do not give paraldehyde IM or IV;
- If the **spasms do not stop within 30 minutes**, give another dose of diazepam 1 mg/kg body weight IV slowly over three minutes (or paraldehyde 0.3 ml/kg body weight rectally). Repeat one more time after another 30 minutes, if necessary;

If the baby's respiratory rate is less than 30 breaths per minute, withhold diazepam, even if the baby continues to have spasms.

- If **spasms continue or if they recur**, give additional diazepam 1 mg/kg body weight IV slowly (or by gastric tube if an IV line still has not been established) every six hours.
- If the **baby has central cyanosis (blue tongue and lips) after the spasm**, give oxygen at a moderate flow rate (**page C-25**). Use only a head box, as other methods of administering oxygen may cause spasms.
- Give the baby:
 - antitetanus immunoglobulin (human) 500 units IM, if available, or give equine tetanus antitoxin 5000 units IM;
 - tetanus vaccine (tetanus toxoid) 0.5 ml IM at a different site from the immunoglobulin or antitoxin;
 - benzylpenicillin IV or IM (**Table C-9, page C-34**) for seven days.
- Give the mother tetanus vaccine (tetanus toxoid) 0.5 ml (to protect her and any baby she may have in the future), and ask her to return in one month for a second dose.
- If the **umbilicus is red and swollen, draining pus, or foul smelling**, treat for infection of the umbilicus (**page F-135**).

ONGOING CARE OF BABIES WITH TETANUS

- Care for the baby in a quiet, darkened room to reduce unnecessary stimulation, but make sure the baby is not neglected.
- Continue IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**).
- Give expressed breast milk by gastric tube (**page C-18**) between the spasms. Start with half the volume appropriate for the baby's age (**Table**

C-4, page C-22), and slowly decrease the volume of IV fluid while increasing the volume of oral feeds over a period of two days.

- If the **baby has not had a spasm for two days**, has received all doses of benzylpenicillin, is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

Low body temperature (hypothermia) may be caused by exposure to a cold environment (low ambient temperature, cold surface, or draught), or the baby may be wet or under-dressed for age and size. Elevated body temperature (hyperthermia) may be caused by exposure to a warm environment (e.g. high ambient temperature, sun exposure, or overheating by an incubator or radiant warmer). Hypothermia and hyperthermia may also be signs of illness, such as sepsis.

PROBLEMS

- The baby's axillary temperature is less than 36.5 °C.
- The baby's axillary temperature is more than 37.5 °C.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information to determine the probable diagnosis (**Table F-15, page F-70**).
- Determine if the baby was exposed to a cold or hot environment. Ask the mother (or whoever brought the baby in):
 - Was the baby dried after birth and kept warm?
 - Has the baby been clothed appropriately for the climate?
 - Has the baby been sleeping separately from the mother?
 - Was the baby exposed to the sun?
- If the **baby was being treated under a radiant warmer or was in an incubator or cot in the hospital when the abnormal body temperature was first noted**, check the:
 - room temperature;
 - temperature setting on the incubator or radiant warmer;
 - actual temperature in the incubator or under the radiant warmer;
 - frequency with which the baby's temperature was monitored.

TABLE F-15 Differential diagnosis of abnormal body temperature

Findings ^a		Probable Diagnosis
History	Examination	
• Baby exposed to cold environment • Time of onset day 1 or later	• <i>Body temperature less than 32 °C</i> • Breathing difficulty • Heart rate less than 100 beats per minute • Poor or no feeding • Lethargy • Hardened skin • Slow, shallow breathing	Severe hypothermia, page F-71
• Baby exposed to cold environment • Time of onset day 1 or later	• <i>Body temperature 32 °C to 36.4 °C</i> • Breathing difficulty • Heart rate less than 100 beats per minute • Poor or no feeding • Lethargy	Moderate hypothermia, page F-72
• No exposure to cold or hot environment • Time of onset day 1 or later	• <i>Fluctuations in body temperature between 36 °C and 39 °C despite being in a stable temperature environment</i> • Fluctuations in temperature occurring after three or more normal temperature readings	Temperature instability Suspect sepsis (page F-38).
• Baby exposed to hot environment (e.g. overwarming in incubator or under radiant warmer, exposure to high ambient temperature) • Time of onset day 1 or later	• <i>Body temperature more than 37.5 °C</i> • Signs of dehydration (sunken eyes or fontanelle, loss of skin elasticity, or dry tongue and mucous membranes) • Poor or no feeding • Respiratory rate consistently more than 60 breaths per minute • Heart rate more than 160 beats per minute • Lethargy • Irritability	Hyperthermia, page F-73

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italics is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT

SEVERE HYPOTHERMIA

- Warm the baby immediately using a prewarmed radiant warmer (**page C-5**). Use another method of rewarming (**page C-1**), if necessary.
- Remove cold or wet clothing, if present. Dress the baby in warm clothes and a hat, and cover with a warm blanket.
- Treat for sepsis (**page F-41**), and keep the tubing of the IV line under the radiant warmer to warm the fluid.
- Measure blood glucose (**page P-13**). If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**).
- Assess the baby:
 - Look for emergency signs (i.e. respiratory rate less than 20 breaths per minute, gasping, not breathing, or shock) every hour;
 - Measure the baby's temperature every hour:
 - If the **baby's temperature is increasing at least 0.5 °C per hour over the last three hours**, rewarming is successful; continue measuring the baby's temperature every two hours;
 - If the **baby's temperature does not rise or is rising more slowly than 0.5 °C per hour**, ensure that the temperature of the warming device is set correctly.
- If the **baby's respiratory rate is more than 60 breaths per minute or the baby has chest indrawing or grunting on expiration**, treat for breathing difficulty (**page F-47**).
- Assess readiness to feed every four hours until the baby's temperature is within the normal range.
- If the **baby shows signs of readiness to suckle**, allow the baby to begin breastfeeding (**page C-11**):
 - If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**);

- If the **baby is not able to feed at all**, give expressed breast milk by gastric tube (**page C-18**) once the baby's temperature reaches 35 °C.
- Once the baby's temperature is normal, measure the temperature every three hours for 12 hours.
- If the **baby's temperature remains within the normal range**, discontinue measurements.
- If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**). Advise the mother how to keep the baby warm at home.

MODERATE HYPOTHERMIA

- Remove cold or wet clothing, if present.
- If the **mother is present**, have her rewarm the baby using skin-to-skin contact (**page C-5**) if the baby does not have other problems.
- If the **mother is not present or skin-to-skin contact cannot be used**:
 - Dress the baby in warm clothes and a hat, and cover with a warm blanket;
 - Warm the baby using a radiant warmer (**page C-5**). Use another method of rewarming (**page C-1**), if necessary.
- Encourage the mother to breastfeed more frequently. If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- Measure blood glucose (**page P-13**). If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**).
- If the **baby's respiratory rate is more than 60 breaths per minute or the baby has chest indrawing or grunting on expiration**, treat for breathing difficulty (**page F-47**).
- Measure the baby's temperature every hour for three hours:
 - If the **baby's temperature is increasing at least 0.5 °C per hour over the last three hours**, rewarming is successful; continue measuring the baby's temperature every two hours;

- If the **baby's temperature does not rise or is rising more slowly than 0.5 °C per hour**, look for signs of sepsis (e.g. poor feeding, vomiting, breathing difficulty; **Table F-9, page F-37**);
- Once the baby's temperature is normal, measure the baby's temperature every three hours for 12 hours;
- If the **baby's temperature remains within the normal range**, discontinue measurements.
- If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**). Advise the mother how to keep the baby warm at home.

HYPERTHERMIA

Do not give antipyretic drugs to reduce the baby's temperature.

- If the **baby's respiratory rate is more than 60 breaths per minute or the baby has chest indrawing or grunting on expiration**, treat for breathing difficulty (**page F-47**).
- If the **hyperthermia is due to overwarming under a radiant warmer or in an incubator**:
 - Reduce the temperature setting of the warming device. If the **baby is in an incubator**, open the incubator portholes until the temperature of the incubator is within the normal range;
 - Undress the baby partially or fully for 10 minutes, then dress and cover the baby;
 - Observe for signs of sepsis (e.g. poor feeding, vomiting, breathing difficulty; **Table F-9, page F-37**) now and repeat when the baby's temperature is within the normal range;
 - Measure the baby's temperature every hour until it is within the normal range;

- Measure the temperature in the incubator or the temperature under the radiant warmer every hour, and adjust the temperature setting accordingly;
- Review nursing care practices to ensure that the problem does not happen again;
- Provide ongoing management of hyperthermia (**page F-74**).
- If the **hyperthermia is due to exposure to a high ambient temperature or sun exposure**:
 - Place the baby in a normal temperature environment (25 °C to 28 °C);
 - Undress the baby partially or fully for 10 minutes, then dress and cover the baby;
 - If the **baby's temperature is more than 39 °C**:
 - Sponge the baby or give the baby a bath for 10 to 15 minutes in water that is about 4 °C lower than the baby's current temperature;
 - Do not use cold water or water that is more than 4 °C lower than the baby's temperature;
 - Measure the baby's temperature every hour;
 - If the **baby's temperature is still abnormal after two hours**, treat for sepsis (**page F-41**);
 - Provide ongoing management of hyperthermia (below).

ONGOING MANAGEMENT OF HYPERTHERMIA

- Ensure that the baby receives adequate food or fluid:
 - Allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**);
 - If there are **signs of dehydration** (sunken eyes or fontanelle, loss of skin elasticity, or dry tongue or mucous membranes):
 - Establish an IV line (**page P-21**), and give IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**);

- Increase the volume of fluid by 10% of the baby's body weight on the first day that the dehydration is noted.
- Measure blood glucose (**page P-13**). If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**).
- Once the baby's temperature is within the normal range, measure the baby's temperature every three hours for 12 hours. If the **baby's temperature remains within the normal range**, discontinue measurements.
- If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**). Advise the mother how to keep the baby warm at home and protect from overheating.

Many babies, particularly small babies (less than 2.5 kg at birth or born before 37 weeks gestation), may have jaundice during the first week of life. In most cases, the level of bilirubin that causes the jaundice is not harmful and does not require treatment. However, any jaundice visible in the first 24 hours of life should be assumed to be serious.

PROBLEM

- The baby has jaundice.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information to determine the probable diagnosis.
- Ask the mother (or whoever brought the baby in):
 - Did you have a previous baby with early jaundice (on day 1 of life), haemolytic jaundice, glucose-6-phosphate dehydrogenase (G6PD) deficiency, or Rhesus (Rh) factor or ABO blood group incompatibility?
 - What is your blood group and the blood group of the baby's father?
 - Is there a family history of anaemia, enlarged liver, or removal of spleen?
- Estimate the severity of jaundice:
 - Observe in good daylight. Jaundice will look more severe if observed in artificial light and may be missed in poor light;
 - Lightly press the skin with a finger to reveal the underlying colour of the skin and subcutaneous tissue;
 - Estimate the severity of jaundice by day of life and the area of the body where jaundice is seen (**Table F-16, page F-78**).

TABLE F-16 Clinical estimation of severity of jaundice

Age	Jaundice Visible on	Classify as
Day 1	Any visible jaundice ^a	Serious jaundice
Day 2	Arms and legs ^a	
Day 3 and thereafter	Hands and feet	

^a Visible jaundice seen anywhere on the body on day 1 or on the hands and feet in addition to the arms and legs on day 2 is very serious and needs to be treated with phototherapy immediately. Do not wait to begin phototherapy until the serum bilirubin level is known.

INITIAL MANAGEMENT OF SERIOUS JAUNDICE

- Begin phototherapy (**page F-84**) if jaundice is classified as serious in **Table F-16**.
- Determine if the baby has the following risk factors: less than 2.5 kg at birth, born before 37 weeks gestation, haemolysis, or sepsis.
- Take a blood sample (**page P-9**), and measure serum bilirubin (if possible) and haemoglobin, determine the baby's blood group, and perform a Coombs test:
 - If the **serum bilirubin is below the level requiring phototherapy (Table F-17, page F-79)**, discontinue phototherapy;
 - If the **serum bilirubin is at or above the level requiring phototherapy (Table F-17, page F-79)**, continue phototherapy;
 - If the **Rh factor and ABO blood group do not indicate a cause of haemolysis** or if **there is a family history of G6PD deficiency**, obtain a G6PD screen, if possible.
- Determine the probable diagnosis (**Table F-18, page F-80**).

TABLE F-17 Treatment of jaundice based on serum bilirubin level

Age	Phototherapy				Exchange Transfusion ^a			
	Healthy Term Baby		Any Risk Factor ^b		Healthy Term Baby		Any Risk Factor	
	mg/dl	μmol/l	mg/dl	μmol/l	mg/dl	μmol/l	mg/dl	μmol/l
Day 1	Any visible jaundice ^c				15	260	13	220
Day 2	15	260	13	220	25	425	15	260
Day 3	18	310	16	270	30	510	20	340
Day 4 and thereafter	20	340	17	290	30	510	20	340

^a Exchange transfusion is not described in this guide. These serum bilirubin levels are included in case exchange transfusion is possible or in case the baby can be transferred quickly and safely to another facility where exchange transfusion can be performed. If **exchange transfusion is possible and the serum bilirubin has reached the level in this table**, send a sample of the mother's and the baby's blood.

^b Risk factors include small size (less than 2.5 kg at birth or born before 37 weeks gestation), haemolysis, and sepsis.

^c Visible jaundice anywhere on the body on day 1 or on the hands and feet in addition to the arms and legs on day 2 is very serious and needs to be treated with phototherapy immediately. Do not wait to begin phototherapy until the serum bilirubin level is known.

DIFFERENTIAL DIAGNOSIS

TABLE F-18 Differential diagnosis of jaundice

Findings ^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Jaundice developing in less than 36 hours • Pallor • ABO blood group or Rh factor incompatibility or G6PD deficiency in previous baby • Family history of G6PD deficiency, jaundice, anaemia, enlarged liver, or removal of spleen	• Serious jaundice • Pallor • Generalized oedema (body swelling) • Male baby (a supportive finding for G6PD deficiency only)	• Haemoglobin less than 13 g/dl (haematocrit less than 40%) • Positive Coombs test • <i>ABO blood group or Rh factor incompatibility between mother and baby</i> • <i>Positive G6PD screen</i>	Haemolytic jaundice Provide general management for pallor (page F-114), if necessary, and treat for haemolytic jaundice (page F-81).
• Time of onset day 2 to 5	• Serious jaundice • Small baby (less than 2.5 kg at birth or born before 37 weeks gestation)	• No evidence of other causes of jaundice	Jaundice of prematurity, page F-82
• Time of onset day 2 to 7	• Serious jaundice	• Sepsis • No evidence of other causes of jaundice	Jaundice associated with sepsis Treat for sepsis (page F-41) and provide phototherapy, if necessary (page F-84).
• Time of onset day 2 or later	• Serious jaundice • Male baby	• No evidence of other causes of jaundice • <i>Positive G6PD screen</i>	G6PD deficiency Treat as for haemolytic jaundice (page F-81).

TABLE F-18 Cont. Differential diagnosis of jaundice

History	Findings ^a		Probable Diagnosis
	Examination	Investigations or Other Known Diagnoses	
• Time of onset of encephalopathy day 3 to 7 • Late or no treatment of serious jaundice	• Serious jaundice • Convulsions • Opisthotonos • Poor or no feeding • Lethargy • Floppiness	• Positive Coombs test	Bilirubin encephalopathy (kernicterus), page F-83

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in *italics* is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT OF SPECIFIC CONDITIONS

HAEMOLYTIC JAUNDICE

Haemolytic jaundice in a newborn is most commonly caused by Rh factor or ABO blood group incompatibility between the baby and mother or by G6PD deficiency in the baby. The treatment below applies to all cases of haemolytic jaundice, regardless of the cause.

- If the **serum bilirubin is at a level requiring phototherapy** (Table F-17, page F-79), continue phototherapy.
- If **referral for exchange transfusion is possible**:
 - If the **serum bilirubin is close to the level requiring exchange transfusion** (Table F-17, page F-79), **the haemoglobin is less than 13 g/dl** (haematocrit less than 40%), **and the Coombs test is positive**, urgently refer the baby (see page F-82);
 - If the **serum bilirubin cannot be measured and it is not possible to perform a Coombs test**, urgently refer the baby (see page F-82) if jaundice started on day 1 and the haemoglobin is less than 13 g/dl (haematocrit less than 40%);

- If the **baby is being referred for exchange transfusion**:
 - Organize transfer (**page C-63**);
 - Urgently refer the baby to a tertiary hospital or specialized centre;
 - Send a sample of the mother's and the baby's blood;
 - Explain to the mother why the baby has jaundice, why the referral is required, and the treatment that the baby will receive.
- Advise the mother:
 - If the **cause of jaundice is Rh factor incompatibility**, ensure that the mother is advised regarding future pregnancies;
 - If the **baby has G6PD deficiency**, advise the mother about which substances to avoid to prevent haemolysis in the baby (e.g. anti-malarial drugs, sulfa drugs, aspirin, mothballs, fava beans).
- If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**).
- If **jaundice persists for two weeks or longer in a term baby or three weeks or longer in a small baby** (less than 2.5 kg at birth or born before 37 weeks gestation), treat for prolonged jaundice (**page F-83**).
- Follow up after discharge, measuring haemoglobin weekly for four weeks. If the **haemoglobin is less than 8 g/dl** (haematocrit less than 24%), give a blood transfusion (**page P-31**).

JAUNDICE OF PREMATURITY

- If the **serum bilirubin is at a level requiring phototherapy** (**Table F-17, page F-79**), continue phototherapy.
- If the **baby is less than three days old**, observe for jaundice for 24 hours after phototherapy is discontinued.
- If the **jaundice persists for three weeks or longer**, treat for prolonged jaundice (below).

PROLONGED JAUNDICE

- Discontinue phototherapy.
- If the **baby's stools are pale or the urine is dark**, organize transfer (**page C-63**) and refer the baby to a tertiary hospital or specialized centre for further evaluation, if possible.
- If the **mother tested positive for syphilis**, treat for congenital syphilis (**page F-46**).

BILIRUBIN ENCEPHALOPATHY (KERNICTERUS)

If severe jaundice is not managed quickly, it may damage the baby's brain. Initial signs of brain damage are lethargy, floppiness, and poor feeding. After a few days, the baby may develop opisthotonos and a high-pitched cry and have convulsions. The final stage is floppiness and poor feeding. It is difficult to determine whether these signs are a result of the severe jaundice or because of another disease. Therefore, always treat a baby with jaundice even if bilirubin encephalopathy is suspected.

- If the **baby has a convulsion**, manage the convulsion (**page F-64**).
- If the **serum bilirubin is at a level requiring phototherapy** (**Table F-17, page F-79**), continue phototherapy.
- Discuss with the mother the baby's condition and prognosis:
 - Explain the feasibility of exchange transfusion and the likely prognosis of the baby;
 - Allow the family to decide if exchange transfusion should be performed, if it is feasible. If the **family requests exchange transfusion**, organize transfer (**page C-63**), and urgently refer the baby to a tertiary hospital or specialized centre, if possible. Send a sample of the mother's and the baby's blood.
- If the **baby's condition does not improve after one week** (baby continues to be lethargic, is not breastfeeding or is feeding poorly, or is still having convulsions) **but the baby is no longer receiving treatment at the hospital or the treatment can be continued at home**, discuss with the mother the possibility of caring for her baby at home.
- If the **baby has not had a convulsion for three days after discontinuing phenobarbital**, the mother is able to feed the baby, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**):

- Discuss with the mother the baby's prognosis and how to deal with the problems the baby may have at home;
- Follow up in one week, or earlier if the mother notes serious problems (e.g. feeding difficulty, convulsions);
- Help the mother find the best method to feed the baby if the baby is not breastfeeding well. If the **baby is feeding slowly**, have the mother feed more frequently.

PHOTOTHERAPY

PREPARING THE PHOTOTHERAPY UNIT

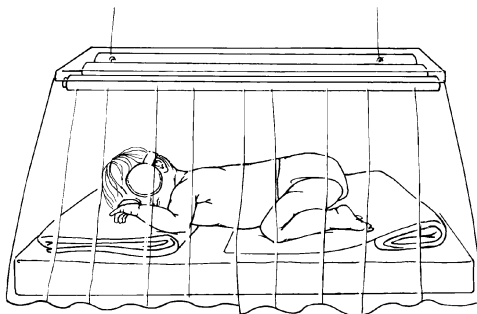
- Ensure that a plastic cover or shield is in position. This prevents injury to the baby in case a lamp breaks and helps to screen out harmful ultraviolet light.
- Warm the room where the unit is located, if necessary, so that the temperature under the lights is 28 °C to 30 °C.
- Switch on the unit, and ensure that all the fluorescent tubes are working.
- Replace fluorescent tubes that are burned out or flickering:
 - Record the date the tubes were replaced, and measure the total duration of use of the tubes;
 - Replace tubes every 2000 hours of use or after three months, whichever comes first, even if the tubes are still working.
- Use white linens in the cot, bassinet, or incubator, and place white curtains around the area where the unit is located to reflect as much light as possible back to the baby (**Fig. F-5, page F-85**).

GIVING PHOTOTHERAPY

- Place the baby under the phototherapy lights (**Fig. F-5, page F-85**):
 - If the **baby weighs 2 kg or more**, place the baby naked in the cot or bassinet. Place or keep smaller babies in an incubator;
 - Place the baby as close to the lights as the manufacturer's instructions allow;

- Cover the baby's eyes with patches, ensuring that the patches do not block the baby's nostrils. Do not secure the patches in place with tape.

FIGURE F-5 Baby under phototherapy lights



- Turn the baby every three hours.
- Ensure that the baby is fed:
 - Encourage the mother to breastfeed on demand but at least every three hours:
 - During feeding, remove the baby from the phototherapy unit and remove the eye patches;
 - There is no need to supplement or replace breast milk with any other type of feed or fluid (e.g. breast-milk substitute, water, sugar water, etc.)
 - If the **baby is receiving IV fluid or expressed breast milk**, increase the volume of fluid and/or milk by 10% of the total daily volume per day (**Table C-4, page C-22**) for as long as the baby is under the phototherapy lights;
 - If the **baby is receiving IV fluid or is being fed by gastric tube**, do not remove the baby from the phototherapy lights.
- Note that the baby's stool may become loose and yellow while the baby is receiving phototherapy. This does not require specific treatment.
- Continue other prescribed treatment and tests:
 - Remove the baby from the phototherapy unit only for procedures that cannot be performed while under the phototherapy lights;
 - If the **baby is receiving oxygen**, briefly turn off the lights when observing the baby for central cyanosis (blue tongue and lips).

- Measure the baby's temperature (**page P-5**) and the temperature of the air under the lights every three hours. If the **baby's temperature is more than 37.5 °C**, adjust the temperature of the room or temporarily remove the baby from the phototherapy unit until the baby's temperature is 36.5 °C to 37.5 °C.
- Measure serum bilirubin level every 12 hours:
 - Discontinue phototherapy when the serum bilirubin level is below the level at which phototherapy was started (**Table F-17, page F-79**) or 15 mg/dl (260 µmol/l), whichever is lower;
 - If the **serum bilirubin is close to the level requiring exchange transfusion (Table F-17, page F-79)**, organize transfer (**page C-63**), and urgently refer the baby to a tertiary hospital or specialized centre for exchange transfusion, if possible. Send a sample of the mother's and the baby's blood.
- If the **serum bilirubin cannot be measured**, discontinue phototherapy after three days.

Bilirubin in the skin rapidly disappears under phototherapy. Skin colour cannot be used as a guide to serum bilirubin level while the baby is receiving phototherapy and for 24 hours after discontinuing phototherapy.

- After phototherapy has been discontinued:
 - Observe the baby for 24 hours, and repeat the serum bilirubin measurement, if possible, or estimate jaundice using the clinical method (**Table F-16, page F-78**);
 - If **jaundice has returned to or is above the level at which phototherapy was started**, repeat phototherapy for the same length of time as originally given. Repeat this step each time phototherapy is discontinued until the measured or estimated bilirubin stays below the level requiring phototherapy.
- If phototherapy is no longer required, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- Teach the mother to assess jaundice, and advise her to return if the baby becomes more jaundiced.

Non-specific signs may be present in a baby with a serious illness. In some cases, the mother may just think the baby “looks ill.” The most common serious problems causing these non-specific signs are sepsis and asphyxia. Lethargy, drowsiness, and reduced activity may also be seen after a baby has had a convulsion. In most cases, other signs are present to indicate these diagnoses. **If any other specific clinical sign is noted in a baby in addition to lethargy or another non-specific sign**, or the baby has two or more non-specific signs, use the chapter *Multiple Findings (Most Often Sepsis or Asphyxia)* (**page F-35**).

PROBLEM

- The baby has a non-specific sign, such as:
 - lethargy;
 - drowsiness;
 - reduced activity;
 - floppiness;
 - irritability;
 - jitteriness;
 - “looks ill.”

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and use this information to determine the probable diagnosis.
- Ask the mother if she received opiate drugs for pain relief during labour and birth.
- Measure blood glucose (**page P-13**). If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**).

GENERAL MANAGEMENT

- Allow the baby to breastfeed (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding

method (**page C-14**).

- Assess the baby's muscle tone and activity at least once daily.
- If the **baby is floppy or lethargic**, handle and move the baby gently to prevent injury when the baby's muscle tone is low. Support the baby's entire body, especially the head.
- Use **Table F-19 (page F-89)** to determine the probable diagnosis.
- If a **specific problem still is not found**:
 - Assess the baby for additional signs every two hours for the next six hours;
 - Ensure that the baby is fed and kept warm;
 - If a **specific problem is noted during the observation period**, follow instructions in the appropriate chapter;
 - If the baby seems well at the end of the observation period, discharge the baby (**page C-67**), and tell the mother to bring the baby back if a problem is suspected.

DIFFERENTIAL DIAGNOSIS

TABLE F-19 Differential diagnosis of non-specific signs

Findings ^a		Probable Diagnosis
History	Examination	
• Opiate drug given to mother during labour or birth • Time of onset at birth	• Lethargy • Respiratory rate less than 30 breaths per minute	Drug-induced lethargy, below
• Complicated or difficult labour or birth (fetal distress) • Failure of baby to spontaneously breathe at birth • Resuscitation at birth • Maternal uterine infection or fever any time from the onset of labour to three days after birth, or rupture of membranes for more than 18 hours before birth	• Baby looks ill	Suspected asphyxia or sepsis, page F-35

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

SPECIFIC MANAGEMENT

DRUG-INDUCED LETHARGY

- Provide general care.
- If the **baby’s respiratory rate is less than 30 breaths per minute**, give oxygen (**page C-25**) at a moderate flow rate.
- If the **baby is not breathing at all, is gasping, or has a respiratory rate less than 20 breaths per minute**, resuscitate the baby using a bag and mask (**page P-1**).
- If the **baby is still lethargic after six hours**, suspect sepsis or asphyxia (**page F-35**).

PROBLEM

- The baby's blood glucose is less than 45 mg/dl (2.6 mmol/l).

MANAGEMENT

BLOOD GLUCOSE LESS THAN 25 MG/DL (1.1 MMOL/L)

- Establish an IV line (**page P-21**) if one is not already in place. Give a bolus of 2 ml/kg body weight of 10% glucose IV slowly over five minutes.
- If an **IV line cannot be established quickly**, give 2 ml/kg body weight of 10% glucose by gastric tube (**page P-33**).
- Infuse 10% glucose at the daily maintenance volume according to the baby's age (**Table C-4, page C-22**).
- Measure blood glucose 30 minutes after the bolus of glucose and then every three hours:
 - If the **blood glucose is less than 25 mg/dl**, repeat the bolus of glucose (above) and continue the infusion;
 - If the **blood glucose is less than 45 mg/dl but is at least 25 mg/dl at any measurement**, continue the infusion and repeat the blood glucose measurement every three hours until the blood glucose is 45 mg/dl or more on two consecutive measurements;
 - Once the blood glucose is 45 mg/dl or more for two consecutive measurements, follow instructions for frequency of blood glucose measurements after blood glucose returns to normal (**page F-92**).
- Allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- As the baby's ability to feed improves, slowly decrease (over a three-day period) the volume of IV glucose while increasing the volume of oral feeds. Do not discontinue the glucose infusion abruptly.

BLOOD GLUCOSE LESS THAN 45 MG/DL BUT AT LEAST 25 MG/DL

- Allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- Measure blood glucose in three hours or before the next feed:
 - If the **blood glucose is less than 25 mg/dl**, treat as described on **page F-91**;
 - If the **blood glucose is still less than 45 mg/dl but at least 25 mg/dl**, increase the frequency of breastfeeding or increase the volume of expressed breast milk given;
 - Once the blood glucose is 45 mg/dl or more on two consecutive measurements, follow instructions for frequency of blood glucose measurements after blood glucose returns to normal (below).

FREQUENCY OF BLOOD GLUCOSE MEASUREMENTS AFTER BLOOD GLUCOSE RETURNS TO NORMAL

- If the **baby is receiving IV fluid for any reason**, continue blood glucose measurements every 12 hours for as long as the baby requires IV fluid. If the **blood glucose is less than 45 mg/dl**, treat as described above.
- If the **baby no longer requires or is not receiving IV fluid**, measure blood glucose every 12 hours for 24 hours (two more measurements):
 - If the **blood glucose is less than 45 mg/dl**, treat as described above;
 - If the **blood glucose remains normal**, discontinue measurements.

Feeding difficulty is common in babies during the first days of life. The difficulty is associated with incorrect breastfeeding technique, small size, or illness. This chapter covers feeding difficulty in the absence of other signs of illness. If the **baby has other problems, such as breathing difficulty or abnormal body temperature, in addition to feeding difficulty**, see the chapter *Multiple Findings (Most Often Sepsis or Asphyxia)* (**page F-35**). If the **feeding problem consists primarily of vomiting**, see the chapter *Vomiting and/or Abdominal Distension* (**page F-99**).

Small babies often have difficulty feeding; as they grow, feeding improves. If **the baby weighed less than 2.5 kg at birth or was born before 37 weeks gestation**, continue with this chapter to evaluate and treat for a specific feeding problem(s). After addressing the problem, see **page F-24** for general principles of feeding a small baby.

PROBLEMS

- The baby fed well at birth but now is feeding poorly or has stopped feeding.
- The baby has not fed well since birth.
- The baby is not gaining weight (proven or suspected).
- The mother has not been able to breastfeed successfully.
- The baby is having difficulty feeding and is small or a twin.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information to determine the probable diagnosis.
- Ask the mother:
 - How do you feed the baby?
 - How much did the baby weigh at birth and any time afterwards?
- Ask the mother to put the baby to her breast. Observe her breastfeeding for about five minutes, assessing for correct positioning and attachment (**page C-12**). If the **baby is not ready to feed**, continue with general management (below), and observe the mother's technique the next time the baby is ready to feed.

GENERAL MANAGEMENT

- If the **baby has retained feeds without coughing, choking, or regurgitating since the first feeding after birth**, continue with differential diagnosis (**Table F-20**, below).
- If the **baby has been coughing, choking, or regurgitating since the first attempt to feed**, try to insert a gastric tube (**page P-33**):
 - If the **gastric tube does not pass or the tip of the tube returns and the baby is choking and vomiting immediately after swallowing**, the baby likely has esophageal atresia or tracheo-esophageal fistula, and urgent surgery is necessary. Organize transfer (**page C-63**), and urgently refer the baby to a tertiary hospital or specialized centre for surgery, if possible;
 - If the **gastric tube passes**, confirm proper placement of the tube in the stomach (**page P-35**), aspirate the stomach contents, and continue with **Table F-20** to determine the cause of the feeding problem.

DIFFERENTIAL DIAGNOSIS

TABLE F-20 Differential diagnosis of feeding difficulty

Findings ^a		Probable Diagnosis
History	Examination	
• Poor or no feeding after having fed well • Time of onset day 1 or later • Maternal uterine infection or fever any time from the onset of labour to three days after birth, or rupture of membranes for more than 18 hours before birth	• Baby looks ill • Vomiting • Abdominal distension • Breathing difficulty • Abnormal body temperature • Irritability or lethargy • Convulsions or unconsciousness	Suspected sepsis, page F-38

TABLE F-20 Cont. Differential diagnosis of feeding difficulty

Findings ^a		Probable Diagnosis
History	Examination	
• <i>Twin or small baby (less than 2.5 kg at birth or born before 37 weeks gestation)</i> • Baby does not wake for feeding, feeds slowly, and tires quickly • Time of onset at birth	• Breastfeeding technique correct, but baby is not yet ready to breastfeed	Small baby or twin, page F-96
• Mother has not been able to breastfeed successfully (e.g. baby cannot latch on to breast; baby roots around hungrily but does not get any milk) • Mother's nipples are sore • Time of onset day 1 or later	• Baby looks otherwise well • Baby not well positioned and attached during breastfeeding	Incorrect positioning and attachment, page F-96
• <i>Baby gaining less than 15 g/kg body weight per day over three days</i>	• Baby looks otherwise well	Inadequate weight gain, page F-96
• Baby regurgitates some of feeding or chokes and coughs during feedings • Time of onset day 1 or later	• <i>Split in lip or opening in palate between mouth and nasal passages</i>	Cleft lip or palate, page F-151
• Baby has coughed, choked, and regurgitated feeds since first feeding • Food is returned frothy and undigested after every feeding • Time of onset at birth	• <i>Gastric tube does not pass or tip of tube returns</i> • Frothy secretions from mouth even when baby is not being fed	Suspected gastrointestinal malformation or obstruction, page F-105

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italics is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT OF SPECIFIC PROBLEMS

SMALL BABY OR TWIN

- If the **baby is small**, see **page F-24** for general principles of feeding a small baby.
- If the **baby is a twin**, see **page C-14** for information on feeding twins.
- Once the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- Follow up in two days to reassess feeding and weight gain.

INCORRECT POSITIONING AND ATTACHMENT

- Note previously recorded weights, if available, and weigh the baby daily.
- Help the mother improve her breastfeeding technique:
 - If the **mother's breastfeeding technique is correct**, reassure the mother, and continue to observe her technique during a three-day period;
 - If the **mother's breastfeeding technique is incorrect**, help the mother to achieve the correct technique (**page C-12**);
 - If the **baby has gained at least 15 g/kg body weight per day over three days**, reassure the mother that her milk supply is adequate and explain appropriate feeding practices to her. If there are no other problems requiring hospitalization, discharge the baby (**page C-67**);
 - If the **baby has not gained at least 15 g/kg body weight per day over three days**, treat for inadequate weight gain (below).

INADEQUATE WEIGHT GAIN

Note that the management described below for inadequate weight gain applies only to babies on full oral feeds via any method (breastfeeding or receiving expressed breast milk using an alternative feeding method). If the **baby is receiving IV fluid and getting less than full (or no) oral feeds and daily weight loss is more than 5%**, increase the total volume of fluid by 10 ml/kg body weight for one day to compensate for inadequate fluid administration.

- Note previously recorded weights and weigh the baby daily.

- Confirm poor weight gain if the baby has gained less than 15 g/kg body weight per day over the last three days.
- Check for and correct or treat obvious causes of inadequate weight gain:
 - Determine if the baby is being fed frequently enough (i.e. eight times in 24 hours), particularly at night. If the **baby is being fed using an alternative feeding method**, ensure that the baby is receiving the correct volume of feeds (**Table C-4, page C-22**);
 - Determine if the ambient temperature is optimal; if the **ambient temperature is too cold or too hot**, the baby will utilize more energy for temperature regulation and less for growth;
 - Look for signs of sepsis (e.g. poor feeding, vomiting, breathing difficulty; **Table F-9, page F-37**);
 - Look for thrush in the baby's mouth (**Table F-25, page F-128**).
- If **poor weight gain is confirmed and there are no obvious causes or if an obvious cause was found and treated** (e.g. the temperature has been corrected for three days or thrush or sepsis has been treated for seven days) **and weight gain is still inadequate**, work with the mother for three days to increase the quantity of breast milk that the baby receives.
- If the **average measured weight gain after three days is at least 15 g/kg body weight per day**:
 - Explain appropriate feeding practices to the mother and what to expect regarding her baby's growth (**page C-53**);
 - If there are no other problems requiring hospitalization, discharge the baby (**page C-67**);
 - Obtain follow-up weights weekly for one month to verify progress.
- If the **average measured weight gain after three days is less than 15 g/kg body weight per day despite the measures above**:
 - Have the mother supplement breastfeeding by expressing breast milk between feedings and giving this to the baby as a supplement, using an alternative feeding method (**page C-14**), after the baby has breastfed;
 - If the **mother cannot express breast milk**, give the baby 10 ml of breast-milk substitute (**page C-19**) by cup/spoon (**page C-16**) after

each time at the breast. Breast-milk substitute should not be used unless it can be ensured that the substitute is:

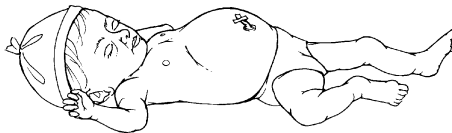
- available for the entire period needed (this might include some time after discharge);
 - affordable for the health care facility as well as the family;
 - used safely;
 - prepared in a sterile manner according to instructions.
- Continue supplementation with expressed breast milk or breast-milk substitute until the baby's weight gain is at least 15 g/kg body weight per day for three consecutive days, and then decrease the supplementary feedings to 5 ml per feed for two days:
 - If **weight gain continues to be adequate** (15 g/kg body weight per day or more) **for two more days**, discontinue supplements completely;
 - If **weight gain becomes inadequate again** (less than 15 g/kg body weight per day), begin supplementing again with 10 ml of expressed breast milk or breast-milk substitute per feed, and repeat the process.
- Monitor the baby's weight gain for three more days. If weight gain continues at the same or better rate, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

Spitting or regurgitation of small quantities of milk after a feed is common in a newborn baby, is usually transitory, and has no effect on growth.

PROBLEMS

- A baby is vomiting:
 - forcefully;
 - regardless of method of feeding;
 - entire feedings after every feed;
 - bile or blood.
- A baby has abdominal distension (**Fig. F-6**).

FIGURE F-6 Abdominal distension



FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information to determine the probable diagnosis.
- Ask the mother (or whoever brought the baby in):
 - Did the vomiting begin at the first feed or did it start later?
 - How long after a feeding does the baby vomit?
 - What does the vomitus look like? Is it frothy, or does it contain bile or blood?
 - Has the baby passed meconium? Was meconium in the amniotic fluid?
 - Are your nipples cracked or sore?

- Look for:
 - abdominal tenderness (baby cries when abdomen is gently pressed);
 - imperforate anus (if the **baby has an imperforate anus**, see **page F-153** for management).

GENERAL MANAGEMENT

- Insert a gastric tube via the nasal route (**page P-33**):
 - If the **gastric tube does not pass or the tip of the tube returns and the baby is choking and vomiting immediately after swallowing**, the baby likely has esophageal atresia or tracheo-esophageal fistula, and urgent surgery is necessary. Organize transfer (**page C-63**), and urgently refer the baby to a tertiary hospital or specialized centre for surgery, if possible;
 - If the **gastric tube passes**, confirm that the tube is properly positioned in the stomach (**page P-35**), and aspirate the stomach contents.
- If the **baby appears to be seriously ill** (e.g. floppy and lethargic) **or small** (less than 2.5 kg at birth or born before 37 weeks gestation), establish an IV line (**page P-21**), and give IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**).
- Use **Table F-21 (page F-101)** to determine the probable cause of vomiting and/or abdominal distension. If the **cause of vomiting cannot be determined**, see **page F-103**.

DIFFERENTIAL DIAGNOSIS

TABLE F-21 Differential diagnosis of vomiting and/or abdominal distension

Findings ^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Time of onset day 1 or later • Maternal uterine infection or fever any time from the onset of labour to three days after birth, or rupture of membranes for more than 18 hours before birth • Poor or no feeding after having fed well	• Baby looks ill • Vomiting • Abdominal distension • Breathing difficulty • Abnormal body temperature • Irritability or lethargy • Convulsions or unconsciousness		Suspected sepsis, page F-38
• Poor or no feeding • Asphyxia • Time of onset day 2 to 10	• Floppiness or lethargy • Baby looks ill • Abdominal distension, tenderness • Small baby (less than 2.5 kg at birth or born before 37 weeks gestation) • Blood or bile in vomitus • Blood or mucus in stool • Diarrhoea • Pallor • Progressive signs of ill health (temperature instability and/or apnoea)	• Sepsis • Increasing volume of gastric aspirates	Necrotizing enterocolitis, page F-104

TABLE F-21 Cont. Differential diagnosis of vomiting and/or abdominal distension

Findings ^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• If mother had a serologic test for syphilis during pregnancy, it was positive • <i>Mother not treated or treated inadequately for syphilis</i> • Time of onset at birth	• Generalized oedema (body swelling) • Abdominal distension (from enlarged liver and/or spleen or from fluid in abdomen) • Blistering skin rash on palms and soles • Profuse nasal discharge (“snuffles”)		Congenital syphilis, page F-46
• Has not passed meconium within 24 hours after birth • Baby coughing and choking at every feed since birth • Time of onset day 1 to 2	• <i>Gastric tube does not pass or tip of tube returns</i> • Increasing abdominal distension • Bile in vomitus • Dark or bloody stools		Suspected gastrointestinal malformation or obstruction, page F-105
• Mother breastfeeding with cracked nipples (time of onset day 2 or later) • Maternal bleeding during labour or from episiotomy (time of onset day 1 or 2)	• Blood in vomitus • Dark stools • Baby looks otherwise well		Swallowed maternal blood, page F-105

TABLE F-21 Cont. Differential diagnosis of vomiting and/or abdominal distension

History	Findings ^a		Probable Diagnosis
	Examination	Investigations or Other Known Diagnoses	
• Baby has regurgitated feeds since first feeding • Time of onset day 1 • Meconium in amniotic fluid	• Gastric tube passes • Baby looks otherwise well		Gastric irritation, page F-106

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italics is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

CAUSE OF VOMITING NOT DETERMINED

- Establish an IV line (**page P-21**), and give only IV fluid at maintenance volume according to the baby’s age (**Table C-4, page C-22**) for the first 12 hours.
- Observe the baby for 12 hours.
- If the **baby has no other signs besides vomiting after the 12-hour period:**
 - Give expressed breast milk by gastric tube (**page C-18**) for 24 hours;
 - If these **feeds are retained**, allow the baby to begin breastfeeding (**page C-11**), or give expressed breast milk using an alternative feeding method (**page C-14**);
 - Remove the gastric tube after two successful feeds.
- If **vomiting continues or any other signs are present** (e.g. blood in vomitus, forceful vomiting, abdominal distension), try again to determine the cause of vomiting (**Table F-21, page F-101**).
- If the **cause of vomiting still cannot be determined**, treat for sepsis (**page F-41**).

MANAGEMENT OF SPECIFIC CONDITIONS

NECROTIZING ENTEROCOLITIS

- Establish an IV line (**page P-21**) if one is not already in place, and give only IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**) for the first five days.
- Treat for sepsis (**page F-41**), and ensure that the baby is not fed for the first five days.
- Insert a gastric tube (**page P-33**) and ensure free drainage.
- If an **abdominal mass becomes palpable**, it is likely that the baby has a bowel perforation or intestinal obstruction from an abscess. Organize transfer (**page C-63**), and urgently refer to a tertiary hospital or specialized centre for surgery, if possible.
- Measure haemoglobin daily until bleeding stops, and then measure once more after 24 hours. If the **haemoglobin is less than 8 g/dl** (haematocrit less than 24%), give a blood transfusion (**page P-31**).
- Check the baby's heart and respiratory rates every three hours for three days after the last blood transfusion.
- Observe the baby for five days. If, after the five-day period, **abdominal distension has decreased, there is minimal gastric aspirate, and the baby is passing non-bloody stool**:
 - Give the baby expressed breast milk by gastric tube (**page C-18**);
 - Begin feeding the volume of milk required on day 1, regardless of the baby's age (**Table C-4, page C-22**);
 - Once adequate volumes of milk are tolerated for 48 hours without vomiting, allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- Observe the baby for 24 hours after discontinuing antibiotics:
 - If the baby's heart and respiratory rates are stable, the baby has not required a transfusion for at least 48 hours and is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**);

- Measure haemoglobin weekly for one month. If the **haemoglobin is less than 8 g/dl** (haematocrit less than 24%), give a blood transfusion (**page P-31**);
- To prevent iron deficiency anaemia, give small babies an oral iron preparation to give elemental iron 2 mg/kg body weight once daily from two months of age up to 23 months of age.

SUSPECTED GASTROINTESTINAL MALFORMATION OR OBSTRUCTION

- Establish an IV line (**page P-21**), and give only IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**).
- If a **gastric tube was inserted**, keep it in place and ensure free drainage (**page P-36**).
- Organize transfer (**page C-63**), and urgently refer the baby to a tertiary hospital or specialized centre for surgery, if possible.

SWALLOWED MATERNAL BLOOD

- If **vomiting is caused by blood swallowed during breastfeeding** (cracked nipples):
 - Observe the mother while she breastfeeds. Assess her technique (**page C-12**) and suggest changes as necessary;
 - If **breastfeeding is painful for the mother**, encourage the mother to:
 - Express some breast milk (**page C-15**) to stimulate the milk let-down reflex before putting the baby to her breast;
 - Begin to nurse on the side that is less sore until the let-down occurs, then switch the baby to the affected breast;
 - Express a little milk or colostrum onto her nipples after breastfeeding;
 - Expose her nipples to the air to prevent maceration and promote healing;
 - If **cracking is severe on only one nipple**, have the mother breastfeed on the other side exclusively for two or more days while the affected nipple heals. During this time she can express

the breast milk of the affected breast and feed this to the baby using an alternative feeding method (**page C-14**);

- If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- If **vomiting is caused by blood swallowed at the time of birth**:
 - Attach a syringe to the gastric tube and aspirate the stomach contents;
 - Allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**);
 - Remove the gastric tube after two successful feeds;
 - If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

GASTRIC IRRITATION

- Allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- If the baby has had two successful breastfeeds, or is feeding well using an alternative feeding method, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- If the **baby continues to regurgitate all feeds after 24 hours**, the problem is probably due to an abnormality of the gastrointestinal tract:
 - Establish an IV line (**page P-21**), and give IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**);
 - Organize transfer (**page C-63**), and urgently refer the baby to a tertiary hospital or specialized centre for further evaluation, if possible.

There are non-infectious causes of diarrhoea, but sepsis is the most common cause during the newborn period.

Observe strict infection prevention practices (page C-37) at all times when caring for any baby with diarrhoea to prevent spreading one baby's infection to other babies in the newborn special care unit. Wear gloves when handling soiled napkins and other items used to care for the baby, and carefully wash hands (page C-38) after handling a baby with diarrhoea.

PROBLEMS

- The baby is passing stool with increased frequency.
- The baby's stool is watery or green, or contains mucus or blood.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information to determine the probable diagnosis (**Table F-22, page F-109**).
 - Ask the mother (or whoever brought the baby in):
 - Is the baby being fed any foods or fluid other than breast milk?
 - What does the baby's stool look like? Is it watery or green, or does it contain mucus or blood?
 - How frequently has the baby been passing stool?
- Look for:
 - signs of dehydration (e.g. sunken eyes or fontanelle, loss of skin elasticity, or dry tongue and mucous membranes);
 - signs of sepsis (e.g. poor feeding, vomiting, breathing difficulty; **Table F-9, page F-37**).

GENERAL MANAGEMENT

- Allow the baby to begin breastfeeding (**page C-11**). If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- If the **mother is giving the baby any food or fluid other than breast milk**, advise her to stop giving them.
- Give oral rehydration solution (ORS) for every diarrhoeal stool passed:
 - If the **baby is able to feed**, have the mother breastfeed more often, or give ORS 20 ml/kg body weight between breastfeeds using a cup, cup and spoon, or other device (**page C-16**);
 - If the **baby is not feeding well**, insert a gastric tube (**page P-33**), and give ORS 20 ml/kg body weight by tube;
 - If **prepackaged ORS is not available**, make ORS as follows:
 - Use recently boiled and cooled water;
 - To 1 litre of water, add:
 - sodium chloride 3.5 g;
 - trisodium citrate 2.9 g (or sodium bicarbonate 2.5 g);
 - potassium chloride 1.5 g;
 - glucose (anhydrous) 20 g (or sucrose [common sugar] 40 g).
- If the **baby has signs of dehydration or sepsis**, establish an IV line (**page P-21**), and give IV fluid while allowing the baby to continue to breastfeed:
 - If **there are signs of dehydration**, increase the volume of fluid by 10% of the baby's body weight on the first day that the dehydration is noted;
 - If the baby receives a sufficient volume of fluid to meet rehydration and maintenance requirements and to replace ongoing losses, the use of ORS is not necessary;
 - Assess the baby again in 12 hours:
 - If the **baby is still having diarrhoeal stools**, continue the increased volume of IV fluid for an additional 24 hours;

- If the **baby has not had a diarrhoeal stool in the last 12 hours**, adjust fluid to maintenance volume according to the baby's age (**Table C-4, page C-22**).
- Determine the probable diagnosis (**Table F-22**).

DIFFERENTIAL DIAGNOSIS

TABLE F-22 Differential diagnosis of diarrhoea

Findings ^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Maternal uterine infection or fever any time from the onset of labour to three days after birth, or rupture of membranes for more than 18 hours before birth • Time of onset day 1 to 3		• Sepsis	Diarrhoea due to sepsis Treat for sepsis (page F-41).
• Baby receiving food/fluid other than breast milk • Time of onset after other food/fluid started	• Baby feeding well		Non-infectious diarrhoea Provide general management (page F-108).
• Baby receiving food/fluid other than breast milk • Time of onset after other food/fluid started	• Poor or no feeding • Baby looks ill • Floppiness • Lethargy		Infectious diarrhoea Treat for sepsis (page F-41).
• Baby receiving phototherapy • Time of onset after phototherapy started	• Loose yellow stool		Loose stool due to phototherapy No treatment is necessary.

TABLE F-22 Cont. Differential diagnosis of diarrhoea

Findings^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Outbreak of diarrhoea among other babies in nursery • Time of onset day 2 or later	• Watery, greenish stools that continue even if the baby is not breastfed • Blood in stool • Vomiting	• Sepsis • Dehydration	Nosocomial diarrhoea of infectious origin, page F-111
• Poor or no feeding • Asphyxia • Time of onset day 2 to 10	• Floppiness or lethargy • Baby looks ill • Abdominal distension, tenderness • Small baby (less than 2.5 kg at birth or born before 37 weeks gestation) • Blood or bile in vomitus • Blood or mucus in stool • Pallor • Progressive signs of ill health (temperature instability and/or apnoea)	• Sepsis • Increasing volume of gastric aspirates	Necrotizing enterocolitis, page F-104

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT OF NOSOCOMIAL DIARRHOEA

- If the **diarrhoea developed while the baby was hospitalized and more than one baby with diarrhoea from the same ward is seen within a two-day period**, suspect a nosocomial infection (**page C-45**).
- Isolate the baby from other babies, if possible.
- Treat for sepsis (**page F-41**).
- Continue to provide general management for diarrhoea (**page F-108**).

This chapter covers the baby who is bleeding or is found to be pale, either at birth or any time thereafter, with or without signs of internal or external bleeding. Pallor can be a sign of anaemia, shock, or both.

PROBLEMS

- The baby is currently bleeding.
- The baby has a history of bleeding.
- The baby appears pale at birth or sometime thereafter.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information to determine the probable diagnosis.
- Ask the mother (or whoever brought the baby in):
 - Is there blood in the baby's stool or urine?
 - Did you have a previous baby with haemolytic jaundice, glucose-6-phosphate dehydrogenase (G6PD) deficiency, or Rhesus (Rh) factor or ABO blood group incompatibility?
 - Was there any abnormal bleeding during pregnancy or labour/birth?
 - Was the baby's umbilical cord clamped/tied correctly at birth?
 - Is the baby vomiting? If so, is there blood or bile in the vomitus?
 - Is the baby a twin? If so, is the other twin very pink or red (i.e. twin-to-twin transfusion)?
 - Have multiple blood samples been taken from the baby?
- Look for:
 - where the blood is coming from (e.g. umbilicus, male circumcision site, or venepuncture site);
 - generalized oedema (body swelling);
 - abdominal tenderness (baby cries when abdomen is gently pressed);
 - jaundice.

GENERAL MANAGEMENT

BLEEDING

- Provide immediate management for bleeding as described in **Table F-1 (page F-6)**, if not already done.
- If the baby is still bleeding, increase the rate of infusion of IV fluid to infuse 20 ml/kg body weight of fluid over the first hour.
- If there are **signs of shock** (e.g. pallor, cold to the touch, heart rate more than 180 beats per minute, unconscious or nearly unconscious) or if **signs of shock develop while the baby is being assessed**:
 - Infuse normal saline or Ringer's lactate 10 ml/kg body weight over 10 minutes, and repeat once after 20 minutes if signs of shock continue;
 - Give a blood transfusion (**page P-31**) immediately using type O, Rh-negative blood.
- Take a blood sample (**page P-9**), and measure haemoglobin. If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**).
- Determine the probable diagnosis (**Table F-23, page F-115**).

PALLOR WITHOUT A HISTORY OF BLEEDING

- If there are **signs of shock** (e.g. cold to the touch, heart rate more than 180 beats per minute, unconscious or nearly unconscious) or if **signs of shock develop while the baby is being assessed**, establish an IV line (**page P-21**), if one is not already in place, and infuse normal saline or Ringer's lactate 10 ml/kg body weight over 10 minutes, and repeat once after 20 minutes if signs of shock continue.
- Measure blood glucose. If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**).
- Take a blood sample (**page P-9**), and measure haemoglobin. If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**).
- Determine the probable diagnosis (**Table F-23, page F-115**).

DIFFERENTIAL DIAGNOSIS

TABLE F-23 Differential diagnosis of bleeding and/or pallor

Findings ^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Time of onset day 2 to 3	• Spontaneous bleeding from one or more sources, such as: - Blood in stool or urine - Bleeding from umbilicus or from male circumcision or venepuncture sites - Spontaneous appearance of multiple bruises after birth, but no evidence of trauma • Pallor		Haemorrhagic disease of the newborn baby, page F-119
• Time of onset day 4 or later		• Findings of haemorrhagic disease of the newborn baby (above) found on day 4 or later	Coagulopathy, page F-119

TABLE F-23 Cont. Differential diagnosis of bleeding and/or pallor

Findings ^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Jaundice developing in less than 36 hours • Pallor • ABO blood group or Rh factor incompatibility or G6PD deficiency in previous baby • Family history of G6PD deficiency, jaundice, anaemia, enlarged liver, or removal of spleen	• Serious jaundice • Pallor • Generalized oedema (body swelling) • Male baby (a supportive finding for G6PD deficiency only)	• Haemoglobin less than 13 g/dl (haematocrit less than 40%) • Positive Coombs test • <i>ABO blood group or Rh factor incompatibility between mother and baby</i> • <i>Positive G6PD screen</i>	Haemolysis Provide general management for pallor (page F-114) and treat for haemolytic jaundice (page F-81).
• Maternal history of vaginal bleeding during later pregnancy and/or labour OR • Problem at birth or during pregnancy (e.g. umbilical cord not clamped immediately after birth; twin-to-twin transfusion)	• Pallor	• Haemoglobin less than 13 g/dl (haematocrit less than 40%)	Possible blood loss from obstetric causes Provide general management for pallor (page F-114).

TABLE F-23 Cont. Differential diagnosis of bleeding and/or pallor

Findings^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Poor or no feeding • Asphyxia • Time of onset day 2 to 10	• Floppiness or lethargy • Baby looks ill • Abdominal distension, tenderness • Small baby (less than 2.5 kg at birth or born before 37 weeks gestation) • Blood or bile in vomitus • Blood or mucus in stool • Diarrhoea • Pallor • Progressive signs of ill health (temperature instability and/or apnoea)	• Sepsis • Increasing volume of gastric aspirates	Necrotizing enterocolitis, page F-104
• Has not passed meconium within 24 hours after birth, or if stool has been passed, it is dark or bloody • Time of onset day 1 to 4	• Increasing abdominal distension • Bile in vomitus		Suspected gastrointestinal malformation or obstruction, page F-105

TABLE F-23 Cont. **Differential diagnosis of bleeding and/or pallor**

Findings^a			Probable Diagnosis
History	Examination	Investigations or Other Known Diagnoses	
• Mother breastfeeding with cracked nipples (time of onset day 2 or later) • Maternal bleeding during labour or from episiotomy (time of onset day 1 to 2)	• Blood in vomitus • Dark stools • Baby looks otherwise well		Swallowed maternal blood, page F-105
• Multiple blood samples taken • Baby is sick or small (less than 2.5 kg at birth or born before 37 weeks gestation)	• Pallor	• Haemoglobin less than 10 g/dl (haematocrit less than 30%)	Anaemia of a sick or small baby, page F-119
	• Pallor	• Haemoglobin less than 13 g/dl (haematocrit less than 40%)	Pallor of unknown origin, page F-119

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italics is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT OF SPECIFIC CONDITIONS

HAEMORRHAGIC DISEASE OF THE NEWBORN BABY

- If **bleeding does not stop within three hours**, treat for sepsis (**page F-41**).
- Take a blood sample (**page P-9**) and measure haemoglobin once daily. If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**).
- Provide ongoing management (**page F-120**).

COAGULOPATHY

- Treat for sepsis (**page F-41**).
- Take a blood sample (**page P-9**) and measure haemoglobin once daily. If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**).
- Provide ongoing management (**page F-120**).

POSSIBLE BLOOD LOSS FROM OBSTETRIC CAUSES

- Take a blood sample (**page P-9**) and measure haemoglobin once daily:
 - If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%), give a blood transfusion (**page P-31**);
 - If the **haemoglobin is between 10 and 13 g/dl** (haematocrit between 30 and 40%) **and there are signs of shock** (e.g. pallor, cold to the touch, heart rate more than 180 beats per minute, unconscious or nearly unconscious), give a blood transfusion (**page P-31**).
- Provide ongoing management (**page F-120**).

ANAEMIA OF A SICK OR SMALL BABY OR PALLOR OF UNKNOWN ORIGIN

- Once the baby's condition is stable, measure haemoglobin weekly for as long as the baby remains in the hospital. If the **haemoglobin is less than 8 g/dl** (haematocrit less than 24%), give a blood transfusion (**page P-31**).
- Provide ongoing management (below).

ONGOING MANAGEMENT OF BABIES WITH PALLOR OR BLEEDING

- Discontinue IV fluid unless an IV line is needed for another reason. If **IV fluid is still required**, continue IV fluid and ensure that the total fluid volume the first day (from both oral and IV sources) equals daily maintenance volume according to the baby's age plus an additional 10% of the total fluid volume required for the day (**Table C-4, page C-22**). Use the maintenance fluid volume for subsequent days.
- Measure haemoglobin daily until the haemoglobin is stable for three days and at a level not requiring transfusion, and then weekly for as long as the baby is in the hospital.
- Check the heart and respiratory rates every three hours until the baby's condition is stable.
- If the baby's heart and respiratory rates are stable, the baby has not required a transfusion for at least 48 hours, is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- To prevent iron deficiency anaemia, give small babies an oral iron preparation to give elemental iron 2 mg/kg body weight once daily from two months of age up to 23 months of age.
- Follow up twice weekly for two weeks after discharge to monitor feeding and growth.
- Measure haemoglobin again in one month. If the **haemoglobin is less than 8 g/dl** (haematocrit less than 24%), give a blood transfusion (**page P-31**).

Most swellings on the baby's scalp originating at birth are minor and resolve spontaneously; however, subaponeurotic (subgaleal) bleeding can be life-threatening and must be recognized and treated immediately.

PROBLEM

- The baby has a swelling on the scalp at birth or soon thereafter.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), looking especially for findings of pallor or increased heart or respiratory rates (consistently more than 160 beats per minute or 60 breaths per minute, respectively).
- Obtain the following additional information to determine the probable diagnosis (**Table F-24, page F-122**).
- Determine (feel):
 - the location and boundary of the scalp swelling;
 - if the swelling is fluctuant (feeling of free liquid) or if there is an area within the swelling that feels spongy;
 - if the scalp is painful (baby cries when scalp is touched);
 - if there is moulding of the head (**Fig. F-7**) with over-riding of the parietal bones.

FIGURE F-7 Moulding of the baby's head



DIFFERENTIAL DIAGNOSIS

TABLE F-24 Differential diagnosis of swelling on scalp

Findings ^a		Probable Diagnosis
History	Examination	
• Swelling apparent at birth or within two hours and becoming more evident during next 24 hours • Birth by vacuum extraction • Asphyxia	• Swelling under entire scalp • Spongy feel of scalp • Baby cries when scalp is touched • Pallor, possibly increasing • Heart rate more than 160 beats per minute • Respiratory rate consistently more than 60 breaths per minute • Increasing head circumference	Subaponeurotic (subgaleal) haemorrhage, page F-123
• Swelling apparent at birth	• Swelling over presenting part of head that is firm and not fluctuant • Moulding of head and over-riding of parietal bones • Baby looks otherwise well	Caput succedaneum, page F-124
• Swelling apparent within four hours after birth	• Rounded swelling with boundaries limited by suture lines (Fig. F-8, page F-125) • Fluctuance within swelling • Baby looks otherwise well	Cephalohaematoma, page F-124
• Swelling apparent at birth • Birth by vacuum extraction	• Swelling where vacuum extraction cup was applied • Baby looks otherwise well	Chignon, page F-124

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT

SUBAPONEUROTIC (SUBGALEAL) HAEMORRHAGE

Babies with subaponeurotic haemorrhage may have a range of problems. Examine the baby closely for other signs, including increasing head circumference, episodes of apnoea, or rapid heart or respiratory rate.

- Give vitamin K₁ (phytomenadione) 1 mg IM once (or IV if an IV line has already been established), even if the baby received it at birth.
- Take a blood sample (**page P-9**):
 - Measure haemoglobin now and again in 24 hours;
 - If the **haemoglobin is less than 10 g/dl** (haematocrit less than 30%) give a blood transfusion (**page P-31**).
- Observe the baby for pallor and check the heart and respiratory rates every hour.
- Measure the baby's head circumference every six hours.
- If the **baby's head circumference is increasing or there are signs of shock** (pallor, cold to the touch, heart rate more than 180 beats per minute, unconscious or nearly unconscious), transfuse immediately with type O, Rh-negative blood.
- Ensure that the baby is fed:
 - Allow the baby to begin breastfeeding (**page C-11**);
 - If the **baby cannot be breastfed**, give expressed breast milk using an alternative feeding method (**page C-14**);
 - If the **baby cannot take enough milk by breastfeeding or using an alternative feeding method**, establish an IV line (**page P-21**) and give IV fluid;
 - Ensure that the baby receives feeds and fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**).
- After the baby is stable:
 - Measure head circumference daily;

- Check pallor and the heart and respiratory rates every three hours;
- Be prepared at any time to give fluid as indicated above;
- If the **haemoglobin is less than 8 g/dl** (haematocrit less than 24%), give a blood transfusion (**page P-31**);
- If the **haemoglobin is more than 10 g/dl** (haematocrit more than 30%), measure haemoglobin two more times after three and six days, and then weekly for as long as the baby is in the hospital.
- Observe for jaundice (**page F-77**) once daily, and give phototherapy if necessary.
- Once the head circumference begins to decrease:
 - Continue observation until the baby is at least four days old and the haemoglobin has remained at a level not requiring transfusion for at least three days;
 - After the observation period, if the baby's heart and respiratory rates are stable, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

CAPUT SUCCEDANEUM, CHIGNON, OR CEPHALOHAEMATOMA

- Reassure the mother that these are not serious conditions and that they do not require treatment. Caput and chignon resolve spontaneously after two to three days. Cephalohaematoma (**Fig. F-8, page F-125**) resolves over several weeks.
- Do not aspirate a cephalohaematoma, even though it feels fluctuant.
- Advise the mother to bring the baby back if the baby develops jaundice (**page F-77**).

FIGURE F-8 Baby with unilateral cephalohaematoma



Skin infections in babies are extremely contagious. Observe strict infection prevention practices (page C-37) at all times to prevent spreading one baby's infection to other babies in the nursery. Dispose of all items in direct contact with the lesions (e.g. gauze) in a plastic bag or leakproof, covered waste container.

PROBLEMS

- The baby's skin or soft tissues are red or swollen.
- The baby has pustules or blisters on the skin.
- The baby has white patches on the tongue or inside the mouth.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information to determine the probable diagnosis (**Table F-25, page F-128**).
- Ask the mother (or whoever brought the baby in):
 - What did the lesions look like and where on the baby's body were they when they first appeared?
 - Have the lesions changed at all since they first appeared?
- Look for:
 - location of lesions (e.g. in the axillae, around the umbilicus and groin, on the palms and soles);
 - characteristics of lesions:
 - pustules (less than 1 cm in diameter) or blisters (1 cm in diameter or more);
 - reddened skin;
 - blistering skin rash.
 - swelling on skin that is tender (baby cries when swelling is touched) or fluctuant (feeling of free liquid in swollen area).
- If the **baby has a cut or abrasion**, see **page F-132**.

DIFFERENTIAL DIAGNOSIS

TABLE F-25 Differential diagnosis of skin and mucous membrane problems

Findings ^a		Probable Diagnosis
History	Examination	
• Time of onset day 1 or later • Lesions solitary at first, then developing into clusters and spreading to other areas	• Pustules or blisters • Lesions prevalent on back of hands, around neck, in axillae, and around umbilicus and groin	Skin infection, page F-129
• Time of onset day 3 or later	• Red skin and swollen subcutaneous tissue anywhere on body • Tender and/or fluctuant swelling	Cellulitis/abscess, page F-130
• Time of onset day 3 or later	• Bright red patches on skin in napkin area, often scaly in appearance or with small white centres	Thrush in napkin area, page F-131
• Time of onset day 3 or later	• Thick white patches on tongue or inside mouth	Thrush in mouth, page F-131
• If mother had a serologic test for syphilis during pregnancy, it was positive • <i>Mother not treated or treated inadequately for syphilis</i> • Time of onset at birth	• Generalized oedema (body swelling) • Abdominal distension (from enlarged liver and/or spleen or from fluid in abdomen) • Blistering skin rash on palms and soles • Profuse nasal discharge (“snuffles”)	Congenital syphilis, page F-46

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italics is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT

SKIN INFECTION

- If the **infection developed while the baby was hospitalized or more than one baby with a skin infection from the same ward is seen within a two-day period**, suspect a nosocomial infection (**page C-45**).
- Wearing clean examination gloves:
 - Wash the affected area(s) of skin using an antiseptic solution (**Table C-10, page C-41**) and clean gauze sponges;
 - Swab the pustules/blisters with 0.5% gentian violet solution;
 - Repeat four times daily until the pustules/blisters are gone. Have the mother do this whenever possible.
- Observe for signs of sepsis (e.g. poor feeding, vomiting, breathing difficulty; **Table F-9, page F-37**), and treat for sepsis (**page F-41**) if found.
- Count the number of pustules or blisters, determine whether they cover less or more than half of the body, and treat as described below.

FEWER THAN 10 PUSTULES/BLISTERS OR COVERING LESS THAN HALF THE BODY WITH NO SIGNS OF SEPSIS

- Observe the baby for five days:
 - If the **pustules/blisters clear within five days** and there are no other problems requiring hospitalization, discharge the baby (**page C-67**);
 - If **most of the pustules/blisters are still present after five days but the baby does not have signs of sepsis**, give cloxacillin by mouth according to the baby's age and weight (**Table C-9, page C-35**) for five days.

TEN OR MORE PUSTULES/BLISTERS OR COVERING MORE THAN HALF THE BODY WITH NO SIGNS OF SEPSIS

- Open the white centre of a pustule using a sterile lancet. Take a specimen of pus using a sterile cotton swab, and send it to the laboratory for culture and sensitivity.
- Give cloxacillin IM according to the baby's age and weight (**Table C-9, page C-35**).

- Assess the baby's condition at least once daily for signs of improvement (pustules/blisters are not spreading and are beginning to dry up and heal):
 - If the **pustules/blisters are improving after three days of treatment with antibiotics**, continue cloxacillin to complete five days of treatment;
 - If the **pustules/blisters are not improving after three days of treatment with antibiotics**:
 - If the **culture is positive**, change the antibiotic according to the results of the culture and sensitivity, and give the antibiotic for an additional five days;
 - If the **culture is not possible or the organism cannot be identified**, continue giving cloxacillin and also give gentamicin according to the baby's age and weight (**Table C-9, page C-35**) for seven days.
- Observe the baby for 24 hours after discontinuing antibiotics. If the pustules/blisters have cleared, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

SKIN PUSTULES/BLISTERS WITH SIGNS OF SEPSIS

- Treat for sepsis (**page F-41**), but give cloxacillin IV according to the baby's age and weight (**Table C-9, page C-35**) instead of ampicillin.
- If the **baby is already receiving antibiotics for sepsis**, discontinue ampicillin. Give cloxacillin IV according to the baby's age and weight (**Table C-9, page C-35**) in addition to gentamicin.
- Observe the baby for 24 hours after discontinuing antibiotics. If the pustules/blisters have cleared, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

CELLULITIS/ABSCESS

- If there is a **fluctuant swelling**, incise and drain the abscess (**page P-43**).
- Give cloxacillin IM according to the baby's age and weight (**Table C-9, page C-35**).

- Assess the baby's condition at least once daily for signs of improvement:
 - If the **cellulitis/abscess is improving after five days of treatment with the antibiotic**, continue cloxacillin to complete 10 days of treatment;
 - If the **cellulitis/abscess is not improving after five days of treatment with the antibiotic**:
 - If the **culture is positive**, change the antibiotic according to the results of the culture and sensitivity and give the antibiotic for an additional 10 days;
 - If the **culture is not possible or the organism cannot be identified**, continue giving cloxacillin and also give gentamicin according to the baby's age and weight (**Table C-9, page C-35**) for 10 days.
- Observe the baby for 24 hours after discontinuing antibiotics. If the cellulitis/abscess has cleared, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

THRUSH IN NAPKIN AREA

- Apply nystatin cream to the lesions or swab the lesions with 0.5% gentian violet solution at every napkin change, continuing for three days after the lesions have healed.
- Ensure that the napkin is changed whenever it is wet or soiled.

THRUSH IN MOUTH

- Swab the thrush patches in the baby's mouth with nystatin oral solution or 0.5% gentian violet solution four times daily, continuing for two days after the lesions have healed.
- Have the mother put nystatin cream or 0.5% gentian violet solution on her breasts after breastfeeding for as long as the baby is being treated.

CUT

- Clean the cut using gauze soaked in antiseptic solution (e.g. 2.5% polyvidone iodine [**Table C-10, page C-41**]; note that other antiseptic solutions may burn).
- Cover the cut with a simple bandage to keep the cut clean and dry.
- If the **edges of the cut are open**, pull them closed with a butterfly bandage.
- If there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- Explain to the mother what the signs of local infection are (e.g. redness, heat, and swelling of the skin around the cut):
 - Ask the mother to bring the baby back if she sees signs of local infection;
 - If **signs of local infection are seen**, remove the bandage and treat with a topical antibiotic ointment three times daily for five days, leaving the cut uncovered.
- Have the mother return with the baby in one week to remove the bandage, if necessary. If there is no infection, no further follow-up is needed.

ABRASION

- Clean the abrasion (e.g. **Fig. F-9**) using cotton-wool balls soaked in antiseptic solution (e.g. 2.5% polyvidone iodine [**Table C-10, page C-41**]; note that other antiseptic solutions may burn).

FIGURE F-9 **Baby with abrasions from forceps delivery**



- Keep the wound clean and dry, and instruct the mother how to do so.
- If there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- Explain to the mother what the signs of local infection are (e.g. redness, heat, and swelling of the skin around the cut):
 - Ask the mother to bring the baby back if she sees signs of local infection;
 - If **signs of local infection are seen**, treat with a topical antibiotic ointment three times daily for five days, leaving the abrasion uncovered.
- Have the mother return with the baby in one week. If there is no infection, no further follow-up is needed.

UMBILICUS RED AND SWOLLEN, DRAINING PUS, OR FOUL SMELLING

F-135

The umbilicus usually separates one week after birth, and the wound heals within 15 days. Until the wound is healed, this is an important entry point for infection, which can quickly lead to sepsis; early recognition and treatment of an infected umbilicus are essential to prevent sepsis.

Observe strict infection prevention practices (page C-37) at all times to prevent spreading one baby's infection to other babies in the nursery. Dispose of all items in direct contact with the umbilicus or draining pus in a plastic bag or leakproof, covered waste container.

PROBLEM

- The baby's umbilicus is swollen, draining pus, or foul smelling (infected).
- The skin around the umbilicus is red and hardened.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), and obtain the following additional information to classify the severity of the infection (**Table F-26, page F-136**).
- Ask the mother (or whoever brought the baby in):
 - Were unclean or harmful substances (e.g. animal dung) applied to the baby's umbilicus?
 - Was the umbilicus covered (e.g. with a bandage)?
- If there is **redness and swelling of the skin around the umbilicus**, determine how far it extends beyond the umbilicus.

TABLE F-26 **Classification of severity of infection of umbilicus**

Findings ^a		Classification
History	Examination	
• Unclean birth • Application of unclean or harmful substances (e.g. animal dung) to umbilicus • Umbilicus covered	• Umbilicus red and swollen • Redness and swelling of skin extending more than 1 cm beyond umbilicus • Umbilicus draining pus • Foul-smelling umbilicus • Skin around umbilicus is red and hardened • Abdominal distension	Severe infection of umbilicus, below
	• Umbilicus red and swollen • Redness and swelling of skin extending less than 1 cm beyond umbilicus	Local infection of umbilicus, page F-137

^a The classification cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the classification. Findings in plain text are supportive findings; their presence helps to confirm the classification, but their absence cannot be used to rule out the classification.

MANAGEMENT

SEVERE INFECTION OF UMBILICUS

- If the **infection developed while the baby was hospitalized or more than one baby with an infection of the umbilicus from the same ward is seen within a two-day period**, suspect a nosocomial infection (page C-45).
- Treat for sepsis (page F-41) but give cloxacillin IV according to the baby's age and weight (Table C-9, page C-35) instead of ampicillin.
- If the **baby is already receiving antibiotics for sepsis**, discontinue ampicillin. Give cloxacillin IV according to the baby's age and weight (Table C-9, page C-35) in addition to gentamicin.
- If **skin pustules/blisters are present**, treat for a skin infection (page F-129).
- Provide general care as described for a local infection of the umbilicus (page F-137).

- Observe the baby for 24 hours after discontinuing antibiotics. If the infection has cleared, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

LOCAL INFECTION OF UMBILICUS

- Wearing clean examination gloves:
 - Wash the umbilicus using an antiseptic solution (**Table C-10, page C-41**) and clean gauze sponges;
 - Swab the umbilicus and the area around it with 0.5% gentian violet four times daily until there is no more pus coming from the umbilicus. Have the mother do this whenever possible.
- If the **area of redness and swelling extends more than 1 cm beyond the umbilicus**, treat for severe infection of the umbilicus (**page F-136**).
- If the infection has cleared, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

Red and swollen eyes or eyes draining pus may be caused by bacteria (e.g. gonococcus, chlamydia, staphylococcus) that are usually transmitted to the baby at the time of birth, or the problem may be caused by chemicals (e.g. silver nitrate eye drops) placed in the baby's eyes just after birth. Most causes of newborn eye problems will respond to local treatment, but gonococcal and chlamydial infections need to be identified, as they require systemic antibiotics.

Observe strict infection prevention practices (page C-37) at all times to prevent spreading one baby's infection to other babies in the nursery. Dispose of all items in direct contact with draining pus in a plastic bag or leakproof, covered waste container.

PROBLEM

- The baby's eye(s) is red, swollen, or draining pus.

FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), looking especially for a history of a sexually transmitted infection in the mother. Obtain the following additional information to determine the probable diagnosis.
- Ask the mother (or whoever brought the baby in):
 - Were drops of silver nitrate put in the baby's eye(s) at birth?
 - Was any other prophylactic treatment put in the baby's eye(s)? If so, when?

GENERAL MANAGEMENT

- Wearing clean examination gloves:
 - Clean the eyelids using sterile normal saline or clean (boiled and cooled) water and a clean swab, cleaning from the inside edge of the eye to the outside edge;
 - Have the mother do this whenever possible;

- Repeat four times daily until the eye problems have cleared.
- Have the mother wash the baby's face once daily (or more often, if necessary) using clean water, and dry with a clean cloth.
- If the **problem developed while the baby was hospitalized or more than one baby with eye problems from the same ward is seen within a two-day period**, suspect a nosocomial infection (**page C-45**).

EYES DRAINING PUS (CONJUNCTIVITIS)

- Take a specimen of pus, if it can be easily obtained, using a sterile cotton swab (take care to avoid direct contact with the baby's eyes):
 - Smear the pus on a slide, stain the slide with Gram stain, and view the slide under a microscope;
 - Send a sample of the pus to the laboratory for culture (including possible gonococcus) and sensitivity;
 - Determine the probable diagnosis (**Table F-27, page F-141**).
- If it is **not possible to perform a Gram stain or culture and sensitivity**, see **page F-143**.

RED OR SWOLLEN EYES AND STICKY EYELIDS BUT NO PUS DRAINING FROM EYES

- If the **eye problem continues for more than four days** (despite the general management described above), **but there is still no pus draining from the eyes**:
 - Give erythromycin by mouth (**Table C-9, page C-35**) for 14 days;
 - Apply 1% tetracycline ointment to the affected eye(s) four times daily until the eye(s) is no longer red, swollen, or sticky.
- If **pus begins to drain from the eye**, see above.
- If there are no other problems requiring hospitalization, discharge the baby (**page C-67**), and have the mother continue the treatment at home.

DIFFERENTIAL DIAGNOSIS

TABLE F-27 Differential diagnosis of conjunctivitis

History	Findings ^a		Probable Diagnosis
	Examination	Gram Stain Investigation and Culture Results	
• Time of onset day 3 or later	• One eye involved • Moderate amount of pus	• <i>Gram-positive cocci in clusters</i> • <i>Culture positive for staphylococcus</i>	Conjunctivitis due to <i>Staphylococcus aureus</i>, page F-142
• Mother has a sexually transmitted infection • Eye prophylaxis either not given or given after first hour of life • Time of onset day 1 or later	• Both eyes involved • Large amount of pus	• <i>Gram-negative diplococci</i> • <i>Culture positive for gonococcus</i>	Conjunctivitis due to gonorrhoea, page F-142
• Watery discharge from eyes at first, then changing to pus • Mother has a sexually transmitted infection • Time of onset day 5 or later	• Both eyes involved • Small to moderate amount of pus	• No organisms seen on Gram stain • Culture negative	Conjunctivitis due to chlamydia, page F-142
• Silver nitrate drops put in eyes at birth • Time of onset day 1 or 2	• Both eyes involved • Eyes red and swollen • Small amount of pus	• No organisms seen on Gram stain • Culture negative	Chemical irritation No treatment is necessary.

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italics is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT OF SPECIFIC CONDITIONS

CONJUNCTIVITIS DUE TO *S. AUREUS*

- Apply 1% tetracycline ointment to the affected eye(s) four times daily for five days. There is no need for systemic antibiotics.
- Continue to clean the baby's eyes and wash the baby's face as described under general management (**page F-139**).
- If the **mother and baby can stay near the health care facility**, the baby does not have to be admitted to the hospital for this treatment.

CONJUNCTIVITIS DUE TO GONORRHOEA

- Give ceftriaxone IM (**Table C-9, page C-34**) in a single dose.
- There is no need for antibiotic eye ointment.
- Continue to clean the baby's eyes and wash the baby's face as described under general management (**page F-139**).
- If the **mother and baby can stay near the health care facility**, the baby does not have to be admitted to the hospital for this treatment.
- Treat the mother and her partner(s) for gonorrhoea if not already treated (modify treatment according to local susceptibility, if necessary). Give:
 - ceftriaxone 250 mg IM as a single dose to the mother;
 - ciprofloxacin 500 mg by mouth as a single dose to her partner(s).

CONJUNCTIVITIS DUE TO CHLAMYDIA

- Give erythromycin by mouth (**Table C-9, page C-35**) for 14 days.
- After cleaning the eyes, apply 1% tetracycline ointment to the affected eye(s) four times daily until the eyes are no longer red, swollen, sticky, or draining pus.
- If the **mother and baby can stay near the health care facility**, the baby does not have to be admitted to the hospital for this treatment.
- Treat the mother and her partner(s) for chlamydia if not already treated (modify treatment according to local susceptibility, if necessary). Give:

- erythromycin 500 mg by mouth four times daily for seven days to the mother;
- tetracycline 500 mg by mouth four times daily for seven days to her partner(s) OR doxycycline 100 mg by mouth twice daily for seven days to her partner(s).

GRAM STAIN OR CULTURE AND SENSITIVITY NOT POSSIBLE

- If the **baby is less than seven days old and has not been treated with systemic antibiotics before**, treat for conjunctivitis due to gonorrhoea (**page F-142**).
- If the **baby is seven days or older and has been previously treated unsuccessfully with systemic antibiotics**, or if the **baby is less than seven days old and the problem is not resolved after 48 hours of treatment**, treat for conjunctivitis due to chlamydia (**page F-142**).

This chapter covers birth injuries without visible bleeding. If the **baby has a swelling on the scalp**, see **page F-121**. If the **baby is pale or bleeding**, see **page F-113**.

PROBLEMS

- The baby's arm and hand are in an abnormal position, lying limply by the baby's side (**Fig. F-10**).
- The baby is unable to wrinkle her/his forehead, close eye on affected side (**Fig. F-11**), or suckle without dribbling milk.
- The baby's bone (of the arm, leg, or shoulder) is displaced from its normal position.
- There is a swelling over the bone of the baby's arm, leg, or shoulder.
- The baby's arms or legs are not moving symmetrically.
- The baby cries when an arm, leg, or shoulder is touched or moved.

FIGURE F-10 Abnormal position of arm and hand

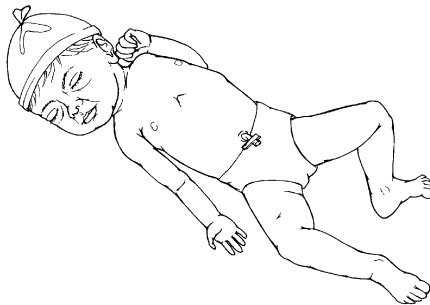


FIGURE F-11 Baby unable to wrinkle forehead or close eye on affected side



Note that babies who were born in a breech position may have fully flexed hips and knees, with the feet near the mouth, or the legs and feet may be to the side of the baby (**Fig. F-12**). This is the normal resting posture of the baby after birth and is not considered a birth injury.

FIGURE F-12 Normal resting posture of a breech baby



FINDINGS

- Review the findings from the general history (**page F-7**) and examination (**Table F-2, page F-11**), looking especially for a history of a difficult birth, and use the information to determine the probable diagnosis (**Table F-28, page F-147**).

DIFFERENTIAL DIAGNOSIS

TABLE F-28 Differential diagnosis of birth injury

Findings ^a		Probable Diagnosis
History	Examination	
• Difficult birth • Breech delivery	• No spontaneous arm movement on one side • Arm and hand lying limply by baby’s side (Fig. F-10, page F-145) • Large baby (more than 4 kg at birth)	Arm palsy (Erb or Klumpke), below
• Difficult birth • Trauma to face (e.g. use of forceps) during birth	• Unable to wrinkle forehead, close eye on affected side, or suckle without dribbling milk (Fig. F-11, page F-145) • Angle of mouth pulled to one side	Facial palsy, page F-148
• Difficult birth	• <i>Displacement of bone from its normal position</i> • Pain (crying) when a limb or shoulder is moved • Lack of movement or asymmetrical movement of a limb • Swelling over bone	Fracture, page F-148

^a The diagnosis cannot be made if a finding listed in bold is absent. The presence of a finding listed in bold, however, does not guarantee the diagnosis. The diagnosis is definitively confirmed if a finding listed in italics is present. Findings in plain text are supportive findings; their presence helps to confirm the diagnosis, but their absence cannot be used to rule out the diagnosis.

MANAGEMENT

ARM PALSY

- Handle the baby’s shoulder (e.g. during dressing or when mother is breastfeeding) gently to prevent further injury, and teach the mother how to do so.
- For the first week, reduce pain by strapping the arm in place as described for a fractured humerus (**page F-149**).

- If the mother is able to care for the baby adequately and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- Have the mother return with the baby at one week of age:
 - Check for improvement in the baby's condition;
 - Advise passive exercises if arm movement is not yet normal.
- Follow up in two weeks. Explain to the mother that the majority of cases of arm palsy recover by six to nine months of age. If **movement of the arm is still limited at one year of age**, permanent paralysis is likely.

FACIAL PALSY

- If the **baby cannot close the eye on the affected side**, apply ointment to that eye at least four times daily for as long as the eye does not close. Teach the mother how to do this.
- If the **baby is having difficulty feeding**:
 - Help the mother find a way to help the baby to attach;
 - If the **baby is not able to breastfeed**, give expressed breast milk using an alternative feeding method (**page C-14**).
- If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- Follow up in two weeks to verify that the palsy is resolved. Explain to the mother that most cases of facial palsy resolve spontaneously within two weeks. If **movement of the face is still limited at one year of age**, permanent paralysis is likely.

FRACTURE

GENERAL MANAGEMENT

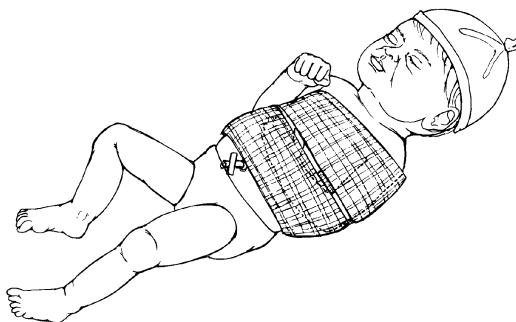
- Confirm the diagnosis with X-ray, if available.
- Handle the baby gently when moving or turning, and teach the mother how to do so. Avoid movement of the affected limb as much as possible.
- Immobilize the limb to reduce pain when the baby is handled (see below for how to immobilize specific fractures).
- If the mother is able to care for the baby and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

- Explain to the mother that fractures will heal spontaneously, usually without residual deformity, and that a hard swelling (callus) may be felt over the fracture site at two to three weeks of age. This is part of the normal healing process.
- Follow up in one month to verify that the fracture has healed. Refer babies with unhealed fractures or severe deformities to a tertiary hospital or specialized centre for orthopaedic care, if possible.

FRACTURED HUMERUS

- Place a layer of cotton batting or gauze padding between the affected arm and the chest, from the axilla to the elbow (**Fig. F-13**).

FIGURE F-13 Splinting a fractured humerus



- Strap the upper arm to the chest using a gauze bandage.
- Flex the elbow of the affected arm to 90 degrees, and use a separate bandage to strap the forearm across the abdomen in this position. Ensure that the umbilicus is not covered by the bandage.
- Check the fingers twice daily for three days (the baby does not have to be admitted to the hospital if the mother is able to bring the baby back to the hospital each time):
 - If the **fingers become blue or swollen**, remove the bandage and rewrap it more loosely;
 - If the **bandage is rewrapped**, observe the fingers for blueness or swelling for an additional three days.
- Have the mother return with the baby in 10 days to remove the gauze bandages.

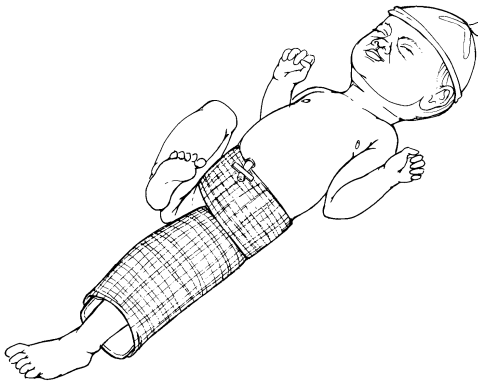
FRACTURED CLAVICLE

- If **moving the arm causes the baby to cry**, strap the arm in place as described for a fractured humerus (**page F-149**).
- Have the mother return with the baby in five days to remove the gauze bandages.

FRACTURED FEMUR

- Place the baby on her/his back and place a padded splint under the baby from the waist to below the knee of the affected leg (**Fig. F-14**).

FIGURE F-14 Splinting a fractured femur



- Strap the splint to the baby by wrapping an elastic bandage around the waist and from the thigh to below the knee of the affected leg. Ensure that the umbilicus is not covered by the bandage.
- Check the toes twice daily for three days (the baby does not have to be admitted to the hospital if the mother is able to bring the baby back to the hospital each time):
 - If the **toes become blue or swollen**, remove the bandage and rewrap it more loosely;
 - If the **bandage is rewrapped**, observe the toes for blueness or swelling for an additional three days.
- Have the mother return with the baby in 14 days to remove the splint.

PROBLEMS

- The baby has a minor birth defect (birth mark, skin tag, extra finger(s) or toe(s), cleft lip, cleft palate, or club foot).
- The baby has a major birth defect (spina bifida/meningomyelocele, gastroschisis/omphalocele, or imperforate anus).
- The baby has a genetic birth defect (e.g. Down syndrome).

MINOR BIRTH DEFECTS

BIRTH MARK

- Assure the mother that most birth marks (e.g. capillary haemangioma or Mongolian blue spot) require no special care and may disappear as the baby gets older.

SKIN TAG OR EXTRA FINGER(S) OR TOE(S)

- Tie off skin tags and extra digits that do not have a bony attachment.
- If the **extra digits have a bony attachment**, refer the baby to a tertiary hospital or specialized centre within a few months, if possible, for surgery to remove the extra digits.

CLEFT LIP OR PALATE

- Provide emotional support and reassurance to the mother (**page C-57**).
- Explain to the mother that the most important thing to do at this time is to feed the baby to ensure adequate growth until surgery can be performed.
- If the **baby has a cleft lip but the palate is intact**, allow the baby to attempt to breastfeed:
 - If the baby breastfeeds successfully and there are no other problems requiring hospitalization, discharge the baby (**page C-67**). Follow up in one week to check growth and weight gain;
 - If the **baby cannot breastfeed well because of the cleft**, give expressed breast milk using an alternative feeding method (**page C-14**).

- If the **baby has a cleft palate**, give expressed breast milk using an alternative feeding method (**page C-14**).
- Once the baby is feeding well and gaining weight, refer the baby to a tertiary hospital or specialized centre, if possible, for surgery to repair the cleft.

CLUB FOOT

- Provide emotional support and reassurance to the mother (**page C-57**).
- Refer the baby to a tertiary hospital or specialized centre within the first month of life, if possible, for correction of the club foot.

MAJOR BIRTH DEFECTS

SPINA BIFIDA/MENINGOMYELOCOELE

- Provide emotional support and reassurance to the mother (**page C-57**).
- If the **defect is not covered by skin**:
 - Cover with sterile gauze soaked in sterile, normal saline;
 - Keep gauze moist at all times, and ensure that the baby is kept warm (**page C-1**).
- Organize transfer (**page C-63**), and refer the baby to a tertiary hospital or specialized centre for further evaluation or surgical care, if possible.

GASTROSCHISIS/OMPHALOCOELE

- Provide emotional support and reassurance to the mother (**page C-57**).
- Establish an IV line (**page P-21**), and give only IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**).
- Ensure that the baby does not receive anything by mouth.
- If the **defect is not covered by skin**:
 - Cover with sterile gauze soaked in sterile, normal saline;
 - Keep gauze moist at all times, and ensure that the baby is kept warm (**page C-1**).

- Insert a gastric tube (**page P-33**), and ensure free drainage.
- Organize transfer (**page C-63**), and urgently refer the baby to a tertiary hospital or specialized centre for surgery, if possible.

IMPERFORATE ANUS

- Provide emotional support and reassurance to the mother (**page C-57**).
- Establish an IV line (**page P-21**), and give only IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**).
- Ensure that the baby does not receive anything by mouth.
- Insert a gastric tube (**page P-33**) and ensure free drainage.
- Organize transfer (**page C-63**), and urgently refer the baby to a tertiary hospital or specialized centre for surgery, if possible.

GENETIC BIRTH DEFECTS

- Provide emotional support and reassurance to the mother (**page C-57**).
- If the **baby has Down syndrome or unusual facial features**, advise the parents about the long-term prognosis, and refer the family to a specialized centre for developmental evaluation and follow-up, if possible.
- Organize genetic counseling for the parents, if possible.
- If the **mother is not going to breastfeed and requests a contraceptive method**, refer her to a family planning service.

ASYMPTOMATIC NEWBORN BABY OF MOTHER WITH HEPATITIS B, TUBERCULOSIS, DIABETES, OR SYPHILIS

F-155

If a baby is born to a mother with one or more of the problems mentioned in this chapter, there is a higher probability that the baby will develop a problem at some time after birth, even if the baby appears entirely normal at birth.

PROBLEMS

- The baby's mother had or has:
 - hepatitis B;
 - tuberculosis;
 - diabetes;
 - syphilis.

MANAGEMENT

HEPATITIS B

Mothers who had acute hepatitis during pregnancy or who are carriers of the hepatitis B virus, as demonstrated by a positive serologic test for the hepatitis B surface antigen (HbsAg), may transmit the hepatitis B virus to their babies.

- Give the first dose of hepatitis B vaccine (HBV) (**page C-51**) 0.5 ml IM in the upper thigh (**page P-15**) as soon after birth as possible (preferably within 12 hours of birth).
- If available, give hepatitis immune globulin 200 units IM in the other thigh within 24 hours of birth, or within 48 hours of birth at the latest.
- Reassure the mother that it is safe for her to breastfeed her baby.

TUBERCULOSIS

- If the **mother has active lung tuberculosis and was treated for less than two months before birth or was diagnosed with tuberculosis after birth:**
 - Do not give the tuberculosis vaccine (BCG) at birth;

- Give prophylactic isoniazid 5 mg/kg body weight by mouth once daily;
- At the age of six weeks, re-evaluate the baby, noting weight gain and taking an X-ray of the chest, if possible:
 - If there are **any findings suggestive of active disease**, start full anti-tuberculosis treatment;
 - If the **baby is doing well and tests are negative**, continue prophylactic isoniazid to complete six months of treatment.
- Delay BCG vaccine (**page C-51**) until two weeks after treatment is completed. If **BCG was already given**, repeat BCG two weeks after the end of the isoniazid treatment.
- Reassure the mother that it is safe for her to breastfeed her baby.
- Follow up in two weeks to assess weight gain.

DIABETES

Babies of diabetic mothers are at high risk for developing low blood glucose during the first three days of life, even if they are feeding well.

- Encourage and support early and frequent breastfeeding, at least eight times daily, day and night.
- If the **baby is less than three days old**, observe the baby until the third day of age:
 - Measure blood glucose (**page P-13**) at the following times:
 - at three hours of age or on admission;
 - three hours after the first measurement and then every six hours for 24 hours or until the blood glucose has been normal for two consecutive days.
 - If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**);
 - If the blood glucose has been normal for three days, the baby is feeding well, and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).
- If the **baby is three days old or older and does not show signs of low blood glucose** (e.g. lethargy, jitteriness), observation is not necessary. If

the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby (**page C-67**).

SYPHILIS

- If the **mother tested positive for syphilis and was treated adequately** (2.4 million units of penicillin) **and the treatment started at least 30 days before birth**, no treatment is necessary.
- If the **mother was not treated for syphilis, she was treated inadequately, or her treatment status is unknown or uncertain and the baby has no signs of syphilis (Table F-10, page F-37)**:
 - Give the baby procaine benzylpenicillin (or benzathine benzylpenicillin) IM (**Table C-9, pages C-34 to C-35**);
 - Give the mother and her partner(s) benzathine benzylpenicillin 1.8 g IM as two injections at separate sites;
 - Refer the mother and her partner(s) for follow-up to a clinic that offers services for sexually transmitted infections.
- Follow up in four weeks to examine the baby for growth and signs of congenital syphilis.
- Report the case to authorities, if required.

There are no specific signs or features diagnostic of HIV at birth; clinical signs of HIV may begin appearing around six weeks of life, but the baby's HIV status cannot be verified by antibody testing until 15 to 18 months of age.

PROBLEM

- The baby's mother is HIV positive.

MANAGEMENT

GENERAL MANAGEMENT

- When caring for a baby of an HIV-positive mother, always:
 - Respect the confidentiality of the mother and family;
 - Care for the baby as for any other baby, paying particular attention to infection prevention procedures (**page C-37**);
 - Give the baby all routine immunizations (**page C-51**).
- Emphasize to the mother the importance of condom use to prevent infection of her partner(s) and transmission of other sexually transmitted infections.
- Provide emotional support (**page C-57**).

ANTIRETROVIRAL THERAPY

Without antiretroviral therapy, 15% to 30% of babies born to known HIV-positive mothers will be infected during pregnancy and birth, and 5% to 20% may be infected by breastfeeding.

- Determine if the mother is receiving or has received antiretroviral treatment for HIV to prevent mother-to-child transmission.
- Treat the baby according to the protocol used for the mother as per national policy. For example:
 - If **zidovudine (AZT)** was given to the mother for four weeks **before birth**, continue to give AZT to the baby for six weeks after birth (2 mg/kg body weight by mouth every six hours);

- If the **mother received a single dose of nevirapine during labour and the baby is less than three days old**, immediately give the baby nevirapine in suspension 2 mg/kg body weight by mouth;
- Schedule a follow-up examination in 10 days to assess feeding and growth.

FEEDING

Advise the mother regarding her feeding options, and respect and support the mother's choice. Allow the mother to make an informed choice about the best feeding option for her baby. Explain to the mother that breastfeeding carries an increased risk of transmitting HIV to the baby after birth.

- Inform the mother about her options for feeding, the advantages, and the risks. The mother can choose to:
 - Give replacement feeding if this is acceptable, affordable, feasible, sustainable, and safe. Explain to the mother that replacement feeding often carries a higher risk of infant mortality than breastfeeding, especially if it cannot be prepared safely, is not continuously available and affordable to the family, and there are limited facilities and water for preparation;
 - Exclusively breastfeed until replacement feeding is feasible. It is important that the mother stops breastfeeding once replacement feeding is introduced;
 - Exclusively breastfeed for six months, then continue breastfeeding while starting complementary feeding (e.g. mashed solid foods) after six months of age.
- Help the mother to assess her situation. Help her decide whether to breastfeed (below) or give replacement feeding (**page F-161**).

MOTHER CHOOSES TO BREASTFEED

- Support the mother's choice.
- Advise the mother against mixed feeding (i.e. feeding anything other than breast milk, such as commercial breast-milk substitute, animal milks, local porridges, tea, water, etc.). Mixed feeding may increase the risk of both HIV transmission and illness or death from diarrhoea or other illnesses.

- Ensure correct positioning and attachment (**page C-12**) to prevent mastitis and damage to the mother's nipples:
 - Advise the mother to return immediately if she has any problems with her breasts or nipples, or if the baby has any difficulty feeding;
 - If there are no other problems requiring hospitalization, discharge the baby (**page C-67**);
 - Ensure a follow-up visit during the first week after discharge to assess attachment and positioning and the condition of the mother's breasts;
 - Ensure that the baby receives regular follow-up visits with an appropriate child care provider.
- Arrange for further counselling to prepare the mother for the possibility of stopping breastfeeding early.

MOTHER CHOOSES REPLACEMENT FEEDING

- Support the mother's choice.
- Ensure that the mother understands that if she chooses replacement feeding, she should begin complementary feeding at six months of age while continuing to provide milk.
- Review the guidelines for preparing and feeding breast-milk substitutes (**page C-19**).
- Allow the mother to begin preparing the replacement feed as soon as she is able to and teach her how to feed the baby using a cup, cup and spoon, or other device (e.g. paladai; **page C-16**).
- Encourage the mother to feed the baby at least eight times daily. Teach her to be flexible and respond to the baby's demands.
- Give the mother written instructions on safe preparation of the replacement feed.
- Explain the risks of replacement feeding and how to avoid them:
 - The baby may get diarrhoea if the mother's hands, water, or utensils are not clean, or if the milk stands too long before being used;
 - The baby may not grow well if:
 - too little substitute is given at each feed;
 - too few feeds are given;

- the substitute contains too much water;
 - the baby has diarrhoea.
- Advise the mother to seek care if the baby has any problems, such as:
 - feeding less than six times daily or taking smaller quantities;
 - diarrhoea;
 - poor weight gain.
- If there are no other problems requiring hospitalization, discharge the baby (**page C-67**);
- Ensure a follow-up visit during the first week after discharge to assess how the mother is coping with replacement feeding and ensure that she receives support to provide safe replacement feeding.
- Ensure that the baby receives regular follow-up visits with an appropriate child care provider.

SECTION 2: PRINCIPLES OF NEWBORN BABY CARE

A baby who is sick or small (less than 2.5 kg at birth or born before 37 weeks gestation) needs additional thermal protection and warmth to maintain normal body temperature. These babies can become hypothermic very quickly, and rewarming the baby can take a long time. The risk of complications and mortality significantly increases if the thermal environment is not optimal.

GENERAL PRINCIPLES

- Keep the baby clothed or covered as much as possible at all times, including during procedures (e.g. when establishing an IV line, during resuscitation):
 - Clothe the baby and cover the head with a cap or hat;
 - Wrap the baby in a soft dry cloth and cover with a blanket;
 - Uncover only parts of the body that need observation or treatment.
- Care for a sick or small baby in a warm room (not less than 25 °C) that is free of draughts.
- Do not place the baby near cold objects, such as a wall or window, even if the baby is in an incubator or under a radiant warmer.
- Do not place the baby directly on a cold surface (e.g. place a cloth or blanket under the baby before placing on a cold bed or examination table), and ensure that hands are warm before handling the baby.
- Keep the baby warm during transfer for diagnostic or treatment procedures. Use warming devices or transfer in skin-to-skin contact (**page C-5**) with the mother or another person, if possible.
- Ensure warmth during procedures (e.g. use a radiant warmer).
- Change napkins whenever they are wet.
- If **anything wet is applied to the skin** (e.g. moistened gauze), ensure that the baby is kept warm.
- Avoid bathing the baby during the first six hours of life or until the baby's temperature is stable; delay bathing a small baby until at least the second day of life.

MEASURING BODY TEMPERATURE

Unless directed otherwise by another chapter, measure the baby’s temperature as often as indicated in **Table C-1**, below.

TABLE C-1 **Measuring body temperature**

	Baby with Serious Illness	Small Baby^a	Very Small Baby^b	Baby Progressing Well
Frequency of measurements	Every hour	Twice daily	Four times daily	Once daily

^a Small babies are less than 2.5 kg at birth or born before 37 weeks gestation.

^b Very small babies are less than 1.5 kg at birth or born before 32 weeks gestation.

METHODS FOR WARMING THE BABY AND MAINTAINING BODY TEMPERATURE

There are five methods for warming the baby and maintaining the baby’s temperature (**Table C-2**). See below for specific instructions for using each method.

TABLE C-2 **Methods for warming the baby and maintaining body temperature**

Method	Guidelines for Selection and Use	Advantages	Risks/Disadvantages
Skin-to-skin contact	• Appropriate for all stable babies • Appropriate for rewarming a baby with moderate hypothermia (32 °C to 36.4 °C), particularly when other methods are not available • Not appropriate for babies with life-threatening problems (e.g. sepsis, severe breathing difficulty)	• Mother can closely monitor baby • Another person can provide skin-to-skin contact if the mother is unavailable • Babies usually maintain normal body temperature	

TABLE C-2 Cont. Methods for warming the baby and maintaining body temperature

Method	Guidelines for Selection and Use	Advantages	Risks/Disadvantages
Kangaroo mother care	• Appropriate for stabilized babies weighing 1.5 to 2.5 kg, but particularly recommended for continuous care of babies weighing 1.5 to 1.8 kg • Not appropriate for babies with life-threatening problems (e.g. sepsis, severe breathing difficulty) • Not appropriate if mother has a serious illness or complication from labour or birth that prevents her from caring for the baby	• Mother can closely monitor baby • Babies usually maintain normal body temperature	• Mother may not always be available
Radiant warmer	• Appropriate for sick babies and babies weighing 1.5 kg or more • Use to keep baby warm during initial assessment, treatment, and procedures, and to rewarm a cold baby	• Allows observation of baby • Many procedures can be performed while baby is under warmer	• Baby can become hyperthermic or hypothermic if temperature is not monitored • Baby can become dehydrated • Warmer is expensive to buy • Warmer requires reliable source of electricity

TABLE C-2 Cont. Methods for warming the baby and maintaining body temperature

Method	Guidelines for Selection and Use	Advantages	Risks/Disadvantages
Incubator	• Appropriate for continuous care of babies weighing less than 1.5 kg who are not eligible for kangaroo mother care • Appropriate for babies who have life-threatening problems (e.g. sepsis, severe breathing difficulty)	• Maintains constant temperature • Allows observation of baby • Oxygen can easily be provided • Baby can be naked, if necessary	• Baby can become hyperthermic or hypothermic if temperature is not monitored • Baby can become dehydrated • Incubator is easily colonized by bacteria • Incubator is expensive to buy and maintain • Incubator requires reliable source of electricity • Personnel trained to care for baby and clean and maintain incubator are required • Mother and baby are separated • Incubator is more difficult to clean than radiant warmer
Warm room	• Appropriate for care of babies recovering from illness and small babies who do not require frequent diagnostic and treatment procedures • Not appropriate for babies with life-threatening problems (e.g. sepsis, severe breathing difficulty)		• Baby can become hypothermic • Room may be uncomfortable for adults

TABLE C-2 Cont. Methods for warming the baby and maintaining body temperature

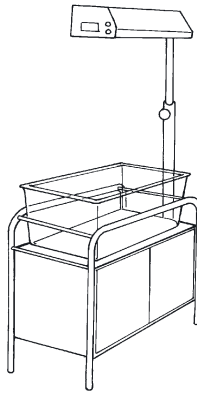
Method	Guidelines for Selection and Use	Advantages	Risks/Disadvantages
Other methods (e.g. hot water bottles or bricks)	• Appropriate for emergency situations when other methods are not available (e.g. during transport)		• Baby can become hyperthermic • Baby can be burned by objects • Baby can become hypothermic if objects are not replaced after they cool • Constant temperature is difficult to maintain

SKIN-TO-SKIN CONTACT

- Clothe and secure the baby as described for kangaroo mother care (**page F-30**).
- Ensure that the temperature of the room where the rewarming takes place is at least 25 °C.
- Measure the baby’s body temperature two hours after beginning skin-to-skin contact unless directed otherwise by another chapter. If the **baby’s temperature is not 36.5 °C to 37.5 °C after the two hours of rewarming**, reassess the baby (**Table F-2, page F-11**).

RADIANT WARMER

- Ensure that the temperature of the room where the radiant warmer (**Fig. C-1, page C-6**) is used is at least 22 °C.
- Clean the mattress and platform, and cover the mattress with a clean linen sheet.

FIGURE C-1 Radiant warmer

- Turn on the warmer and set the temperature according to the manufacturer's instructions (usually between 36 °C and 37.5 °C). When it is known beforehand that a baby is to arrive in the newborn special care unit, turn on the warmer to pre-warm the linen and mattress so that the baby does not initially lie on a cold surface.
- Ensure that the baby's head is covered and the baby is clothed or covered unless it is necessary for the baby to be naked or partially undressed for observation or a procedure.
- Place only one baby under each radiant warmer.
- Turn the baby frequently while under the warmer, if possible.
- If the **baby is receiving IV fluid or expressed breast milk**, increase the volume of fluid and/or milk by 10% of the total daily volume per day (**Table C-4, page C-22**) for as long as the baby is under the radiant warmer.
- Check the temperature of the warmer and of the room every hour, and adjust the temperature setting accordingly.
- Move the baby to be with the mother as soon as the baby no longer requires frequent procedures and treatment.

INCUBATOR

- Determine the appropriate temperature for the incubator (**Fig. C-2**) based on the baby’s weight and age (**Table C-3**).
- Warm the incubator to the desired temperature before placing the baby inside.

FIGURE C-2 Incubator

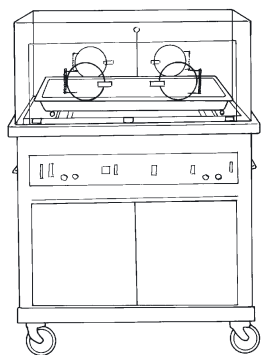


TABLE C-3 Recommended incubator temperatures

Weight of Baby	Incubator Temperature by Age ^a			
	35 °C	34 °C	33 °C	32 °C
Less than 1.5 kg	1 to 10 days old	11 days to 3 weeks old	3 to 5 weeks old	More than 5 weeks old
1.5 to 2.0 kg		1 to 10 days old	11 days to 4 weeks old	More than 4 weeks old
2.1 to 2.5 kg		1 to 2 days old	3 days to 3 weeks old	More than 3 weeks old
More than 2.5 kg			1 to 2 days old	More than 2 days old

^a If the **incubator is single-walled**, increase the incubator temperature 1 °C for every 7 °C difference in temperature between the room and the incubator.

- Clean the mattress and cover it with a clean linen sheet.
- Ensure that the incubator's water reservoir is empty; dangerous bacteria may grow in the water and infect the baby. Leaving the reservoir dry will not affect the function of the incubator.
- Ensure that the baby's head is covered and the baby is clothed or covered unless it is necessary for the baby to be naked or partially undressed for observation or a procedure.
- Place only one baby in each incubator.
- Close the hood as quickly as possible after placing the baby inside, and keep the portholes of the incubator closed at all times to keep the incubator warm.
- Check the temperature of the incubator every hour for the first eight hours, and then every three hours:
 - If the **temperature of the incubator does not match the set temperature**, the incubator may not be functioning properly; adjust the temperature setting until the desired temperature is reached inside the incubator, or use another method to warm the baby.
- Measure the baby's temperature (**page P-5**) every hour for the first eight hours, and then every three hours:
 - If the **baby's temperature is less than 36.5 °C or more than 37.5 °C**, adjust the temperature of the incubator accordingly;
 - If the **baby's temperature remains less than 36.5 °C or more than 37.5 °C in spite of the incubator being kept at the recommended setting**, manage for abnormal body temperature (**page F-69**).
- Move the baby to be with the mother as soon as the baby no longer requires special care and frequent procedures and treatment.

WARM ROOM

- Ensure that the baby's head is covered and the baby is adequately clothed or covered.
- Ensure that the temperature of the room is at least 26 °C. A warm room is often uncomfortable for adult staff and caregivers; ensure that the baby is not neglected and that the staff and caregivers do not decrease the temperature without providing another warming method.

- Place the baby in a cot in the room, away from cold walls and windows, and away from draughts.
- Measure the temperature of the room and the baby's body temperature four times daily.
- Provide additional warmth at night.

OTHER METHODS

- Ensure that the baby's head is covered and the baby is adequately clothed or covered.
- Ensure that the object (e.g. hot water bottle or brick) does not come into contact with the baby's skin, which could cause burns.
- Ensure that the object is not too hot.
- Monitor the warmth of the object and replace it before it becomes cold.

FEEDING

Ensure that the baby is fed as soon as possible after birth (within one hour if possible) or within three hours of admission unless feeding should be delayed because of a specific problem. If possible, admit the mother when admitting the baby. Encourage the mother to breastfeed the baby or to give expressed breast milk; support whichever method of feeding the mother chooses. Note that this guide assumes that the mother is available to breastfeed or express breast milk for her baby. If the **baby is small** (less than 2.5 kg at birth or born before 37 weeks gestation), review the general principles of feeding a small baby (**page F-24**).

GENERAL PRINCIPLES OF EXCLUSIVE BREASTFEEDING

- Encourage early and exclusive breastfeeding whenever possible.
- Explain to the mother and her family the benefits of early and exclusive breastfeeding:
 - Breast milk contains the exact nutrients the baby needs and promotes the baby's development;
 - Breast milk is easily digested and efficiently used by the baby's body;
 - Breast milk protects the baby from infection;
 - Breastfeeding can be used as a contraceptive method (lactational amenorrhoea method).
- Encourage the mother to breastfeed the baby on demand, both day and night (eight or more times in 24 hours), for as long as the baby wants.
- Have the mother offer the second breast once the baby releases the first breast on her/his own.
- Advise the mother that she should not:
 - force the baby to feed;
 - interrupt a feed before the baby is done;
 - use artificial teats or pacifiers;
 - give the baby any other food or drink (e.g. commercial breast-milk substitute, animal milks, local porridges, tea, water, etc.) other than breast milk for the first six months of life.

- Include the mother's partner, a family member, or other support person in discussions about breastfeeding, if possible.
- Ensure that the mother eats nutritious food and has enough to drink.
- Ensure that the mother can wash or shower daily, but tell her to avoid washing or wiping her nipples before breastfeeding.
- Explain to the mother that most medications she may be given will not harm her baby while she breastfeeds; however, if the mother is taking cotrimoxazole or pyrimethamine with sulfadoxine, monitor the baby for jaundice.
- If the **mother is HIV positive**, see **page F-159** for guidelines to help the mother choose the most suitable feeding method.
- If the **mother is too ill or if she chooses not to breastfeed**:
 - Give the baby a breast-milk substitute (**page C-19**);
 - Advise the mother on how to care for her breasts:
 - Explain to the mother that her breasts may be uncomfortable for some time, but she should avoid stimulating them. If the **mother's discomfort is severe**, she can express a small amount of milk (**page C-15**) a few times a day to relieve the discomfort;
 - Advise the mother to support her breasts with a well-fitting bra or cloth, but she should not bind the breasts tightly because this may increase her discomfort;
 - Suggest that the mother apply a warm or cold compress to her breasts to reduce swelling.

CORRECT POSITIONING AND ATTACHMENT FOR BREASTFEEDING

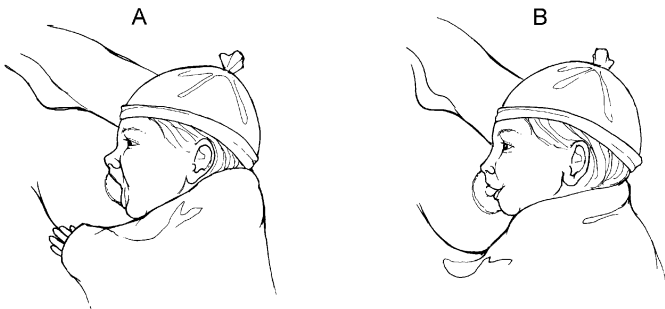
- Ask the mother to help the baby attach when the baby seems to be ready. Signs of readiness to suckle include opening the mouth, rooting or searching, looking around, and moving.
- Explain to the mother how to hold her baby during breastfeeding. She should:
 - hold the baby in skin-to-skin contact (**page C-5**), if possible;
 - hold the baby's head and body straight so that the baby faces her breast, with the baby's nose near her nipple;
 - support the baby's whole body, not just the neck and shoulders.

- Explain to the mother how to encourage her baby to attach (**Fig. C-3**). She should:
 - touch the baby's lips with her nipple;
 - wait until the baby's mouth is opening wide;
 - move the baby quickly onto her breast, so that the baby's lower lip is well below the nipple.

FIGURE C-3 Encouraging the baby to attach to the breast



- Assess attachment on the breast and suckling. Help the mother if she wishes, especially if she is a first time or very young mother. Signs of correct attachment (**Fig. C-4, page C-14**) are:
 - baby's chin touches the breast;
 - baby's mouth is wide open with the lower lip curled out;
 - more of the areola is visible above than below the mouth;
 - baby suckles with slow, deep sucks and pauses sometimes.
- If the **mother's breasts are engorged**, have her express a small amount of breast milk (**page C-15**) before beginning to breastfeed. This will soften the area around the nipple so that it is easier for the baby to attach.

FIGURE C-4 Correct (A) and incorrect (B) attachment to the breast

BREASTFEEDING TWINS

- Reassure the mother that she has enough breast milk for both babies.
- If the **babies are small** (less than 2.5 kg at birth or born before 37 weeks gestation), review the general principles of feeding a small baby (**page F-24**). In addition, have the mother:
 - begin feeding one baby at a time until breastfeeding is well established in both babies;
 - ensure that the weaker twin gets enough milk;
 - rotate at every breastfeeding the breast each baby is offered;
 - give expressed breast milk using an alternative feeding method (below) after the initial breastfeed, if necessary.

FEEDING THE BABY USING AN ALTERNATIVE FEEDING METHOD

- Teach the mother how to express breast milk, if necessary (**page C-15**).
- Encourage the mother to express breast milk at least eight times in 24 hours.
- Assess feeding ability twice daily, and encourage and support the mother to begin breastfeeding as soon as the baby shows signs of readiness to suckle unless treatment of the baby's illness prevents breastfeeding (e.g. the baby is receiving oxygen).
- Record the following each time the baby is fed:

- time of feeding;
- amount and kind of milk given (e.g. expressed breast milk or breast-milk substitute);
- any feeding difficulty.
- Calculate the volume of milk required according to the baby's age (**Table C-4, page C-22**).
- Ensure that the baby is receiving enough milk by assessing the baby's growth (**page C-53**).
- Choose the most appropriate alternative feeding method:
 - cup, cup and spoon, or other device (**page C-16**);
 - hand-expressing breast milk into the baby's mouth (**page C-18**);
 - gastric tube (**page C-18**).

EXPRESSING BREAST MILK

- Teach the mother how to express breast milk herself. The mother should:
 - obtain a clean (washed, boiled or rinsed with boiling water, and air-dried) cup or container to collect and store the milk;
 - wash her hands thoroughly;
 - sit or stand comfortably and hold the container underneath her breast;
 - express the milk (**Fig. C-5, page C-16**):
 - support the breast with four fingers and place the thumb above the areola;
 - squeeze the areola between the thumb and fingers while pressing backwards against the chest;
 - express each breast for at least four minutes, alternating breasts until the flow of milk stops (both breasts are completely expressed).

FIGURE C-5 Expressing breast milk

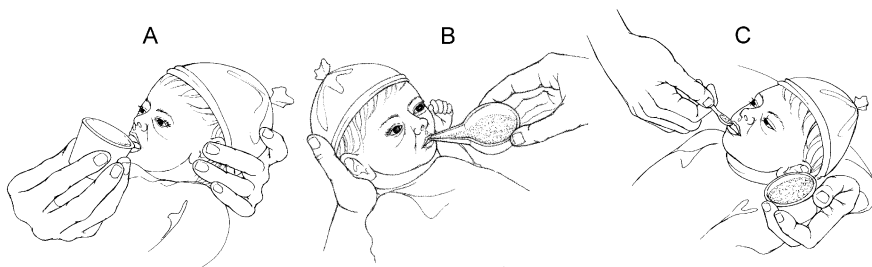
- If the **milk does not flow well**:
 - ensure that the mother is using the correct technique;
 - have the mother apply warm compresses to her breasts;
 - have someone massage the mother's back and neck.
- If the **expressed breast milk is not going to be used immediately**, label the container and either refrigerate the milk and use within 24 hours or freeze the milk (if freezing conditions can be reliably maintained) at -20°C for no more than six months:
 - If a **refrigerator or freezer is not available**, keep the milk covered at room temperature for up to six hours;
 - Ensure that the milk is at room temperature before giving it to the baby:
 - Warm frozen or refrigerated milk in a warm water bath (approximately 40°C), but avoid overheating the milk;
 - Use the rewarmed milk promptly.

FEEDING BY CUP, CUP AND SPOON, OR OTHER DEVICE

- Ensure that the mother can properly express breast milk (**page C-15**).
- Feed the baby using a cup, a cup and spoon, or other suitable device (e.g. paladai) (**Fig. C-6, page C-17**).

- Use clean (washed, boiled or rinsed with boiled water, and air-dried) utensils and feeding devices for each feed.

FIGURE C-6 Feeding by cup (A), paladai (B), or cup and spoon (C)



- Feed the baby immediately after the milk is expressed, if possible. If the **baby does not consume all of the milk**, store the remaining milk according to the guidelines on **page C-16** for expressed breast milk.
- Have the mother feed the baby unless she is not available. The mother should:
 - measure the volume of breast milk in the cup, ensuring that it meets the required volume according to the baby's age (**Table C-4, page C-22**);
 - hold the baby sitting semi-upright on her lap;
 - rest the cup (or paladai or spoon) lightly on the baby's lower lip and touch the outer part of the baby's upper lip with the edge of the cup;
 - tip the cup (or paladai or spoon) so the milk just reaches the baby's lips;
 - allow the baby to take the milk; do not pour the milk into the baby's mouth;
 - end the feeding when the baby closes her/his mouth and is no longer interested in feeding.
- If the **baby does not take the necessary volume of milk** (according to **Table C-4, page C-22**), have the mother encourage the baby to feed for a longer time or feed more often.
- Encourage the mother to begin breastfeeding as soon as the baby shows signs of readiness to suckle.

- If the **baby is not feeding well using a feeding device or the mother prefers not to use it**, have the mother attempt to hand-express breast milk directly into the baby's mouth (**page C-18**).

HAND-EXPRESSING BREAST MILK INTO BABY'S MOUTH

- Ensure that the mother can properly express breast milk (**page C-15**).
- Have the mother:
 - hold the baby with the baby's mouth close to her nipple;
 - express the breast until some drops of milk appear on the nipple;
 - let the baby smell the nipple and attempt to suck, and allow some breast milk to fall into the baby's mouth;
 - express more drops of breast milk after the baby swallows;
 - end the feeding when the baby closes her/his mouth and is no longer interested in feeding.
- Ask the mother to repeat this process every one to two hours if the baby weighs less than 1.5 kg or every two to three hours if the baby weighs 1.5 kg or more.

FEEDING EXPRESSED BREAST MILK BY GASTRIC TUBE

- Ensure that the mother can properly express breast milk (**page C-15**).
- Insert a gastric tube (**page P-33**) if one is not already in place.
- Confirm that the tube is properly positioned (**page P-35**) before each feeding.
- Encourage the mother to hold the baby and participate in feedings.
- Determine the required volume of milk for the feed according to the baby's age (**Table C-4, page C-22**).
- Remove the plunger of a high-level disinfected or sterile syringe (of a size large enough to hold the required volume of milk) and connect the barrel of the syringe to the end of the gastric tube:
 - If a **high-level disinfected or sterile syringe is not available**, use a clean (washed, boiled or rinsed with boiled water, and air-dried) syringe;
 - If a **suitable syringe is not available**, use any other suitable, clean funnel that connects snugly to the gastric tube.

- Pour the required volume of milk for the feed into the syringe with the “tip” of the syringe pointed downward.
- Have the mother hold the syringe 5 to 10 cm above the baby (**Fig. C-7**) or suspend the tube above the baby and allow the milk to run down the tube by gravity. Do not force milk through the tube using the plunger of the syringe.

FIGURE C-7 Feeding expressed breast milk by gastric tube



- Using this method, each feeding should take 10 to 15 minutes. If the **flow of milk is too fast**, slightly pinch the tube below the syringe to slow down the flow.
- When the feeding is finished, remove, wash, and high-level disinfect or sterilize the syringe, and cap the tube until the next feeding.
- Progress to feeding by cup/spoon when the baby can swallow without coughing or spitting milk. This could be in as little as one or two days, or it may take longer than one week.
- Replace the gastric tube with another clean gastric tube after three days, or earlier if it is pulled out or becomes blocked, and clean and high-level disinfect or sterilize it according to **Table C-11 (page C-43)**.

BREAST-MILK SUBSTITUTES

- If the **mother cannot breastfeed or express breast milk**, use a commercial breast-milk substitute. (Note that the following instructions are for the health care provider. Ensure that the mother knows how to properly prepare the breast-milk substitute before discharging the baby.)

- If the **baby is small** (less than 2.5 kg at birth or born before 37 weeks gestation), use a breast-milk substitute designed for premature or small babies.
- Once a container of breast-milk substitute is open, use the substitute within the recommended time according to the manufacturer's instructions (e.g. use liquid breast-milk substitute within four hours of opening the container).
- Check the expiry date of the breast-milk substitute.
- Use aseptic technique to prepare the breast-milk substitute from liquid concentrates or powders, using high-level disinfected or sterile utensils and containers, and sterilized or boiled and cooled water.
- Wash hands with soap and water.
- Determine the required volume of milk for the feed according to the baby's age (**Table C-4, page C-22**).
- Measure the breast-milk substitute and water, mix them, and feed the baby using a cup, cup and spoon, or other device (**page C-16**). Have the mother do this whenever possible.
- Store remaining milk in a labelled container in a refrigerator for a maximum of 24 hours.
- If **commercial breast-milk substitute is not available**, have the mother use a breast-milk substitute that is based on animal milk and prepared at home (see national guidelines for correct preparation).

FLUID MANAGEMENT

- IV fluid is given to ensure that the baby receives necessary fluid, minimum calories, and electrolytes. Give IV fluid only if directed to do so in a chapter in the section *Assessment, Findings, and Management*.
- If the **baby is small** (less than 2.5 kg at birth or born before 37 weeks gestation), see **page F-24** for special considerations for fluid and feeding management of small babies.

CHOICE OF IV FLUID

- Give 10% glucose for the first three days of life.

- On the fourth day of life, if urine output is well established, give 10% glucose with 3 mmol/kg body weight of sodium and 2 mmol/kg body weight of potassium:
 - It is preferable to use commercially-produced IV fluid, such as glucose in quarter normal saline, if available. Using this fluid avoids the risk of introducing infection by having to add electrolytes and eliminates errors in calculations when making the solution;
 - If these **premixed solutions are not available**, add normal saline 20 ml/kg body weight to the required volume of 10% glucose. To calculate the necessary fluid volume, determine the volume of fluid required for day of life (see **Table C-4, page C-22**) and add 20 ml/kg body weight of normal saline, but infuse only the required daily volume. For example:
 - For a baby who is four days old, the required daily fluid volume is 120 ml/kg body weight;
 - Add 20 ml/kg body weight of normal saline to the 120 ml/kg body weight of 10% glucose for a total fluid volume of 140 ml/kg body weight;
 - Infuse 120 ml/kg body weight of this mixed solution.
 - Addition of potassium to IV fluid is required when a baby cannot be fed for a prolonged period of time. This must be done with extreme caution because a small overdose can have serious consequences:
 - Commonly available preparations are 7.5% and 15% KCl, which contain 1 and 2 mmol of potassium per ml, respectively;
 - While supplementing potassium, add 2 ml/kg body weight of 7.5% KCl or 1 ml/kg body weight of 15% KCl to the total volume of IV fluid infused each day.

ADMINISTRATION OF IV FLUID

- Use an infusion set with a microdropper (where 1 ml = 60 microdrops). Microdroppers allow slow administration of fluid and ensure that babies receive the volume of fluid they need. Using a standard infusion set (where 1 ml = 20 drops) can cause dangerous fluid overload.
- Before infusing IV fluid, check:
 - the expiry date of the fluid;

- that the seal of the infusion bottle or bag is not broken;
- that the fluid is clear and free from visible particles.
- Calculate the rate of administration, and ensure that the microdropper delivers the fluid at the required rate.
- Change the IV infusion set and fluid bag every 24 hours, even if the bag still contains IV fluid (they can be a major source of infection).

VOLUMES OF FLUID AND FEEDS DURING THE FIRST DAYS OF LIFE

- Determine the required volume of fluid according to the baby’s age (Table C-4; for small babies [less than 2.5 kg at birth or born before 37 weeks gestation], see pages F-26 to F-30). Note that Table C-4 combines the volumes of IV fluid and feeds (day 1 is the day of birth).
- Subtract the volume of feeds the baby is receiving from the total daily volume required to determine the necessary volume of IV fluid.
- Adjust the volume of feeds and/or fluid if directed to do so by another chapter (e.g. if the **baby is placed under a radiant warmer or is receiving phototherapy**, increase the volume of feeds and/or fluid by 10% of the total daily volume per day because of increased loss of water from the skin).
- Convert the total volume into ml per hour or drops per minute.

TABLE C-4 Total daily feed and fluid volumes for babies^a from birth

Day of Life	1	2	3	4	5	6	7+
ml/kg body weight of feeds and/or fluid	60	80	100	120	140	150	160+

^a See pages F-26 to F-30 for fluid volumes for small babies (less than 2.5 kg at birth or born before 37 weeks gestation).

MONITORING BABIES RECEIVING IV FLUID

- Inspect the infusion site every hour:
 - Look for redness and swelling around the insertion site of the cannula, which indicate that the cannula is not in the vein and fluid is leaking into the subcutaneous tissue. If redness or swelling is seen at any time, stop the infusion, remove the needle, and establish a new IV line (page P-21) in a different vein;

- Check the volume of fluid infused and compare to the prescribed volume;
- Record all findings.

Solutions containing glucose can cause tissue to die and should not be allowed to leak into subcutaneous tissue.

- Measure blood glucose every six hours:
 - If the **blood glucose is less than 45 mg/dl (2.6 mmol/l)**, treat for low blood glucose (**page F-91**);
 - If the **blood glucose is more than 105 mg/dl (6 mmol/l)** (hyperglycaemia) on two consecutive readings:
 - Change to a 5% glucose solution, if possible;
 - Measure blood glucose again in three hours.
- Assess hydration daily:
 - If there are **signs of dehydration** (e.g. sunken eyes or fontanelle, loss of skin elasticity, or dry tongue and mucous membranes), increase the volume of fluid by 10% of the baby's body weight on the first day that the dehydration is noted;
 - If there are **signs of overhydration** (e.g. excessive weight gain, puffy eyes, or increasing oedema over lower parts of the body), reduce the volume of fluid by half for 24 hours after the overhydration is noted.
- Document in the baby's clinical record when the baby urinates. If there is **little or no urine output in 24 hours in the absence of asphyxia**, increase the volume of fluid by 10%, as for dehydration (above).
- Weigh the baby daily. If the **daily weight loss is more than 5%**, increase the total volume of fluid by 10 ml/kg body weight for one day to compensate for inadequate fluid administration.

COMBINING IV FLUID AND FEEDING

- Allow the baby to begin breastfeeding as soon as the baby's condition improves unless directed otherwise by a chapter in the section *Assessment, Findings, and Management*. If the **baby cannot be**

breastfed, give expressed breast milk using an alternative feeding method (**page C-14**).

- If the **baby tolerates the feed and there are no problems**, continue to increase the volume of feeds while decreasing the volume of IV fluid to maintain the total daily fluid volume according to the baby's daily requirement (**Table C-4, page C-22**).
- Feed the baby every three hours, or more frequently if necessary, adjusting the volume at each feeding accordingly.
- Add the total volume of feeds and fluid given each day. Compare this volume with the required daily volume, and adjust the volume that the baby receives accordingly.
- Discontinue the infusion of IV fluid when the baby is receiving more than two-thirds of the daily fluid volume by mouth and has no abdominal distension or vomiting.
- Encourage the mother to breastfeed exclusively as soon as the baby is receiving 100% of the daily fluid volume by mouth.

ADMINISTERING OXYGEN

- Review the methods of administering oxygen, their instructions for use, and advantages and disadvantages (**Table C-5**).
- Continue to perform any examinations, tests, procedures, and treatment while the baby is receiving oxygen.
- If **the baby can tolerate oral feedings**, give expressed breast milk by gastric tube (**page C-18**). If the **baby cannot be fed**, establish an IV line (**page P-21**) and give IV fluid at maintenance volume according to the baby’s age (**Table C-4, page C-22**).
- Ensure that the baby does not receive too little or too much oxygen:
 - Giving too little oxygen may cause organ damage and eventual death;
 - Giving too much oxygen may damage the baby’s lungs and retinas. This damage, however, occurs after days (rather than minutes or hours) of excess oxygen therapy and is unlikely to occur in babies more than 35 weeks gestation.

TABLE C-5 Methods for administering oxygen

Method	Flow and Concentration	Advantages	Disadvantages
Nasal prongs	• Low = 0.5 L per minute • Moderate = 0.5 to 1 L per minute • High = more than 1 L per minute	• Low flow of oxygen required • Constant concentration of oxygen if applied correctly	• Requires special prongs for use on newborn babies • Requires flow-control device that allows low flow • Directs cold oxygen into baby’s lungs
Nasal catheter	• Low = 0.5 L per minute • Moderate = 0.5 to 1 L per minute • High = more than 1 L per minute	• Low flow of oxygen required • Constant concentration of oxygen if applied correctly	• Requires flow-control device that allows low flow • Directs cold oxygen into baby’s lungs

TABLE C-5 Cont. **Methods for administering oxygen**

Method	Flow and Concentration	Advantages	Disadvantages
Head box	• Low = 3 L per minute • Moderate = 3 to 5 L per minute • High = more than 5 L per minute	• Warms the oxygen • Can give a high concentration	• High flow of oxygen required to achieve desired concentration
Face mask	• Low = 1 L per minute • Moderate = 1 to 2 L per minute • High = more than 2 L per minute	• Oxygen can be administered quickly • Convenient for administering oxygen for short periods of time	• Carbon dioxide can accumulate if flow rate is low or mask is small • Difficult to feed baby while mask is in place • Difficult to keep mask in place
Incubator	• If using a head box inside the incubator, see above • If connecting oxygen directly to the incubator, follow the manufacturer's instructions	• Warms the oxygen	Disadvantages of giving oxygen directly into the incubator: • High flow of oxygen required to achieve desired concentration • Difficult to maintain oxygen concentration when incubator portholes are open for care and procedures

NASAL PRONGS

- Use 1-mm prongs for a small baby (less than 2.5 kg at birth or born before 37 weeks gestation) and use 2-mm prongs for a term baby.
- Place the prongs just within the baby's nostrils.
- Secure the prongs in place using elastic or a piece of adhesive tape.

- Adjust the flow of oxygen to achieve the desired concentration.
- Change the nasal prongs twice daily. Give oxygen using a face mask (**page C-28**) while cleaning and disinfecting the prongs (see **Table C-11, page C-43**), if necessary.

NASAL CATHETER

- Use an 8-F catheter. If the **8-F catheter is too large**, use a 6-F catheter.
- Determine the distance the tube should be passed by measuring the distance from the nostril to the inner margin of the eyebrow.
- Gently insert the catheter into the nostril. If a **gastric tube is already in place in one nostril**, insert the catheter into the same nostril that the gastric tube is in, if possible.
- Ensure that the catheter is correctly positioned:
 - Look into the baby's mouth;
 - The catheter should not be visible at the back of the mouth;
 - If the **catheter is visible at the back of the mouth**, pull the catheter out slowly until it is no longer visible.
- Adjust the flow of oxygen to achieve the desired concentration.
- Change the nasal catheter twice daily. Give oxygen using a face mask (**page C-28**) while cleaning and disinfecting the catheter (see **Table C-11, page C-43**), if necessary.

HEAD BOX

- Place a head box (**Fig. C-8, page C-28**) over the baby's head.
- Ensure that the baby's head stays within the head box, even when the baby moves.
- Adjust the flow of oxygen to achieve the desired concentration.

FIGURE C-8 Baby receiving oxygen via a head box

FACE MASK

- Place the mask over the baby's mouth and nose.
- Secure the mask in place using elastic or a piece of adhesive tape.
- Adjust the flow of oxygen to achieve the desired concentration.

INCUBATOR

- Use a head box, following the instructions for a head box (**page C-27**), or connect the oxygen directly to the incubator according to the manufacturer's instructions.
- Adjust the flow of oxygen to achieve the desired concentration.

SOURCES OF OXYGEN

Ensure that a source of oxygen (**Table C-6, page C-29**) is available at all times. Oxygen is expensive, so use it only in situations where it is necessary, and discontinue as soon as possible. There are three main sources of oxygen, which are described below. The oxygen is carried from the source to the baby by means of non-crush, plastic oxygen delivery tubing. A face mask, which can give a high concentration of oxygen, should always be available in case of rapid deterioration of the baby's condition.

TABLE C-6 Sources of oxygen

Source	Special Considerations	Advantages	Disadvantages
Oxygen cylinder (cylinder filled with oxygen under high pressure)	• Ensure that a backup cylinder is available in case the first cylinder becomes empty	• Does not require electricity	• Requires a special regulator to control the flow of oxygen
Oxygen concentrator (machine that extracts oxygen from air)	• Ensure that a backup oxygen cylinder is available in case of electrical or mechanical failure	• May be less expensive to operate than buying oxygen cylinders (in the long term) • Built-in flow-control device	• Requires a reliable source of electricity
Piped oxygen from central storage area to a wall outlet			• Expensive • Usually available only in larger health care facilities • Requires a separate flow-control device at each outlet

MONITORING THE BABY’S RESPONSE TO OXYGEN

- Use an oximeter according to the manufacturer’s instructions to ensure that the baby receives an adequate concentration of oxygen.
- If an **oximeter is not available**, monitor the baby for signs of oxygenation by assessing whether the baby has signs of breathing difficulty or central cyanosis (blue tongue and lips) (note that these observations cannot differentiate between normal and excessive concentrations of oxygen in the blood):

Central cyanosis is a late sign that the baby is not receiving enough oxygen. If the baby shows signs of central cyanosis, increase the concentration of oxygen immediately and continue until cyanosis is eliminated.

- If the **breathing difficulty is moderate to severe** (see **Table F-12, page F-49**), give oxygen at a moderate flow rate;
- When the baby's breathing begins to improve (e.g. respiratory rate begins to move towards the normal range, grunting or chest indrawing decreases), decrease the oxygen flow;
- When the baby's respiratory rate is within the normal range and there are no other signs of breathing difficulty (e.g. chest indrawing or grunting on expiration), remove oxygen and observe the baby for 15 minutes:
 - If the **baby's tongue and lips remain pink**, do not give any more oxygen. Observe for central cyanosis every 15 minutes for the next hour;
 - If **central cyanosis reappears at any time**, give oxygen again at the last rate given;
 - Continue to observe the baby for 24 hours after oxygen is discontinued.

CHOICE AND ADMINISTRATION OF ANTIBIOTICS

Antibiotic choice begins empirically with the selection of the drug(s) that is most likely to be effective against the organism causing the baby's illness. If **bacterial culture and sensitivity are possible**, the results of these investigations guide further treatment, particularly if the baby is not responding to the empirically chosen antibiotic(s).

If **bacterial culture and sensitivity are not possible and the baby is not responding to the initial antibiotic(s)**, a second-line antibiotic or combination of antibiotics is given on an empiric basis. **Table C-7 (page C-32)** lists the first-line antibiotic(s) for the infections described in this guide and the second-line antibiotic(s) to use if the baby shows no improvement (by the third day, unless directed otherwise by a chapter in the section *Assessment, Findings, and Management*) and if culture and sensitivity have not been performed. Review **Table C-8 (page C-33)** for information on diluting antibiotics, and see **Table C-9 (pages C-34 to C-35)** for antibiotic doses according to the baby's age.

Note that the information provided in this chapter applies only to antibiotics given to the baby. For information regarding dosage of antibiotics for the mother and/or her partner (e.g. for a sexually transmitted infection), see the appropriate chapter in the section *Assessment, Findings, and Management*.

ROUTE OF ADMINISTRATION

- For sepsis, meningitis, tetanus, and congenital syphilis, give antibiotics intravenously (IV) (**page P-17**):
 - Give the antibiotics, especially gentamicin and cefotaxime, slowly over a period of at least three minutes;
 - Monitor the baby while giving IV fluids (**page C-22**) to ensure that fluid overload does not occur;
 - If an **IV line cannot be established immediately**, give antibiotics intramuscularly (IM) (**page P-15**) until an IV line is in place;
 - When the baby is recovering and an IV line is no longer needed for another purpose, give the antibiotics IM to complete the course of treatment.
- For most other infections, give the antibiotics IM (**page P-15**). If an **IV line is needed for another purpose**, however, give the antibiotics IV.

TABLE C-7 Antibiotics used to treat infections described in this guide

Infection	First-Line Antibiotic(s)	Second-Line Antibiotics
Sepsis or meningitis	Ampicillin and gentamicin	Cefotaxime and gentamicin
Sepsis with infection of the umbilicus or skin	Cloxacillin and gentamicin	Cefotaxime and gentamicin
Congenital syphilis with central nervous system (CNS) involvement	Benzylpenicillin	
Congenital syphilis without CNS involvement	Procaine benzylpenicillin or benzathine benzylpenicillin	
Tetanus	Benzylpenicillin	
Skin infection with 10 or more pustules or blisters or covering more than half the body but without sepsis	Cloxacillin	Cloxacillin and gentamicin
Skin infection with fewer than 10 pustules or blisters or covering less than half the body but without sepsis	Cloxacillin	
Cellulitis	Cloxacillin	Cloxacillin and gentamicin
Conjunctivitis due to gonorrhoea	Ceftriaxone	
Conjunctivitis due to chlamydia	Erythromycin	
Mother with uterine infection or fever, or rupture of membranes for more than 18 hours before birth; asymptomatic baby	Ampicillin and gentamicin	
Mother not treated for syphilis; asymptomatic baby	Procaine benzylpenicillin or benzathine benzylpenicillin	

TABLE C-8 Antibiotic dilutions

Antibiotic	Dilution
Ampicillin	Add 5 ml sterile water to 500-mg vial = 100 mg/ml
Benzathine benzylpenicillin	Add 5 ml sterile water to 1.8-g (2.4-million unit) vial = 360 mg/ml (480 000 units/ml)
Benzylpenicillin	Add 5 ml sterile water to 600-mg (1-million unit) vial = 120 mg/ml (200 000 units/ml)
Cefotaxime	Add 5 ml sterile water to 500-mg vial = 100 mg/ml
Ceftriaxone	Add 2.5 ml sterile water to 250-mg vial = 100 mg/ml
Cloxacillin for injection	Add 5 ml sterile water to 500-mg vial = 100 mg/ml
Cloxacillin for oral administration	Add 5 ml boiled water to 125-mg bottle = 25 mg/ml
Erythromycin for oral administration	Add 5 ml boiled water to 125-mg bottle = 25 mg/ml
Gentamicin	Use 10 mg/ml, 2-ml vial = 10 mg/ml
Procaine benzylpenicillin	Add 5 ml sterile water to 1-g (1-million unit) vial = 200 mg/ml (200 000 units/ml)

TABLE C-9 Antibiotic doses^a

Antibiotic	Dose in mg		Dose in ml	
	Day 1 to 7	Day 8+	Day 1 to 7	Day 8+
Ampicillin for meningitis ONLY	100 mg/kg every 12 hours	100 mg/kg every 8 hours	1.0 ml/kg every 12 hours	1.0 ml/kg every 8 hours
Ampicillin for sepsis	50 mg/kg every 12 hours	50 mg/kg every 8 hours	0.5 ml/kg every 12 hours	0.5 ml/kg every 8 hours
Benzathine benzylpenicillin for asymptomatic baby of mother not treated for syphilis	75 mg/kg (100 000 units/kg) in a single dose	75 mg/kg (100 000 units/kg) in a single dose	0.2 ml/kg in a single dose	0.2 ml/kg in a single dose
Benzathine benzylpenicillin for congenital syphilis without CNS involvement	75 mg/kg (100 000 units/kg) once daily	75 mg/kg (100 000 units/kg) once daily	0.2 ml/kg once daily	0.2 ml/kg once daily
Benzylpenicillin for congenital syphilis without CNS involvement	30 mg/kg (50 000 units/kg) once daily	30 mg/kg (50 000 units/kg) once daily	0.25 ml/kg once daily	0.25 ml/kg once daily
Benzylpenicillin for congenital syphilis with CNS involvement	30 mg/kg (50 000 units/kg) every 12 hours	30 mg/kg (50 000 units/kg) every 12 hours	0.25 ml/kg every 12 hours	0.25 ml/kg every 12 hours
Benzylpenicillin for tetanus	60 mg/kg (100 000 units/kg) every 12 hours	60 mg/kg (100 000 units/kg) every 12 hours	0.5 ml/kg every 12 hours	0.5 ml/kg every 12 hours
Cefotaxime for meningitis ONLY	50 mg/kg every 8 hours	50 mg/kg every 6 hours	0.5 ml/kg every 8 hours	0.5 ml/kg every 6 hours
Cefotaxime for sepsis	50 mg/kg every 12 hours	50 mg/kg every 8 hours	0.5 ml/kg every 12 hours	0.5 ml/kg every 8 hours
Ceftriaxone	50 mg/kg in a single dose	50 mg/kg in a single dose	0.5 ml/kg in a single dose	0.5 ml/kg in a single dose

TABLE C-9 Cont. Antibiotic doses^a

Antibiotic	Dose in mg		Dose in ml	
	Day 1 to 7	Day 8+	Day 1 to 7	Day 8+
Cloxacillin (oral administration)	Less than 2 kg:		Less than 2 kg:	
	50 mg/kg every 8 hours	50 mg/kg every 8 hours	2 ml/kg every 8 hours	2 ml/kg every 8 hours
	2 kg or more:		2 kg or more:	
	50 mg/kg every 8 hours	50 mg/kg every 8 hours	2 ml/kg every 8 hours	2 ml/kg every 8 hours
Cloxacillin (injection)	Less than 2 kg:		Less than 2 kg:	
	50 mg/kg every 8 hours	50 mg/kg every 8 hours	0.5 ml/kg every 8 hours	0.5 ml/kg every 8 hours
	2 kg or more:		2 kg or more:	
	50 mg/kg every 8 hours	50 mg/kg every 8 hours	0.5 ml/kg every 8 hours	0.5 ml/kg every 8 hours
Erythromycin	12.5 mg/kg every 6 hours	12.5 mg/kg every 6 hours	0.5 ml/kg every 6 hours	0.5 ml/kg every 6 hours
Gentamicin	Less than 2 kg:		Less than 2 kg:	
	4 mg/kg once daily	7.5 mg/kg once daily OR 3.5 mg/kg every 12 hours	0.4 ml/kg once daily	0.75 ml/kg once daily OR 0.35 ml/kg every 12 hours
	2 kg or more:		2 kg or more:	
	5 mg/kg once daily	7.5 mg/kg once daily OR 3.5 mg/kg every 12 hours	0.5 ml/kg once daily	0.75 ml/kg once daily OR 0.35 ml/kg every 12 hours
Procaine benzylpenicillin for congenital syphilis without CNS involvement	100 mg/kg (100 000 units/kg) once daily	100 mg/kg (100 000 units/kg) once daily	0.5 ml/kg once daily	0.5 ml/kg once daily
Procaine benzylpenicillin for asymptomatic baby of mother not treated for syphilis	100 mg/kg (100 000 units/kg) in a single dose	100 mg/kg (100 000 units/kg) in a single dose	0.5 ml/kg in a single dose	0.5 ml/kg in a single dose

^a See **pages C-31 to C-33** for information on route of administration and directions for diluting antibiotics.

Infection prevention is an important part of every component of care of a newborn baby. Newborn babies are more susceptible to infections because their immune system is immature; thus, the consequences of failing to follow infection prevention principles are particularly devastating. Key infection prevention practices are summarized below.

GENERAL PRINCIPLES OF INFECTION PREVENTION

Observing the infection prevention practices below will protect the baby, mother, and health care provider from infections. They also will help prevent the spread of infections.

- Provide routine care of the newborn baby.
- Consider every person (including the baby and staff) as potentially infectious.
- Wash hands or use an alcohol-based handrub.
- Wear protective clothing and gloves.
- Use aseptic technique.
- Handle sharp instruments carefully, and clean and, if necessary, sterilize or disinfect instruments and equipment.
- Routinely clean the newborn special care unit, and dispose of waste.
- Isolate babies with infections to prevent nosocomial infections.

INFECTION PREVENTION PRACTICES

PROVIDE ROUTINE CARE OF THE NEWBORN BABY

- After the first six hours of life or after the baby's temperature is stable, use cotton cloths soaked in warm water to remove blood and other body fluids (e.g. from the birth) from the baby's skin, and then dry the skin. Delay bathing a small baby (less than 2.5 kg at birth or born before 37 weeks gestation) until at least the second day of life.
- Clean the buttocks and perineal area of the baby each time the baby's napkin is changed, or as often as required, using cotton soaked in warm, soapy water, and then carefully dry the area.

- Ensure that the mother knows correct positioning and attachment for breastfeeding (**page C-12**) to prevent mastitis and nipple damage.

PEOPLE AS SOURCES OF INFECTION

- Locate the newborn special care unit in a low-traffic area with restricted access.
- Have a private room for newborn babies, if possible.
- Ensure that staff in direct contact with newborn babies receive as many of the following immunizations as possible:
 - rubella;
 - measles;
 - hepatitis B virus;
 - mumps;
 - influenza (yearly).
- Do not allow personnel with skin infections or lesions to come into direct contact with babies.
- Do not allow staff or visitors to enter the newborn special care unit if they have an acute infection (e.g. respiratory virus).
- Limit the number of different individuals handling the baby.

HANDWASHING

- Wash hands with soap and water (if **hands are visibly clean**, disinfect them using an alcohol-based handrub):
 - before and after caring for a baby and before any procedure;
 - after removing gloves;
 - after handling soiled instruments or other items.
- Instruct the mother and family members to wash their hands before and after handling the baby.
- To wash hands:
 - Thoroughly wet hands;

- Wash hands for 10 to 15 seconds with plain soap and running or poured water;
- Allow hands to air-dry or dry them with a clean paper or personal towel.
- An alcohol-based handrub, made from adding 2 ml of glycerine (or other emollient) to 100 ml of 60% to 90% ethyl or isopropyl alcohol, is more effective in cleaning hands than handwashing unless the hands are visibly soiled. To clean hands using an alcohol-based handrub:
 - Apply enough handrub to cover the entire surface of hands and fingers;
 - Rub the solution into hands until they are dry.

PROTECTIVE CLOTHING AND GLOVES

- It is not necessary to wear gowns or masks when providing routine care for newborn babies.
- Wear protective clothing (e.g. aprons, gowns) when contact with blood or body fluids is anticipated.
- Wear closed-toe shoes, if possible. Do not go barefoot.
- When gloves are required for a procedure, wear a separate pair of gloves for each baby to avoid cross-contamination, and dispose of gloves after contact. Use different gloves for different situations:
 - Wear sterile or high-level disinfected gloves for contact with broken skin or for invasive procedures (e.g. lumbar puncture, umbilical vein catheterization);
 - Wear clean examination gloves for contact with mucous membranes or body fluids (e.g. taking a blood sample, caring for the umbilicus);
 - Wear heavy rubber or latex utility gloves for handling contaminated items, cleaning instruments and equipment, and disposing of waste.
- Disposable gloves are preferred, but where resources are limited, gloves can be reused if they are:
 - decontaminated by soaking in 0.5% chlorine solution for 10 minutes;
 - washed and rinsed;

- sterilized by autoclaving (eliminates all microorganisms) or high-level disinfected by steaming or boiling (eliminates all microorganisms except some bacterial endospores).
- If **single-use disposable surgical gloves are reused**, do not process them more than three times because invisible tears may occur.

Do not use gloves that are cracked or peeling or have visible holes or tears.

ASEPTIC TECHNIQUE

Using aseptic technique eliminates or reduces to a safe level the number of microorganisms on skin, tissue, and inanimate objects.

- Scrub hands for three to five minutes using an antiseptic soap, and rinse with running or poured water.
- Allow hands to air dry or dry them with a clean paper or personal towel.
- Put on clean examination gloves.
- Prepare the skin for procedures by washing with a swab or cotton-wool ball soaked in an antiseptic solution (e.g. **Table C-10, page C-41**) in an outward spiral motion. Repeat two more times, using a new swab or cotton-wool ball each time, and allow to dry. If **polyvidone iodine is used**, allow it to dry after applying or wait at least two minutes before continuing with the procedure.
- Remove examination gloves and put on high-level disinfected or sterile gloves.
- Use sterile or high-level disinfected instruments and equipment.
- If there is **any question about whether an item is sterile or not**, consider it contaminated.

MULTI-USE VIALS

- Use a new, sterile needle and syringe each time medication is withdrawn from a multi-use vial or container.
- Store multi-use vials according to their instructions (e.g. store in a dark, cool area or refrigerate).
- Record on the vial the date and time it was opened, and use for up to one month or according to the expiry date.

- Do not keep opened glass ampules so that the drug can be used for multiple babies. The drug may not be stable, and taping ampules shut will not prevent contamination.
- Discard diluent solutions (e.g. sterile water or normal saline) after 24 hours.
- Change the IV infusion set and fluid bag every 24 hours, even if the bag still contains IV fluid (they can be a major source of infection).

ANTISEPTIC AND DISINFECTANT SOLUTIONS

Although the terms are sometimes used interchangeably, antiseptic and disinfectant solutions (**Table C-10**) serve different purposes. Antiseptic solutions are used on the skin and are usually not as strong as disinfectants. Disinfectant solutions are used to decontaminate or high-level disinfect instruments and equipment.

TABLE C-10 Acceptable antiseptic and disinfectant solutions

Acceptable Antiseptic Solutions	Acceptable Disinfectant Solutions ^a
• 2.5% polyvidone iodine (for skin preparation or scrub) • 4% chlorhexidine gluconate (for skin preparation or scrub) • 60% to 90% ethyl or isopropyl alcohol (for skin preparation for taking a blood sample or establishment of an IV line)	• 0.5% chlorine bleach (for decontamination of surfaces and high-level disinfection of instruments) • 2% glutaraldehyde

^a Do not use disinfectants with phenolic compounds, as they may harm newborn babies.

- To prevent contamination of antiseptic and disinfectant solutions:
 - use only boiled water for dilution, if dilution is necessary (boil water for 20 minutes to high-level disinfect it);
 - take care not to contaminate the mouth of the container when pouring the solution into smaller containers;
 - empty and wash containers with soap and water and allow them to air dry at least once weekly;
 - pour the antiseptic solution onto cotton-wool balls or gauze. Do not dip into the solution;
 - store the solutions in a cool, dark place.

INSTRUMENTS AND EQUIPMENT

SAFE HANDLING OF SHARP INSTRUMENTS

- After use, decontaminate syringes and needles by flushing them with a disinfectant solution (**Table C-10, page C-41**) three times.
- Immediately dispose of sharps by placing them in a puncture-proof container. Do not recap, bend, or break the needle or remove it from the syringe. If the **needle must be recapped**, use the one-handed recap method:
 - Place the cap on a hard, flat surface;
 - Hold the syringe with one hand and use the needle to “scoop up” the cap;
 - When the cap covers the needle completely, hold the base of the needle and use the other hand to secure the cap.
- Dispose of the container as directed on **page C-44**.

INSTRUMENT PROCESSING

- See **Table C-11 (page C-43)** for specific guidelines for processing instruments to ensure that they are clean and high-level disinfected or sterile.
- Ensure that instruments that penetrate the skin (e.g. needles, catheters) are adequately sterilized or high-level disinfected before use and properly processed after use.
- Use a disinfectant solution to wipe off equipment that does not contact the bloodstream (e.g. stethoscope, incubator) between each use, and particularly between use with different babies.

TABLE C-11 Guidelines for processing instruments and equipment

Instrument	Processing Guidelines (after each use)
Thermometers and stethoscopes	• Wipe with a disinfectant solution
Resuscitation bag and mask	• Wipe exposed surfaces with gauze pad soaked in disinfectant solution • Wash with soap and water
Incubator or radiant warmer	• Wipe with a disinfectant solution daily • Wash radiant warmer with soap and water before using for a new baby • Wash incubator weekly, if the same baby is still in the incubator, and before using for a new baby
Suction apparatus and catheter, gastric tube, nasal prongs, nasal catheter, syringes	• Soak in disinfectant solution for 10 minutes • Wash with soap and water • High-level disinfect or sterilize
Oxygen head box	• Wash with soap and water

HOUSEKEEPING AND WASTE DISPOSAL

Regular and thorough cleaning will decrease microorganisms on surfaces and help prevent infection. Remember the following about housekeeping and waste disposal:

- Every newborn special care unit should have a housekeeping schedule:
 - Post the cleaning schedule in a visible area (see **Table C-12, page C-44** for a sample cleaning schedule);
 - Provide details on exactly what needs to be done and how often;
 - Educate staff regarding cleaning, and delegate responsibility.
- Follow general guidelines for housekeeping:
 - Clean from the top to the bottom (e.g. of walls and window coverings) so that the dirt that falls during cleaning is removed;
 - Always wear heavy rubber or latex utility gloves;
 - Ensure that a fresh bucket containing disinfectant solution is available at all times;

- Immediately clean up spills of blood or body fluids using disinfectant solution;
- Wrap or cover clean linens and store them in an enclosed cart or cabinet to prevent contamination with dust;
- After each use, wipe off beds, tables, and procedure trolleys using disinfectant solution.
- Separate contaminated waste (e.g. items soiled by blood, pus, and other body fluids) from non-contaminated waste.
- Use a puncture-proof container for contaminated sharps, and destroy the container when two-thirds full:
 - Add a small amount of kerosene to the container, and burn the waste in an open area downwind from the service site;
 - If it is **not possible to burn the disposal container**, bury it in a site at least 50 metres away from a water source.

TABLE C-12 Sample cleaning schedule for the newborn special care unit

Frequency	Cleaning Guidelines
Daily	• Wet-mop floors with a disinfectant and detergent solution. Do not sweep floors or use cleaning methods that increase dust. • Wipe incubators and radiant warmers with a disinfectant solution.
Between Babies	• Wipe equipment, bassinets, examination tables, etc., with a cloth dampened with disinfectant solution. • Clean incubators and radiant warmers between each use, including the mattress, with a disinfectant solution. Allow the incubator to dry completely before placing a baby inside.
As Needed	• Clean windows, walls, lamps, chairs, and window coverings to prevent accumulation of dust. • Remove and destroy or clean contaminated waste containers. • Remove and destroy the sharps-disposal container and replace with another suitable container. • Clean spills of blood or body fluids with a disinfectant solution.

ADDITIONAL METHODS TO PREVENT INFECTION

- Have a private room specifically for newborn babies, if possible.
- Avoid overcrowding and understaffing.
- Do not place two or more babies in the same cot or incubator or under the same radiant warmer or phototherapy unit.

NOSOCOMIAL INFECTIONS

Nosocomial infections are infections that are acquired in the health care facility. A presumptive epidemic in a newborn special care unit is defined as finding two or more babies with the same condition (e.g. skin or eye infection, infectious diarrhoea) at the same time. If a **nosocomial infection occurs**, strict control measures should be put in place and monitored to resolve the problem. For skin and eye infections and diarrhoea (the most common nosocomial infections in newborn special care units), perform the following:

- Isolate the baby by placing the baby and her/his mother in a private room:
 - Leave the door open, if necessary, to ensure that the baby and mother are not neglected;
 - If a **private room is not available**, place all babies with the same infection, but no other infections, in the same room.
- When entering the room with the baby:
 - Wear clean examination gloves, and change gloves after contact with infectious material (e.g. faecal material, gauze used to wash pustules or blisters);
 - Wear a clean gown if contact with the baby or infectious material is anticipated.
- Before leaving the room:
 - Remove the gown;
 - Remove gloves;
 - Wash hands with an antibacterial soap or alcohol-based handrub;

- Avoid touching potentially contaminated surfaces or objects, and ensure that clothing does not come in contact with potentially contaminated surfaces or objects.
- Restrict transfer of the baby to other areas of the health care facility unless absolutely necessary. During transfer, maintain infection prevention precautions.
- Reserve non-critical care equipment (e.g. stethoscope, thermometer) for use only with the infected baby, if possible, and carefully clean and disinfect equipment shared among infected and non-infected babies.

Blood is transfused only for a condition that cannot be managed effectively by other means. District health care facilities should be prepared for the urgent need for blood transfusion. Health care facilities with newborn special care units should keep stored blood available, especially type O, Rh-negative blood. Splitting units of blood into smaller bags (e.g. 50 ml) suitable for babies can help prevent wasting blood and reduces the risk of transfusing too much blood. For the procedure of transfusing blood, see **page P-31**.

PRINCIPLES OF BLOOD TRANSFUSION

Principles of blood transfusion to remember include the following:

- Transfusion is only one element of managing a problem in a baby.
- The baby's haemoglobin level (or haematocrit), although important, should not be the only deciding factor in giving a transfusion. The decision to transfuse should be supported by the need to relieve clinical signs (e.g. active and ongoing bleeding) and prevent significant morbidity and mortality. Note that the measured haemoglobin will not reflect the baby's actual clinical condition in cases of ongoing bleeding.
- In small babies (less than 2.5 kg at birth or born before 37 weeks gestation), the haemoglobin may gradually fall (anaemia of prematurity), but transfusion is recommended only when the haemoglobin is less than 8 g/dl (haematocrit less than 24%) if the baby is otherwise well.
- The volume of blood taken for laboratory tests should be minimized to decrease "wastage" of the baby's blood to reduce the need for transfusion. Use of special low-volume collection tubes, if available, is helpful.
- If **blood is not immediately available for transfusion**, give crystalloid fluid (e.g. normal saline or Ringer's lactate) until blood can be obtained.

REDUCING RISKS OF BLOOD TRANSFUSION

- The transfusion of blood carries the risk of:
 - viral infections, such as HIV and hepatitis;
 - bacterial infections (any blood product can become contaminated with bacteria if it is prepared or stored incorrectly);
 - serious haemolytic transfusion reactions;

- graft-versus-host disease.
- The risks associated with transfusion can be reduced by:
 - effectively selecting, deferring, and excluding blood donors;
 - screening for transfusion-transmissible infections in the blood donor population (e.g. HIV and hepatitis; see below);
 - ensuring high quality blood-grouping, compatibility testing, storage, and transportation of blood;
 - ensuring that the blood bank follows recommendations for safe blood;
 - appropriately using blood;
 - establishing and maintaining quality assurance programmes.
- Blood that is given to the baby must be cross-matched to the blood of both the mother and the baby. When sending the baby's blood sample for blood-typing and cross-matching, always send a sample of the mother's blood, if possible.
- In areas with a high prevalence of malaria, give prophylactic antimalarial drugs to the baby receiving the blood.

SCREENING BLOOD FOR INFECTIOUS AGENTS

- Screen every unit of donated blood for transfusion-transmissible infections, using the most appropriate and effective tests, in accordance with both national policies and the prevalence of infectious agents in the potential blood donor population.
- All donated blood should be screened for:
 - HIV-1 and HIV-2;
 - hepatitis B surface antigen (HbsAg);
 - *Treponema pallidum* antibody (syphilis).
- Where possible, all donated blood should also be screened for:
 - hepatitis C;
 - Chagas disease (in countries where the seroprevalence is high);
 - cytomegalovirus;

- malaria (in low-prevalence countries when donors have travelled to malarial areas).
- No blood should be released for transfusion until all nationally required tests are shown to be negative.
- Perform compatibility tests on all blood transfused even if, in life-threatening emergencies, the tests are performed after the blood has been issued.

GENERAL GUIDELINES

The following guidelines are general and should be harmonized with existing national policies.

- Vaccinate the baby at birth against tuberculosis (where prevalence is high), poliomyelitis, and hepatitis B unless directed otherwise below.
- Immunize the baby according to the following guidelines, regardless of whether the baby:
 - is small (less than 2.5 kg at birth or born before 37 weeks gestation). Immunize at the usual age (chronological age and not corrected age), and do not reduce vaccine dose;
 - has been hospitalized for a prolonged period of time. If the **baby is still in the hospital at 60 days of age**, complete a first course of immunization (described below) and also give diphtheria, pertussis, and tetanus (DPT) vaccine 0.5 ml IM in the upper thigh before the baby is discharged;
 - has a clinically stable neurologic condition (e.g. brain injury);
 - was born to a mother who is HIV positive;
 - is receiving treatment with antibiotics;
 - has jaundice.
- Be sure to use a sterile or high-level disinfected syringe and needle for each immunization and for each baby.

TUBERCULOSIS VACCINE (BCG)

- Give a single dose of 0.05 ml intradermally (**page P-19**) in the upper portion of the left arm using a special BCG syringe.
- In countries with a high prevalence of tuberculosis, give the BCG immunization as soon after birth as possible, with the following exceptions:
 - If the **baby is sick**, give the immunization after the baby has recovered and just before discharge from the hospital;
 - If the **baby's mother has active lung tuberculosis and has been treated for less than two months before birth or is diagnosed with tuberculosis after birth**, see **page F-155**.

POLIOMYELITIS VACCINE (OPV)

There is no risk of nosocomial spread of polio as a result of immunizing babies with OPV.

- Place two drops of the vaccine on the baby's tongue.
- Give four doses of OPV for effective protection:
 - In polio-endemic areas, give a single dose of OPV at birth or up to two weeks after birth;
 - Regardless of whether the first dose was given at birth, give the other three doses of OPV at 6, 10, and 14 weeks, respectively.

HEPATITIS B VACCINE (HBV)

- Give HBV (paediatric formulation) 0.5 ml IM in the upper thigh (**page P-15**). Note that the efficacy may be lower if the vaccine is injected into the buttocks.
- Give three doses of HBV:
 - If the **baby is sick**, give the first dose as soon as the baby has recovered;
 - If the **mother is known to be HbsAg positive** or if **perinatal transmission is common**:
 - Give the first dose shortly after birth (preferably within 12 hours of birth);
 - Give the second and third doses at 6 and 14 weeks, respectively.
 - If the **mother is known to be HbsAg negative and the baby is still in the hospital at 60 days of age**, give HBV just before the baby is discharged;
 - In all other cases, give the first dose at six weeks and give the second and third doses at an interval at least four weeks apart.

GENERAL PRINCIPLES

The most commonly used method for monitoring and assessing growth is weight gain. Until breastfeeding is established, or if the baby is sick or small (less than 2.5 kg at birth or born before 37 weeks gestation), the baby may not gain, or may even lose, weight. Babies weighing 1.5 to 2.5 kg may lose up to 10% of their birth weight in the first four to five days after birth, and babies weighing less than 1.5 kg may lose up to 15% of their birth weight during the first 7 to 10 days after birth.

- Unless the baby requires immediate drugs or fluid based on body weight, weigh the baby at birth after the baby's temperature has stabilized or upon admission to:
 - identify low birth weight and anticipate problems associated with it;
 - have a reference value for monitoring growth;
 - calculate drug doses and volume of fluid to give, if necessary;
 - assess the adequacy of food and fluid intake.
- Weigh and assess weight gain twice weekly (note that weighing on the same two days each week establishes a routine that is easy to follow) until the baby is gaining weight for three consecutive assessments, and then weigh weekly for as long as the baby is in the hospital (unless directed to do so more frequently in another chapter):
 - A minimum daily weight gain of 15 g/kg body weight per day over three days is desirable after the initial period of weight loss;
 - After birth weight has been regained, weight gain during the first three months of feeding should be:
 - 150 to 200 g per week for babies weighing less than 1.5 kg (i.e. 20 to 30 g per day);
 - 200 to 250 g per week for babies weighing 1.5 to 2.5 kg (i.e. 30 to 35 g per day).

WEIGHING TECHNIQUE

- Use a precise and accurate scale, with 5- or 10-g increments, made especially for weighing babies.

- Adjust/standardize the scale according to the manufacturer's instructions. If the **manufacturer's instructions are not available**, adjust the scale weekly or whenever the scale is moved.
- Place a clean cloth/paper in the weighing pan.
- Adjust the scale to zero with the cloth/paper in the pan.
- Place the naked baby gently on the cloth/paper.
- Wait for the baby to settle and the weight to stabilize.
- Read the weight to the nearest 5 or 10 g.
- Record the weight in the baby's record and plot it on the weight chart (below).

RECORDING WEIGHT

Figure C-9 (page C-55) is a blank weight chart that can be used to monitor the weight of a sick or small baby. On the horizontal axis are spaces to record the number of days after admission. The vertical axis is for the weight in kilograms, stepped in 100-g increments and marked in 500-g increments, but the exact weight has been left blank so that the chart can be used for any baby irrespective of the starting weight.

If the **baby's birth weight is known**, mark it as day 0. Mark the admission day and fill in the starting weight at the appropriate level (e.g. 1.5, 2.0, 2.2 kg). Ensure that enough space is left on the vertical axis of the chart to plot initial weight loss. Chart the baby's weight while hospitalized, and calculate the weight gain/loss. See **Fig. C-10 (page C-56)** for an example of a completed chart.

FIGURE C-9 Blank weight chart

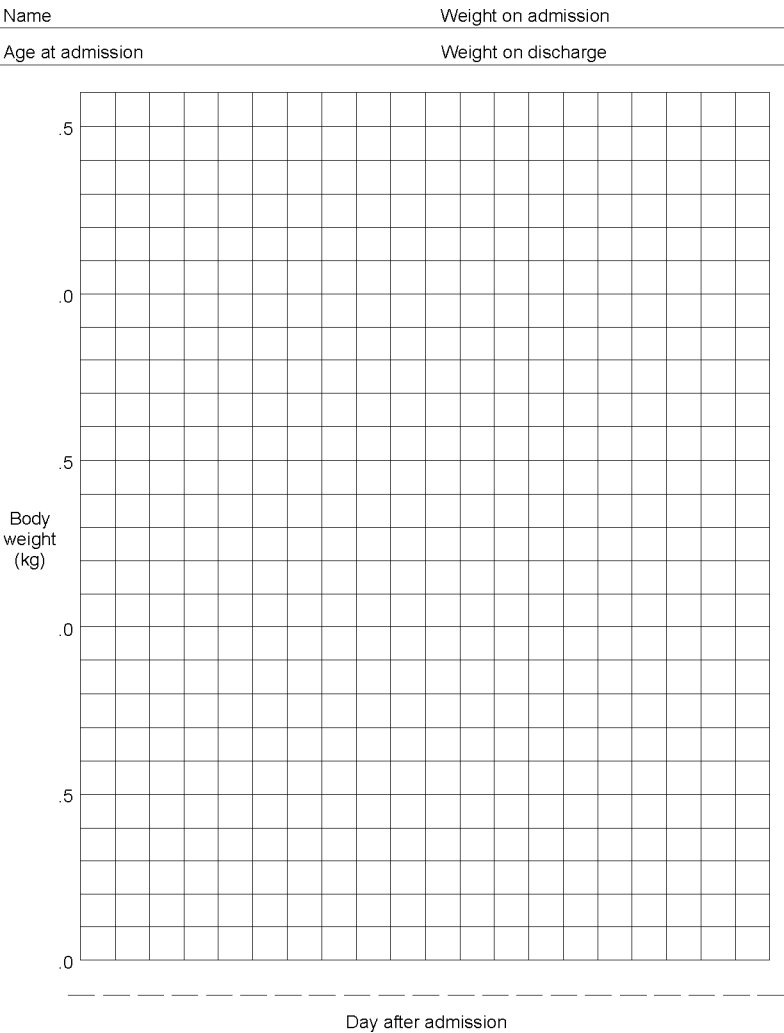
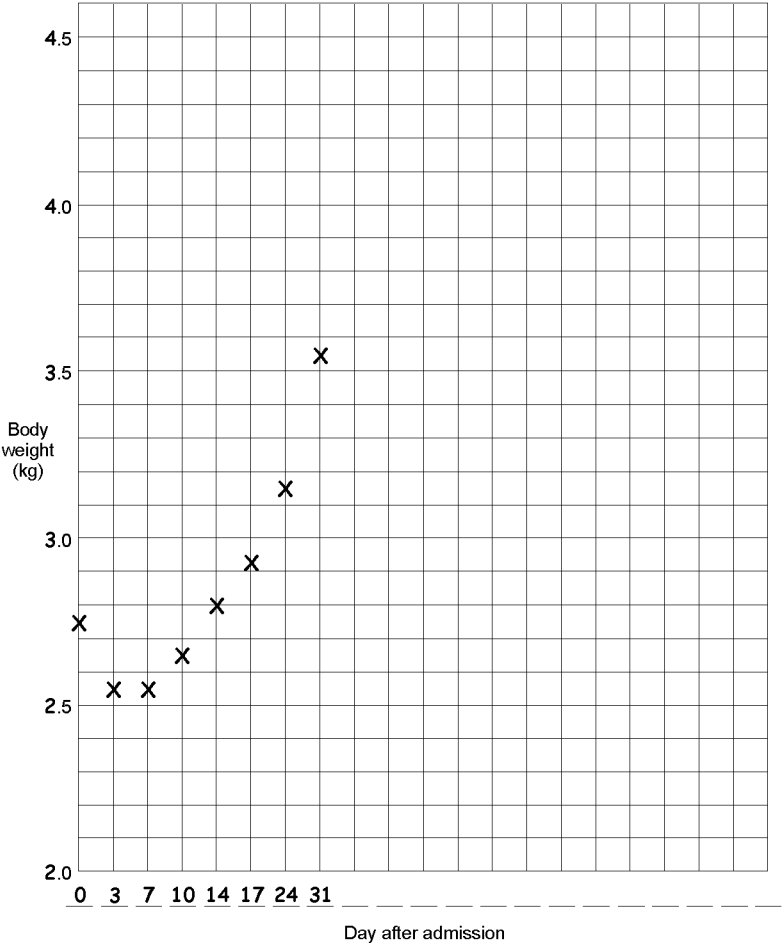


FIGURE C-10 Example of a completed weight chart

Name	Baby M	Weight on admission	2.74 kg
Age at admission	Birth	Weight on discharge	3.54 kg



Emergency situations are often very disturbing for everyone involved and evoke a range of emotions that can have significant consequences. The need for the baby, whether sick or small, to be in the unfamiliar environment of a health care facility is a stressful and emotional experience for the family, especially the mother. In addition to the family's fear of the baby dying, they may have feelings of guilt, anger, and denial.

GENERAL PRINCIPLES OF COMMUNICATION

When communicating with the mother and family, remember the following:

- Be respectful and understanding.
- Listen to the family's concerns and encourage them to ask questions and express their emotions.
- Use simple and clear language when giving the family information about the baby's condition, progress, and treatment, and ensure that the family understands what you have told them. If **you do not speak a language the family understands**, use a sensitive translator.
- Respect the family's right to privacy and confidentiality.
- Respect the family's cultural beliefs and customs, and accommodate the family's needs as far as possible.
- Ensure that the family understands any instructions, and, if possible, give written information to family members who can read.
- Obtain informed consent before performing procedures, if possible.
- Remember that health care providers may feel anger, guilt, sorrow, pain, and frustration. Showing emotion is not a weakness.

GENERAL PRINCIPLES OF EMOTIONAL SUPPORT

EMOTIONAL AND PSYCHOLOGICAL REACTIONS

- How each member of the family reacts to an emergency situation may depend on the:
 - marital status of the mother and her relationship with her partner;
 - social situation of the mother/couple and their cultural and religious practices, beliefs, and expectations;

- personalities of the people involved and the quality and nature of social and emotional support;
- nature, gravity, and prognosis of the problem and the availability and quality of the health care services;
- anticipated costs of health care.
- Common reactions to newborn problems or death include:
 - denial (feelings of “it can’t be true”);
 - guilt regarding possible responsibility;
 - anger, which is frequently directed towards health care providers and staff but often masks anger that parents direct at themselves for their “failure”;
 - bargaining, particularly if the baby has a life-threatening condition;
 - depression and loss of self-esteem, which may be long-lasting;
 - isolation (feelings of being different or separate from others), which may be reinforced by health care providers who avoid people who experience loss;
 - disorientation.

EMOTIONAL SUPPORT FOR THE FAMILY

- Do not place blame on the family if there is a question of neglect or intervening too late.
- Allow the parents to take a photograph of the baby, if they wish to. This can provide great comfort to the parents, especially if they are not able to visit the baby very often.
- Show that you care about the baby and the family and that you respect them:
 - Express your feelings of concern for the family and encourage them to express their emotions, if culturally appropriate;
 - Encourage the mother to stay with her baby, and admit her, if necessary. If the **mother is not able to stay with the baby**, encourage her to visit the baby as often as she wishes. Ensure that there are sufficient rooms available nearby so that she can establish and maintain breastfeeding and be with her baby;

- Encourage the mother to take an active role in the care of her baby and simple procedures, if possible;
- Encourage the mother to touch and hold the baby as much and as often as she wants;
- If the **mother is alone**, identify a friend or a particular member of the staff to support her;
- Provide extra support and encouragement to a mother who is expressing breast milk for a sick or small baby.

VISITATION

- Allow and encourage visits by close family members and friends whenever possible:
 - If the **number of visitors must be limited**, choose one person to act as the representative and report to the others;
 - Encourage the family to visit the baby, but do not insist. Family members may be reluctant to visit the baby for fear of what they will see or because they do not want to become too attached to the baby until they know if the baby will survive;
 - Do not equate the frequency of visiting with the quality of the baby-parent bond or level of concern for the baby. Practical problems—the cost of travel, the need to care for other children at home, the mother's need for medical treatment at a different hospital, or responsibilities of employment or farming—can prevent the mother and other family members from visiting.
- Allow the baby's sibling(s) to visit the baby unless the sibling has a fever, signs of acute illness (e.g. acute respiratory infection), or recent exposure to a communicable disease (e.g. chickenpox).
- Ensure that a visiting child:
 - has contact only with her/his sibling;
 - has properly washed her/his hands;
 - is supervised at all times.

BABY WITH NEURODEVELOPMENTAL PROBLEMS OR BIRTH DEFECT

The birth of a baby with a neurodevelopmental problem (e.g. brain injury from birth asphyxia or bilirubin encephalopathy) or a birth defect can be a devastating experience for the parents and family. Reactions may vary. Having a baby with obvious abnormalities is very distressing for parents, and in many societies this is associated with particular stigma for the mother. Different families have different responses and needs, and the health care staff cannot use the same approach for all families; however, all parents are eager to obtain information about their baby. Keep in mind the following:

- Disbelief, denial, and sadness are normal reactions, especially if the problem is unexpected. Feelings of unfairness, despair, depression, anxiety, anger, failure, and apprehension are common.
- Provide the parents with all of their options and an honest opinion of the likely outcome. Ensure that their decisions are made with informed consent and sufficient understanding of all the possibilities of care.
- Provide a bed or cot in the room so that a companion can stay with the mother if she chooses.
- Allow the parents free access to their baby, and keep the baby with the mother at all times, if possible. The more the parents can do for the baby themselves, the more quickly they will accept the baby as their own.
- Help the parents access supportive professional individuals and groups, when possible.
- Be willing and ready to repeat information and advice on another occasion, as parents often cannot understand or remember all the messages provided during the first discussion or consultation.

BABY WITH NEURODEVELOPMENTAL PROBLEMS

- Encourage the mother to be involved with the care of her baby whenever possible.
- Discuss with the mother the possibility of her caring for her baby at home once the baby no longer requires treatment or when treatment can be continued at home.
- Ensure that the mother has the support to have the baby receive regular follow-up visits with an appropriate child care provider.

BABY WITH A BIRTH DEFECT

- Ask the mother if she would like to see and hold the baby:
 - Some mothers accept their baby immediately while others may take longer;
 - If the **mother does not want to see her baby right away**, do not force her to;
 - Allow the mother to have a companion when she sees her baby for the first time;
 - If the **baby has major deformities**, try to wrap the baby in such a way that these are covered when the mother first sees the baby;
 - Point out the normal features of the baby before discussing the abnormalities;
 - Allow the mother and family time alone with the baby, if possible and appropriate.
- Explain that nobody is to blame for the abnormality. It may be helpful to give a simple explanation of why the baby has an abnormality.
- Explain the likely prognosis for the baby, but do not dwell on the negative aspects of the baby's future.
- If the **baby has a particular birth defect that can be corrected**, such as a cleft palate or club foot, explain this to the mother and reassure her. Do not raise the mother's hopes, however, if it is not possible to correct the problem.

BABY WHO IS DYING OR HAS DIED

The response of each family to a baby who is dying or has died will be different. Try to apply the following principles:

- Allow the mother and family to be with the baby, even during procedures, if possible and appropriate.
- Explain what is being done to the baby and why. Involve the parents in decision-making when considering whether further treatment is appropriate.
- If an **informed decision has been made to stop resuscitation efforts or if the baby's death is inevitable**, focus on providing emotional support to the family.

- Encourage the mother and family to see and hold the baby after death and for as long as they desire, if they wish.
- Where it is the custom to name babies at birth, encourage the family and staff to call the baby by the name they have chosen.
- Offer the mother some mementos of the baby, such as a name tag, a lock of hair, or a palm print, if culturally appropriate, as this may help with the grieving process.
- Ask the family how they will bury the baby. Even if the baby will not be buried by the family, allow the mother (or a family member) to prepare the baby for the funeral, if she wishes.
- Encourage locally-accepted burial practices and ensure that medical procedures (such as autopsies) accommodate them.
- Help the family, if necessary, with the paperwork to register the baby's death if this is not done by the health care staff.
- Arrange to see the family a few weeks after the death:
 - Answer any questions they have and help them with the grieving process;
 - Provide written information to literate families, if possible, especially if the condition is genetic or steps can be taken to prevent the condition in a future pregnancy.

If the baby needs to be transferred to a tertiary hospital or specialized centre, or brought from a more peripheral facility or to a different service within the same facility (e.g. from the delivery room to the newborn special care unit), ensure a safe and timely transfer. It is important to prepare the baby for transfer, communicate with the receiving or sending facility, and provide care during transfer.

PREPARATION

- Explain to the family the reason for transfer of the baby (**page C-57**).
- Obtain informed consent for any anticipated procedures, if applicable.
- Transfer the mother with the baby, if possible, so that she can continue to breastfeed or provide expressed breast milk.
- Prepare the baby for transfer:
 - Ensure that the baby's condition is stable before transfer, if possible;
 - Give necessary treatment before transfer (e.g. treat low blood glucose), if possible;
 - If the **baby is able to feed but the mother is unable to accompany and breastfeed the baby or the baby must be fed using an alternative feeding method**, insert a gastric tube (**page P-33**);
 - Ensure that the IV line, if present, is in place and secured and that the microdropper is filled with fluid;
 - Gather essential equipment, supplies, drugs, and fluid (**Table C-13, page C-64**).
- Have a health care provider (with experience in establishing and maintaining IV lines, resuscitating a baby, and giving drugs) accompany the baby, if possible.
- Ensure that the vehicle has adequate lighting and insulation to keep the baby warm or to prevent overheating.
- Ask a relative to accompany the baby and mother, if possible.

TABLE C-13 Suggested equipment, supplies, drugs, and fluid for transfer of a sick or small baby

Equipment and Supplies		Drugs and Fluid
• Resuscitation bag and mask • Suction apparatus • Oxygen cylinder with flow metre and a headbox, nasal prongs, nasal catheter, or face mask • Stethoscope • Thermometer • Blanket • Source of warmth • Gastric tubes (5-F and 8-F)	• IV infusion set • Butterfly set or cannula • Antiseptic solution and cotton-wool balls • Syringes and needles (various sizes and types) • Adhesive tape • Gloves • Napkins (diapers) • Food for the baby^a • Torch and extra batteries and bulb	• Any drug (e.g. antibiotics) the baby is receiving if a dose is anticipated during the trip • IV fluid

^a If the **baby is able to feed and the mother is not accompanying the baby**, take expressed breast milk.

COMMUNICATION

- If **receiving the transferred baby**, request a referral form (e.g. **Fig. A-3, page A-4**) with the baby's essential information. At discharge or following the death of the baby, send a detailed note or feedback form (e.g. **Fig. A-4, page A-5**) to the referring facility.
- If **referring a baby to another facility**:
 - Contact the receiving facility in advance, if possible, so they can be prepared;
 - Confirm that the facility is able to admit the baby;
 - Give an estimated time of arrival;
 - Fill out the referral form and send it with the baby (e.g. **Fig. A-3, page A-4**);
 - If the **mother is accompanying the baby**, inform the facility to ensure that she will have a place to stay with the baby.

CARE DURING TRANSFER

- Keep the baby in skin-to-skin contact with the mother or a relative. If **skin-to-skin contact is not possible**, keep the baby dressed and covered.
- If **transferring the baby during cold weather**:
 - Use a warming device. Keep the baby dressed and covered, and check the temperature setting and measure the baby's temperature every hour;
 - If a **warming device is not available**, place the baby in a box with warm water bottles:
 - Cover the bottles with a cloth and ensure that they are secured so that they do not directly touch the baby's skin;
 - When the water becomes cold, refill the bottles with warm water or remove them from the box.
- If **transferring the baby during hot weather**, ensure that the baby does not become overheated.
- Ensure that the baby receives feeds or fluid:
 - Allow the baby to breastfeed. If the **baby cannot be breastfed**, give expressed breast milk by gastric tube (**page C-18**);
 - If the **baby is receiving IV fluid**:
 - Carefully monitor the rate to ensure that the baby receives the correct volume of fluid (**Table C-4, page C-22**);
 - Inspect the infusion site every hour:
 - Look for redness and swelling around the insertion site of the cannula, which indicate that the cannula is not in the vein and fluid is leaking into the subcutaneous tissue. If **redness or swelling is seen at any time**, stop the infusion, remove the needle, and establish a new IV line in a different vein;
 - Check the volume of fluid infused and compare to the prescribed volume;
 - Record all findings.
- If the **baby is receiving oxygen**, check the oxygen flow and tubing every 15 minutes.

- Assess the baby's respiratory rate every 15 minutes. If the **baby is not breathing at all, is gasping, or has a respiratory rate less than 20 breaths per minute**, resuscitate the baby using a bag and mask (**page P-1**).
- Stop the vehicle, if necessary, to manage problems.

DISCHARGE

- Have a written policy on discharging babies. Explain the policy to the mother and answer any questions she may have.
- Examine the baby and confirm that the baby meets the requirements for discharge. Follow the specific instructions for discharge in each chapter, if applicable.
- In general, discharge the baby when the:
 - baby is breathing without difficulty and has no other ongoing problems that cannot be managed on an outpatient basis;
 - baby's body temperature is being maintained in the range of 36.5 °C to 37.5 °C (using a method that can be continued at home if the baby is small [less than 2.5 kg at birth or born before 37 weeks gestation]);
 - mother is confident about her ability to care for the baby;
 - baby is breastfeeding well or the mother is confident using an alternative feeding method;
 - baby is gaining weight.
- Advise the mother to return with the baby immediately if the baby has any problems (e.g. feeding or breathing difficulty, convulsions, abnormal body temperature).
- Ensure that the baby has received the necessary immunizations (**page C-51**).
- Give the mother a sufficient supply of drugs to complete any treatment at home, or give a prescription for the drugs (e.g. give a three-month supply of iron/folate supplements or a prescription for them).
- Advise the mother on home care (normal newborn care and breastfeeding, proper position for sleeping, danger signs, when and where to go if danger signs occur, etc.), and give her an appointment for a follow-up visit.
- Discuss with the mother support systems at home or in the community, especially if mother is adolescent, single, a first-time mother, or HIV positive.

- Complete the baby's clinical record with discharge information, including weight, discharge diagnosis, and the plan for follow-up.
- Complete a discharge form (e.g. **Fig. A-2, page A-3**) and send a feedback form (e.g. **Fig. A-4, page A-5**), if necessary, to the referring institution or department.
- Write a discharge letter with medical information, instructions for treatment to be continued at home, and follow-up, if applicable.

FOLLOW-UP

- Ensure at least one follow-up visit after discharge of babies who were seriously ill, very small (less than 1.5 kg at birth or born before 32 weeks gestation), or fed using an alternative feeding method at the time of discharge. Advise the parents to ensure that the baby has regular paediatric care after the initial follow-up visit.
- At each visit:
 - Assess the baby for the specific problem that required follow-up and ensure that the problem has been resolved;
 - Assess the baby's general condition;
 - Weigh the baby and assess growth;
 - Advise on and/or manage any problems or concerns identified by the mother;
 - Assess breastfeeding or alternative feeding, and advise the mother on exclusive breastfeeding;
 - Reinforce parental education in newborn care and danger signs;
 - Promote the family's continued use of the primary health care facility;
 - Give immunizations (**page C-51**) if they are due, or refer the baby and mother to the relevant service.
- If the mother is HIV positive or the baby is likely to have long-term problems (e.g. due to brain injury), ensure that the baby receives regular follow-up visits with a child care provider.

SECTION 3: PROCEDURES

This chapter describes resuscitation of babies with breathing difficulty, and is not intended for use to resuscitate babies immediately after birth.

EQUIPMENT AND SUPPLIES

- Newborn-size, self-inflating resuscitation bag (an adult-size bag may be used if a bag specifically for newborn babies is not available)
- Newborn-size mask (size 0 for a small baby [less than 2.5 kg at birth or born before 37 weeks gestation] and size 1 for a normal size baby)
- Suction apparatus (e.g. DeLee mucus trap)
- Oxygen source (if available)

PROCEDURE

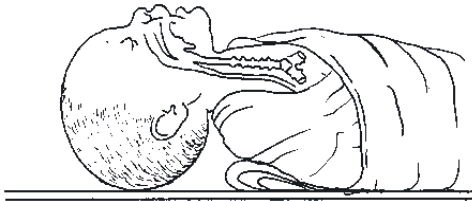
- Gather necessary equipment and supplies.
- Wash hands (**page C-38**).
- Ensure that the resuscitation equipment is functioning properly. Block the mask by making a tight seal with the palm of your hand, and squeeze the bag:
 - If you feel pressure against your hand, the bag is generating adequate pressure;
 - If the bag reinflates when you release your grip, the bag is functioning properly.
- Keep the baby wrapped or covered, except for the face and upper chest.
- Move the baby to a firm, warm surface under a radiant warmer.

OPENING THE AIRWAY

- Position the baby (**Fig. P-1, page P-2**):
 - Place the baby on her/his back;
 - Position the baby's head in a slightly extended position to open the airway (the neck should not be as extended as for adults). A rolled-

up piece of cloth under the baby's shoulders may be used to extend the head.

FIGURE P-1 Correct position of the head for ventilation



- If **mucus or vomitus is present**, clear the airway by suctioning first the mouth and then the nostrils.

Do not suction deep in the throat as this may decrease the baby's heart rate.

- If the **baby is still not breathing**, ventilate with a bag and mask.

VENTILATING WITH A BAG AND MASK

- Recheck the baby's position and ensure that the neck is slightly extended (**Fig. P-1**).
- Position the mask and check the seal (**Fig. P-2, page P-3**):
 - Place the mask on the baby's face so that it covers the baby's chin, mouth, and nose;
 - Form a seal between the mask and the baby's face;
 - Squeeze the bag with two fingers only (adult-size bag) or with the whole hand (newborn-size bag);
 - Check the seal between the mask and the baby's face by ventilating two times and observing the rise of the chest.

FIGURE P-2 Positioning the mask and checking the seal

- Once a seal is ensured and chest movement is present, ventilate the baby using oxygen. If **oxygen is not immediately available**, begin ventilating using room air.
- Maintain the correct rate (approximately 40 breaths per minute) and pressure during ventilation:
 - If the **baby's chest is rising**, ventilation pressure is probably adequate;
 - If the **baby's chest is not rising**:
 - Recheck and correct, if necessary, the position of the baby (**Fig. P-1, page P-2**);
 - Reposition the mask on the baby's face to improve the seal between the mask and the baby's face;
 - Squeeze the bag harder to increase ventilation pressure.
- Ventilate for one minute and then stop and quickly determine if the baby is breathing spontaneously:
 - If the **respiratory rate is normal** (30 to 60 breaths per minute), stop ventilating;
 - If there is **central cyanosis** (blue tongue and lips), **chest indrawing**, **or grunting on expiration**, or the **respiratory rate is 20 to 30 or more than 60 breaths per minute**, treat for breathing difficulty (**page F-47**);

- If the **baby is gasping or not breathing, or the respiratory rate is less than 20 breaths per minute**, continue ventilating.
- If the **baby starts crying**, stop ventilating and observe the baby's respiratory rate for five minutes after crying stops:
 - If the **respiratory rate is normal** (30 to 60 breaths per minute), stop ventilating;
 - If there is **central cyanosis** (blue tongue and lips), **chest indrawing, or grunting on expiration, or the respiratory rate is 20 to 30 or more than 60 breaths per minute**, treat for breathing difficulty (**page F-47**);
 - If the **baby is gasping or not breathing, or the respiratory rate is less than 20 breaths per minute**, continue ventilating.
- If the **baby is not breathing regularly after 20 minutes of ventilation**:
 - Continue ventilation with oxygen;
 - Establish an IV line (**page P-21**), if one is not already in place, and give a bolus of IV fluid 10 ml/kg body weight over 10 minutes, and then continue IV fluid at maintenance volume according to the baby's age (**Table C-4, page C-22**);
 - Insert a gastric tube (**page P-33**) to empty the stomach of air and secretions;
 - Organize transfer (**page C-63**), and refer the baby to a tertiary hospital or specialized centre for further evaluation, if possible.
- If there is **no gasping or breathing at all after 20 minutes of ventilation, or gasping but no breathing after 30 minutes of ventilation**, stop ventilating. Provide emotional support to the family (**page C-57**).

CARE AFTER SUCCESSFUL RESUSCITATION

- Keep the baby under a radiant warmer until the baby's condition is stable.
- Monitor the baby's respiratory rate and look for other signs of illness every hour for four hours and then every two hours for the next 24 hours.
- If **signs of breathing difficulty recur** (respiratory rate consistently more than 60 or less than 30 breaths per minute, central cyanosis, chest indrawing, or grunting on expiration), treat for breathing difficulty (**page F-47**).

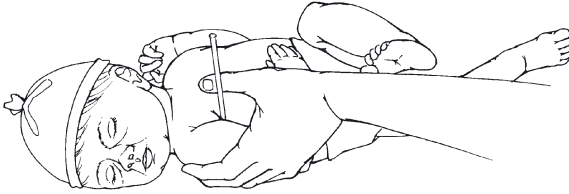
SUPPLIES

- thermometer that measures temperatures as low as 35 °C (axillary temperature)
- thermometer that measures temperatures as low as 25 °C (rectal temperature)
- disinfectant solution (**Table C-10, page C-41**)
- water-based lubricant

PROCEDURE

MEASURING AXILLARY TEMPERATURE

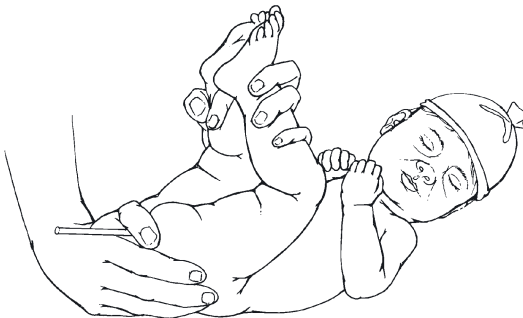
- Gather necessary supplies.
- Wash hands (**page C-38**).
- Use a regular thermometer that measures temperatures as low as 35 °C.
- Ensure that the thermometer is clean.
- Keep the baby as warm as possible during the procedure (e.g. warmly wrapped or on a warm surface).
- Place the baby on her/his back or side.
- Shake the thermometer until it is below 35 °C.
- Place the tip of the thermometer high in the apex of the baby's axilla and hold the arm continuously against the body for at least three minutes (**Fig. P-3, page P-6**).
- Remove the thermometer and read the temperature. If the **temperature is too low to be recorded by this thermometer** (less than 35 °C), measure rectal temperature (**page P-6**).
- Wipe the thermometer with a disinfectant solution after use.

FIGURE P-3 Measuring axillary temperature

MEASURING RECTAL TEMPERATURE

Only measure rectal temperature if the temperature is too low to be recorded with a regular thermometer in the axilla.

- Gather necessary supplies.
- Wash hands (**page C-38**).
- Use a thermometer that measures temperatures as low as 25 °C.
- Ensure that the thermometer is clean.
- Keep the baby as warm as possible during the procedure (e.g. warmly wrapped or on a warm surface).
- Place the baby on her/his back or side.
- Shake the thermometer until it is below 25 °C.
- Lubricate the thermometer using a water-based lubricant.
- Gently grasp the baby's ankles and hold the legs in knee-chest position (**Fig. P-4**).

FIGURE P-4 Measuring rectal temperature

- Place the thermometer in the rectum (**Fig. P-4, page P-6**) to a maximum depth of 2 cm and hold it in place for at least three minutes.

Do not leave the baby alone with the thermometer in the rectum; any movement of the baby may result in the thermometer perforating the rectum.

- Remove the thermometer and read the temperature.
- Wipe the thermometer with a disinfectant solution after use.

Determine how much blood will be needed to perform all necessary laboratory investigations (e.g. haemoglobin, blood glucose, serum bilirubin, and blood type and cross-match) and take enough blood at one time for all the tests, if possible. If **only a small volume of blood is needed** (e.g. for measurement of blood glucose, serum bilirubin, or haemoglobin), use a capillary blood sample (heel prick) if possible (**page P-11**). If a **larger volume of blood is needed than can be obtained from a heel prick** (e.g. when more than 1 ml of blood is needed for several laboratory investigations or for blood culture and sensitivity), use venepuncture (below).

VENEPUNCTURE

- Use veins in the hands and feet first. Do not use jugular or femoral veins for routine sampling.
- A closed system using a butterfly set and syringe ensures a sterile blood sample to use for bacterial culture and sensitivity.

SUPPLIES

- clean examination gloves
- swab or cotton-wool ball soaked in antiseptic solution (**Table C-10, page C-41**)
- dry cotton-wool ball
- sterile needle (21- to 23-gauge) or butterfly set (23- to 25-gauge)
- sterile syringe (of appropriate size for the amount of blood needed; a syringe is not required if only a needle is used)
- appropriate blood collection tubes

PROCEDURE

- Gather necessary supplies.
- Follow principles of infection prevention (**page C-37**).
- Identify the vein to be used.
- Wash hands (**page C-38**), and put on clean examination gloves.
- Prepare the skin over the vein using a swab or cotton-wool ball soaked in antiseptic solution, and allow to dry.

- Ensure that the blood collection tubes are within easy reach.
- Have an assistant use her/his forefinger and thumb to gently encircle the limb above the site selected for puncture.

NEEDLE WITH A SYRINGE OR BUTTERFLY SET

- Attach the syringe to the needle or butterfly set tubing.
- Insert the needle through the skin at an angle of about 15 degrees, with the bevel of the needle facing upward.
- Pull gently on the syringe plunger as the needle is advanced. Once blood flows easily into the syringe or the tubing of the butterfly set, do not advance the needle any further.
- Take enough blood to perform all necessary laboratory investigations.
- After blood is collected:
 - Have the assistant remove her/his finger and thumb from around the baby's limb;
 - Withdraw the needle from the vein, and have the assistant apply gentle pressure to the puncture site with a dry cotton-wool ball for several minutes to prevent bruising.
- If an **open collection tube is used**, carefully recap the needle (**page C-42**) and remove it from the syringe before transferring the blood into the tube.
- Dispose of the syringe (or clean it) and the butterfly set or needle according to recommended infection prevention procedures (**page C-42**).
- Record the volume of blood taken.

NEEDLE WITHOUT SYRINGE

A needle can be used without a syringe; however, this can be messy and is unsterile, making this method unsuitable for culture and sensitivity. Ensure that the needle is disposed of properly (**page C-42**).

- Insert the needle through the skin at an angle of about 15 degrees, with the bevel of the needle facing upward, until blood flows out quickly:
 - If the **blood comes out very slowly**, gently adjust the needle slightly by pulling it back or pushing it in;

- Hold the collection tubes under the needle to collect the blood, being careful not to touch the tubes or the end of the needle.
- Take enough blood to perform all necessary laboratory investigations.
- After blood is collected, withdraw the needle from the vein, and have the assistant apply gentle pressure to the puncture site with a dry cotton-wool ball for several minutes to prevent bruising.
- Dispose of the needle according to recommended infection prevention procedures (**page C-42**).
- Record the volume of blood taken.

CAPILLARY BLOOD SAMPLE (HEEL PRICK)

SUPPLIES

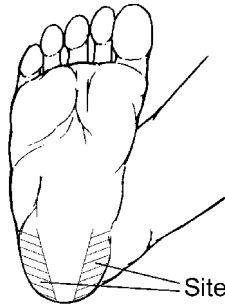
- clean examination gloves
- swab or cotton-wool ball soaked in antiseptic solution (**Table C-10, page C-41**)
- dry cotton-wool ball
- sterile lancet (if a lancet is not available, use a 24-gauge needle)
- capillary tubes or other appropriate glass collection tubes

PROCEDURE

- Gather necessary supplies.
- Follow principles of infection prevention (**page C-37**).
- Wash hands (**page C-38**), and put on clean examination gloves.
- Prepare the skin of the heel using a swab or cotton-wool ball soaked in antiseptic solution, and allow to dry.
- Flex the foot up towards the leg and hold it in this position with one hand.
- Squeeze the heel firmly enough to make it flush red (but not so much that it turns white).
- Puncture the skin (about 1 to 2 mm deep) firmly with a lancet:

- Aim towards the lateral or medial side of the heel (**Fig. P-5**);
- Avoid the heel pad because of the risk of infection;
- Avoid using previously used sites, if possible.

FIGURE P-5 Site for heel prick



- Squeeze the heel gently and intermittently to enhance blood flow. Avoid excessive squeezing and rubbing of the heel, as this will cause bruising and dilution of blood with tissue fluid, giving an inaccurate result.

A tiny jab is more unpleasant for the baby because it will take longer to collect the blood and requires prolonged squeezing of the heel; in some cases, a second heel stick may be required. Excessively deep heel sticks, however, can cause cuts, infection, and scarring.

- Collect blood into the tube, taking enough blood to perform all necessary laboratory investigations.
- After blood is collected, have an assistant apply gentle pressure to the puncture site with a dry cotton-wool ball for several minutes to prevent bruising.
- Record the volume of blood taken.

Measure blood glucose using standard laboratory methods. If **laboratory methods are not available**, use paper reagent strips that are made for newborn babies. Note that paper reagent strips may underestimate blood glucose by as much as 0.5 to 1.0 mmol/l.

- Gather necessary equipment and supplies.
- Read the instructions for the reagent strips.
- Take a blood sample (**page P-9**).
- Transfer the required volume of blood onto the reagent strip, usually in an area at the tip of the strip, taking care to cover all the required area with one or two drops of blood at the same time.
- Leave the blood on the strip for the required length of time—usually 60 seconds.
- Wipe or wash off the blood, using running water, according to the manufacturer's instructions.
- Estimate the blood glucose:
 - Immediately compare the colour on the strip to a colour chart (usually on the container of the reagent strips) to estimate blood glucose;
 - Improve the accuracy of this method by using a reflectance metre (supplied by the manufacturer of the reagent strips), if available, to read the colour change on the reagent strip.
- If the **blood glucose is less than 25 mg/dl (1.1 mmol/l)**, confirm by laboratory measurement, if possible.

INTRAMUSCULAR (IM) INJECTIONS

GENERAL PRINCIPLES

- The sites for IM injections include the:
 - Quadriceps muscle group of the upper, outer thigh. This site is preferred because of the small risk of giving the injection intravenously, hitting the femur with the needle, or injuring the sciatic nerve;
 - Gluteus muscle group in the buttock. This muscle group is difficult to use for IM injection because of variable amounts of fat and subcutaneous tissue and the danger of injury to the sciatic nerve and major blood vessels in the region. If using this site, use only the upper, outer quadrant of the muscle, and always aspirate before injecting;
 - Deltoid muscle group. This site can be used for giving immunizations but should not be used for giving other injections.
- Minimize pain with injection by:
 - Using a sharp needle of the smallest diameter that will allow fluid to flow freely (e.g. 22- to 24-gauge);
 - Ensuring that no material for injection is in the needle at the time of insertion into the skin;
 - Using a minimal volume for injection (e.g. 2 ml or less at any single injection site);
 - Avoiding rapid injection of material;
 - Using alternative injection sites for subsequent injections.
- Potential complications of IM injections include:
 - inadvertent intra-arterial or intravenous injection;
 - infection from contaminated injection material;
 - neural injury (typically the sciatic nerve after injections in the buttock);
 - local tissue damage due to injection of irritants.

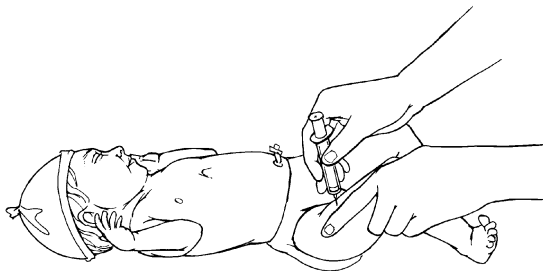
- Avoid these complications by:
 - selecting the safest agents for injection;
 - choosing the proper injection site;
 - establishing anatomic landmarks;
 - cleansing the skin thoroughly;
 - alternating sites for subsequent injections;
 - aspirating before injection;
 - avoiding tracking the drug into superficial tissues;
 - using a needle of adequate length to reach the intended injection site.

SUPPLIES

- sterile 1-inch needle of the smallest size that will allow fluid to flow freely (e.g. 22- to 24-gauge)
- sterile syringe of the smallest size available that has adequate markings for proper dose (e.g. 1- to 3-ml)
- dry cotton-wool ball

PROCEDURE

- Gather necessary supplies.
- Wash hands (**page C-38**).
- Select the site for injection.
- Draw the material for injection into the syringe.
- Ensure that the drug and dose are correct.
- Grasp the centre of the target muscle between the thumb and forefinger, if possible.
- Insert the needle at a 90-degree angle through the skin with a single quick motion (**Fig. P-6, page P-17**).

FIGURE P-6 Intramuscular injection into quadriceps muscle group

- Withdraw the plunger of the syringe slightly to ensure that the tip of the needle is not in a vein (i.e. no blood should enter the needle):
 - If the **needle is in a vein**:
 - Withdraw the needle without injecting the material;
 - Apply gentle pressure to the site with a dry cotton-wool ball to prevent bruising;
 - Place a new, sterile needle on the syringe;
 - Choose a new site for injection;
 - Repeat the procedure described above.
 - If the **needle is in the muscle**, inject the material with steady pressure for three to five seconds.
- Upon completion of the injection, withdraw the needle and apply gentle pressure with a dry cotton-wool ball.
- Record the site of the injection, and rotate the site of subsequent injections.

INTRAVENOUS (IV) INJECTIONS

The directions in this section are for giving an IV push injection to a baby with an IV line in place; these directions do not apply if the drug is mixed with IV fluid in a bag and then infused.

SUPPLIES

- swab or cotton-wool ball soaked in antiseptic solution (**Table C-10, page C-41**)

- two sterile 1-inch needles of the smallest size that will allow fluid to flow freely (e.g. 22- to 24-gauge)
- two sterile syringes of the smallest size available that have adequate markings for proper dose (e.g. 1- to 3-ml)
- 2 ml IV fluid

PROCEDURE

- Gather necessary supplies.
- Wash hands (**page C-38**).
- Choose the place in the IV line where an IV injection can be given closest to the insertion site of the cannula (e.g. a valve or a soft rubber connector).
- Clean the port with the swab or cotton-wool ball soaked in antiseptic solution, and allow to dry.
- Draw the material for injection into the syringe.
- Ensure that the drug and dose are correct.
- **If the IV fluid was infusing without problem:**
 - Stop the IV infusion;
 - Insert the needle into the IV line, and inject the material slowly over two minutes, carefully observing the area around the cannula for swelling.
- **If there is any question as to whether the cannula is properly positioned in the vein:**
 - Stop the IV infusion;
 - Flush the IV line first with 2 ml of IV fluid, observing the area around the cannula carefully for swelling that indicates that the cannula has come out of the vein;
 - If the **cannula is still in the vein**, inject the material slowly over two minutes, carefully observing the area around the cannula for swelling.
- Upon completion of the injection, withdraw the needle and restart the IV infusion.

INTRADERMAL INJECTIONS

Only use intradermal injection for the BCG vaccine (**page C-51**) and when first administering local anaesthetic for draining an abscess (**page P-43**).

SUPPLIES

- sterile 25- or 27-gauge, 5/8-inch needle
- sterile 21-gauge, 1-inch needle
- sterile tuberculin syringe (1-ml)
- dry cotton-wool ball

PROCEDURE

- Gather necessary supplies.
- Select the site for injection.
- Wash hands (**page C-38**).
- Draw the material for injection into the syringe using the 21-gauge needle.
- Ensure that the correct drug and dose are given.
- Replace the 21-gauge needle with a 25- or 27-gauge needle.
- Hold the syringe and needle almost parallel with the skin, with the bevel of the needle facing up.
- Pull the skin taut with one hand, and insert the tip of the needle barely under the skin. Advance the needle slowly until the bevel of the needle has fully entered the skin.
- Gently point the needle upward, without repiercing the skin.
- Inject the material with steady pressure for three to five seconds (there will be significant resistance) and look for a blanching of the skin. The baby will probably cry during the injection; a true intradermal injection often burns slightly and should raise a small “bleb” under the skin that causes the skin to pucker like the skin of an orange (peau d’orange).
- Upon completion of the injection, withdraw the needle and apply gentle pressure with a dry cotton-wool ball.

- Various sites can be used to establish an intravenous (IV) line. Common sites used for a baby are:
 - peripheral veins on the back of the hand or top of the foot (the most common and preferred sites);
 - veins on the forearm, the front of the elbow, or around the ankle or knee (minimize use of the veins around the knee because there is a greater risk of the needle coming in contact with the bone);
 - scalp veins.
- If a **peripheral IV line cannot be established quickly in an emergency situation**, use an umbilical vein catheter (**page P-24**) or intraosseous line (**page P-27**).

PERIPHERAL IV LINE

SUPPLIES

- clean examination gloves
- swab or cotton-wool ball soaked in antiseptic solution (**Table C-10, page C-41**)
- sterile infusion set with IV fluid (use a microdropper if one is available)
- sterile butterfly set or cannula (23- to 25-gauge; if the **IV line is required for a blood transfusion**, ensure that the needle is large enough [e.g. 22-gauge] so that the blood does not clot in the needle during the transfusion)
- adhesive strapping or thin paper tape
- tincture of benzoin (if available)
- rubber band (if using a scalp vein)
- arm board (or splint)

PROCEDURE

- Gather necessary supplies.
- Follow principles of infection prevention (**page C-37**).

- Prepare the solution to be infused, ensuring that the entire infusion set is filled with fluid and that there is no air in the infusion set. If a **butterfly set is used**, ensure that the set is filled with IV fluid.

Air embolism can occur easily in babies. It is essential to ensure that all components of the IV infusion set are filled with fluid and that there are no air bubbles in the set before beginning the infusion.

- Wash hands (**page C-38**), and put on clean examination gloves.
- Prepare the skin over the vein using a swab or cotton-wool ball soaked in antiseptic solution, and allow to dry.
- Have an assistant press on the skin near the vein to act as a tourniquet:
 - If **using a vein on the hand, foot, arm, or leg**, have the assistant use her/his forefinger and thumb to gently encircle the limb above the chosen site of insertion;
 - If **using a scalp vein**, have an assistant press over the vein below the chosen site of insertion, or place a rubber band (as a tourniquet) around the baby's head (**Fig. P-7**).

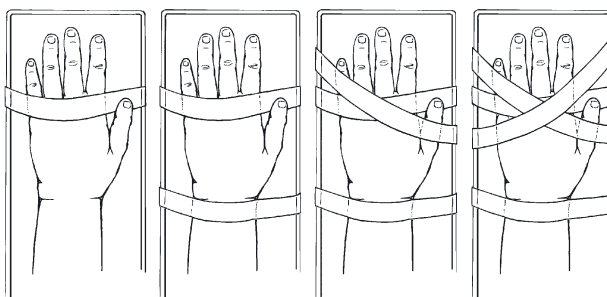
FIGURE P-7 Using a rubber band as a tourniquet for scalp vein



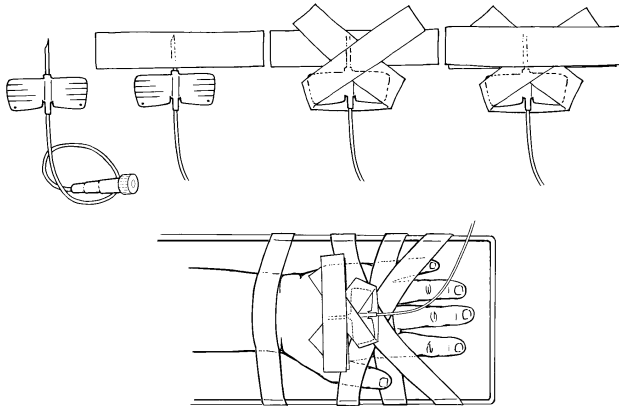
- Insert the needle at a 15-degree angle through the skin, with the bevel of the needle facing upward:
 - If **using a butterfly set**, a small amount of blood will flush back into the tubing when the vein is punctured. Do not push the needle in any further;
 - If **using a cannula**:
 - Once blood fills the hub of the cannula, withdraw the needle partially while continuing to push the cannula in;

- When the hub of the cannula reaches the skin at the puncture site, withdraw the needle completely;
- Dispose of the needle according to recommended infection prevention procedures (**page C-42**).
- Have the assistant remove her/his finger and thumb from around the baby's limb (or remove the rubber band if a scalp vein was used).
- Connect the infusion set to the cannula or butterfly set:
 - Ensure that there are no air bubbles in the infusion set;
 - Infuse fluid into the vein for a few seconds to make sure that the vein has been successfully cannulated. The fluid should run freely, and there should be no swelling around the site of the cannula;
 - If **swelling develops around the site of infusion**, withdraw the needle from the vein and repeat the procedure using a different vein.
- If **using a vein in the hand, arm, foot, or leg**, immobilize the limb (e.g. using an arm board [or splint] and adhesive strapping or thin paper tape) to minimize movement (e.g. **Fig. P-8**).

FIGURE P-8 Immobilizing the hand



- Secure the cannula or butterfly set in position using strips of adhesive strapping or thin paper tape (e.g. **Fig. P-9, page P-24**). If **tincture of benzoin is available**, apply this to the skin before applying the adhesive strapping.

FIGURE P-9 Securing butterfly set in place

- Inspect the infusion site every hour:
 - Look for redness and swelling around the insertion site of the cannula, which indicate that the cannula is not in the vein and fluid is leaking into the subcutaneous tissue. If **redness or swelling is seen at any time**, stop the infusion, remove the needle, and establish a new IV line in a different vein;
 - Check the volume of fluid infused and compare to the prescribed volume;
 - Record all findings.

Solutions containing glucose can cause tissue to die and should not be allowed to leak into subcutaneous tissue.

- Change the IV infusion set and fluid bag every 24 hours, even if the bag still contains IV fluid (they can be a major source of infection).

UMBILICAL VEIN CATHETER

An umbilical vein catheter is indicated only when the need for IV access is urgent but a peripheral IV line cannot be established quickly.

EQUIPMENT AND SUPPLIES

- clean examination gloves
- high-level disinfected or sterile gloves
- high-level disinfected or sterile umbilical catheter or ordinary gastric tube:
 - if the baby weighs less than 1.5 kg, use a 3.5-F catheter
 - if the baby weighs 1.5 kg or more, use a 5-F catheter
- sterile infusion set with IV fluid (use a microdropper if one is available)
- sterile 5- or 10-ml syringe
- swabs or cotton-wool balls soaked in antiseptic solution (**Table C-10, page C-41**)
- sterile drapes
- sterile blade
- cord tie or suture (to control bleeding)
- sterile forceps
- sterile suture, adhesive strapping, or thin paper tape (to secure catheter)

PROCEDURE

- Gather necessary equipment and supplies.
- Follow principles of infection prevention (**page C-37**) and aseptic technique (**page C-40**).
- Prepare the solution to be infused.
- Wash hands (**page C-38**), and put on clean examination gloves.
- Prepare the umbilicus and surrounding skin by washing in an outward spiral motion with a swab or cotton-wool ball soaked in antiseptic

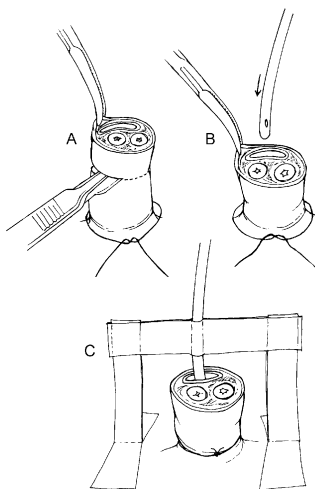
solution. Repeat two more times, using a new swab or cotton-wool ball each time, and allow to dry.

- Remove examination gloves and put on high-level disinfected or sterile gloves.
- Fill the umbilical catheter with IV fluid using a closed syringe (i.e. with the plunger completely inside the barrel of the syringe) attached to the end of the catheter.

Ensure that air is not in the catheter and that a closed syringe is attached to the end of the catheter; a sudden deep breath by the baby just after the catheter has been inserted may result in an air embolus if air is inside the catheter.

- Place sterile drapes over the baby's body so that only the umbilical area is exposed.
- Place a cord tie or suture around the base of the umbilicus to control bleeding, and using a sterile blade, cut the cord to a length of 1 to 2 cm (**Fig. P-10A**).
- Identify the two umbilical arteries, which are thicker-walled and usually contracted, and the single umbilical vein, which usually has a wider opening and is found above the arteries (closer to the baby's head; **Fig. P-10**).

FIGURE P-10 Inserting an umbilical vein catheter



- Hold the catheter in one hand (applying gentle traction to the cord with forceps in the other hand, if necessary) and insert the catheter into the umbilical vein, guiding the catheter towards the head of the baby and to the baby's right side (**Fig. P-10B, page P-26**).
- As the catheter is advanced, periodically apply gentle suction with the syringe until blood flows back. Once blood flows back freely through the catheter (usually after the catheter is inserted 5 to 7 cm), do not advance the catheter any further.
- If **resistance is encountered while advancing the catheter**, especially in the first 2 to 3 cm, do not continue. Remove the catheter and try again.

Never force the umbilical catheter if resistance is encountered.

- Tie the cord tie or suture around the stump of the umbilicus to hold the catheter in place and prevent bleeding around the catheter or from one of the arteries.
- Remove the syringe and connect the infusion set to the catheter, ensuring that there are no air bubbles in the set.
- Secure the catheter with suture material or adhesive tape (**Fig. P-10C, page P-26**) to prevent it from being dislodged.
- Inspect the infusion every hour:
 - Look for redness and swelling around the umbilicus, which may indicate infection. If **redness or swelling is seen at any time**, stop the infusion and remove the umbilical vein catheter. Attempt to establish a peripheral IV line again, and treat for infection of the umbilicus (**page F-135**);
 - Check the volume of fluid infused and compare to the prescribed volume;
 - Record all findings.

INTRAOSSEOUS INFUSION

Establishing intravenous access in a newborn baby can be difficult. In an emergency, a good temporary alternative is the intraosseous route using the bone marrow cavity. Fluid and drugs can be given by this route.

Remove the intraosseous line as soon as other IV access is established (within eight hours, if possible). Do not place an intraosseous line if there is infection at the intended insertion site or if the bone is fractured. Because this procedure is only performed in an emergency, no anaesthetic is required.

SUPPLIES

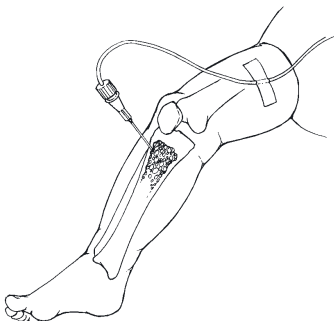
- clean examination gloves
- swab or cotton-wool ball soaked in antiseptic solution (**Table C-10, page C-41**)
- sterile intraosseous needle, bone marrow needle, or 22-gauge needle
- sterile infusion set with IV fluid (use a microdropper if one is available)
- adhesive strapping or thin paper tape
- sterile 5-ml syringe
- elastic bandage
- padded splint

PROCEDURE

- Gather necessary supplies.
- Prepare the solution to be infused, ensuring that the entire infusion set is filled with fluid and that there is no air in the infusion set.
- If **using a regular hypodermic needle**, attach a 5-ml syringe filled with 3 ml of IV fluid, and flush the fluid through the needle.
- Identify the insertion site (proximal end of tibia or distal end of femur):
 - The site at the proximal end of the tibia is 1 cm below and 1 cm medial to the tibial tuberosity;
 - The site at the distal end of the femur is 2 cm above the lateral condyle.
- Wash hands (**page C-38**), and put on clean examination gloves.
- Prepare the skin over the insertion site using a swab or cotton-wool ball soaked in antiseptic solution, and allow to dry.

- Position the baby's leg with the knee bent about 30 degrees and the heel resting on the table.
- Support the upper tibia with one hand, placed so that the hand is not directly behind the site of insertion.
- Hold the needle (with the attached syringe if using a hypodermic needle) in the other hand at a 90-degree angle to the selected insertion site, angled slightly towards the foot.
- Advance the needle using a firm, twisting motion and moderate, controlled force. Stop immediately when there is a sudden decrease in resistance to the needle, which indicates that the needle has entered the marrow cavity.
- Once the needle is properly positioned, remove the stylet (if a bone marrow or intraosseous needle was used) and attach the syringe.
- Aspirate using the syringe to confirm that the needle is correctly positioned. The aspirate should look like blood.
- Slowly inject 3 ml of IV fluid to check for proper placement of needle:
 - Look for swelling (indicating leaking of fluid under the skin) at the front of the leg or in the calf muscle at the back of the leg. If swelling is seen, remove the needle and try again;
 - If it is **difficult to infuse the fluid but there is no swelling in the calf muscle**, the needle may have entered the posterior bone cortex. Withdraw the needle approximately 0.5 cm and cautiously inject IV fluid again.
- If **no problems are detected**, attach the infusion set to the needle (**Fig. P-11**).

FIGURE P-11 Intraosseous infusion



- Secure the needle in place using tape, and splint the leg as for a fractured femur (**page F-150**), ensuring that the elastic bandage does not interfere with the needle or infusion set.
- Inspect the infusion site every hour:
 - Look for redness and swelling around the insertion site of the cannula and in the baby's calf muscle, which indicate that the cannula is not in the vein and fluid is leaking into the subcutaneous tissue. If **redness or swelling is seen at any time**, stop the infusion, remove the needle, and attempt to establish a peripheral IV line again or establish a new intraosseous line at a different site;
 - Check the volume of fluid infused and compare to the prescribed volume; flow rates may alter dramatically with changes in the position of the leg;
 - Record all findings.
- Remove the intraosseous needle as soon as alternative IV access is available, and within eight hours, if possible.

MONITORING THE TRANSFUSED BABY

- For each transfusion, monitor the baby at the following stages:
 - before starting the transfusion;
 - at the onset of the transfusion;
 - every five minutes for the first 15 minutes after starting the transfusion;
 - at least every hour during the transfusion;
 - every four hours for 24 hours after completing the transfusion.

Closely monitor the baby during the first 15 minutes of the transfusion and regularly thereafter to detect early signs of a transfusion reaction.

- At each of these stages, record the following information on the baby's chart:
 - general appearance;
 - temperature;
 - heart rate;
 - respiratory rate;
 - fluid balance (i.e. oral and IV fluid intake and urine output).
- In addition, record:
 - the time the transfusion is started and completed;
 - the volume and type of all blood transfused;
 - the unique donation numbers of all blood transfused;
 - any adverse effects.

TRANSFUSING BLOOD

- Review the general principles of the clinical use of blood (**page C-47**).
- If an **IV line is not yet in place**, establish an IV line (**page P-21**).

- Before beginning the transfusion, check (with a second staff member, if possible) to ensure that the:
 - blood is the correct type for the baby, the baby's information is clearly marked, and the blood has been matched against the blood of the mother and the baby. In emergency situations, use type O, Rh-negative blood;
 - blood transfusion bag has not been opened and does not leak;
 - blood pack has not been out of the refrigerator for more than two hours, the plasma is not pink, the red cells do not look purple or black, and the blood is not clotted;
 - IV line is patent and the needle used is large enough (e.g. 22-gauge) so that the blood does not clot in the needle during the transfusion.
- Record the baby's temperature and heart and respiratory rates.
- Remove the protective cover from the blood bag or bottle without touching the opening, and attach a blood infusion set.
- Open the clamp on the tubing of the blood infusion set, allow blood to run through to the end of tubing, and then close the clamp.
- Detach the tubing at the infusion site and immediately attach the tubing from the blood transfusion set.
- Transfuse whole blood at the rate of 20 ml/kg body weight over four hours.
- Monitor the baby's temperature and heart and respiratory rates, and slow the infusion to half the rate when the baby's vital signs begin to improve.

Do not leave a unit of blood hanging for more than four hours.

- Use an infusion device to control the rate of transfusion, if available.
- Ensure that the blood is flowing at the correct rate.
- Upon completion of the transfusion, reassess the baby. If **another transfusion is required**, transfuse blood at the same rate and volume.

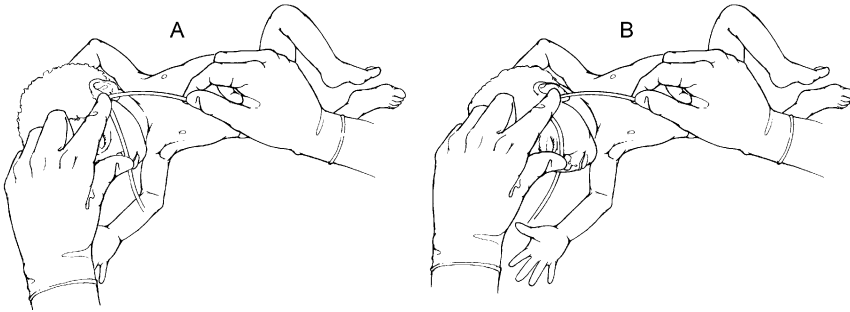
A gastric tube may be inserted via one nostril or the mouth. Insert the tube via the nostril if the baby is breathing regularly, using the smallest (narrowest) tube available. Insert the tube via the mouth if the tube is needed for drainage of the stomach, for feeding a baby with breathing difficulty, or if only a relatively large tube is available.

SUPPLIES

- clean examination gloves
- clean plastic tube or catheter appropriate for baby's weight:
 - if the baby weighs less than 2 kg, use a 5-F tube
 - if the baby weighs 2 kg or more, use an 8-F tube
- writing pen or flexible tape measure
- 3- to 5-ml syringe (for aspiration)
- blue litmus paper or stethoscope
- sterile or high-level disinfected syringe or funnel suitable for holding breast milk (if the tube will be used for feeding)
- cap for gastric tube (if the tube will be used for feeding)
- adhesive strapping
- tincture of benzoin (if available)

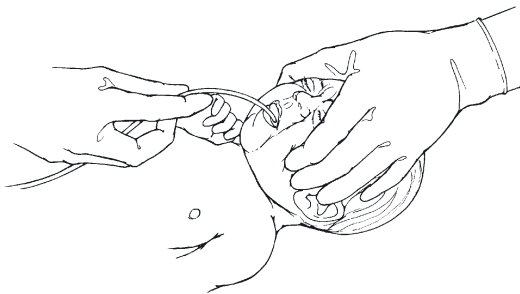
PROCEDURE

- Gather necessary supplies.
- Wash hands (**page C-38**), and put on clean examination gloves.
- Estimate the required length of tube:
 - Hold the tube so that it mimics the route that it will follow once inserted (i.e. from the mouth or the tip of the nostril to the lower tip of the ear lobe and then to the stomach, just below the rib margin; **Fig. P-12, page P-34**), and place a mark on the tube with a pen or a piece of strapping;
 - Alternatively, estimate the distance using a flexible tape measure, and mark the distance on the tube with a pen or a piece of strapping.

FIGURE P-12 Measuring gastric tube for oral (A) and nasal (B) routes

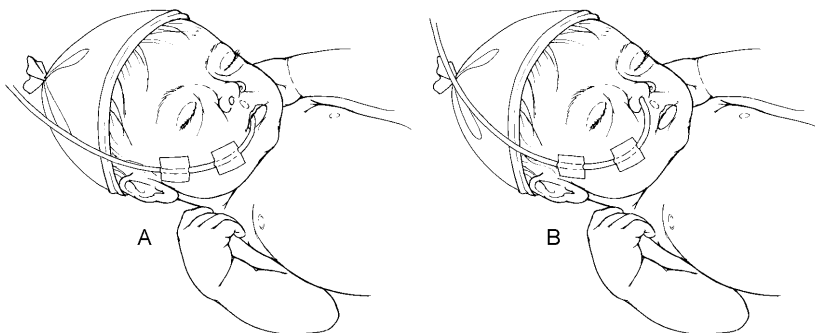
- Flex the baby's neck slightly and gently pass the tube through the mouth (**Fig. P-13**) or through one nostril to the required distance. If **using the nasal route**:
 - If a **nasal catheter is in place for administration of oxygen**, insert the gastric tube through the same nostril, if possible;
 - If the **tube does not slide easily into the nostril**, try the other nostril;
 - If the **tube still does not slide easily into the nostril**, use the oral route.

Never force the gastric tube into the nostril if resistance is encountered.

FIGURE P-13 Inserting oral gastric tube

- Secure the tube in position with adhesive strapping (**Fig. P-14**):
 - If **tincture of benzoin is available**, apply this to the skin first before applying the adhesive strapping;
 - If a **nasogastric tube is used**, avoid pulling the tube taut against the nostril, as this may injure the skin.

FIGURE P-14 **Securing oral (A) and nasal (B) gastric tube in place**



CONFIRMING PROPER PLACEMENT OF GASTRIC TUBE

- Confirm proper placement of the tube:
 - Fill a syringe with 1 to 2 ml of air and connect it to the end of the tube. Use a stethoscope to listen over the stomach as air is quickly injected into the tube:
 - If a **whistling sound is heard through the stethoscope as the air is injected**, the end of the tube is correctly positioned in the stomach;
 - If a **whistling sound is not heard**, the tube is not properly positioned. Remove the tube and repeat the procedure.
 - Alternatively, test the acidity of the aspirate:
 - Note that this method is only suitable for babies more than 24 hours old or small babies (less than 2.5 kg at birth or born before 37 weeks gestation) who are more than 48 hours old;
 - Use a syringe to aspirate some fluid, and place a drop of fluid onto a strip of blue litmus paper:

- If the **litmus paper turns pink**, the fluid is acidic and the tip of the tube is correctly positioned in the stomach;
 - If the **litmus paper remains blue**, the tip of the tube is not in the correct position. Remove the tube and repeat the procedure.
- Replace the tube with another clean gastric tube after three days, or earlier if it is pulled out or becomes blocked, and clean and high-level disinfect or sterilize it according to **Table C-11 (page C-43)**.

USING A GASTRIC TUBE FOR FEEDING OR DRAINAGE

- If the **gastric tube is inserted for the purpose of giving expressed breast milk**, see **page C-18** for instructions on feeding.
- If the **gastric tube is inserted for drainage**, leave the tube uncapped and wrap clean gauze around the end, fastened with tape, to keep the tube clean and to absorb the drainage from the stomach.

Lumbar puncture is used to confirm the diagnosis when the baby has signs suggestive of meningitis. Do not perform a lumbar puncture if the baby has spina bifida/meningomyelocele.

SUPPLIES

- clean examination gloves
- high-level disinfected or sterile gloves
- sterile drapes
- swabs or cotton-wool balls soaked in antiseptic solution (**Table C-10, page C-41**)
- spinal needle or intravenous needle (22- to 24-gauge)
- appropriate collection tubes
- dry cotton-wool ball
- adhesive bandage

PROCEDURE

- Be prepared to resuscitate the baby using a bag and mask (**page P-1**), if necessary.
- Gather necessary supplies.
- Place the baby under a radiant warmer (**page C-5**), if possible, and undress the baby only when ready to perform the procedure.
- Follow principles of infection prevention (**page C-37**) and aseptic technique (**page C-40**).
- Position the baby:
 - Have an assistant hold the baby in a sitting position:
 - Position the baby so that the baby's legs are straight and the back is arched (**Fig. P-15, page P-38**);
 - Ensure that the baby's neck is partially extended and not flexed towards the chest, which could obstruct the baby's airway.

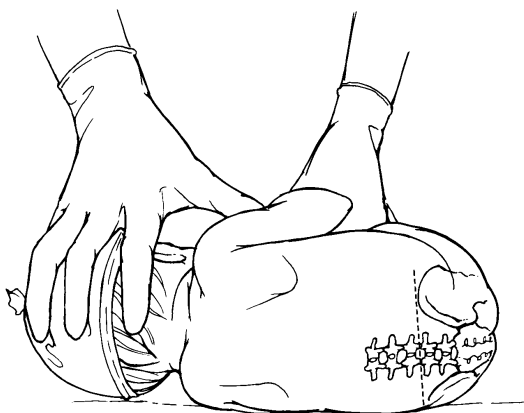
FIGURE P-15 Sitting position for lumbar puncture

- Alternatively, place the baby on her/his side facing the assistant (most right-handed health care providers find it easiest if the baby is on her/his left side; **Fig. P-16**):
 - Position the baby so that the baby's back is closest to the side of the table from which the lumbar puncture will be performed;
 - Have the assistant place one hand behind the baby's head and neck, and place the other hand behind the baby's thighs to hold the spine in a flexed position;
 - Ensure that the baby's neck is partially extended and not flexed towards the chest, which could obstruct the baby's airway.

FIGURE P-16 Lying position for lumbar puncture

- Wash hands (**page C-38**), and put on clean examination gloves.
- Prepare the skin over the area of the lumbar spine and then the remainder of the back by washing in an outward spiral motion with a swab or cotton-wool ball soaked in antiseptic solution. Repeat two more times, using a new swab or cotton-wool ball each time, and allow to dry.
- Identify the site of the puncture between the third and fourth lumbar processes (i.e. on a line joining the iliac crests; **Fig. P-17**).

FIGURE P-17 Site of lumbar puncture



- Remove examination gloves and put on high-level disinfected or sterile gloves.
- Place sterile drapes over the baby's body so that only the puncture site is exposed.
- Insert the needle in the midline of the vertebrae, angled towards the baby's umbilicus.
- Slowly advance the needle to a depth of about 1 cm (or less if the baby is small [less than 2.5 kg at birth or born before 37 weeks gestation]). A slight "pop" may be felt as the needle enters the subarachnoid space.
- If **using a spinal needle**, remove the stylet.
- If **bone is encountered**, the needle cannot be redirected. Pull the needle back to just beneath the skin and reinsert the needle, directing it slightly upward while aiming for the baby's umbilicus.

- Collect the cerebrospinal fluid (CSF):
 - Collect about 0.5 to 1 ml (about 6 to 10 drops) of CSF in each collection tube;
 - If **CSF does not come out**, rotate the needle slightly;
 - If **CSF still does not come out**, remove the needle and reinsert it between the fourth and fifth lumbar processes;
 - If **blood is seen in the CSF**, the needle probably went through the spinal canal and caused bleeding. If the **CSF does not clear**, collect enough CSF for culture and sensitivity only.
- After the CSF is collected, remove the needle.
- Have an assistant apply gentle pressure to the puncture site with a cotton-wool ball until bleeding or leakage of fluid stops.
- Apply an adhesive bandage to the site.

SUPPLIES

- clean examination gloves
- 3-ml plastic syringe
- sterile 1-inch needle (22- to 23-gauge)
- paraldehyde
- arachis (or vegetable) oil
- water-based lubricant

PROCEDURE

- Gather necessary supplies.
- Wash hands (**page C-38**), and put on clean examination gloves.
- Have an assistant remove the baby's napkin and hold the baby on one side, similar to the lying position for lumbar puncture (**Fig. P-16, page P-38**).
- Draw up 2 ml arachis oil into the syringe.
- Attach the needle and draw up the paraldehyde 0.3 ml/kg body weight into the same syringe.
- Remove the needle from the syringe.
- Lubricate the syringe with a water-based lubricant.
- Gently insert the syringe into the baby's rectum and advance it approximately 3 cm.
- Administer the drug slowly over three minutes and then slowly withdraw the syringe.
- Allow the baby to relax from the curled up position.
- If the **dose is passed from the rectum within the first five minutes**, repeat the dose. The majority of absorption will occur between 5 and 15 minutes after administration, so if stool is passed after this, the dose does not need to be repeated.

SUPPLIES

- clean examination gloves
- high-level disinfected or sterile gloves
- swab or cotton-wool ball soaked in antiseptic solution (**Table C-10, page C-41**)
- sterile swab in glass test tube for culture
- high-level disinfected or sterile tissue forceps
- sterile gauze
- sterile blade
- sterile drapes
- sterile 10-ml syringe
- sterile 3-ml syringe (or other available size with adequate markings for proper dose)
- sterile 22-gauge needle
- sterile 25-gauge, 5/8-inch needle
- local anaesthetic (e.g. 0.5% lignocaine solution)
- sterile IV fluid

PROCEDURE

- Gather necessary supplies.
- Wash hands (**page C-38**), and put on clean examination gloves.
- Prepare the skin over and around the abscess using a swab or cotton-wool ball soaked in antiseptic solution, and allow to dry.
- Remove examination gloves and put on high-level disinfected or sterile gloves.
- Attach the 22-gauge needle to the 10-ml syringe, fill the syringe with IV fluid, and remove the needle.
- Place sterile drapes over the area surrounding the abscess so that only the abscess is exposed.

- Inject local anaesthetic around the abscess:
 - Draw the local anaesthetic into the 3-ml syringe and attach the 25-gauge needle;
 - Inject local anaesthetic intradermally (**page P-19**) to raise a small “bleb” in the skin;
 - After one minute, attach the 22-gauge needle to the syringe, insert the needle through the “bleb” in the skin, and infiltrate with local anaesthetic the area around the abscess.
- After waiting two minutes to allow the local anaesthetic to take effect, make an incision over the fluctuant area of the abscess.
- Using a sterile swab, take a sample of the pus, and send it to the laboratory for culture and sensitivity.
- Use high-level disinfected or sterile tissue forceps to break up the pocket of pus.
- Flush out the abscess with IV fluid, and leave the wound open.

SECTION 4: APPENDIX

There are several types of records used in the care of newborn babies. The following records are included in this guide: general clinical record, discharge form, referral form, feedback form, and death certificate. The example records included are suggested for their content more than for their format. Additional records may be used for administrative purposes. In addition, a log book (**page A-8**) should be kept with basic information on all babies admitted.

- Ensure that the baby's name and identification number are correct on all records.
- Store clinical records according to institutional policy. Ensure that the records can be easily retrieved for the annual statistics or special investigations or studies.
- Keep clinical records for at least one year unless directed otherwise by local policy.
- Be familiar with the requirements for country reporting of diseases under surveillance (e.g. congenital syphilis).
- Analyse the hospital's statistics every 6 or 12 months:
 - Number of babies admitted;
 - Number of babies discharged;
 - Number of babies who died;
 - Main conditions by birth weight and sex of the baby;
 - Shortages of drugs, equipment, supplies, and staff on duty.

CLINICAL RECORD

The clinical record consists of the admission record and record of ongoing care.

- The admission record (example not shown) should include the reason for admission, history, previous treatment, and other information about the mother and family. A checklist of tasks is useful.
- The record of ongoing care (e.g. **Fig. A-1, page A-2**) during hospitalization is a confidential record that is shared between the doctor and nurses involved in the baby's care:
 - Keep the record near the baby;
 - Use more than one column, if necessary, for daily recording when the baby is ill or when the baby is recovering.

FIGURE A-1 Clinical record of ongoing care

Record ID		Name and Sex				Birth Weight		Gestational Age		Diagnosis				Ward	
														Page #	
Date	Day														
Weight															
Temperature															
Breathing															
Feeding instructions															
Feeding (see key below)															
Examination findings															
Diagnostic tests															
Treatment															

Key for feeding: B = baby is breastfeeding. If the baby is not breastfeeding, indicate in the left column what the baby is fed (BM = expressed breast milk, S = breast-milk substitute) and the method of feeding (C = fed by cup/spoon or other device, T = fed by gastric tube), and indicate in the right column the volume of milk given.

A discharge form (e.g. **Fig. A-2**) should include information for the parents and the health care provider who will provide care after discharge.

Number:	Date of admission:	Unit/Ward:		
Family name:		Date of birth:	Age:	Birth weight:
Parents:		Address:		
Reason for admission:		Admitted from: ☐ Home ☐ Institution:		
History of pregnancy and birth:				
Onset of illness:				
Hospital stay:				
Instructions for home care:				
Date of discharge:	Discharged: ☐ Home ☐ Institution:		If died, age at death:	
Discharge diagnoses:		Cause of death (diagnosis and code):		
Follow-up visit:		Signature:		
Where:	When:			

Number:	Date of admission:	Unit/Ward:		
Family name:		Date of birth:	Age:	Birth weight:
Parents:		Address:		
Reason for admission:		Admitted from: ☐ Home ☐ Institution:		
History of pregnancy and birth:				
Onset of illness:				
Hospital stay:				
Instructions for home care:				
Date of discharge:	Discharged: ☐ Home ☐ Institution:		If died, age at death:	
Discharge diagnoses:		Cause of death (diagnosis and code):		
Follow-up visit:		Signature:		
Where:	When:			

REFERRAL FORM

A referral form (e.g. **Fig. A-3**) includes information that should be provided with the baby when the baby and/or mother is referred to another facility or department/unit for care.

FIGURE A-3 Referral form

Record number:	BABY name:	MOTHER name:
Who is referring:	Birth weight:	Age:
Name:	Date and hour of birth:	Address:
Facility:	Gestational age:	
Accompanied by health care worker:	Main reasons for referral: ☐ Emergency ☐ Non-emergency ☐ To accompany the mother	Main reasons for referral: ☐ Emergency ☐ Non-emergency ☐ To accompany the baby
Referred Date: Time:	Major findings (clinical and temperature):	Major findings (clinical, blood pressure, temperature, and laboratory):
Arrival Date: Time:	Treatment given and time Before referral:	Treatment given and time Before referral:
	During transfer:	During transfer:
	Last (breast)feed (time):	
	Information given to the mother and companion about the reasons for referral:	Information given to the mother and companion about the reasons for referral:

FEEDBACK FORM

A feedback form (e.g. **Fig. A-4**) includes information that should be provided back to the referring facility or department/unit following discharge or the death of the baby.

FIGURE A-4 Feedback form

Record number:	BABY name:	MOTHER name:
Who is referring:	Weight at discharge:	Age:
Name:	Date of birth:	Address:
Facility:	Age (days):	
Accompanied by health care worker:	Main reasons for referral: ☐ Emergency ☐ Non-emergency ☐ To accompany the mother	Main reasons for referral: ☐ Emergency ☐ Non-emergency ☐ To accompany the baby
Admission Date:	Diagnoses:	Diagnoses:
Time:	Treatment given:	Treatment given:
Discharge Date:	Treatment and recommendations for further care:	Treatment and recommendations for further care:
	Follow-up visit: When:	Follow-up visit: When:
	Where:	Where:
	Preventive measures:	Preventive measures:
	If death: Date:	If death: Date:
	Causes:	Causes:

INTERNATIONAL MEDICAL CERTIFICATE OF CAUSE OF DEATH

- If the baby dies, fill out a death certificate and send it to the authorities according to national requirements. Use the International Classification of Disease or other coding system used in the country. Follow the instructions for coding.
- **Figure A-5 (page A-6)** is an example of the death certificate proposed by WHO. Each country has its own form and regulations for reporting a death and cause of death, which determine the content of the form and the time period within which the death must be reported. Consider adding additional information on the baby, if necessary, to the country death certificate.

FIGURE A-5 Death certificate

Cause of Death		Approximate Interval between Onset and Death
I Disease or condition directly leading to death*	(a)..... Due to (or as consequence of)	
Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b)..... Due to (or as consequence of)	
	(c)..... Due to (or as consequence of)	
	(d).....	
II Other significant conditions contributing to the death but not related to the disease or condition causing it		
* This does not mean the mode of dying, e.g. heart failure or respiratory failure. It means the disease, injury, or complication that caused death.		

Consider collecting the following information:

III If the deceased is a female, was she:	☐ Not pregnant
Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	☐ Not pregnant, but pregnant within 42 days of death
	☐ Pregnant at the time of death
	☐ Unknown if pregnant or was pregnant within 42 days of death
IV If the deceased is an infant and less than one month old:	What was the birth weight: g If exact birth weight not known, did the baby weigh: ☐ 2.5 kg or more ☐ less than 2.5 kg

LOG BOOK

- Keep a log book with the basic information on all babies admitted:
 - identification number;
 - record ID;
 - name;
 - address;
 - sex;
 - birth weight;
 - dates of admission and discharge;
 - reason for admission;
 - diagnoses at discharge;
 - condition at discharge (alive, transferred, died);
 - next follow-up visit.
- Minimal information includes date of admission, names of the mother and the baby, main condition, outcome (discharged home, transferred, or died), and date. It is useful to include birth weight.
- It may be useful to keep a separate log book of babies who died, were transferred, or required follow-up.

HEALTH CARE FACILITY'S LABORATORY FACILITIES

BIOCHEMISTRY AND HAEMATOLOGY

Supplies necessary to:

- Measure blood glucose
- Measure haemoglobin (or haematocrit [erythrocyte volume fraction])
- Measure serum bilirubin
- Perform cerebrospinal fluid cell count
- Perform serologic test for syphilis

MICROBIOLOGY

Supplies necessary to perform:

- Culture and sensitivity on samples of blood, pus, and cerebrospinal fluid
- Gram stain

BLOOD BANK

Fresh whole blood, including type O, Rh-negative blood

Supplies necessary to perform:

- Blood type and cross-match
- Coombs test

NEWBORN SPECIAL CARE UNIT

NON-PATIENT-CARE AREAS

- Area for preparing IV fluid and drugs
- Refrigerator and/or freezer
- Storage space for supplies
- Torch with extra batteries and bulb

PATIENT-CARE AREAS

- Blankets, bed linen, baby clothes (or cloth for wrapping), hats, and napkins
- Chair for mother (comfortable for breastfeeding)
- Cots for newborn babies
- Facilities for handwashing
- Heat source

Light source

Oxygen supply (e.g. from a cylinder, oxygen concentrator, or wall outlet) and a flow metre allowing flow as low as 0.5 litres per minute

Room thermometer

Wall clock

EQUIPMENT

Face masks for resuscitation (sizes 0 and 1)

Incubators

IV poles

Phototherapy unit

Radiant warmers

Self-inflating resuscitation bag, newborn-size

Stethoscope

Suction apparatus

Thermometers (including a rectal thermometer that measures as low as 25 °C)

Weighing scale with 5- to 10-g increments

SUPPLIES

TUBES AND CATHETERS

Gastric tubes (3.5-F, 5-F, and 8-F) with caps

Suction catheters

Umbilical vein catheter

METHODS OF ADMINISTERING OXYGEN

Head box

Nasal catheter (6-F and 8-F)

Nasal prongs (1-mm and 2-mm)

IV LINE

Butterfly sets (22- to 25-gauge)

Cannulas (22- to 25-gauge)

IV tubing

Microdropper

Stopcocks (two-way or three-way)

INJECTIONS

Needles (21- to 27-gauge)

Syringes (1- to 10-ml)

INSTRUMENTS

Blades and handles
Forceps (e.g. artery, dissecting, tissue)
Needle holder

TESTS

Capillary tubes
Collection tubes appropriate for sample (blood, pus, and cerebrospinal fluid)
Glucose paper reagent strips
Lancet

FEEDING AND BREASTFEEDING

Breast-milk substitute for term and preterm babies
Containers for storing expressed breast milk
Cups, cups and spoons, or other devices for feeding
Utensils and containers for preparing breast-milk substitute

OTHER

Adhesive strapping or thin paper tape
Arm board
Cord ties
Cotton-wool balls
Drapes
Gauze bandage
Splints
Suture
Swabs

RECORDS

Laboratory slips
Log book
Medical records, growth charts, referral and feedback forms
Other prescribed forms

INFECTION PREVENTION

FACILITIES FOR HANDWASHING

Running/clean water
Soap and/or alcohol-based handrub
Towels

GLOVES

Clean examination gloves

Heavy rubber or latex utility gloves

High-level disinfected or sterile gloves

SKIN PREPARATION

Antiseptic solution (e.g. 2.5% polyvidone iodine, 4% chlorhexidine gluconate, 60% to 90% ethyl or isopropyl alcohol)

WASTE DISPOSAL

Leakproof container for contaminated waste

Puncture-proof container for sharps disposal

Receptacle for soiled linens and napkins

CLEANING AND DISINFECTION

Area for cleaning and disinfecting equipment and supplies

Disinfectant solution (e.g. 0.5% chlorine bleach, 2% glutaraldehyde)

Instrument sterilizer

DRUGS

0.5% gentian violet

1% tetracycline hydrochloride ointment

10% glucose solution

Ampicillin

Antitetanus immunoglobulin (human)

Arachis (or vegetable) oil

Benzathine benzylpenicillin (or procaine benzylpenicillin)

Benzylpenicillin

Oral iron preparation

Eye prophylaxis (e.g. 1% silver nitrate, 2.5% polyvidone iodine, or 1% tetracycline ointment)

Cefotaxime

Ceftriaxone

Ciprofloxacin

Cloxacillin

Diazepam

Gentamicin

Isoniazid

Lignocaine

Nevirapine

Normal saline (or Ringer's lactate)

Nystatin cream
Oral rehydration solution
Paraldehyde
Phenobarbital
Phenytoin
Vitamin K₁ (phytomenadione)
Zidovudine (AZT)

VACCINES

Tuberculosis (BCG)
Diphtheria, pertussis, and tetanus (DPT)
Hepatitis B (HBV)
Poliomyelitis (OPV)
Tetanus (tetanus toxoid)

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