Management of the Sick Newborn: Report of a Technical Working Group
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This report summarizes the discussions of the Technical Working Group on the care of the sick newborn at health centre and referral hospital. It outlines danger signs for early detection at home and health centre as well as management at health centre and referral hospital. This report does not provide complete guidelines on detection and management at the three levels of care but the Technical Working Group gave guidance to the secretariat for further development of materials on these topics.

1 World Health Organization, 1996

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INTRODUCTION

The Mother-Baby Package, 1 introduced by WHO's Maternal Health and Safe Motherhood Programme in 1995, comprises a cluster of interventions designed to support countries in striving to attain the goals of the Safe Motherhood Initiative - substantial reductions in maternal, perinatal and neonatal mortality and morbidity.

A Technical Working Group was convened by WHO in Ankara, Turkey, 5-8 June 1995, to discuss the health factors that relate to newborn deaths and the interventions that can reduce a number of these deaths. The specific objectives of the Technical Working Group meeting were:

- to review the epidemiology of illnesses affecting the newborn in developing countries;
- to identify the illnesses that contribute the most to newborn mortality and morbidity, and that are most amenable to prevention or management;

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to identify risk factors related to pregnancy, delivery and the postpartum period in developing countries that are amenable to interventions;

to assess current knowledge and ability in the detection and management of selected newborn illnesses at three levels of care (home, health centre and district hospital) in developing countries;

to develop strategies to reduce deaths resulting from those illnesses;

to identify critical areas for research and development.

In view of the time constraints (4 days) the Technical Working Group concentrated on outlining recommendations for clinical management of the commonest and most severe diseases (those that are life-threatening or cause disability) that can be managed with limited resources in the community, health centre or referral hospital. Discussion focused on the early neonatal period. Guidelines on the management of childhood illness are provided in another WHO document.

The recommendations of the Technical Working Group were directed to four groups:

- health workers at the health centre who need to
  - recognize newborn diseases correctly
  - give treatment at the health centre
  - make a decision about referral;

- doctors and nurses at district hospitals who need to provide effective care for newborns with severe diseases;

- birth attendants who assist at delivery, provide postnatal care in the early neonatal period, and who must recognize danger signs and refer newborns to hospital or special wards;

- mothers and other family members who need to recognize danger signs and either bring the newborn to the health centre or call the birth attendant.

The group looked particularly at the technical soundness and feasibility of recommendations for the first week of life.

Members of the Technical Working Group agreed unanimously that maternal health, pregnancy and delivery care are of utmost importance for reducing newborn deaths and that basic care should be provided to all newborns. Basic newborn care was the subject of a Technical Working Group in 1994.

However, management of most common and severe diseases of newborns is important because these diseases, mostly infections, are the second most common cause of newborn death. Mothers, other family members and other care providers need to know not only the danger signs but also when and where to bring the sick newborn to the attention of health workers.

**PROCEEDINGS**

The meeting was opened by Dr T. Trmen, Director of WHO's Division of Family Health; Dr G.J. Ebrahim was the chairman. The meeting dealt with the tasks and procedures for assessment, classification and treatment of major newborn diseases by health workers in the community, at the health centre and at the referral...
hospital during the first week of life.

Not all newborn disease and conditions were discussed at the meeting. More emphasis was placed on the early neonatal period (first week of life) since that is when most neonatal deaths occur. The management of illness in older newborns is dealt with in other WHO documents.

Diseases were selected on the basis of the following criteria:

- diseases that contribute most to mortality and/or morbidity/disability;
- diseases for which treatment is available in most circumstances within the health care system (health centre, referral hospital).

The global burden of newborn illness was described at the meeting. In 1993, 4 million babies in developing countries died within one month of their birth. Some 42% of these deaths were due to infections (neonatal tetanus 14%, sepsis and meningitis 7%, pneumonia 19%, diarrhoea 1.5%). Other causes of neonatal deaths were birth asphyxia (21%), birth injuries (11%), prematurity and low birth weight (10%), and congenital abnormalities (11%). Newborn deaths are declining at a slower rate than post-neonatal deaths. More deaths occur during the first week of life than at any other time in childhood. This pattern has been observed even in countries with good neonatal care.

Two-thirds of babies in developing countries are born at home, and only a small proportion of these births take place with the assistance of a trained birth attendant. Most babies born in institutions are discharged within 24 hours of birth. Therefore most diseases manifest themselves when the newborn is at home and must therefore be recognized at home. Family members, especially mothers, need to be able to recognize signs of newborn diseases promptly in order to make the decision to seek care.

In the newborn period, particularly during the first week of life, most diseases present with similar unspecific signs. It is difficult to determine the exact cause of disease because of the overlap of these signs. In any case, normal conditions vary widely. In addition, health workers have limited time and limited laboratory support for diagnosing and managing newborn diseases. Therefore the Technical Working Group tried to identify those signs that are most predictive of severe disease and attempted to simplify decision-making about treatment. Diseases were categorized according to similarity of signs and response to similar (initial) treatment.

Discussions of the Technical Working Group were based on the assumption that no special diagnostic facilities for newborns (micromethod for haematology, biochemistry, microbiology) would be available either at the health centre or at the hospital level.

Strong emphasis was placed on urgency in managing newborn diseases. The group stressed that urgency must be reinforced at all levels and that:

- mothers and families must understand that a good outcome depends on rapid recognition and management;
- health workers must give higher priority to newborn care.

For each condition, the meeting discussed:

- identification at home by mother/family and at the health facility of danger signs that are most predictive of the condition;
- assessment (ask/observe/examine) at the health centre;
classification into disease categories at the health centre (further refinement into treatment groups for hospital care was not completed);

treatment at the health centre, referral to hospital and treatment at hospital (antibiotics, other specific treatment, supportive treatment);

advice to the mother about home care, breast-feeding, danger signs and follow-up (e.g. when to bring the baby back to the health centre).

Most of the time of the Technical Working Group was spent on discussion of assessment, classification and treatment at the health centre level. The tables produced by the group will be the technical basis for the development of guidelines and/or training materials for health workers at the health centre.

Inpatient care was found to be a more complex issue. Some general principles of inpatient newborn care were discussed and appropriate treatment was agreed for most disease groups. The assessment and classification process at hospital level was not defined.

Although rare, congenital abnormalities are more common in the first week than at any other period of life. Some are treatable, but only if good surgical services are available. The group did not discuss these problems in depth but noted the need to review congenital abnormalities and identify those that are treatable with limited resources to prevent deaths and disabilities.

The Technical Working Group gave guidance to the secretariat for further development of materials on these topics. It also identified several areas for research and development.

Common English expressions were used to describe signs of illness. These are also used in this document. However, the importance of using local expressions in adapted guidelines and training materials was emphasized. For definitions of terms, see the Glossary on page 18.

**MANAGEMENT OF THE SICK NEWBORN**

Globally, the major contributors to newborn mortality and morbidity are severe infections (such as sepsis, meningitis, pneumonia, neonatal tetanus, congenital syphilis, and ophthalmia where the prevalence of sexually transmitted diseases is high), diarrhoea, jaundice, hypoxic-ischaemic encephalopathy and severe birth trauma. These conditions often present with nonspecific signs. For the purposes of management at the health centre, diseases were grouped into four disease/emergency categories on the basis of urgency for action, similarity of signs, and similarity of management. Each diagnostic category or group included the most common reasons for medical (but not surgical) treatment in the first few weeks of life.

The four categories of newborn illness are:

1. Severe bacterial infection (emergency group)
2. Local bacterial infection
3. Severe jaundice
4. Not able to feed.

The diseases, their clinical presentation (danger signs), their diagnostic categories and possible maternal complications are listed in Table 1.
Case fatality for severe bacterial infections is high and it is very important that newborns with these infections are immediately recognized by the health worker responsible for triage. If needed, referral to hospital should be as rapid as possible. Treatment of newborn diseases at the health centre is limited due to the unpredictable severity of diseases and because oral antibiotics are not effective in the first week of life. Most newborns with severe bacterial infections also need supportive treatment that is not available at home (extra warmth, parenteral fluids, gavage feeding, oxygen, phototherapy) and will require transferral to a district hospital. The few measures that need to be taken before immediate referral are intramuscular injection of antibiotics, making sure the baby is warm, and feeding or giving fluids.

At the referral hospital there should be further refinement of the problem according to treatment group. Definitive diagnosis can be made only by laboratory investigations, which may not always be possible.

**Early detection at home by the mother, family**

Mothers/families need to know the danger signs of newborn illness, where to go for treatment, and why they must respond quickly if the danger signs occur. The Technical Working Group identified a number of predictive signs (see Table 2).

Any contact of health providers with mothers/families is an opportunity to communicate educational messages about maternal and newborn health (breast-feeding, immunization etc.) and danger or warning signs.

**Case management at the health centre**

The most important element of newborn care at the health centre is the identification of signs that suggest severe disease (meningitis, sepsis, severe pneumonia, neonatal tetanus, hypoxic-ischaemic encephalopathy, severe hypothermia, severe hyperthermia, dehydration) and need for referral of the newborn to the hospital. Because newborns are so vulnerable their management should take priority over that of other children.

**Assessment (triage)**

Assessment consists of taking a history from the mother (ask) and examining the newborn (look, listen, feel).

**Ask**

Assessment of newborn conditions starts with asking the mother about the preceding events (specific problems that the newborn has had). It is important to ask questions about serious conditions that occur periodically but that might not be observed during the visit to the health worker (e.g. convulsions). Health workers should always ask about breast-feeding and immunization status, including tetanus toxoid immunization of the mother.

The Technical Working Group felt that a history of the mothers pregnancy and delivery would not change the classification and treatment of the newborn at the health centre. However, a maternal history would be very useful for refinement of treatment categories at the hospital.

**Look, listen, feel**

Assessment of the newborn includes:

- observation and examination of breathing
• checking body temperature
• observation of state of arousal, movements
• checking skin for jaundice, pustules
• examination of umbilicus
• examination of eyes
• weighing and assessment of weight for age
• assessment of breast-feeding (observe the positioning and attachment, and correct if necessary)

in areas where male circumcision or female genital mutilation is performed during the newborn period, the wound should be examined for swelling/pus.

For details see Table 3.

Classification

On the basis of the assessment the health worker should classify the newborn in one of the four disease/urgency categories:

1. **Severe bacterial infection** (emergency group)

   If any danger sign from the first box in Table 4 is present, the newborn will be classified as having a severe bacterial infection.

   Diarrhoea in the early newborn period, with or without dehydration, with or without blood in the stool, is considered a sign of a bacterial infection because it is often associated with severe bacterial infection.

2. **Local bacterial infection**

   If the newborn has no danger signs but signs of omphalitis, conjunctivitis or pustules are found the condition will be classified as local bacterial infection.

3. **Severe jaundice**

   If the newborn has no other danger signs but yellow feet and hands the condition will be classified as severe jaundice.

4. **Not able to feed**

   If the newborn is not able to feed at all, this may be a sign of serious bacterial infection and he/she should be referred to hospital. If feeding is poor, potential problems should be assessed and counselling given to the mother. The newborn should be weighed and weight for age should be assessed.

For details see Table 4.

Treatment

*Severe bacterial infection*
Newborns classified as having severe bacterial infection should be urgently referred to hospital. Before transfer/referral the health worker should do the following:

- Give the first dose of antibiotics intramuscularly.

If possible, send the mother with the newborn. Advise the mother on thermal protection of the newborn during transfer. The best way to provide warmth is by skin-to-skin contact with the mother. In case of hyperthermia reduce swaddling but skin-to-skin contact is still good during transfer.

Encourage the mother to breast-feed the newborn before and during transfer. If the infant cannot suckle, expressed breast milk can be given by cup, spoon or gavage. If no breast milk is available, sugar water may be given before transfer.

**Local bacterial infection**

Local infections such as omphalitis and pustules in the newborn must be treated with systemic antibiotics. The first dose of antibiotics should be given according to the local epidemiological situation, and the skin/cord should be cleaned and painted with an antiseptic. Therefore referral after initial treatment is needed. Exceptions can be infection of the umbilical stump if redness is not spreading, and skin infections with only a few pustules.

Conjunctivitis in the newborn is always considered gonococcal and, as such, is treated with a single dose of appropriate intramuscular antibiotic. Eyes should be irrigated with saline. If the newborn has no other danger signs and an appropriate antibiotic is available (local sensitivity of *Neisseria gonorrhoeae*), a single dose of the antibiotic could be given intramuscularly and the mother instructed on home care and the need for a follow-up visit if conjunctivitis persists. Otherwise, ophthalmic tetracyclines should be applied and the newborn with the mother referred to hospital.

If referral is difficult, possibilities of management at the health centre could be considered.

**Severe jaundice**

Newborns with yellow hands and feet should be referred to hospital since appropriate treatment is generally available only there. Unless sepsis is suspected, no specific interim treatment is needed. The mother should be advised on thermal protection and breast-feeding during transfer.

**Not able to feed**

Assessment of breast-feeding starts with asking the mother about feeding (see Table 3).

If the mother reports that the newborn is not feeding at all and lethargy is confirmed by the health worker, a severe bacterial infection is likely. The first dose of the antibiotic should be given intramuscularly and the newborn urgently sent to hospital.

If the mother reports that the newborn is not feeding well but does not have danger signs, positioning, attachment and suckling should be assessed, the mother counselled, and a follow-up visit suggested.

Even if the mother does not report feeding problems, every newborn who has not been urgently referred to the hospital needs to be assessed for feeding and weight gain. If there is uncertainty, breast-feeding needs to be observed during...
the visit. The weight of the newborn must be compared with the appropriate weight for age. Follow-up visits and counselling should be arranged in accordance with the findings.

Other

Immunization status of both newborn and mother should be checked. The newborn should be immunized according to local policy and the immunization card/child record started.

Advise the mother

Newborns who are not referred but are treated must be seen again after 48 hours. Mothers need clear instructions on when to bring the child back to the health worker. Mothers should also be given advice on basic newborn care (thermal protection, cleanliness).

Adaptations

In areas with a high prevalence of syphilis, the guidelines will need to be adapted to include guidance on the assessment, classification and treatment of congenital syphilis (see Management of sexually transmitted diseases. WHO/GPA/TEM/94.1).

If no transport is available or it cannot be organized in a short time, continuing treatment at the health centre could be considered. (The Technical Working Group did not discuss details of this.)

Case management at the referral hospital

Newborns who need treatment in hospital may be referred from the health centre or home, or they may be born in the hospital, often to mothers with complications.

General principles

Admission

Newborns should be admitted immediately, possibly directly to the ward, without delay. Admitting a sick newborn requires a rapid response by an experienced team trained in newborn care. Whenever possible the mother should be admitted with the newborn and food and lodging provided for her. Both mother and newborn should receive an identification bracelet.

Hospital facilities

Sick newborns should be placed in a separate area from healthy ones and from older sick infants and children to reduce the risk of infection within the hospital. Sick newborns should ideally be near a nurse station to facilitate monitoring and near essential equipment, supplies, drugs and oxygen. Cleanliness and hand-washing are extremely important. Running water, soap and clean towels are critical in the prevention and control of nosocomial infections. Sick newborns should not share cots or cribs with other sick infants.

Other

All sick newborns should be given vitamin K intramuscularly on admission. Before discharge, the immunization status of newborn and mother should be checked and each should be immunized as necessary.

Assessment and classification
Detailed assessment and classification of the sick newborn in hospital were not discussed by the Technical Working Group, though certain principles were agreed. Once admitted, the newborn should be assessed in two stages:

a) rapid assessment of vital signs (breathing, circulation, consciousness) to determine if the infant is critically ill and needs emergency resuscitation or stabilization;

b) more detailed examination to further classify into treatment categories.

The maternal history provides important information for refining treatment categories. Information on prolonged and/or obstructed labour, prolonged rupture of membranes or maternal fever may point to asphyxia or infection. If the mother is reactive for syphilis when tested or she has signs and symptoms suggestive of sexually transmitted disease, treatment of the newborn can be changed accordingly.

**Treatment**

*Emergency treatment and care*

If the newborn is very sick, treatment, initial resuscitation and stabilization may include administration of oxygen, fluids, warmth and anticonvulsants. Antibiotics are part of emergency treatment if not given earlier or within the necessary time-frame.

**General comments about treatment**

Medication dosages for newborn infants are very low in comparison with those for older children and adults. Health personnel must be trained to mix and administer neonatal medications and should be provided with simple ways to calculate accurate doses on the basis of the newborn’s weight. In many countries, precise regulation of the flow of intravenous fluids is not possible and there is serious danger of overload with fluids. Breast-feeding and thermal control of the newborn are important components of treatment.

**Specific treatment**

**Antibiotics**

Ampicillin and gentamycin are given parenterally, preferably intravenously until the child has improved and then continued intramuscularly for a total course of at least 14 days for meningitis and 10 days for sepsis. If ampicillin is not available, penicillin may be given. If syphilis is suspected, see *Management of sexually transmitted diseases* (WHO/GPA/TEM/94.1).

If there is no response to treatment with ampicillin and gentamycin or the child’s condition deteriorates after two days (48 hours), add/consider treatment with a second-line antibiotic.

**Anticonvulsants**

Phenobarbital is a drug of choice for management of convulsions in newborns. If convulsions are not controlled with phenobarbital, phenytoin or paraldehyde may be given. Because phenytoin is given only intravenously, it is less useful to the newborn with convulsions in a setting where intravenous access may be difficult. Paraldehyde, which may be given rectally, has been used safely and effectively in neonates who do not respond to phenobarbital.

**Neonatal tetanus**
Sometimes it is not easy to differentiate neonatal tetanus from other severe neonatal conditions. Specific treatment includes antitoxin, penicillin, anticonvulsants and supportive care.

Local antiseptics

Painting pustules and umbilical cord with antiseptic will prevent spread of infection.

Phototherapy

Continuous phototherapy, interrupted only for breast-feeding, for at least 24 hours (with good equipment) should reduce bilirubin in most newborn infants (term and preterm). Because of a 20-25% higher insensible water loss under phototherapy, the newborn should be breast-fed often and, if necessary, additional boiled water should be provided by cup or spoon. Eyes should be covered during phototherapy but checked for infection at least twice daily and treated accordingly. If possible, bilirubin blood level should be monitored.

Rewarming

Rewarming methods will depend on the equipment available. In any case, an increase in body temperature of 1°C per hour is recommended. Recent study has shown that placing a naked but covered newborn skin-to-skin with the mother is an effective method of rewarming. The newborn with hypothermia must be treated as having sepsis until rewarmed and the condition is reassessed.

Oxygen

The indications for administering oxygen to the newborn are respiratory rate >60, severe chest indrawing, central cyanosis and convulsions. Oxygen can be given by prongs. The recommended methods for oxygen administration are described in another WHO document.

Management of complications

The management of complications (shock, pneumothorax, cardiac failure etc.) was not discussed by the Technical Working Group.

Supportive care

Airway management

The upper airways should be intermittently cleared of secretions.

Other specific treatment

Eyes of newborns with ophthalmia should be irrigated with saline three times daily. No antibiotic ointment or drops are needed.

Vitamin K

Every sick newborn should receive vitamin K intramuscularly to help prevent haemorrhagic disease. If the newborn is bleeding and does not stop within two hours after the first dose of vitamin K, the dose must be repeated. Every newborn with excessive bleeding should be treated as having possible sepsis.

Thermal protection

The newborn should be cared for in a warm environment. Care in skin-to-skin contact with the mother is a good alternative to conventional warming methods for sick newborns. Axillary measurement of temperature is a better indicator of
temperature instability than rectal measurement.

**Fluids**

On admission all sick newborns should be assumed to have hypoglycaemia and should be treated for it, i.e. food and fluids should be given as soon as possible. Blood glucose should be measured if possible. Exact amount of fluids will depend on age (days of life), gestational age and/or birth weight and the problem. Breast milk provides fluids and food and can be given by orogastric tube if the newborn is not breast-feeding. If intravenous fluids are needed they should be substituted by oral fluids as soon as possible.

Newborn infants receiving phototherapy need 20-25% more fluids. If the newborn is suckling well, extra fluids can be provided by more frequent breast-feeding. Extra fluids may be given by spoon, cup or orogastric tube in newborns who are not feeding well.

**Feeding**

Feeding should be initiated as soon as possible. If breast-feeding is not possible, expressed breast milk can be given by cup, spoon or gastric tube and breast-feeding continued as soon the newborn can suckle. The mother will need encouragement and support for breast-feeding.

**Monitoring**

The newborn should be frequently assessed by a nurse for temperature instability, inability to suck, voiding, rousability, breathing and seizures, and by a doctor twice daily until the condition stabilizes. If the newborn responds poorly to treatment with antibiotics, development/presence of common complications should be considered (heart failure, empyema, oliguria). The health worker should refer to standard textbooks of neonatology or paediatrics for the treatment of serious complications or refer the newborn to an institution where appropriate treatment is available.

**Discharge**

Immunization (BCG and oral polio vaccine for the newborn and tetanus toxoid for the mother) should be checked on discharge and both should be immunized if necessary. Advice on treatment at home, follow-up visits and when to return to hospital if danger signs reappear should also be given.

**Control of hospital infections**

Nosocomial infections are a major threat to women and newborns in hospitals in developing countries. Hospital policies should define methods for prevention, detection and control of nosocomial infections, taking into account the specific sensitivity of newborns. Hand-washing is the single most important procedure for preventing nosocomial infections.

**TABLES**

The following tables summarize the discussion of the Technical Working Group on the identification, assessment and classification of danger signs in newborns at the health centre during the first week of life.

**Table 1. The most common newborn diseases in the first week of life, the presenting signs, classification (diagnostic category) at the health centre and possible associated complications of pregnancy and delivery**
<table>
<thead>
<tr>
<th>Newborn problem</th>
<th>Danger/warning signs</th>
<th>Diagnostic category (at health centre)</th>
<th>Possible associated maternal complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth asphyxia</td>
<td>Convulsions</td>
<td>Hypoxic-ischemic encephalopathy</td>
<td>Prolonged/obstructed labour Abnormal presentation Eclampsia Bleeding before and/or during labour and delivery</td>
</tr>
<tr>
<td>Hypoxic-ischemic</td>
<td>Flappiness</td>
<td>Severe bacterial infection</td>
<td></td>
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<tr>
<td>encephalopathy</td>
<td>Unconsciousness</td>
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<tr>
<td>Intracranial</td>
<td>Lethargy - difficult to wake</td>
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<tr>
<td>haemorrhage</td>
<td>High-pitched, weak, or absent cry</td>
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<td></td>
<td>Unable to feed</td>
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<td></td>
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<tr>
<td>Sepsis, meningitis</td>
<td>Difficulty breathing (see below)</td>
<td>Severe bacterial infection</td>
<td>Prolonged/obstructed labour Prolonged rupture of membranes Unclean delivery Sexually transmitted disease (STD) Other maternal infection Intrapartum fever</td>
</tr>
<tr>
<td></td>
<td>Lethargy - difficult to wake</td>
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<tr>
<td></td>
<td>Weak, absent cry</td>
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<td></td>
<td>Less than normal movement</td>
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<td></td>
<td>Unable to feed, poor suckling</td>
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<td></td>
<td>Hypothermia</td>
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<td></td>
<td>Fever</td>
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<td></td>
<td>Bulging fontanelle</td>
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<td></td>
<td>Convulsions</td>
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<tr>
<td>Pneumonia</td>
<td>Difficulty breathing: fast breathing &gt;60 (severe) chest indrawing nasal flaring</td>
<td>Severe bacterial infection</td>
<td>See above</td>
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<tr>
<td></td>
<td>grunting cough</td>
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<tr>
<td>Neonatal tetanus</td>
<td>Convulsions</td>
<td>Severe bacterial infection</td>
<td>Non-immunized mother Unclean delivery</td>
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<tr>
<td></td>
<td>Rigidity</td>
<td></td>
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<td></td>
<td>Stopped feeding well</td>
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<tr>
<td>Congenital syphilis</td>
<td>Rashess</td>
<td>Severe bacterial infection</td>
<td>STD Positive screening test</td>
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<td></td>
<td>Nasal discharge</td>
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<td></td>
<td>Snuffles</td>
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<tr>
<td>Omphalitis</td>
<td>Umbilical redness extending to skin</td>
<td>Local bacterial infection</td>
<td>Unclean delivery</td>
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<td></td>
<td>Umbilicus draining pus</td>
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<tr>
<td>Conjunctivitis,</td>
<td>Eyes swollen</td>
<td>Local bacterial infection</td>
<td>STD</td>
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<tr>
<td>ophthalmia</td>
<td>Draining pus</td>
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<tr>
<td>Skin infection</td>
<td>Pustules</td>
<td>Local bacterial infection</td>
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<tr>
<td>Diarrhoea</td>
<td>Loose watery excessive (bloody) stools</td>
<td>Diarrhoea</td>
<td>Not breast-fed, pre-lacteal feeds</td>
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<td></td>
<td></td>
<td>Severe bacterial infection</td>
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<tr>
<td>Hyperbilirubinaemia</td>
<td>Yellow skin (on hands and feet)</td>
<td>Jaundice, if no other signs</td>
<td>Hereditary disease Family disease</td>
</tr>
<tr>
<td>Haemolytic</td>
<td>Convulsions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-haemolytic</td>
<td>Stiffness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Kernicterus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Hypothermia
Cold to touch (temp. <36°C)
- Lethargy,
- hypotonia, poor suckling, weak cry, shallow breathing, hardening of skin (of the back and limbs)
- Hyperthermia (environment)
- Severe bacterial infection

### Hyperthermia
Warm to touch (temp. >38°C)
- irritation, fast breathing, red face turns pale later, lethargy
- Hyperthermia (environment)
- Severe bacterial infection

### Preterm birth
- Respiratory distress: Difficulty breathing (see pneumonia above)
- Severe bacterial infection
- Prolonged rupture of membranes, STD, (other causes of preterm birth)
- Jaundice: Yellow skin (see above)
- Hyperbilirubinaemia
- Hypothermia: See hypothermia above
- Severe bacterial infection
- Feeding difficulties: Not able to feed
- Not suckling well
- Feeding less than 6 times per day
- Severe bacterial infection
- Preterm birth
- Congenital abnormality: Visible abnormality
- Congenital abnormality

### Other problems
- Failure to gain weight
- Low weight for age
- Prolonged rupture of membranes
- Severe bacterial infection
- Inadequate feeding
- Metabolic disorders
- Twitching, convulsions
- Inadequate feeding
- Severe bacterial infection

### Table 2. Danger signs in the first week of life that can be recognized by mothers/families and by health workers at the health centre, indicating whether included in the assessment

<table>
<thead>
<tr>
<th>Danger sign by organ system</th>
<th>Description of the condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Included</strong></td>
<td><strong>Not included</strong></td>
</tr>
<tr>
<td>Respiratory</td>
<td>Laboured, fast, difficult breathing, grunting Cough</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Could be the same as above</td>
</tr>
</tbody>
</table>
| Behavioural                 | Seizures
- Lethargy, floppiness
- Stiffness/rigidity/lockjaw | Jitteriness, tremor are nonspecific. There is no specific management either needed or available for irritability, excessive cry, abnormal movements |
| Feeding                     | Poor or no suckling, especially in a newborn who | |

13
was previously suckling vigorously

<table>
<thead>
<tr>
<th>Skin colour</th>
<th>Yellow</th>
<th>Pale and blue not considered discriminating enough, conditions associated with pallor and cyanosis can be better picked up by other signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin by touch</td>
<td>Cold or hot to touch</td>
<td></td>
</tr>
<tr>
<td>Skin for abnormalities</td>
<td>Pustules</td>
<td>Rashes and swelling are rather unspecific or can be picked up by other signs</td>
</tr>
<tr>
<td>Cord</td>
<td>Discharge, bleeding, redness</td>
<td></td>
</tr>
<tr>
<td>Eyes</td>
<td>Purulent discharge, swollen, foul smell</td>
<td></td>
</tr>
<tr>
<td>Size, proportion</td>
<td>Appearance: small baby</td>
<td>No criteria for smallness were determined. There is no specific management for large baby, odd-looking baby, haematoma, bruises</td>
</tr>
<tr>
<td>Gastro-intestinal</td>
<td>Loose, watery, bloody, excessive stool</td>
<td>&quot;No bowel movements, no urine&quot; would probably contribute little to the ability to recognize manageable conditions; for some other conditions there are no interventions in the minimum package</td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
<td>Vomiting was identified as a common complaint in the early newborn period. In a newborn infant otherwise doing well (not having any other danger signs) it is not an alarming sign. It can be an early sign of a serious condition such as gastrointestinal obstruction. Nevertheless, the group decided not to include this condition on the list of diseases for referral</td>
</tr>
</tbody>
</table>

Table 3. Assessment of the newborn in the first week of life at the health centre

<table>
<thead>
<tr>
<th>Ask</th>
<th>Look, listen, feel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has the newborn had convulsions? Has the newborn had diarrhoea? For how long?</td>
<td>Breathing (the newborn must be calm) Count the breaths in one minute: look for (severe) chest indrawing, nasal flaring; listen for grunting</td>
</tr>
<tr>
<td>Consciousness</td>
<td>See if the newborn is difficult to wake; look or feel for stiffness, bulging fontanelle; look at newborn movements (are they less than normal and are they symmetrical?) Listen to the cry (is it high-pitched, weak or absent?)</td>
</tr>
<tr>
<td>Temperature</td>
<td>Measure temperature</td>
</tr>
<tr>
<td>Local infections</td>
<td>Look at the umbilicus (is it red and draining pus and does the redness extend to the skin?) Is pus draining from the ear or the eye?</td>
</tr>
<tr>
<td>Jaundice</td>
<td></td>
</tr>
</tbody>
</table>
Look for jaundice on hands and feet

| Is there any difficulty in feeding? Is the newborn breast-fed and how many times per day? Does he/she receive any other fluids or foods? | Weigh the newborn; determine weight for age If necessary, assess breast-feeding (look for positioning, attachment and suckling) Look for white patches in the mouth (thrush) |

Table 4. Classification and identification of treatment at the health centre (based on the assessment described in Table 3)

<table>
<thead>
<tr>
<th>Signs</th>
<th>Classification</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convulsions</td>
<td>Serious bacterial infection</td>
<td>Give first dose of intramuscular antibiotics Advise mother how to keep the infant warm on the way to the hospital Treat the newborn to prevent low blood sugar Refer urgently to hospital</td>
</tr>
<tr>
<td>Fast breathing (&gt;60/min), (severe) chest indrawing Nasal flaring, grunting Lethargic or unconscious, bulging fontanelle Less than normal movement High-pitched, weak or absent cry Fever (37.5°C) or low body temperature (36°C) Diarrhoea Umbilicus draining pus and redness extending to skin</td>
<td>Local bacterial infection</td>
<td>Give first dose of intramuscular antibiotics Refer to hospital If eye infection only and appropriate antibiotic is available, give the only dose of the antibiotic, advise the mother to give home care for the newborn and teach her to treat local infections at home. Follow up in two days</td>
</tr>
<tr>
<td>Red umbilicus or draining pus Skin pustules Eye(s) draining pus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow hands and feet</td>
<td>Severe jaundice</td>
<td>Refer to hospital Advise the mother to breast-feed and show her how to keep the infant warm on the way to the hospital</td>
</tr>
<tr>
<td>Not able to feed, not attached to breast, not suckling</td>
<td>Possible severe bacterial infection</td>
<td>Give the first dose of intramuscular antibiotics Refer urgently to hospital</td>
</tr>
<tr>
<td>Not well attached Not suckling effectively Less than 6 feeds per day Receives other food or fluids Thrush Low weight for age</td>
<td>Feeding problem</td>
<td>Advise mother to give home care for the newborn Breast-feeding counselling, how to treat thrush at home Follow up in two weeks</td>
</tr>
<tr>
<td>No danger signs, no jaundice, no inadequate feeding</td>
<td></td>
<td>Advice on home care for the newborn</td>
</tr>
</tbody>
</table>
GLOSSARY

Health worker can be an auxiliary health worker, nurse, midwife or a doctor not specialized in paediatrics. The term is defined in terms of function and not in terms of academic background.

Newborn period is the first month up to the 28th day of life.

Health centres vary in size, staffing patterns, levels of resources, services offered and in the sizes of population they are expected to cover. The recommendation of the Mother-Baby Package is that the health centre should be staffed with a health worker trained in midwifery and family planning, in addition to traditional maternal and child health functions, and in the provision of primary curative care. Services, equipment and facilities will depend on the distance from and accessibility to the nearest hospital.

Hospital in the context of the Mother-Baby Package is a health facility performing all the essential obstetric functions. It is synonymous with the first referral level (i.e. the district or subdistrict hospital).

STD refers to sexually transmitted disease.

REFERENCES


Technical Working Group on the Management of the Sick Newborn, Ankara, Turkey, 5-8 June 1995

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