

Part

4

Interventions for Newborn
Health and Lessons Learned

PART FOUR

Interventions for Newborn Health and Lessons Learned

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MESSAGES FOR PART FOUR

1. Understand the principles for newborn health interventions, particularly:
 - ❖ the importance of the rights of the mother and baby;
 - ❖ the need for a comprehensive health care delivery system;
 - ❖ the importance of information for newborn health programming.
2. Learn about approaches to reduce delays in accessing quality care for mother and baby.
3. Understand the “Spider Web Framework,” a tool showing interventions by time period (pre-pregnancy, care during pregnancy, care during delivery, newborn care) for the mother and the baby. Interventions within each Intervention Package are listed as core services/package components (essential for all settings), additional (possible when capacity has been increased), and situational (appropriate for a given local problem, such as malaria or HIV). Core interventions should be the first priority in any setting.
4. Understand the need for Intervention Packages by time period and grasp the overall vision and aims of the following Intervention Packages:

-  Pre-pregnancy health.
-  Care during pregnancy.
-  Care during delivery.
-  Postpartum care of the mother.
-  Newborn care.
 - Essential newborn care.
 - Extra newborn care.
 - Emergency newborn care.

5. Learn more about the details of evidence-based interventions for priority problems within each of the intervention packages and how other programs have implemented such interventions.



TERMINOLOGY FOR PART FOUR

Birth planning: A process that empowers pregnant women, families, and communities to prepare for safe delivery and for motherhood.

Care during pregnancy: Care throughout pregnancy until the onset of labor, including care both at home and in the formal health care system, such as in an antenatal clinic.

Care during delivery: Care from the onset of labor until the delivery of the placenta.

Emergency newborn care: Identification, stabilization, and management of the sick babies with conditions such as neonatal sepsis, asphyxia, and jaundice.

Emergency preparedness: An approach to promote early recognition of complications for mother and baby at any time during pregnancy, delivery, or after delivery and to maximize the likelihood of timely referral and management. This involves preparedness in the community and in the formal health care system.

Essential newborn care: Basic preventive care for all newborns, especially warmth, cleanliness, breastfeeding, cord and eye care, and immunizations.

Extra newborn care: Identification of and additional support for babies who are born weighing less than 2,500 grams. Mortality rates for babies with birth weight between 1,750-2,500 grams can be improved significantly with simple interventions. Babies weighing less than 1,750 grams at birth are likely to require more specialized care. May also apply to other babies who are not LBW, but have other special requirements, such as babies born to HIV-positive mothers.

Intervention package: A group of interventions that are individually of proven effectiveness in reducing fetal-neonatal mortality and are combined as they apply to the same period (i.e., care during pregnancy) or the same problem (i.e., neonatal tetanus). The intervention package is not just for the formal health sector but for all levels of care.

Newborn (or neonatal) care: Care from birth until the 28th completed day of life, including care both at home and in the formal health care system.

Intervention package component: A group of services within an Intervention Package.

Partograph: A written record charting the progress of labor and delivery and showing the key observations to monitor the women and the fetus, such as pulse, blood pressure, fetal heart rate, etc.

Postpartum care: Care from delivery until 42 days after delivery, including care both at home and in the formal health care system.

Pre-pregnancy health: The health of the woman before she becomes pregnant.

Skilled attendant at birth: An individual with midwifery skills (i.e., doctors, midwives, nurses) who has been trained to proficiency in the skills to manage normal deliveries and to diagnose and manage or refer complicated cases.

Spider Web Framework (Figure 4.4): A tool showing interventions by time period (pre-pregnancy, during pregnancy, during delivery, newborn care) for the mother and the baby. Package components within each Intervention Package are termed:

- ❖ core (essential for all settings);
- ❖ additional (possible when capacity has been increased); and
- ❖ situational (appropriate for a specific local problem, such as malaria or HIV).

I. PRINCIPLES OF NEWBORN HEALTH INTERVENTIONS

PRINCIPLES OF NEWBORN HEALTH INTERVENTIONS

- ▶ **PRINCIPLE 1**
Interventions for the mother *and* baby.
- ▶ **PRINCIPLE 2**
A systems approach to strengthen the health care delivery system.
- ▶ **PRINCIPLE 3**
Using information to adapt intervention packages.
- ▶ **PRINCIPLE 4**
Using information to prioritize management process in the local setting.

A. Interventions for the Mother *and* the Baby

Most of the world's neonatal deaths occur in poor rural homes and can be prevented by very simple, low-technology interventions, often at low cost.

The main factor that has been missing is attention to the newborn with the mother at all levels of decision-making. Because all fetal deaths and most neonatal deaths are related to maternal causes, priority should be given to interventions that benefit both the mother and baby. Some evidence-based interventions benefiting both are outlined in Table 4.1

B. Systems Approach

Since the majority of deaths occur in the community, there is a need for a systems-based approach that involves the community and targets the particular populations where the most deaths occur. Successful reduction of fetal-neonatal mortality is most likely if the program manager and other partners work to strengthen the existing health care delivery system (HCDS) with input from all of the key stakeholders. This involves strengthening the capacity of the current system by improving quality as well as increasing access. A strong system aims to provide core interventions at all levels for the mother and the baby. These interventions can be grouped together as Intervention Packages⁽¹⁾.

TABLE 4.1
INTERVENTIONS THAT BENEFIT BOTH MOTHER AND NEWBORN

BENEFIT TO MOTHER	INTERVENTION	BENEFIT TO NEWBORN
During pregnancy	During pregnancy	During pregnancy
Reduced risks of infection, pelvic inflammatory disease (PID), infertility, other STI complications.	↔ Treatment of STIs (especially syphilis). →	Reduced stillbirth, preterm birth, IUGR, ophthalmitis, infection, death.
Decrease severe anemia, severe malaria, death.	↔ Prevention/treatment of malaria. →	Reduced risks of stillbirth, preterm birth, IUGR, death.
Reduced risk of tetanus (rare).	↔ Administration of tetanus toxoid vaccine. →	Protect against neonatal tetanus (common).
Decrease iron deficiency anemia.	↔ Provide iron and folic acid; treat hookworm. →	Reduced risk of LBW, asphyxia, stillbirth.
Reduce “depletion syndrome.”	↔ Targeted protein-calorie supplements. →	Reduced risks of LBW, preterm birth, perinatal death.
Possible reduction in maternal mortality.	↔ Provide Vitamin A (if deficient). →	Reduced neonatal and postneonatal infections.
Reduced risk of eclampsia and adverse outcomes, including death.	↔ Identification and management of pregnancy → induced hypertension pre-eclampsia.	Reduced risk of LBW, asphyxia, stillbirth, neonatal death.
Decrease prolonged labor, ruptured uterus, death.	↔ Identification of major risk of obstructed labor (dystocia).	Reduced risk of asphyxia, fetal-neonatal death, birth trauma.
During delivery	During delivery	During delivery
Early identification and management of complications and reduced death and morbidity.	↔ Delivery with skilled attendant/partograph → and access to emergency obstetric care.	Reduced neonatal asphyxia; provision of neonatal resuscitation if needed.
Reduced risk of infection, sepsis, infertility.	↔ Clean delivery. →	Reduced risks of tetanus, sepsis, deaths.
Reduced risk of infection, sepsis, infertility.	↔ Antibiotics for prolonged/preterm → rupture of membranes.	Reduced risk of sepsis and death.
No known benefit.	↔ Corticosteroids in preterm labor. →	40% – 60% reduced risk of respiratory distress.
Immediate postpartum period	Immediate postpartum period	Immediate neonatal period
Reduced risk of death (40% of maternal deaths occur within first week after delivery).	↔ Integrated maternal and newborn → postpartum care.	Reduced risk of death (66% of neonatal deaths occur within the first week after birth).
Reduced risk of postpartum hemorrhage, breast abscess.	↔ Promotion of early breastfeeding. →	Prevent early hypoglycemia, dehydration; reduced risks of early neonatal jaundice and sepsis/ALRI.
Reduced maternal stress due to infant illness.	↔ Appropriate cord, eye, and skin care. →	Reduced risks of sepsis, tetanus, ophthalmitis.
Enhanced bonding.	↔ Promote skin-to-skin contact. →	Enhanced thermal regulation.
Reduced Vitamin A deficiency, night blindness.	↔ High-dose Vitamin A to mother. →	Possible reduction in neonatal infection.
Reduced maternal depletion, especially if pregnancy and breastfeeding overlap.	↔ Family planning counseling. →	Reduced risk of early malnutrition if mother stops breastfeeding after she becomes pregnant again.

C. Adaptable Intervention Packages

Intervention Packages consist of a group of individually effective activities/services (called Package Components) in reducing fetal-neonatal mortality. These activities/services are combined when they apply to the same period (i.e., care during pregnancy). The Intervention Package helps to integrate a variety of activities to develop a systematic approach that will have an impact on fetal-neonatal mortality. Each Intervention Package includes activities/services that can be applied at all levels of the HCDS (i.e., the community, formal health care sector, and intersectoral sector). The following Intervention Packages will be covered in this part.

-  Pre-pregnancy health.
-  Care during pregnancy.
-  Care during delivery.
-  Postpartum care of the mother.
-  Newborn care.
 - Essential newborn care.
 - Extra newborn care.
 - Emergency newborn care.

The Intervention Packages are intended to be adapted to the needs of the local setting. This may involve the prioritization of a particular intervention package or a specific package component. Although one Intervention Package may be the first priority in the local setting, the greatest effect on newborn and maternal survival will come when all of the core activities/services are functioning well as a system. The single most important intervention is a skilled attendant at delivery who serves to reduce neonatal asphyxia, sepsis, and tetanus (Table 4.1). This is also likely to be the single most important intervention for the reduction of maternal deaths, as reflected in the major WHO initiative “Making Pregnancy Safer”⁽²⁾. Other evidence-based interventions are outlined in Table 4.1.

D. Prioritization in the Local Setting

There is no one-size-fits-all newborn health program. Evidence-based Intervention Packages and lessons learned from field-based programs need to be adapted to fit the local setting. The causes of fetal-neonatal deaths are a complex mix of medical and social factors that vary by setting, as detailed in Part One. Local newborn health problems need to be examined and prioritized on the basis of data and community perceptions, as detailed in Part Three.

Step 1: Define the problem. This step enables the program manager to develop a consensus with key stakeholders about the priority problems for newborn health in the local setting, according to the analyzed data and the priorities of the community. Assessment tools, such as the BABIES matrix detailed in Part Two, can be used to maximize the information from the limited data available.

Step 2: Assess performance. Assessing the current and potential performance of the entire HCDS to implement certain core services is a critical step to developing newborn health interventions. The interventions that will be successful in a given setting are clearly influenced by the level of development, the infrastructure, and the HCDS. Approaches to assess performance are outlined in Part Three, Step 2.

Step 3a: Prioritize interventions. If the core services for the identified problem are not in place or if coverage of these services is very low, the program manager knows that the priority is to provide the appropriate core services. The activities/services selected should be the ones that will have the greatest impact on newborn survival in the local setting. If the core services are in place, the program manager has to prioritize which Intervention Packages and/or Package Components would most likely make a difference in the local setting and focus on improving quality of care.

Step 3b: Implement interventions. Regardless of the chosen interventions, certain cross-cutting strategies are needed to implement them. These cross-cutting strategies include:

- ❖ creating partnerships;
- ❖ empowering communities;
- ❖ promoting healthy behaviors;
- ❖ building capable institutions; and
- ❖ advocating for supportive policies.

Step 4: Monitor and evaluate. Monitoring serves to provide information for decision-making in a program. Evaluation determines whether the interventions had the intended effect (and if not, why not).

Part Four covers the importance of addressing delays in accessing quality care for the mother and newborn. Part Four also outlines potential approaches to reduce delays.

II. ADDRESSING THE DELAYS IN RECEIVING QUALITY MATERNAL AND NEWBORN CARE

Improving access to quality health services for both the mother and the newborn is a central theme to improving both maternal and fetal-neonatal outcomes. Delays in access to care can occur at any point throughout pregnancy, delivery, or postpartum/newborn periods. These delays may have fatal consequences for the fetus, baby, and/or mother. Access to health care is determined by more than the distance to the nearest health facility as discussed in Part One. Factors that influence care-seeking behavior include the ability of community members to recognize illness, traditional beliefs, availability of transport, the acceptability and affordability of formal health care services, and the hours that the health facility is open.

There are four key barriers, presented below, that contribute to maternal and newborn deaths.

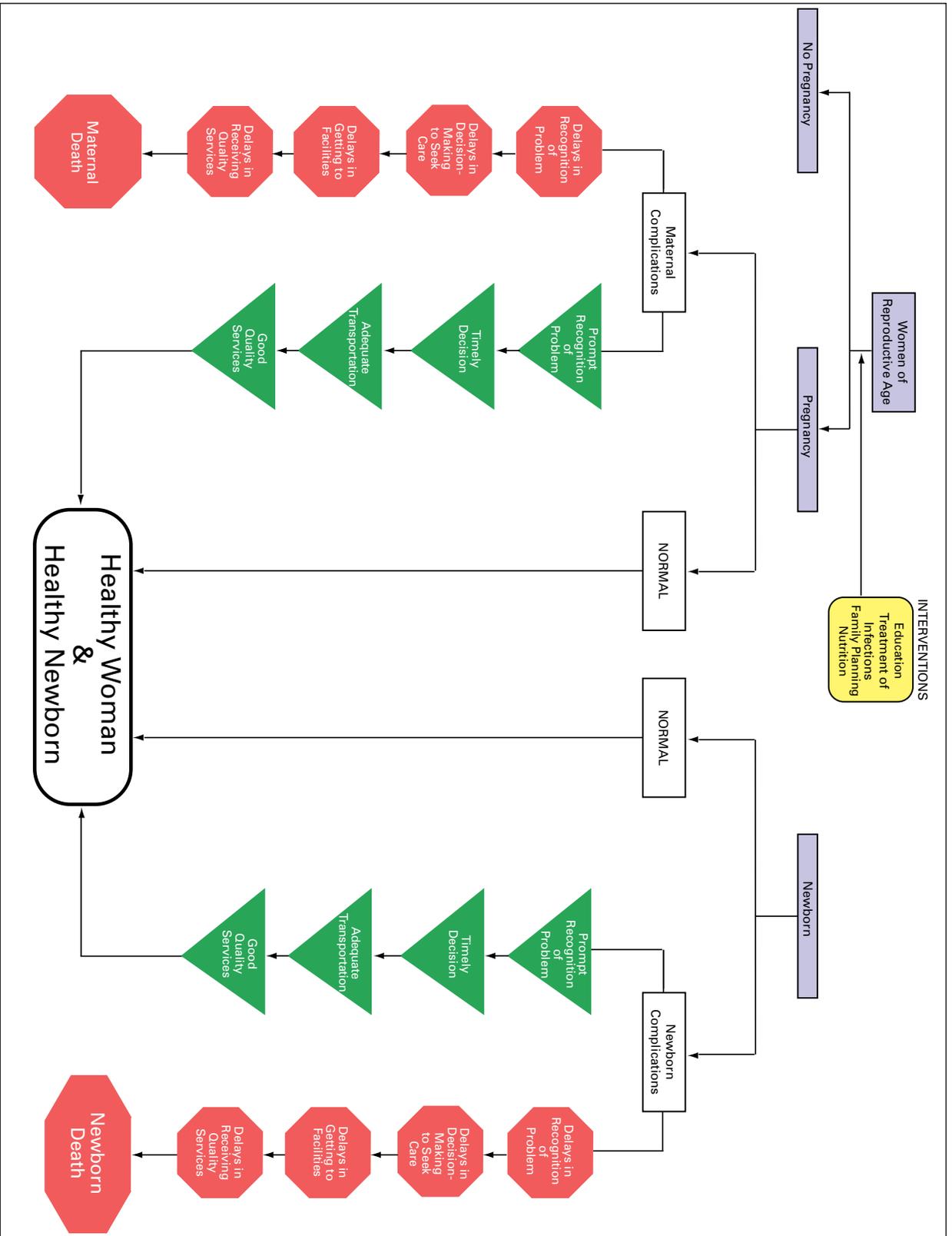
- **Delay #1:** *Delays in problem recognition within the home;*
- **Delay #2:** *Delays in deciding to seek care;*
- **Delay #3:** *Delays in reaching the health facility due to lack of transport and resources; and*
- **Delay #4:** *Delays in receiving appropriate quality care at the facility.*

The first three delays demand action at the household and community level. Addressing the fourth delay, by supplying excellent services at the health care institution level, will have little impact on outcomes if danger signs are unrecognized or mothers choose not to use these services.

To improve maternal and newborn outcomes, it is necessary to address all of these key delays. Improving capacity for emergency obstetric care (EmOC) in the facility (delay four) is unlikely to be effective if there is no community demand for services. There is also an ethical question, *Is it right to educate the community to recognize danger signs, improve decision-making and transportation if the health facility cannot treat the emergencies when they arrive?* To reduce delays, cooperation between the formal, informal, and intersectoral sectors is necessary. It is particularly important that the formal health sector adopt a listening attitude to facilitate dialogue with all stakeholders. (see Community Empowerment Step 3b, Part Three).

Figure 4.1 outlines how the delays contribute to maternal and/or neonatal deaths.

FIGURE 4.1
PATHWAY TO HEALTHY MATERNAL AND NEWBORN CARE



Source: Ross, S.R. (4).

One practical way to foster change at the local level is to involve all the sectors of the HCDS in discussions of the death of a mother or newborn. An investigation could be done at each level of the HCDS to help the program manager and stakeholders understand the main factors contributing to these deaths. This approach has been used successfully in the Safe Motherhood program in Malawi (Panel 4.1). Sometimes solutions address only emergencies for the mother but do not include the management of the newborn; both should be considered at the same time.



PANEL 4.1
LESSONS LEARNED

**USING ONE DEATH TO PREVENT OTHERS
IN A COMMUNITY IN MALAWI**

A woman died from infection after emergency obstetric surgery in a hospital. After the initial period of mourning, a village meeting was called to discuss what could be done to prevent this from happening again. A local band used music, songs, and drama to facilitate the discussion. Analyzing this death led to several improvements:

- New sterilizing equipment.
- Re-equipping the hospital with new bed sheets and plastic bed covers.
- Resources to buy a refrigerator to store blood.
- Retraining in operative technique for several staff members.
- Antibiotic supplies in health centers so they could treat women before referring them.



Source: Strengthening safe motherhood⁽³⁾.

A. Delay One: Problem Recognition Within the Home

KEYS TO ADDRESSING DELAY #1

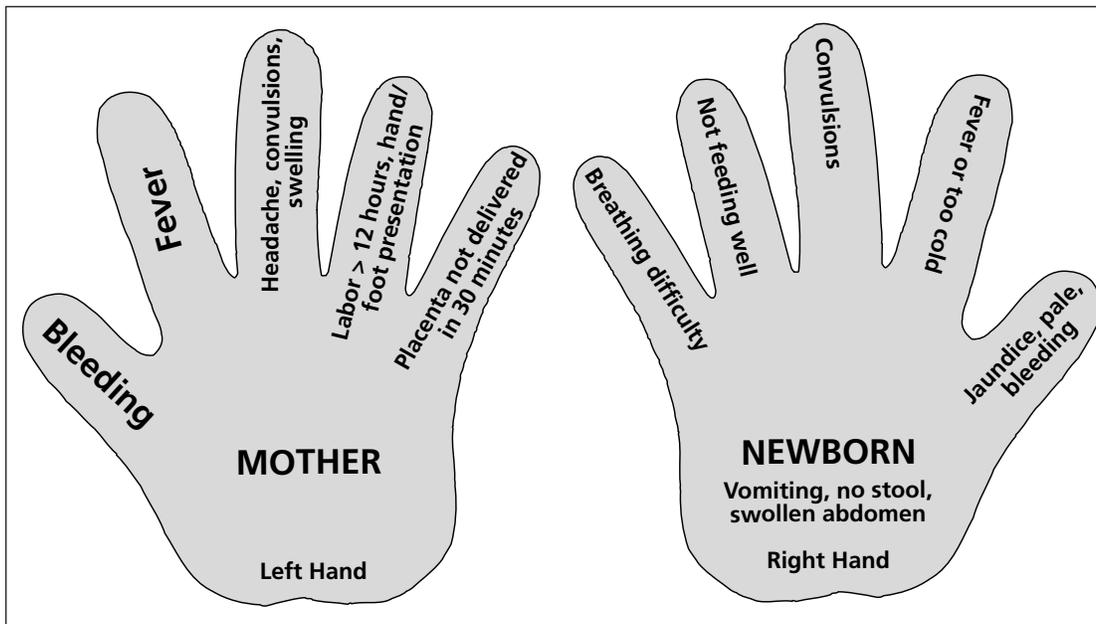
- ➔ **UNDERSTANDING DANGER SIGNS.**
 - In pregnancy
 - In labor/postpartum
 - For the newborn
- ➔ **BIRTH PLANNING FOR INDIVIDUALS, HOUSEHOLDS, AND COMMUNITIES.**

In many settings with high rates of maternal and fetal-neonatal mortality, communities and health personnel lack both the ability and knowledge to recognize critical danger signs. In addition, they may not fully comprehend the urgency of treating complications affecting the mother and/or newborn. As more deliveries occur with skilled birth attendants who are trained in the recognition of danger signs, this

delay should become less common. However, it is still crucial for mothers to know danger signs for themselves and their babies. Education in an antenatal clinic cannot be effective alone since it is only directed at women who attend ANC services. Unfortunately, this information does not reach women who do not attend ANC visits, men and other key decision-makers, such as mothers-in-law, husbands, or village elders.

The key to improving the recognition of danger signs is to incorporate behavioral change approaches into field programs. Birth planning is an educational process to enable women and their families to prepare for a complication, should it arise. This process may assist women and their families in adopting and maintaining healthy behaviors. The birth planning approach is directed at pregnant women, their families, and key community key decision-makers. The content of the birth planning messages must be simple and memorable. The information needs to be presented through a media that is easily understandable, such as songs, dramas, or puppet shows. In Guatemala, the concept of “a handful of danger signs” was used to impart this information. As presented in Figure 4.2, the left hand describes the danger signs for the mother and the right hand describes the newborn danger signs (Figure 4.2 and Panel 4.2).

**FIGURE 4.2
DANGER SIGNS FOR THE MOTHER AND THE NEWBORN THROUGHOUT PREGNANCY, CHILDBIRTH, POSTPARTUM, AND THE NEWBORN PERIODS.**





PANEL 4.2
LESSONS LEARNED

A HANDFUL OF NEWBORN DANGER SIGNS IN GUATEMALA

Fetal-neonatal mortality is a serious problem in Guatemala. This is especially true in rural areas where most deliveries happen at home with assistance from TBAs. Perinatal causes are the single largest cause of infant deaths. In this region, about 40 percent of fetal-neonatal deaths occur during delivery or the first 24 hours and are due to asphyxia. The other main causes of neonatal deaths are neonatal sepsis and preterm birth caused 20 percent of neonatal deaths.

A study found that delay in recognition of the severity of illness was an important factor in increasing the risk of death. The field workers were taught danger signs for the newborn, with the five fingers of the hand used as a memory aid (Figure 4.2). Babies identified as having severe illness were treated with antibiotics and taken to the hospital, although a few families refused hospital care. Most of these babies (86%) survived despite potentially life-threatening illnesses. This survival rate was much higher than previously recorded in the area and was attributed to earlier recognition of illness. Preterm babies had an 11-fold greater risk of having a life-threatening illness. Full-term LBW babies had a three-fold greater risk. Thus, early recognition of illness saves lives, especially those of small babies.



Source: Bartlett et al.⁽⁵⁾, Schieber et al⁽⁶⁾.

B. Delay Two: Deciding to Seek Care

KEYS TO ADDRESSING DELAY #2

- ➔ ACTION PLAN FOR EMERGENCIES TO SEEK CARE IN A TIMELY MANNER.
- ➔ PROXY DECISION-MAKERS IF NECESSARY.

Many factors influence the household decision-making process. Decision-making may be mainly the role of the husband and male village leaders. In some countries, the sex of the baby also affects the decision-making processes, girls being less likely to have access to formal health care. Reaching a decision to travel and to spend money on

formal care may be a slow process.

The key to reducing the delay in deciding to seek care is to develop an action plan before an emergency occurs. At the household level, the pregnant woman, her husband, and other decision-makers, such as the mother-in-law, decide on a plan of action, if the mother or the baby develops a complication. This plan should be made during pregnancy, not after a complication occurs. With a plan in place, if a problem does occur during labor, hours or even days may be saved, especially if the husband is out of town. The community also has a key role to play in decision-making that influences when and/or if the woman seeks emergency obstetric care.

One barrier to planning ahead in traditional societies is the fear that merely discussing the possibility of adverse outcomes may increase their occurrence or result in a curse on the family. Knowledge of the local culture is essential to overcome this barrier, as shown in the example of the green pendelu as described in Panel 3.2. The community also has a role to play in the decision-making process.

The community may appoint proxy decision-makers to take responsibility for making decisions about a pregnant woman and her newborn's health if the husband/father or village elder is absent. Mothers and their families may not know where to go for care, and this confusion may lead to delay. In a study conducted in a peri-urban slum in India, researchers found that mothers had knowledge about danger signs but were unclear about where to seek appropriate care⁽⁸⁾.

In some communities, traveling to a formal health care institution may not be feasible or may be unacceptable. Provision of care in the community may be a solution for some communities, particularly for certain emergencies, such as neonatal sepsis, as shown by SEARCH in rural India⁽⁹⁾. However, community-level treatment may not be feasible for all emergencies, especially obstetric emergencies, such as antepartum hemorrhage. The decision to provide community-based emergency care will depend on the prevalence of local health problems, the capacity of local institutions, and the capacity of the community to provide quality emergency care.

C. Delay Three: Reaching the Health Facility

KEYS TO ADDRESSING DELAY #3

- ➔ **COMMUNITY MOBILIZATION FOR EMERGENCY TRANSPORT.**
- ➔ **COMMUNITY EMERGENCY FUND.**

Once the decision has been made that the mother or the newborn should seek emergency care, availability and cost of transport are common barriers. The key to overcoming this problem, especially in isolated communities with few resources, is community participation.

At the community level, awareness of the problem of transportation can stimulate discussion, especially if a woman or newborn in the community has died. A community that has discussed and recognized underlying reasons for delays in transportation can often prevent these delays. These underlying reasons may seem obvious, for example no roads or very few vehicles, but community members may identify less obvious reasons, such as attitudes of transport workers, security, or landmines. A specific community plan for transport emergencies can be helpful, even in remote areas (Panel 4.3).

If a sick mother or newborn is referred from one level of the health care system to the next level (i.e., health center to hospital), the chance of survival is greater when the referring health provider attempts to stabilize the condition and arranges for transport. For example, a baby who is feeding poorly and has a fever should be given a dose of antibiotics before transfer. The mother should be supported to express milk and cup feed to reduce the risk of hypoglycemia. A simple referral letter also improves treatment at the next level of care, especially if the letter describes the drugs and doses given by the referring health center. Stabilization and safer referral of emergencies require that local health care workers be trained in basic obstetric and newborn first aid.

If timely and safe transportation, especially for emergencies during delivery, is not feasible, an alternative is a maternity waiting home. A waiting home is a place for the pregnant woman to stay near a facility with emergency obstetric services. Women who are known to have a high chance of requiring emergency services, particularly those with previous cesarean section, intrapartum fetal death, or multiple pregnancy, will benefit the most. Maternity waiting homes are more effective when community members are involved in building and managing them. For example, a study in Zimbabwe of 6,438 women delivering at a district hospital found that women staying in a free self-catering maternity waiting home had a 50 percent reduction in late fetal and early neonatal deaths compared to women coming from home, even after correcting for potential confounding factors⁽¹³⁾. Panel 4.3 describes a successful transportation program in Tanzania.

PANEL 4.3
LESSONS LEARNED

PEDALING FOR OBSTETRIC EMERGENCIES IN TANZANIA

Maternal mortality in rural Tanzania is high, estimated at up to 700 maternal deaths per 100,000 live births. About half of deliveries take place at home, and 22 percent of women receive no assistance at delivery. A major problem in the Lake Region is access to emergency obstetric care because there are few vehicles and bridges, and roads are often impassible.

A collaborative effort between the Tanzanian Ministry of Health, CARE, and USAID has been developing community-based reproductive health services. Delays in transportation were identified as a key problem. A team from CDC (CCHI) assisted in developing a participatory approach that enabled each village to adopt a community plan for accessing emergency obstetric care. It involved raising awareness of maternal health, showing pictures of transportation systems that had worked elsewhere, and meeting with the community and leaders to gain a consensus. A village committee was identified to support the village health workers and oversee emergency transport. Alternatives for emergency transport systems included a tricycle with a stretcher attached for the woman to lie on, a boat, or a savings fund to pay for hire of a vehicle.

At follow-up 6 months later, 52 of 62 villages had an action plan in place. Those communities with a recent maternal death in the village were the most successful in mobilizing resources. Those very far from the hospital were more likely to have a functioning emergency transport.



Source: Ahluwalia I et al.⁽¹¹⁾, Kouletio et al⁽¹²⁾.

Community loan programs: In many countries, people may not have access to funds to pay for transportation and/or health services or supplies. Developing a community loan fund to address this problem has been successful in many settings (Panel 4.4).



PANEL 4.4
LESSONS LEARNED

COMMUNITY SAVING FUNDS FOR MEDICAL EMERGENCIES IN NIGERIA

Maternal mortality in rural northern Nigeria is very high. One of the identified problems was lack of funds to pay for transportation for emergency obstetric care. A hospital in Ekpoma was active in mobilizing the surrounding communities to set up emergency transportation funding schemes. Of the 13 clans to which funding scheme proposals were presented, 12 launched loan funds. In the first year, 456 families requested loans ranging from the equivalent of US \$7 to US \$15. Three hundred eighty loans were granted. Three hundred fifty-four were repaid in full.

Although the number of women admitted to the hospital remained constant, the number of cesarean sections performed in the hospital increased from 0 in 1991 to 13 in 1995. The number of women with complications seen at the hospital increased from 7 in 1990 to 29 in 1995. During the same period, the Prevention of Maternal Mortality project enabled this hospital to establish a revolving drug fund, conduct staff development training in obstetric services, and receive equipment for an operating theater, labor suite, and laboratory. Unfortunately, subsequent riots in the region and the national introduction of user fees affected sustainability.

Source: Chiwuzie et al⁽¹⁰⁾.



D. Delay 4: Receiving Appropriate Quality Care at the Facility

KEYS TO ADDRESSING DELAY #4

- ➔ STANDARD PROTOCOLS FOR EMERGENCIES.
- ➔ SYSTEM OF TRIAGE.
- ➔ SKILLED COMPETENT STAFF.
- ➔ CLIENT-CENTERED CARE.

A study in Mexico City found that approximately 80 percent of maternal deaths were related to a delay in receiving care within the institution (i.e., medical error⁽¹⁴⁾). Thus, the quality of care is determined by many factors, but it is primarily determined by the skill and motivation of personnel. In settings where pay and morale are low and frustrations are high, it is difficult to attract and motivate good personnel.

Quality care can be improved by instituting standards of care by:

- ❖ instituting or strengthening standards of care;
- ❖ training staff on interpersonal skills, as well as clinical skills, particularly the saving skills, neonatal resuscitation and management of the sick newborn;
- ❖ enhancing supportive supervision; and
- ❖ ensuring that services are available 24 hours a day with adequate equipment.

Program managers should emphasize life-saving skills to resuscitate and stabilize sick neonates as well as care for the mother. Interventions also should be available 24 hours a day to have significant impact. Equipment and supplies need to be consistently available. The time elapsed before an emergency case received appropriate attention and treatment in the health institution is a major indicator of the quality of a service and should be monitored. The general principles of improving quality of care are covered in Part Two. The CD-ROM includes details about quality improvement.

III. DESCRIPTION OF INTERVENTION PACKAGES AND PACKAGE COMPONENTS



A. What is an Intervention Package?

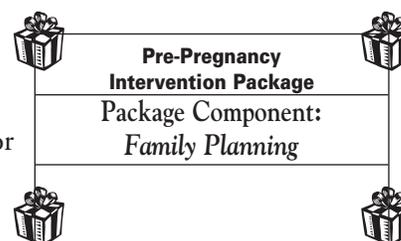
An intervention package is a group of activities/services that individually have been effective in reducing fetal-neonatal mortality. They are combined when they apply to the same time period, during pregnancy. The Intervention Package is for all sectors of the HCDS, not just for the formal health sector. There are five Intervention Packages, arranged by period of care that will be discussed.

-  Pre-pregnancy Health Intervention Package.
-  Care During Pregnancy Intervention Package.
-  Care During Delivery Intervention Package.
-  Postpartum Care of the Mother Intervention Package.
-  Newborn Care Intervention Package.
 - Essential Newborn Care Intervention Sub-Package.
 - Extra Newborn Care Intervention Sub-Package.
 - Emergency Newborn Care Intervention Sub-Package.

Each Intervention Package relates to all the sectors of the HCDS. The Intervention Package has an overall vision (long-term goal) and a list of aims related to the key package components (core activities/services). Each of the five Intervention Packages are represented in a box presented to the right.



The package components, within each Intervention Package, are discussed in more detail after the introduction to the Intervention Package. Many of the package components will have specific boxes outlining key information about the service/activity that is important for program managers to understand, presented in a box presented to the right. There are also several lessons learned panels, successful field programs that have effectively implemented the activities/services.



Strategies for implementing cross-cutting approaches, such as community empowerment, behavioral change and capacity building are discussed in Part Three, again with more detailed resources provided on the CD-ROM. This manual is not designed to cover all the details of the activities/services; rather, it is intended to guide the program manager in making decisions. Detailed clinical guidelines are included in WHO references, such as “Managing Complications in Pregnancy and Childbirth (MCPC)” and other relevant documents on the CD-ROM. Many of the maternal Intervention Packages are covered in “Promoting Quality Maternal and Newborn Care: A Reference Manual for Program Managers,” which is also on the CD-ROM.

B. Using the Spider Web Framework to Design an Integrated System

Each of the Intervention Packages, if well implemented, can contribute to a reduction in fetal-neonatal deaths. However, to have the maximum improvement in newborn survival and health, the core activities/services for all the Intervention Packages need to be in place and functioning. While no program manager is able to incorporate all of the Intervention Packages immediately, the goal is to prioritize those most important to implement first and then gradually integrate all of the Intervention Packages.

The Spider Web Framework, presented in Figure 4.3, is a tool to help visualize the interrelationships between the five Intervention Packages. The Intervention Packages are divided into three categories, presented below.

First Level (center of the Spider Web) core activities/services: These are the essential services for each time period that apply to any setting, even those with very little infrastructure.

Second Level (middle of the Spider Web) additional activities/services: These services become feasible as capacity is strengthened.

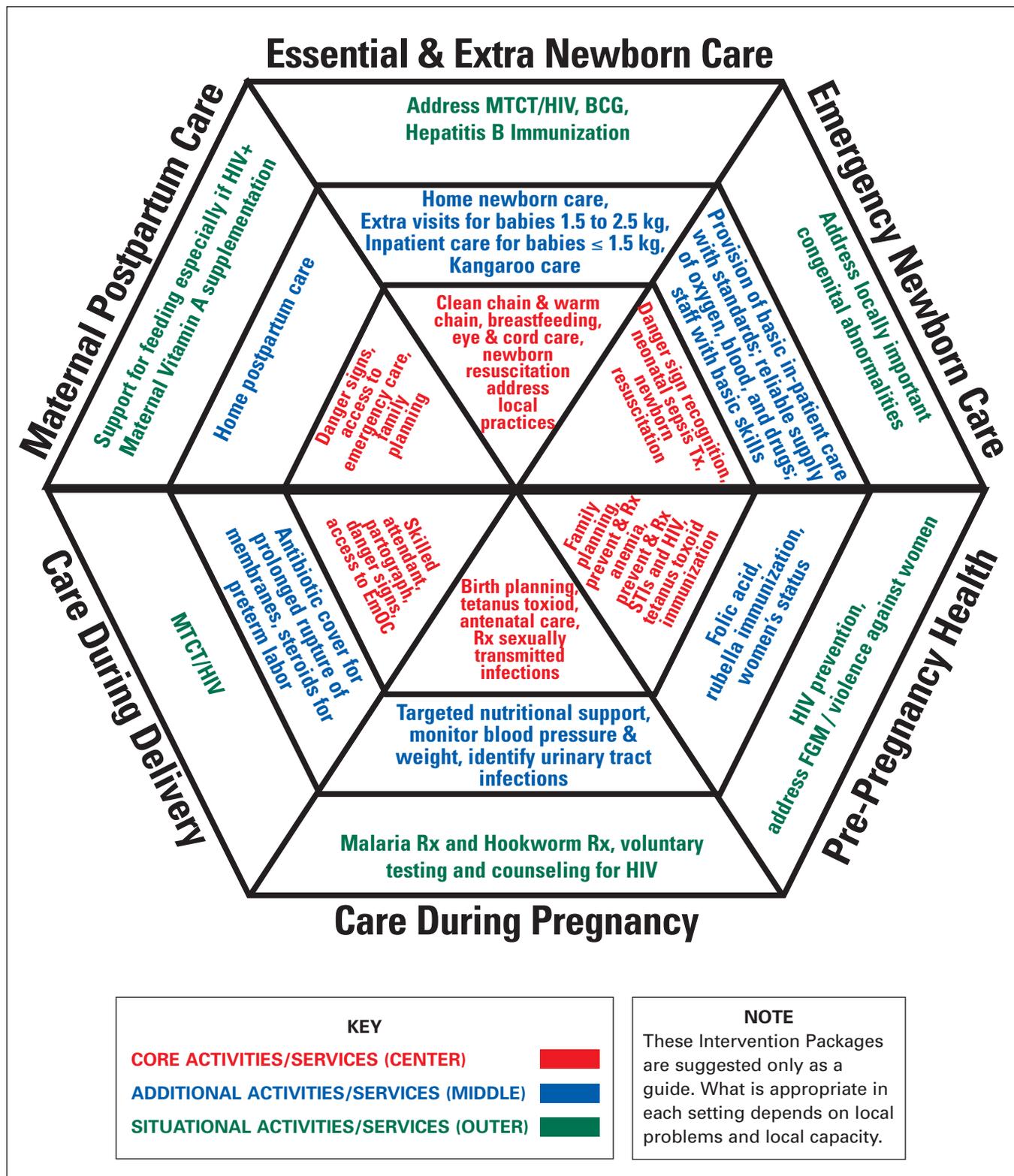
Third Level (outer level of the Spider Web) situational activities/services: These services are relevant to a particular situation, such as where malaria, HIV, or some other specific problem is common.

Grouping activities/services into core, additional, and situational categories is somewhat arbitrary. A specific local problem may lead the program manager and community to prioritize a particular intervention that has been listed here as additional. The step-by-step approach described in Part Three allows the program manager to identify core activities/services for the local setting. This process also facilitates discussion on what activities/services are feasible within that local setting. Many of these core activities/services can be implemented in the various sectors of the HCDS. For example, the SEARCH project in India prioritized the management of neonatal sepsis at the community level⁽⁹⁾. In a community where program managers determined that neonatal asphyxia was a primary problem, perhaps the focus would shift to capacity-building for emergency obstetric care in institutions. In this case, the community would play a critical role in reducing delays to access.

All tools in this manual, including the Spider Web Framework, can be adapted to reflect local health problems and capacity. The Spider Web Framework can be used to assess local capacity as well as to develop overall goals for an integrated system for maternal and newborn care as discussed in Step 2 of Part Three. For the purposes of this manual, the Spider Web Framework has been adapted to emphasize the newborn. A blank Spider Web is included in the Appendix. 

Further description of this tool is on the CD-ROM:
Ross, S.R. CARE's guide for the use of maternal and newborn health-planning tools. October 1999.

FIGURE 4.3
SPIDER WEB OF INTERVENTION PACKAGES BY TIME PERIOD

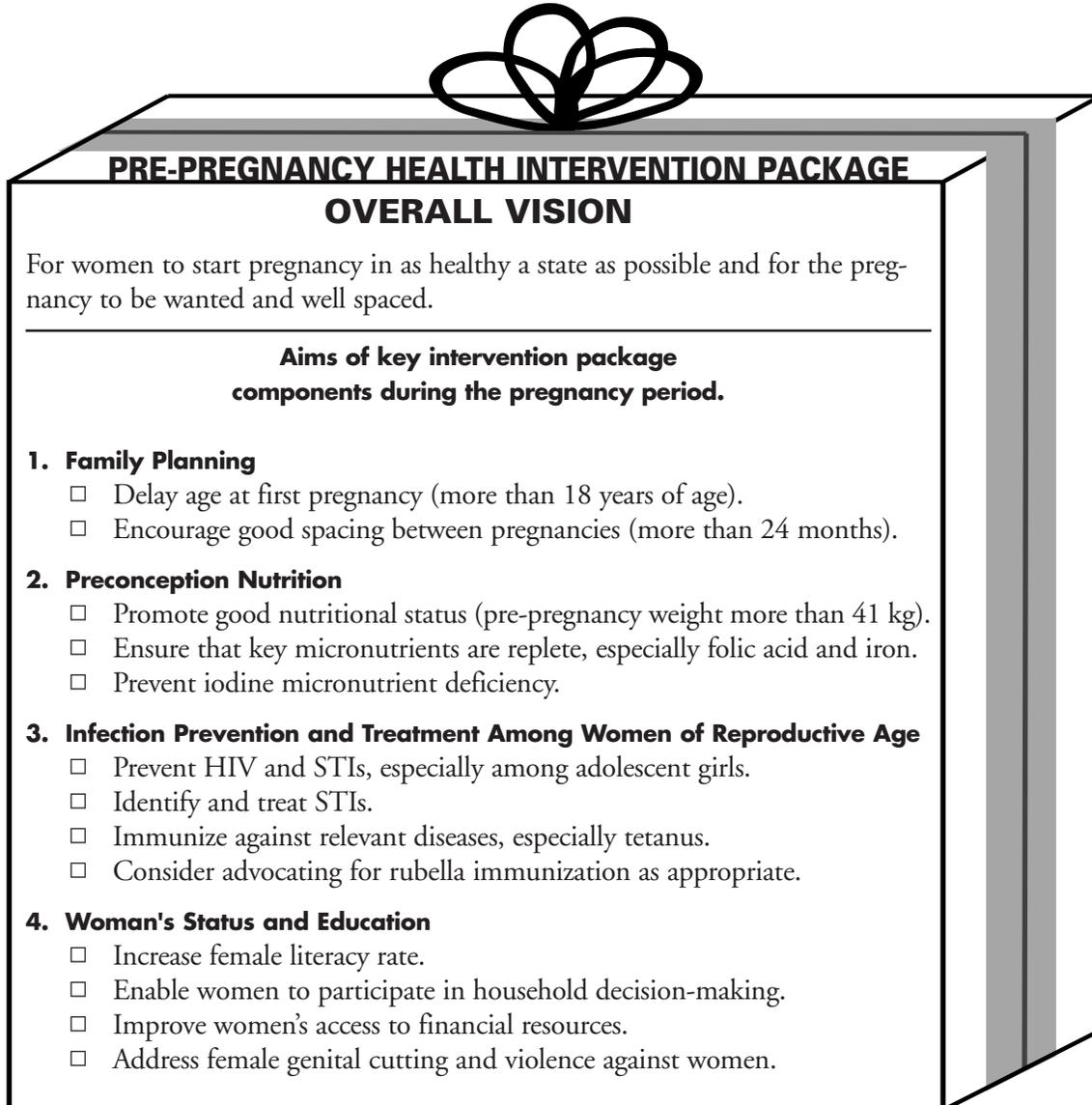


IV. INTERVENTION PACKAGES BY TIME PERIOD

A. Pre-Pregnancy Health Intervention Package

The health and behaviors of women before they become pregnant are an important foundation for improving outcomes for women and babies, as outlined in Part One. Many of the interventions for pre-pregnancy health may not have a short-term obvious impact on newborn health outcomes, such as reduced rates of neonatal mortality or LBW rate. However, these interventions may improve newborn and maternal survival and health in the long-term as well as reduce the gap in the status and education of women and the under-nutrition of female children.

Although the immediate priority must be to improve newborn outcomes as quickly and cost-effectively as possible, these long-term issues must also be addressed. Some maternal health interventions – especially family planning, addressing specific micronutrient deficiencies such as folic acid, and treating certain infections like rubella – can have a rapid, demonstrable impact on fetal-neonatal and maternal outcomes.



PRE-PREGNANCY HEALTH INTERVENTION PACKAGE

OVERALL VISION

For women to start pregnancy in as healthy a state as possible and for the pregnancy to be wanted and well spaced.

Aims of key intervention package components during the pregnancy period.

- 1. Family Planning**
 - Delay age at first pregnancy (more than 18 years of age).
 - Encourage good spacing between pregnancies (more than 24 months).
- 2. Preconception Nutrition**
 - Promote good nutritional status (pre-pregnancy weight more than 41 kg).
 - Ensure that key micronutrients are replete, especially folic acid and iron.
 - Prevent iodine micronutrient deficiency.
- 3. Infection Prevention and Treatment Among Women of Reproductive Age**
 - Prevent HIV and STIs, especially among adolescent girls.
 - Identify and treat STIs.
 - Immunize against relevant diseases, especially tetanus.
 - Consider advocating for rubella immunization as appropriate.
- 4. Woman's Status and Education**
 - Increase female literacy rate.
 - Enable women to participate in household decision-making.
 - Improve women's access to financial resources.
 - Address female genital cutting and violence against women.

The Pre-Pregnancy Health Intervention Package has four package components, which will be further discussed below, including:

- A1. Package component: Family planning;
- A2. Package component: Pre-pregnancy nutrition;
- A3. Package component: Infections of women of reproductive age; and
- A4. Package component: Status of women.

A. PRE-PREGNANCY HEALTH INTERVENTION PACKAGE

A1. PACKAGE COMPONENT: FAMILY PLANNING

In settings with high fertility, reducing the number of pregnancies may be the single most important intervention to reduce fetal-neonatal mortality (Table 4A.1)⁽¹⁶⁾.



TABLE 4A.1

PRE-PREGNANCY HEALTH INTERVENTION PACKAGE



PACKAGE COMPONENT - FAMILY PLANNING

Increase coverage of family planning services

- ✓ Increase access for family planning using novel approaches, such as community-based distributors and commercial pharmacies.
- ✓ Increase demand for family planning with well-designed behavioral change programs.
- ✓ Provide effective communication about choices for delaying and spacing pregnancies.
- ✓ Involve men in addressing healthy fertility.

Increase quality of family planning services

- ✓ Provide client-centered services that respect the dignity and choice of the woman.
- ✓ Develop and implement agreed standards of care.
- ✓ Establish training and supervision systems.
- ✓ Improve the method mix of family planning options, based on informed choice.
- ✓ Strengthen logistics systems.



For more information, see the Population Report listed in Best Reading.



Panel 4.5 describes how increasing the space between pregnancies is better for the health of both the mother and the newborn.



PANEL 4.5
LESSONS LEARNED

**EFFECT OF INCREASED PREGNANCY-SPACING
ON NEONATAL AND INFANT MORTALITY**

Researchers from Macro International used data from Demographic and Health Surveys in 17 countries to analyze the relationship between infant and perinatal mortality and birth intervals. Results show that birth intervals three years or longer substantially decrease the risk of infant, neonatal, and fetal deaths compared to those of either two years or less than two years. Shorter birth intervals were associated significantly with low birth weight.

Estimates were made of the number of deaths that could be averted through birth spacing. In India, for example, about 60 percent of birth intervals are shorter than 36 months, and 25 percent are shorter than 24 months. If the minimum birth interval increased to 24 months, the IMR (infant mortality rate) would drop from 71.6/1,000 live births to 55.49/1,000 live births. A half of a million deaths per year, or 23 percent of infant deaths in India, would be averted. If the minimum birth interval shifted even further to 36 months, additional gains in infant health would occur. The IMR would drop from 71.6/1,000 live births to 51.12/1,000 live births. Also, 780,000 infant deaths, or 29 percent of India's infant deaths, would be averted.

Interestingly, the average birth-spacing interval desired by women in all of the countries studied was longer than the current national average. The actual average birth interval in India is 31.1 months, and the interval preferred by Indian women is 35.4 months. By enabling women to realize their birth-spacing preferences, infant deaths would also be markedly reduced.

Source: Rustein⁽¹⁸⁾.



A. PRE-PREGNANCY HEALTH INTERVENTION PACKAGE

A2. PACKAGE COMPONENT: PRECONCEPTION NUTRITION

Low pre-pregnancy weight (less than 41 kg) and stunting of the mother's growth are some of the strongest predictors of LBW. However, this is a complex issue because deeply ingrained behaviors often relate to nutrition of the female child. A life-cycle approach is required to address these behaviors through several generations and this problem is important in the long-term, from both a human rights and a health-outcome standpoint, as discussed in Part One. However, there is little evidence about the programs, with the exception of folic acid supplementation. In a setting with a high rate of neural tube defects, folic acid can make a significant difference in fetal-neonatal outcomes. Given the necessary public policy support and capacity for implementation, results can be achieved in a short period of time. Table 4A.2 outlines the key issues to be aware of in terms of micronutrient deficiencies and treatment.



TABLE 4A.2

**PRE-PREGNANCY HEALTH INTERVENTION PACKAGE****PACKAGE COMPONENT – PRECONCEPTION NUTRITION****Protein-energy supplementation**

Protein-energy supplements are effective in improving outcomes for the newborns of under-nourished women during pregnancy. However, few programs have been developed to address pre-pregnancy weight increase and document improvements in LBW rate. More research is needed in program settings to see if this is effective and how best to implement supplementation within programs.

Micronutrient supplementation✓ **Folic acid**

Peri-conceptual folic acid is highly effective in preventing neural tube defects, but its effect on LBW remains uncertain.

- Take 2 mg daily for 3 months before pregnancy and until week 12 of gestation.

✓ **Iodine**

Iodine is important in preventing mental impairment or cretinism, but the effect of mild iodine deficiency on LBW is unclear.

- Prevent iodine deficiency by iodization of salt.
- Treat iodine deficiency with iodized oil, 0.5 mL single dose.

✓ **Iron**

In developing countries, 32-49 percent of women are anemic (hemoglobin less than 12.0 g/dL), mainly with iron deficiency anemia, before pregnancy.

- Prevent iron deficiency with better diet and intermittent treatment of hookworm.
- Treat iron deficiency with 120 mg of elemental iron daily.

✓ **Vitamin A**

• Prevent Vitamin A deficiency with better diet. Good sources of Vitamin A include dark green, leafy vegetables; dark yellow fruits and vegetables, such as mangos, papaya, pumpkin, ripe squash, carrots, sweet potatoes, apricots, and cantaloupe; and margarine, eggs, and other dairy products.

- Treat Vitamin A deficiency with 10,000 IU daily.

Source: UNACC/SCN⁽¹⁹⁾.

Panel 4.6 describes an intervention in China to prevent neural tube defects.



PANEL 4.6
LESSONS LEARNED

**PREVENTING NEURAL TUBE DEFECTS
WITH FOLIC ACID IN CHINA**

Folic acid is very effective in preventing neural tube defects (NTDs) in babies; adequate intake cuts the risk in half. One region in northern China was noted to have a very high rate of neural tube defects, the single largest cause of neonatal deaths in this region. Recently Berry and the US-Chinese Neural Tube Defect Prevention Group evaluated the effect of a public health campaign promoting folic acid consumption by newly married women in two regions of China, one in northern China with a high NTD incidence and one in southern China with a low NTD incidence.

Women in both regions were asked to take a pill containing only 400 mg of folic acid daily from the time of their premarital examination until the end of their first trimester of pregnancy. For women who did not take any folic acid, the rates of NTDs were 4.8 per 1000 pregnancies in the northern region and 1.0 per 1,000 in the southern region. For women taking peri-conceptual folic acid, the rates were 1.0 per 1,000 in the northern region and 0.6 per 1000 in the southern region. The greatest reduction of risk occurred among the fetuses or infants of a subgroup of women in the northern region (where baseline incidence was high) who took folic acid pills more than 80 percent of the time from marriage until the end of the first trimester.

This study concluded that peri-conceptual intake of 400 mg of folic acid daily can reduce the risk of NTDs in areas with high rates of these defects and in areas with low rates. In settings where many pregnancies are not planned, the promotion of peri-conceptual folic acid may be more complex.



Source: Berry et al⁽²⁰⁾. 

A. PRE-PREGNANCY HEALTH INTERVENTION PACKAGE

A3. PACKAGE COMPONENT: INFECTION AMONG WOMEN OF REPRODUCTIVE AGE

Infections, especially STIs, are responsible for a significant burden of disease for women. The key period for prevention is during adolescence and young adult life. About half of the new HIV infections in sub-Saharan Africa each year occur in adolescents⁽²¹⁾. Prevention is crucial because there is no cure for AIDS. Improved prevention, identification, and treatment of other STIs would help reduce new HIV infections and would directly benefit women and babies. HIV is discussed in more detail in Part One and under Essential Newborn Care.

Targeting women of reproductive age (WRA) for immunization is an important strategy, especially to increase tetanus toxoid coverage in settings where the majority of girls attend school and school-based programs are feasible. If rubella immunization is policy, coverage of adolescent girls is crucial to avoid congenital rubella syndrome⁽²²⁾. Rubella vaccine is not recommended for administration to pregnant woman. However, the risk of congenital abnormalities from the vaccine is considered so negligible that inadvertent administration during pregnancy is not an indication for termination of pregnancy⁽²²⁾. Table 4A.3 outlines some of the key activities to think about when trying to address infections among WRA.



TABLE 4A.3

PRE-PREGNANCY HEALTH INTERVENTION PACKAGE



PACKAGE COMPONENT – INFECTIONS

Prevent sexually transmitted infections

STIs, including HIV, have a devastating effect on women and babies. In sub-Saharan Africa, about half of new HIV and STI infections occur in adolescents, and at least half are in girls. Prevention is crucial.

- ✓ Delay age at first intercourse through behavioral change, policy support, and community mobilization.
- ✓ Strengthen healthy sexual behaviors, such as having one partner.
- ✓ Promote condom use and ensure consistent supply.
- ✓ Reduce prevalence by quality treatment and partner tracing.

Identify and treat sexually transmitted infections

- ✓ Implement effective behavioral change programs that promote recognition of STIs and health-seeking behavior.
- ✓ Improve partner tracing for STIs.
- ✓ Build the clinical capacity of the health system to identify and treat STIs.
- ✓ Build the laboratory capacity of the health system to investigate STIs at least at the regional level.
- ✓ Develop and implement national policies for screening and treatment for STIs and HIV.
- ✓ Strengthen logistics systems related to STI services, including testing supplies and drugs for treatment.

Immunize women of reproductive age against key infections

- ✓ Ensure that women of reproductive age have had at least two tetanus toxoid immunizations.
- ✓ Consider advocating for policy change for rubella immunization (covering only women of reproductive age or covering all infants) depending on the national burden of congenital rubella syndrome and the capacity to maintain high immunization coverage (more than 80 percent).
- ✓ Consider including hepatitis B immunization as a standard of care depending on national policy. If hepatitis B immunization is not supported by national policy but the burden of hepatitis B-related disease is high, consider advocating for policy change.



A. PRE-PREGNANCY HEALTH INTERVENTION PACKAGE

A4. PACKAGE COMPONENT: STATUS AND EDUCATION OF WOMEN

Investment in the literacy of women is an important long-term strategy to improve the health and well-being of women and infants as well as society in general. Although this investment may not result in immediate improvement in newborn survival, over time mortality rates will decrease.

TABLE 4A.4

PRE-PREGNANCY HEALTH INTERVENTION PACKAGE**PACKAGE COMPONENT – STATUS AND EDUCATION****Improve education**

- ✓ Increase school enrollment for all children through community mobilization.
- ✓ Reduce the gender literacy gap by strengthening educational opportunities for girls and women.
- ✓ Advocate for regional and national opportunities for girls to attend higher levels of education.

Increase access to income for all women

- ✓ Expand and strengthen micro-finance schemes.
- ✓ Promote business training and cooperative businesses for women.
- ✓ Use community mobilization to empower women to negotiate for access to family resources.
- ✓ Implement behavioral change programs addressing male responsibility to commit resources to the family.

Increase the general status of women in the home and community

- ✓ Empower women's groups to identify key rights to negotiate for at the household and community levels.
- ✓ Enable women who have status in the community to empower others with negotiation skills ("positive deviance").
- ✓ Build on strengths from micro-finance schemes and increased female literacy to promote women's concerns at the community level.

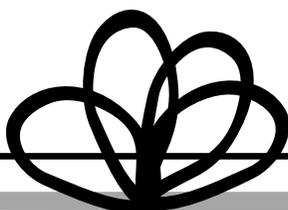
Source: World Bank⁽²⁵⁾. 

 **B. Care During Pregnancy Intervention Package**

Care during pregnancy includes the care of the woman and her fetus both in the home and community and in the formal health care sector, particularly at the antenatal clinic. Although most pregnancies are “normal” where mothers and babies survive, any woman or newborn can develop complications. Appropriate care during pregnancy provides individuals and communities with information and an enabling environment to promote healthy choices. Health care should also help women and their communities recognize and avoid harmful practices. It is important for all individuals concerned to recognize danger signs and respond quickly.

At the household level, it is important to plan for a healthy birth and to develop an action plan for possible complications. Other key issues include workload and nutrition for the pregnant woman in addition to planning for delivery. In many settings, the mother is expected to continue a heavy workload until full term. This may contribute to preterm labor and/or a factor in intrauterine growth restriction. Research trials in low-resource settings showed that giving the mother protein-energy supplementation during pregnancy resulted in a significant reduction in LBW rate and fetal-neonatal mortality⁽²⁶⁾. However, reviews of programs addressing nutrition in pregnancy have not found such effects, and nutritional supplementation has not been tested in a large-scale program⁽¹⁹⁾.

In the formal health care system, the contribution of antenatal care to improving outcomes is unclear. The lack of clarity of the effect of antenatal care may be because the quality of care is variable⁽²⁷⁾. Many antenatal clinic visits of low-quality care may not change outcomes, whereas even a few visits where standard protocols of care are followed may have a big impact. Four visits with evidence-based care is adequate in a normal pregnancy⁽²⁸⁾.



CARE DURING PREGNANCY INTERVENTION PACKAGE

OVERALL VISION

To provide quality care during pregnancy in order to prevent complications of pregnancy, identify and manage danger signs, and to prepare for delivery and motherhood.

Aims of key interventions during pregnancy.

1. Provision of Evidence-based, Client-centered Antenatal Care

- Increase coverage of antenatal care services.
- Improve the quality of antenatal care.
- Rapidly recognize and manage severe hypertension or pre-eclampsia.
- Identify and manage complications and major risks at delivery (e.g., multiple birth, malpresentation).

2. Improved Nutrition in Pregnant Women

- Promote iron and folate supplementation for all pregnant women.
- Provide targeted protein-energy supplementation as appropriate.
- Consider micronutrient supplements, such as iodine and Vitamin A, depending on local setting.

3. Address Anemia in Pregnancy

- Prevent anemia with good diet, iron and folate supplementation and presumptive treatment of malaria and hookworm if indicated.
- Identify and treat severe and moderate anemia.

4. Prevention and Treatment of Infections in Pregnant Women

- Identify and treat STIs, especially syphilis and gonorrhea.
- Institute presumptive treatment for malaria/hookworm in endemic areas.
- Provide voluntary testing and counseling for HIV, if locally appropriate.
- Ensure tetanus toxoid immunization coverage of all pregnant women.

5. Promotion of birth planning

- Educate women/communities about danger signs for the mother and newborn.
- Enable women to choose a skilled provider and to ensure clean materials for delivery.
- Encourage mothers, fathers, and families to prepare for (transport) potential complications during delivery or in the newborn.
- Address transport difficulties with use of community participatory methods.
- Help the mother and family prepare for care of the newborn, especially regarding early and exclusive breastfeeding and avoiding harmful practices.
- Enable the HIV-positive mother to plan options to reduce the risk of transmission to her newborn, including presenting the balance of risks for breastfeeding.

The Care During Pregnancy Intervention Package has five package components, which will be further discussed below.

- B1. Package component: Provide client-centered ANC services.
- B2. Package component: Improved nutrition in pregnancy.
- B3. Package component: Prevention and treatment of anemia in pregnancy.
- B4. Package component: Prevention and treatment of infections in pregnancy.
- B5. Package component: Promotion of birth planning.

B. CARE DURING PREGNANCY INTERVENTION PACKAGE

B1. PACKAGE COMPONENT: PROVIDE CLIENT-CENTERED ANC SERVICES

Specific interventions in care during pregnancy that are effective in improving outcomes for the fetus/neonate, mother, or both include:

- ❖ administering tetanus toxoid immunization (minimum of two doses, unless there is evidence of four previous doses providing lifetime immunity)⁽²⁹⁾;
- ❖ screening for and treating STIs, especially syphilis^(30, 31);
- ❖ screening for and treating urinary tract infections⁽³¹⁾;
- ❖ providing presumptive treatment of malaria⁽³²⁾ and hookworm⁽³³⁾ in endemic areas;
- ❖ detecting (early) and managing pre-eclampsia⁽²⁷⁾;
- ❖ detecting (early) and managing major risk factors for obstructed labor, based on previous history of prolonged/obstructed labor⁽³¹⁾;
- ❖ providing protein-energy supplementation to undernourished women⁽²⁶⁾; and
- ❖ promoting birth planning and emergency preparedness.

Many practices carried out in antenatal clinics have limited or no evidence of benefit. Sometimes health personnel may spend most of their time weighing every woman, which may not change outcomes for the mother or the baby. This practice may leave little time to invest in activities that do make a difference, such as screening for STIs or birth planning. There is strong evidence of benefit from tetanus toxoid immunization. However, only about one-third (33%) of women in developing countries receive two or more immunizations. In addition, many opportunities are missed to immunize women even in the antenatal clinic. Very busy clinics with long waiting times and little real dialogue between the women and the attendants reduce motivation for women to return to the clinic again or to deliver with a skilled attendant.

It is not possible to develop global guidelines for antenatal care that are appropriate and feasible in every setting. Generic guidelines have to be adapted at national and local levels in response to local problems and capacities. However, it is crucial that local standards are developed through consensus of the major stakeholders (i.e., clinicians, professional groups of obstetricians and midwives, Ministry of Health, etc.) and that all the health care personnel and other relevant personnel are aware of these standards and able to carry them out. The process of development of standards can be facilitated by starting with an agreed international standard such as WHO's Management of Complications in Pregnancy and Childbirth. The standards are no use unless staff are trained to competency level, and the content is standards is clear. This may involve displaying posters on walls, having written copies of standards, as well as training and supervising staff. Some of the issues that need to be included in standards are listed on in the Table 4B.1 "Quality Care During Pregnancy". The details of clinical guidelines are in the documents on the CD-ROM; hypertensive disease in pregnancy is outlined in more detail.

Hypertension in pregnancy: Pre-eclampsia can lead to eclampsia, resulting in convulsions. Pre-eclampsia and eclampsia are more common in primigravidas (women in their first pregnancy). The condition is often associated with a rise in diastolic blood pressure above 90 mm Hg, generalized swelling (edema) in the hands and face, protein in the urine, and overactive reflexes. Screening parameters, such as a rise in blood pressure, generalized edema, proteinuria, and hyperreflexia, do not always predict pre-eclampsia, and pre-eclampsia or eclampsia may occur without these signs. However, these signs should always be taken seriously and acted upon promptly. If any of these symptoms are present, women should be encouraged to go to a health institution with a skilled provider and emergency obstetric capacity immediately.

WHO recommends that blood pressure should be measured monthly in the second and third trimesters. Women need to be closely monitored for generalized swelling in the arms and face (not ankles) and for urine protein, if feasible. Treatment of preeclampsia/eclampsia includes: 1) administration of magnesium sulfate (see MCPC on CD-ROM for the dosing schedules); 2) administration antihypertensives if required; and 3) bed rest in a calm environment. Women at risk of developing eclampsia (history of pre-eclampsia) appear to benefit from low-dose aspirin (150 mg) daily, although the best time to start this has yet to be established. Regular calcium supplements have also been shown to be beneficial for women at high risk of hypertension, although this is still somewhat controversial⁽²⁷⁾.



TABLE 4B.1

**CARE DURING PREGNANCY INTERVENTION PACKAGE****PACKAGE COMPONENT – PROVIDE CLIENT-CENTERED ANC SERVICES****Increase coverage of care during delivery services**

- ✓ Increase demand for care during pregnancy with well-designed behavioral change programs.
- ✓ Address unmet need for care during pregnancy by increasing access points and using outreach services.
- ✓ Evaluate and address other barriers, such as acceptability (i.e., offering only male doctors), affordability, or overly long waits.

Increase quality of services offering care during pregnancy

- ✓ Provide client-centered services that respect the dignity of women and improve client-provider dialogue.
- ✓ Develop and implement locally agreed upon standards of care that address the number of care during pregnancy visits, remembering that fewer visits with good care have more effect than many low-quality visits. WHO recommends a minimum of four visits with increased quality of care at each visit.
- ✓ Develop and implement locally developed standards for content of care during pregnancy, including detailed outlines for the first visit and follow-up visits. These local standards should provide clear guidelines for the following:

History – What to ask? How to record information and the decisions that flow from this information (i.e., previous late fetal death should trigger syphilis screening (if not routine) and extra visits)?

Examination – What to examine? What equipment is needed? How do you best use the equipment (i.e., little evidence supports routine weighing of women in antenatal clinics)?
What response should be triggered by the abnormal findings on examination (i.e., twins should trigger careful counseling and a plan for institutional delivery)?

Investigations – What tests are important and feasible in your setting (i.e., syphilis screening)? Is it possible to have results immediately? If not, how will women with abnormal test results be traced?

Treatment – What routine treatment will be recommended? Will patients pay for all treatment? What essential drugs will be on site (i.e., syphilis treatment)? How will a consistent supply of drugs be ensured?

- ✓ Establish training, supervision, and reward systems to promote quality.
- ✓ Strengthen logistics systems, such as supplies for investigations, drugs, or equipment.





TABLE 4B.1

**CARE DURING PREGNANCY INTERVENTION PACKAGE****PACKAGE COMPONENT – PROVIDE CLIENT-CENTERED ANC SERVICES (cont.)****Include core services in standards of care**

- ✓ Develop systems for early detection and management of complications of pregnancy, especially pre-eclampsia, malpresentation, preterm labor, and prelabor rupture of membranes.
- ✓ Provide iron/folate supplementation (60 mg elemental iron).
- ✓ Provide tetanus toxoid immunization (minimum of two doses unless evidence of four previous doses, which would provide lifetime immunity to tetanus).
- ✓ Provide testing and treatment for STIs, especially syphilis, as appropriate.
- ✓ Promote birth planning (see Table 4B.5).

Address situational problems in standards of care

- ✓ Institute presumptive treatment of malaria in endemic areas (see Table 4B.3).
- ✓ Institute presumptive treatment of hookworm in pregnancy in endemic areas (see Table 4B.3).
- ✓ Develop locally feasible standards for investigation and treatment of syphilis and other STIs in pregnancy in areas with high prevalence. (Note: data on STI prevalence are often lacking/unreliable, so the program manager need to have *evidence* that the STI is *not there*, especially regarding syphilis in sub-Saharan Africa.)
- ✓ Provide voluntary counseling and testing for HIV, if appropriate (see Table E1.8).

Advocate for policy support in implementing standards of care

- ✓ Increase coverage and quality of care through policy support from MOH and other sectors.



Source: WHO/RHR/00.⁽⁷⁷⁾, WHO/FHE/MSM/94.^(11,34), JHPIEGO/BASICS⁽³⁵⁾.

B. CARE DURING PREGNANCY INTERVENTION PACKAGE

B2. PACKAGE COMPONENT: NUTRITION IN PREGNANCY

Two important determinants of birth weight are pre-pregnancy weight of the mother and weight gain during pregnancy. Pre-pregnancy weight of less than 41 kg has been shown to be a contributing factor for LBW⁽¹⁹⁾. Weight gain during the second and third trimesters of pregnancy (22 to 40 weeks) is more important than weight gain during the first trimester. WHO recommends that a women should gain at least one kg per month for the last two trimesters, resulting in a weight gain of six kg. The Institute of Medicine Report on Nutrition in Pregnancy recommends a total weight gain of 12 kg. The WHO recommendation of six kg, is an attempt to create an achievable goal. The sad reality is that many pregnant women do not even achieve the 6 kg goal, due to low energy intake and continued high workload.¹⁹ The key issues for nutrition in pregnancy are listed in Table 4B.2.

Regular weighing of women is not feasible in many settings and has not been shown to affect newborn outcomes. This is probably because even if poor weight gain is detected it rarely leads to a specific intervention. One study in the Gambia, where locally baked peanut biscuits were provided to pregnant women, showed a significant gain in birth weight and about a 50 percent reduction in perinatal mortality (Panel 4.7)⁽²⁶⁾. Replication of similar interventions should be feasible in other programs and has the potential for a dramatic impact on fetal-neonatal outcomes.



PANEL 4.7
LESSONS LEARNED

PEANUT COOKIES, PREGNANCY, AND REDUCED PERINATAL MORTALITY

There has been controversy as to whether dietary supplementation during pregnancy can increase birth weight. A study was completed in a poor, rural area in Gambia where food is scarce, especially in the dry, or "hungry," season. The LBW rate was around 18 percent. The aim of the study was to test the effect of an inexpensive dietary supplement provided to pregnant women under realistic field conditions through the primary health care system.

Ceesay et al.⁽²⁶⁾ conducted a 5-year trial, randomizing all pregnant women in 28 villages to daily supplementation with high-energy groundnut biscuits (4.3 megajoules per day) for about 20 weeks before delivery (intervention group) or after delivery (control group). The biscuits were cooked in the village and delivered to the mother by the village health worker.

Supplementation before delivery increased weight gain in pregnancy and significantly increased the birth weight of the baby by an average of 136 grams, thereby reducing the LBW rate by 35 percent. Supplementation also significantly reduced perinatal mortality. Stillbirths were reduced by about 53 percent and early neonatal deaths by 46 percent. The babies' head circumferences were only slightly increased, and there was no evidence of increased risk for obstructed labor⁽³⁷⁾.

The study concluded that this low-cost, locally sustainable prenatal dietary supplementation reduced IUGR and perinatal mortality. The intervention was successfully delivered through a primary health care system.



Source: Ceesay et al.⁽²⁶⁾, Garner and Kramer⁽³⁷⁾.



Many micronutrients have been studied in terms of effect on maternal, fetal and neonatal outcomes. The following text and Table 4B.2 summarize the current evidence regarding the most important micronutrients during pregnancy.

Iodine: Iodine is needed for adequate physical and mental development of the fetus. Iodine deficiency increases the chances of miscarriage, stillbirth, and premature birth. A child born to an iodine-deficient mother is more likely to have mental retardation, cretinism, and poor muscle coordination. About 250 million women suffer the effects of iodine deficiency, and nearly one-third of Africans (181 million) live in iodine-deficient areas⁽³⁴⁾.

Salt iodization is the optimal way of preventing iodine deficiency and should be the primary focus for preventing iodine deficiency disorders. The recommended dietary intake for pregnant and lactating women is 200 mg/day. In 1996, WHO hosted an expert panel to look at the safety of giving iodine oil to pregnant women with iodine deficiency disorders. This panel concluded that for preventing and controlling moderate and severe iodine deficiency disorders, administration of iodized oil is safe at any time during pregnancy. The specific recommendations are given in Table 4B.2⁽⁴³⁾.

Vitamin A: Vitamin A is important for growth, development, and immune function. Although the increased Vitamin A requirement during pregnancy is quite small, in countries where Vitamin A deficiency is endemic, women need supplementation⁽⁴¹⁾. If more than 1 percent of the total population of children less than five years of age are diagnosed with Vitamin A deficiency, the prevalence is high and indicates a significant problem. Pregnant women with Vitamin A deficiency often display varying levels of night blindness (i.e., not being able to see in dim light), which is easy to treat with Vitamin A supplementation. No study has clearly shown that Vitamin A increases birth weight. A study in Tanzania compared pregnancy outcomes and MTCT/HIV for groups of HIV-positive pregnant women taking either Vitamin A or multivitamins. The study found Vitamin A had no significant effect on fetal-neonatal survival. In the multivitamin group, the risk of fetal death, LBW and pre-term birth was reduced by half. One study in Nepal found a dramatic reduction in maternal mortality for women taking Vitamin A supplements⁽⁴²⁾.

Vitamin A supplementation during pregnancy has raised concerns because of its potential to cause birth defects if taken in high levels. Both severe Vitamin A deficiency and Vitamin A toxicity can cause birth defects, especially if either occurs early in pregnancy. In June 1996, WHO convened a meeting on “Safe Vitamin A Dosage during Pregnancy and the First Six Months After Birth”. The recommended doses from this meeting are summarized in Table 4B.2⁽⁴¹⁾.

Calcium: A study of calcium supplementation during pregnancy (two grams daily from 20 weeks of gestation) given to first-time mothers at risk of hypertension resulted in a reduction in preterm birth and an increase in birth weight. It is advised to give calcium to women at high risk of hypertension in pregnancy who live in communities with low dietary intake of calcium⁽²⁷⁾. However, generalized recommendations for calcium are not justifiable on the evidence available to date.

Magnesium sulfate: The current recommendation is to give magnesium sulfate to women with pre-eclampsia or eclampsia (the full dosage regimen is given in MCPC⁽⁷⁾ page S45).

Zinc: Some cross-sectional studies have found an association of low maternal levels of zinc with LBW and preterm birth, but evidence from randomized controlled trials of zinc supplementation have been less convincing. More studies are needed before zinc can be routinely recommended in pregnancy⁽¹⁹⁾. In contrast, the benefits of zinc in reducing morbidity and mortality due to early childhood infections are not in doubt⁽⁴⁴⁾.

Multiple micronutrient supplementation: Pregnant women in industrialized countries commonly take multivitamin supplements. However, few studies have examined this practice closely. Several cross-sectional studies have suggested that multivitamins reduce the risks of preterm birth, LBW, and congenital abnormalities. One randomized controlled trial among HIV-positive women in Tanzania found that multivitamins and mineral supplements decreased LBW by 44 percent and preterm birth (less than 34 weeks gestation) by 39 percent⁽⁴⁵⁾. The results of a randomized controlled trial of multivitamin-mineral supplementation in rural Mexico are not yet available. A general recommendation cannot be made for supplementation based on the current evidence.

Trials investigating micronutrient supplementation in industrialized countries may be complicated by the fact that most women are not markedly deficient. On the other hand, trials in developing countries may be complicated by the fact that a woman who is deficient in many micronutrients may not benefit from receiving another single micronutrient alone. Supplementation with iron and folate, but not with zinc, may be of limited advantage for women who are deficient in all three⁽⁴⁶⁾.

More information is available on the CD-ROM. 

**TABLE 4B.2****CARE DURING PREGNANCY INTERVENTION PACKAGE****PACKAGE COMPONENT – NUTRITION IN PREGNANCY****Protein-energy supplementation**

Protein-energy supplements for undernourished women during pregnancy have been shown to be effective in increasing birth weight and reducing perinatal mortality. However, few programs have documented effects on LBW rate or other outcomes for the fetus/neonate. More research is needed in program settings to see if protein-energy nutrition interventions are feasible and effective and to determine how to implement them.

Micronutrient supplementation✓ **Folic acid**

Preconceptional folic acid is highly effective at preventing neural tube defects. Its effect on LBW is uncertain.

- ◆ Take two mg daily for three months before pregnancy and until week 12 of gestation.

✓ **Iodine**

Iodine is important in preventing mental impairment or cretinism, but the effect of mild iodine deficiency on LBW is unclear.

- ◆ Prevent iodine deficiency by iodization of salt.
- ◆ Treat iodine deficiency with iodized oil 0.5 mL single dose (safe in pregnancy).

✓ **Iron**

In developing countries, 24-76 percent of pregnant women are anemic (hemoglobin less than 11.0 g/dL).

- ◆ Prevent iron deficiency with better diet and intermittent presumptive treatment of hookworm (see Table 4B.3).
- ◆ Give iron supplementation during pregnancy (60 mg per day).
- ◆ Treat iron deficiency with 120 mg of elemental iron daily.





TABLE 4B.2 (continued)

**CARE DURING PREGNANCY INTERVENTION PACKAGE****PACKAGE COMPONENT – NUTRITION IN PREGNANCY (cont.)**

- ✓ **Vitamin A**
The role of Vitamin A supplementation during pregnancy is still controversial.
 - ❖ Prevent Vitamin A deficiency with better diet. Good sources of Vitamin A include dark green, leafy vegetables; dark yellow fruits and vegetables, such as mangos, papaya, pumpkin, ripe squash, carrots, sweet potatoes, apricots, and cantaloupe; and margarine, eggs, and other dairy products.
 - ❖ Provide 10,000 IUs of Vitamin A oral supplementation daily in the second or third trimester if Vitamin A deficiency in children is more than one percent locally.
 - ❖ In settings where women's intake meets or exceeds RDA amount (8,000 IUs), there is no justification for a supplement above 8,000 IUs. Supplements could be dangerous to this population.
 - ❖ Postpartum women should receive a single high dose of 200,000 IUs in the first month after delivery.

- ✓ **Magnesium sulfate**
Magnesium sulfate is the treatment of choice for pre-eclampsia and eclampsia.
 - ❖ Provide magnesium sulfate to pregnant women with current pre-eclampsia or eclampsia. The loading dose, maintenance, and other considerations are detailed in MCPC⁽⁷⁾ page S45.

- ✓ **Calcium**
 - ❖ Provide calcium supplementation for women who are at high risk of hypertensive disease of pregnancy and who live in communities with low dietary calcium intake.

- ✓ **Zinc**
The benefits of zinc supplementation during pregnancy are still unclear.

- ✓ **Multiple micronutrients (i.e., multivitamins)**
A general recommendation cannot be made for supplementation based on the current evidence.

Source: UNACC/SCN⁽¹⁹⁾, Ramakrishnan⁽³⁸⁾, Tinker et al.⁽³⁹⁾, Kramer⁽⁴⁰⁾.

B. CARE DURING PREGNANCY INTERVENTION PACKAGE

B3. PACKAGE COMPONENT: ANEMIA IN PREGNANCY

Anemia (hemoglobin of less than 11 gm/dL) affects between 24 and 76 percent of pregnant women globally⁽⁴⁷⁾. Anemia has many causes, but the major cause in women of reproductive age is iron deficiency due to inadequate diet, low absorption of iron, or iron loss. Other nutrient deficiencies, such as folic acid and Vitamins A and C, also contribute to anemia. In many areas, malaria and hookworm are major causes of anemia.

Severe anemia (hemoglobin less than 7 gm/dL) has been shown to increase the mother's risk of death⁽³²⁾. Iron deficiency anemia in the mother increases the risk of LBW by three-fold and of preterm birth by two-fold⁽⁴⁸⁾. A recent Cochrane review concluded that iron and folate both separately and together increase maternal hemoglobin during pregnancy⁽⁴⁹⁾. No study has definitively shown an improvement in maternal or fetal-neonatal outcomes due to iron or folate supplementation. The possibility of future studies is complicated because it would be considered unethical to have a control group of women not receiving iron. One small randomized study in Niger gave iron supplements or placebo during pregnancy and showed an increase in neonatal iron levels but no significant difference in birth weight or perinatal/neonatal mortality⁽⁵⁰⁾.

In settings where anemia prevalence is high (more than 40%), it is more cost-effective to treat all women with iron and folate than to test women. This is due to the fact that iron is very inexpensive and laboratory testing is often not available or expensive. Examination by pallor screening (examining the inner lower eyelids, conjunctiva, palms, and nailbeds for paleness) is useful in detecting severe anemia (hemoglobin less than 7 gm/dL). Studies have found that using this screening method is not very effective in identifying mild or moderate anemia. It is essential to identify women with severe anemia to ensure they are referred and properly treated, but identification is complex in settings with little or no investigation available. More details on the detection and investigation of anemia in low resource settings are available in a useful manual by PATH⁽⁵¹⁾.

Iron supplementation of 60 mg daily in combination with 250 mg of folic acid is recommended for all pregnant women. In settings where anemia is endemic, it is recommended to give all pregnant women a dose of 120 mg of iron with 500 mg of folic acid. Yet few women actually receive and take the tablets regularly⁽⁵³⁾. There are many reasons for this, but the key solutions include the following:

- ❖ ensuring that staff are aware of the policy for iron and folic acid supplementation;
- ❖ improving supply logistics of iron and folic acid tablets;
- ❖ selecting tablets that are acceptable to clients with the best profile for side-effects; and
- ❖ communicating to clients the importance of taking the tablets and what to do to minimize side effects.

Table 4B.3 outlines the key activities to prevent and/or treat anemia in pregnant women. Panel 4.8 outlines some African programs that have been effective in dealing with malaria during pregnancy.



TABLE 4B.3

**INTERVENTION PACKAGE – CARE DURING PREGNANCY****PACKAGE COMPONENT – ANEMIA IN PREGNANCY****Definition**

Anemia is a condition in which the hemoglobin level is less than the expected level based on age, sex, and gestation of pregnancy. After the 12th week of pregnancy, anemia is defined as hemoglobin of less than 11 gm/dL; severe anemia is a hemoglobin level less than 7gm/dL. There are many causes of anemia but the most common cause, especially in women of reproductive age, is iron deficiency.

Investigations

In settings where 40 percent or more of pregnant women are anemic, it is more cost-effective to treat all pregnant women than to test routinely. Certain women, especially those with severe anemia (less than 7 gm/dL), may require further investigation, such as:

- ✓ hemoglobin level; and
- ✓ blood film (which can suggest underlying causes such as iron deficiency or sickle cell disease).

Specific treatment

For iron deficiency anemia, treat with 120 mg of elemental iron and 500 mg of folic acid daily. Women with severe anemia require further investigation and may require a blood transfusion. Other causes, such as malaria, should be treated appropriately.

Prevention

- ✓ **Good diet** - Iron is contained in two types of food: heme and nonheme sources. Heme sources provide iron that is most easily digested; good sources are red meat and organ meat. Good nonheme sources include dark green, leafy vegetables, molasses, egg yolks, dried fruit, and legumes. Iron absorption is enhanced by eating foods high in Vitamin C (i.e., fruits) and avoiding consumption of coffee, tea, or chapati flour at the same time. Iron fortification of grains (i.e., cereals, breads) can also be a strategy in some settings.
- ✓ **Delay age of first pregnancy** and space pregnancies by at least two years. Avoid breastfeeding while pregnant because this drains the body's iron stores.
- ✓ **Provide iron** (60 mg daily) and folate (250 mg daily) supplements during pregnancy and promote their use.
- ✓ **Treat hookworm** presumptively during pregnancy in endemic areas. Do not give sulfadoxine-pyrimethamine in the first trimester. WHO suggests that all primigravidas receive sulphadoxine-pyrimethamine (three tablets) monthly for the second trimester. If HIV prevalence is high, give sulphadoxine-pyrimethamine (three tablets) monthly to all women from the second trimester.
- ✓ **Treat malaria** presumptively during pregnancy in endemic areas depending on the national protocol.



Source: Atukorala et al.⁽³³⁾, PATH⁽⁵¹⁾, Shulman et al.⁽⁵⁴⁾.

PANEL 4.8
LESSONS LEARNED

MOSQUITOES, MALARIA, AND MOTHER-BABY OUTCOMES



In areas where malaria is endemic, it is a major cause of severe maternal anemia and is estimated to cause three to five percent of neonatal mortality. The risks of adverse health outcomes are especially high in a woman's first pregnancy. Malaria during pregnancy is often asymptomatic, so treating only women with symptoms will miss most cases.

Many sub-Saharan African countries have previously had a policy of weekly chloroquine prophylaxis for pregnant women. However, compliance with this regimen has been typically low and chloroquine resistance is now very common. Insecticide-treated bed nets have not had a significant benefit for the pregnant women in highly malaria endemic areas despite the dramatic benefits that have been shown for children aged less than five years. Benefits of mosquito nets during pregnancy may be greater in areas of seasonal transmission⁽⁵⁴⁾.

Kilifi is mainly a rural district in Kenya with high rates of malaria transmission. Hookworm infection is also common with 75 percent of women infected. A study was carried out, and 1,264 women were randomized to receive either sulphadoxine-pyrimethamine (S-P) or placebo monthly. They received one, two, or three doses depending on the month of pregnancy which they started care.

The women who received S-P had 85 percent less malaria, and the rate of severe anemia (defined as less than 7 gm/dL) was reduced by almost half. Even women who only attend one ANC visit, receiving one S-P dose, still benefited. Perinatal deaths were also reduced by 22 percent and neonatal deaths by 38 percent, although this reduction was not statistically significant. No serious side effects were detected, although there is a small risk of reaction to sulpha-containing drugs.

Kenya has now changed the national policy so that all women in their first pregnancy receive monthly S-P in an antenatal clinic. For HIV-positive women, the risk of severe malaria in pregnancy does not decline with subsequent pregnancies. Since most Malawians do not know their HIV status, the policy-makers in Malawi decided that it would be simpler to give S-P to all pregnant women, an approach that remains inexpensive because S-P costs about 19 US cents per dose, up to three doses.

Source: Shulman⁽³²⁾, Shulman et al.⁽⁵⁴⁾.

B. CARE DURING PREGNANCY INTERVENTION PACKAGE

B4. PACKAGE COMPONENT: INFECTIONS IN PREGNANCY

In areas where STIs are common, they are an important cause of adverse maternal outcomes (i.e., sepsis) and adverse fetal-neonatal outcomes, such as stillbirths, IUGR, preterm birth, neonatal infections, and mortality. Identification and management of STIs at antenatal clinics are often neglected due to:

- ❖ poor-quality information on local rates of various STIs;
- ❖ lack of recognition of the importance of STIs on outcomes for both mother and baby (summarized in Table 1.7);
- ❖ difficulties identifying or testing for STIs in women; and
- ❖ lack of clarity on treatment protocols or lack of drugs for treatment.

The relative importance of STIs and other maternal infections varies around the world. Group B streptococcus is important in industrialized countries and may be of increasing importance in some transitional countries⁽⁵⁵⁾. Neonatal sepsis and meningitis with Group B streptococcus are very serious conditions that can be prevented by giving an infected (asymptomatic) mother a single dose of penicillin before delivery. Given the low prevalence of Group B streptococcus in developing countries and the logistical difficulties of screening and treatment, this preventive measure is unlikely to become policy in these settings. Bacterial vaginosis is an important cause of preterm birth in the United States, but it is not included here since the burden in developing countries is largely unknown, and investigation and treatment may not be feasible in low-resource settings in the foreseeable future.

Investigation and treatment for selected infections are outlined in Table 4.2. Many STIs are asymptomatic in women. The only sure way to know whether a pregnant woman is infected is to test her. In settings where women attend an antenatal clinic only a few times, using tests with “instant” results can be very useful. These tests allow an opportunity to immediately treat more women. It may also enhance partner tracing⁽⁵⁷⁾. Several organizations, particularly PATH, are currently developing less expensive, reliable, “instant” tests, especially for syphilis. The most important STIs to identify in order to improve fetal-neonatal and maternal outcomes are the following.

Syphilis: The options for investigation are listed in Table 4.2. The most inexpensive (about 30 US cents per test) and most widely used is rapid plasma reagin, but it is more difficult to get rapid results from this test. Tests that allow “instant” results increase the proportion of women treated but are more expensive (US\$1.40 per test). Cheaper alternatives are being developed. Panel 4.9 describes a prenatal syphilis screening program in Mozambique.

Gonorrhea and chlamydia: Many women are asymptomatic, and testing is currently unavailable in most low-resource settings. Diagnosis is currently based on a syndromic method, thereby missing women who are asymptomatic^(58,59). Low-cost, rapid tests are needed to make progress in addressing this problem. Alternatively, women who test positive for gonorrhea could be automatically treated for chlamydia⁽⁶⁰⁾.

HIV: Combining STI counseling, testing, and treatment with voluntary counseling and testing for HIV would be a major benefit to the mother and newborn. Treatment of all STIs should include counseling about safe sex behaviors, especially condom use and partner treatment. Specific treatment for the major STIs and also for urinary tract infections is outlined in Table 4.2. If a clinician knows that a woman has gonorrhea, the best practice is to treat this woman for chlamydia as well⁽⁶⁰⁾. More information is available on the CD-ROM.



PANEL 4.9
LESSONS LEARNED



PRENATAL SYPHILIS SCREENING POLICY AND PRACTICE IN MOZAMBIQUE

In sub-Saharan Africa, it is estimated that 4-16 percent of pregnant women have syphilis. Syphilis is the major cause of 26-42 percent of stillbirths in parts of Malawi and Zambia. Basic screening with rapid plasma-reagin (RPR) takes 15-20 minutes and costs about 30 cents (US), and treatment is US\$1.00 per dose of benzathine penicillin, given three times. In 1979, universal prenatal syphilis testing was made national policy in Mozambique, yet a study in 1993 found that screening was carried out for only approximately five percent of women.

A program by Health Action International in nine health facilities reinforced RPR testing and supported maternal and child health nurses. Screening coverage increased from 5 percent to 80 percent. However, four months later the testing dropped to 25 percent because of increases in transportation costs, laboratory closures, and RPR shortage. After meeting with the Medical Director for Manica Province, this was made a program priority. Activities include:

- improving the procurement and distribution of RPR tests and penicillin;
- conducting a five-day intensive workshop for the MCH nurses;
- improving quality such as having the MCH nurses drawing blood (instead of the lab workers), ensuring same day results, and treatment;
- enhancing supervision of the laboratory; and
- education for women to promote coming in for screening and treatment.

As a result of these systems-approach changes, the coverage of RPR testing increased to 80 percent in the health facilities with labs. These facilities identified about 6,500 pregnant women who tested positive for syphilis, out of a total population of about 60,000 (WRA). Unfortunately, information was not available on what proportion of women who were RPR-positive were actually treated or what the impact was on fetal-neonatal outcomes. Future challenges include maintaining supplies of RPR, penicillin, and syringes, overcoming difficulties with monitoring, and determining how to include partner treatment.

Source: Adapted from Ramirez⁽⁶³⁾.




TABLE 4.2
INVESTIGATION AND TREATMENT OF INFECTIONS IN PREGNANCY

INFECTION	MATERNAL SYMPTOMS	INVESTIGATION	TREATMENT
Syphilis (<i>Treponema pallidum</i>)	Primary Ulcer or chancre at site of infection. Secondary Rash, mucocutaneous lesions, adenopathy. Tertiary Cardiac, neurological, auditory, eye, or gummatous lesions.	'Screening tests' • Rapid plasma reagin (RPR) • Venereal disease research laboratory (VDRL) There are many causes of false-positive and false-negative tests for syphilis, including being pregnant. Specific treponemal test i.e., fluorescent treponemal antibody test, which is more sensitive, but more expensive. Newer tests – in field trials by PATH^a Immunochromatographic instant testing strip with 96% sensitivity and almost 100% specificity, cost projected to be "low".	For the mother 1.2 million units of procaine penicillin G IM daily for 10 days OR 2.4 million units of benzathine penicillin IM single dose For the neonate Procaine penicillin G, 50,000 units/kg single daily dose for 10 days (should be given even if the mother has been treated unless her RPR or VDRL has been shown to decrease four-fold following treatment)
Gonorrhea (<i>Neisseria gonorrhoeae</i>)	Infections are usually asymptomatic in women. May be vaginal discharge or, later, symptoms of pelvic inflammatory disease.	High vaginal swab for culture and sensitivity – unavailable and complex to perform. Hence usually based on 'syndromic diagnosis'. Newer tests – under development by PATH^a Immunochromatographic instant testing strip, cost projected to be "low".	One IM dose of ceftriaxone, 125 mg For the neonate Eye prophylaxis oxytetracycline ointment or 1% silver nitrate undecose Treatment for ophthalmitis Ceftriaxone, 2.5 - 50 mg/kg IM in single dose (max dose 125 mg)
Chlamydia (<i>Chlamydia trachomatis</i>)	Infections are usually asymptomatic in women. May be vaginal discharge or later symptoms of pelvic inflammatory disease.	High vaginal swab for culture and sensitivity, but it is difficult to culture chlamydia. In industrialized settings often use urine antigen test (expensive). Newer tests – under development by PATH^a Immunochromatographic instant testing strip, cost projected to be "low".	Erythromycin orally 500 mg four times daily for 7 days OR Amoxicillin orally 500 mg three times daily for 7 days For the neonate with ophthalmitis/ALRI^b Erythromycin 50 mg/kg/day in 4 divided doses daily for 10 - 14 days.
Urinary tract infection or asymptomatic bacteriuria	May be frequent or pain on urination, or fever and loin pain if pyelonephritis develops.	Urine 'dipstick' for nitrites/leukocyte esterase. Urine microscopy and/or culture and sensitivity. Recommended at 16 weeks of pregnancy.	Choice of drug depends on local sensitivity patterns. Duration may be a single dose or daily doses for 4 - 7 days. Single treatment has similar cure rate and fewer side effects.
HIV	Depends on stage of disease. Often no symptoms or signs.	Serological testing and/or polymerase chain reaction testing.	Supportive treatment Strategies to reduce MTCT/HIV (see essential newborn care intervention sub-package).
Genital herpes simplex virus	Vesicles on the cervix if active (risk of herpes encephalitis in baby).	Microscopy of vesicle fluid, not available in most settings.	Acyclovir for the mother and cesarean delivery if lesions are active.
Hepatitis B virus	Asymptomatic or history of jaundice.	Hepatitis B serology.	Prevention of mother-to-child transmission of Hepatitis B through immunization of both mother and newborn

Sources: MMWR⁽⁶⁰⁾, Walker⁽⁶¹⁾, Carroli et al.⁽⁶²⁾

^bALRI: acute lower respiratory infection. ^aPATH: Program for Appropriate Technologies for Health, based in Seattle. MTCT/HIV: Mother to Child Transmission.

B. CARE DURING PREGNANCY INTERVENTION PACKAGE

B5. PACKAGE COMPONENT: PROMOTION OF BIRTH PLANNING

Birth planning is the process of assisting women and their families in adopting and maintaining healthy behaviors. The birth planning approach is directed at pregnant women, their families and key community key decision-makers. The content of the birth planning messages must be simple and memorable. The information needs to be presented through a media that is easily understood such as songs, dramas, or puppet shows. Table 4B.5 outlines the key information that can be included in a birth plan.

TABLE 4B.5		
CARE DURING PREGNANCY INTERVENTION PACKAGE		
PACKAGE COMPONENT – BIRTH PLANNING		
	<ul style="list-style-type: none"> ✓ Educate women and their communities about danger signs for the mother and newborn (Figure 4.2). ✓ Enable women to choose skilled providers and to use clean materials for delivery. ✓ Encourage mothers, fathers, and families to prepare for potential complications during delivery or in the newborn (i.e., to know where to go and how to get there). ✓ Help mothers and families prepare for care of the newborn, especially promoting early exclusive breastfeeding and the "clean chain" and the "warm chain" (see essential newborn care intervention sub-package). ✓ Enable HIV positive mothers to plan options to reduce the risk of transmission to newborns, including explaining the balance of risks for feeding babies and opportunities for antiretroviral therapy, if appropriate. 	
		

Panel 4.10 describes how birth planning can be an important intervention, in combination with others, to improve health outcomes.



PANEL 4.10
LESSONS LEARNED

IMPROVING MATERNAL SURVIVAL IN BANGLADESH

Bangladesh has made significant progress in reducing child mortality, but maternal mortality remains very high (440/100,000 live births in 1990); an estimated 28,000 women die annually. Fetal and neonatal mortality are also very high, with a neonatal mortality rate of almost 50 per 1,000 live births.

From 1998-2001, the Government of Bangladesh, CARE, and UNICEF implemented the Dinajpur Safe Mother Initiative. Activities included:

- ❖ assisting couples to develop a birth plan which included information on danger signs, how to access services, and ways to facilitate mobilization of resources for services;
- ❖ developing behavioral change communication strategies to raise awareness about and create demand for maternal health services, including emergency obstetric care;
- ❖ establishing community support systems that increase utilization of appropriate services when needed, including transportation, communication, and funds for medical services;
- ❖ strengthening the ability of government health service providers to enhance their capacity to provide high-quality emergency obstetric care services; and
- ❖ strengthening the linkages between the community and the health personnel through stakeholder committees.

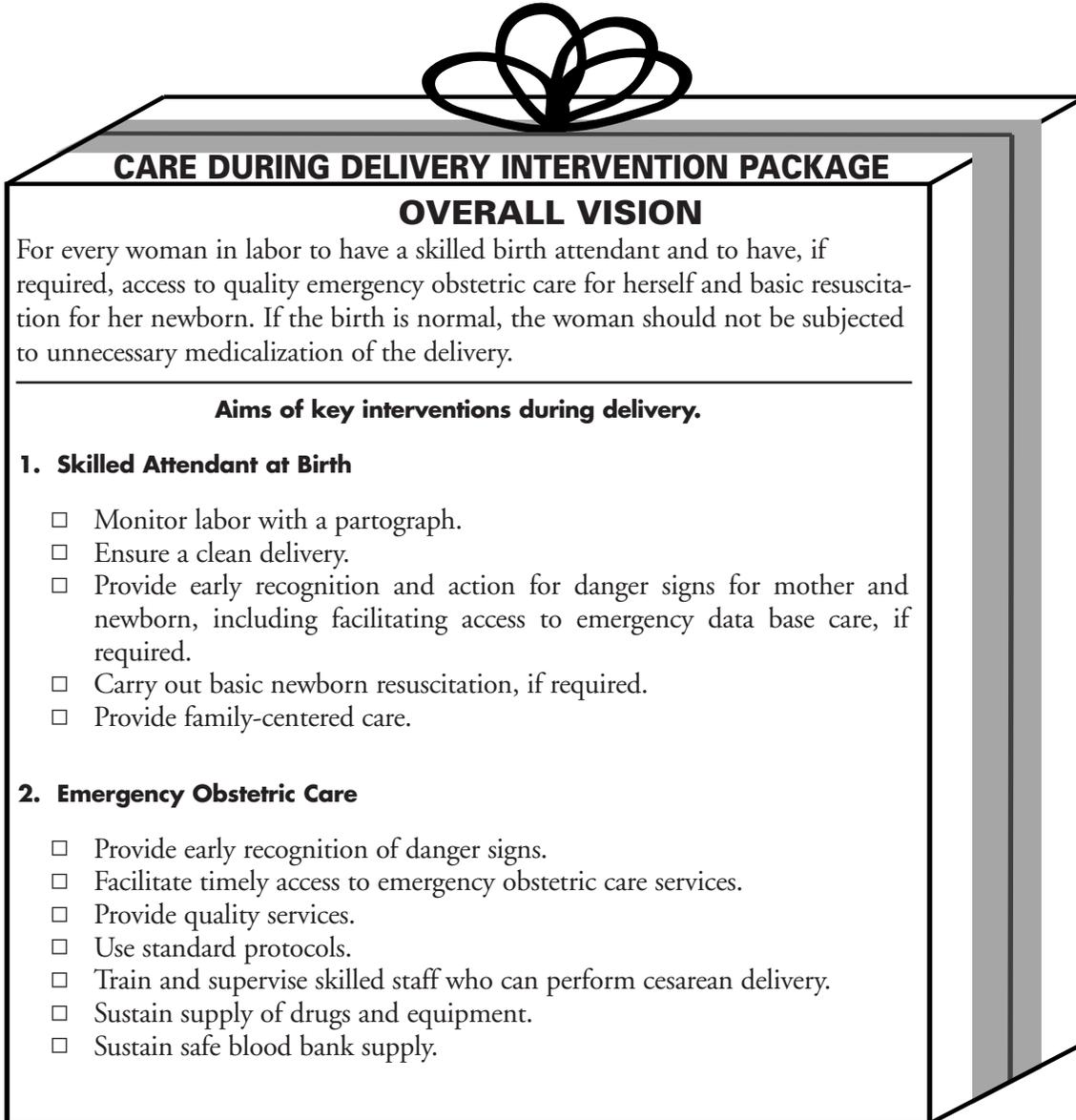
After three years the results of this project showed an increase in the met need of obstetric care services from 17 percent to 39 percent. Other achievements included an increase in the knowledge of dangers signs among women and key decision makers. Government health workers, community health workers, schoolteachers, and community leaders were all key stakeholders involved in the process. Through the committees, communities felt that they were able to make a valuable contribution to addressing this problem. Families are more aware of the risks of pregnancy and the role of family planning in women's health. Communities now recognize the potential impact of a maternal death and know how to avoid this. The program is now incorporating focus on newborn survival.



Source: CARE⁽¹⁵⁾.

C. Care During Delivery Intervention Package

The care during delivery period is critical for mother and baby because many deaths (or initiation of the cause of later deaths) occur then. Improved care during labor and delivery could potentially reduce maternal mortality by 50 to 80 percent and perinatal mortality by 30 to 40 percent⁽¹⁶⁾.



CARE DURING DELIVERY INTERVENTION PACKAGE

OVERALL VISION

For every woman in labor to have a skilled birth attendant and to have, if required, access to quality emergency obstetric care for herself and basic resuscitation for her newborn. If the birth is normal, the woman should not be subjected to unnecessary medicalization of the delivery.

Aims of key interventions during delivery.

1. Skilled Attendant at Birth

- Monitor labor with a partograph.
- Ensure a clean delivery.
- Provide early recognition and action for danger signs for mother and newborn, including facilitating access to emergency data base care, if required.
- Carry out basic newborn resuscitation, if required.
- Provide family-centered care.

2. Emergency Obstetric Care

- Provide early recognition of danger signs.
- Facilitate timely access to emergency obstetric care services.
- Provide quality services.
- Use standard protocols.
- Train and supervise skilled staff who can perform cesarean delivery.
- Sustain supply of drugs and equipment.
- Sustain safe blood bank supply.

The Care During Delivery Intervention Package has two package components, which will be further discussed below, including:

- C1. Package component: Skilled attendant at birth
- C2. Package component: Emergency obstetric care

C. CARE DURING DELIVERY INTERVENTION PACKAGE

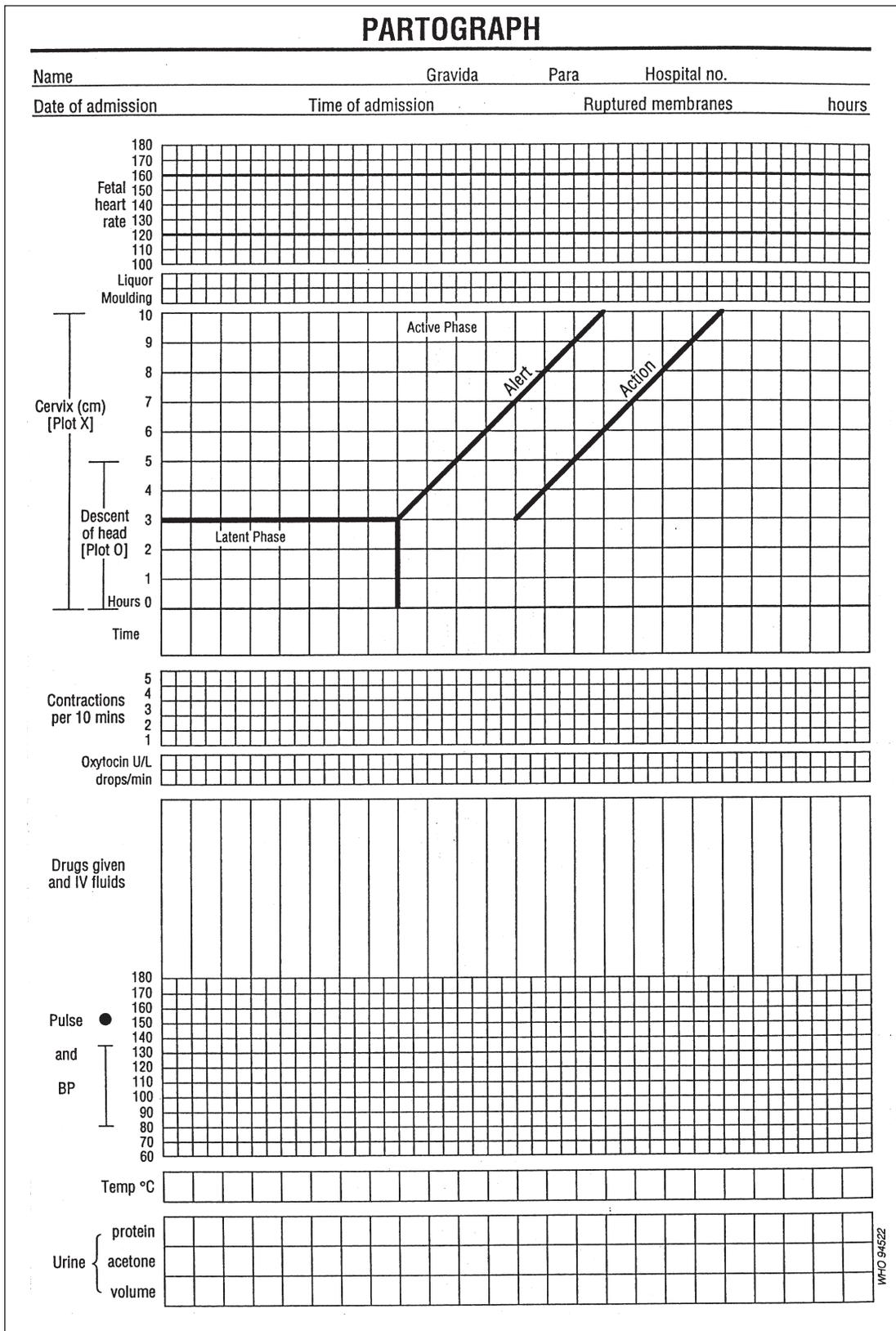
C1. PACKAGE COMPONENT: SKILLED ATTENDANT AT BIRTH

The single most important intervention for the mother and the baby is skilled attendance at delivery. A skilled provider can manage neonatal asphyxia, sepsis, and tetanus as well as maternal postpartum hemorrhage, sepsis, and obstructed labor. As early as 1955, WHO's expert committee on midwifery training was discussing a program to "result in the evolution from the use of traditional birth attendants and auxiliary attendants to a fully qualified midwife." Half a century later, it is finally becoming a priority in the major WHO initiative "Making Pregnancy Safer," which aims to "massively increase" the proportion of deliveries with a skilled attendant.

Currently only about half of the world's deliveries occur with a skilled birth attendant, and the reality is that there will still be women, especially in rural areas of low income countries, who deliver without a skilled birth attendant for many years to come. Each country and district must develop policies to maximize the coverage of skilled birth attendants and prioritize care for those who clearly are more likely to need emergency care. It is important for the informal and formal health sectors to identify realistic skills and roles for traditional birth attendants so that the formal health sector does not have unreasonable expectations of the informal sector and can help to supervise and monitor birth outcomes. Traditional birth attendants can have an important role in providing culturally appropriate health education and emotional support to women during pregnancy and childbirth and in offering a first link with the formal health care system⁽⁴⁾.

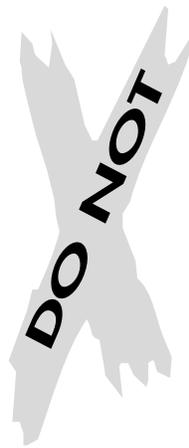
The primary role of the skilled birth attendant is to monitor and manage normal labor and delivery, identify problems in a timely manner, and respond to problems and, if necessary, refer the mother or newborn to a higher level of care. The realization of the importance of normal delivery has led to two new sets of guidelines for what should be done for the normal delivery^(35,64). The partograph is a key tool for early recognition of complications in labor⁽⁶⁵⁾. The partograph is a record of the progression of labor and delivery documenting cervical dilation, and fetal heart rate with time and alerting the attendant to slow, or abnormal progress (Figure 4.4). This record provides a standard for how often the attendant should measure which parameter and what is abnormal as well as a guideline for how to respond. This process is detailed in WHO's Managing Complications in Pregnancy and Childbirth on the CD-ROM.

FIGURE 4.4
THE WHO PARTOGRAPH FOR MONITORING PROGRESS IN LABOR



The presence of a trained supportive companion (sometimes called a doula) at delivery in addition to a skilled birth attendant has been shown to reduce the rate of instrumental delivery and to improve the mother's perceptions of the experience of labor⁽⁶⁶⁾. A randomized study in Botswana found that the presence of a female relative during labor also improved outcomes⁽⁶⁷⁾, and this may be more feasible in low-resource settings than providing a doula in addition to a skilled birth attendant. In Botswana, the presence of a female relative was also closer to tradition and improved women's satisfaction with hospital delivery. These findings emphasize that if a doula is not present at delivery, the skill of the attendant is not the only important factor. The attendant's attitude to the laboring women is also important in influencing outcomes⁽⁶⁸⁾.

Many unhelpful practices in common use during labor should be discontinued^(69,70). Some examples include:



- shaving pubic hair;
- giving an enema to empty the bowels;
- electronic fetal monitoring;
- giving medication (oxytocics) to speed up labor without close medical supervision;
- not letting the woman eat or drink;
- repeated vaginal examination;
- getting the woman to lie on her back during labor/delivery;
- routine episiotomy;
- taking the baby away from the mother at birth; and
- unnecessary cesarean section operations.



TABLE 4C.1

**CARE DURING DELIVERY INTERVENTION PACKAGE****PACKAGE COMPONENT – SKILLED ATTENDANT****Definition**

Skilled birth attendants are “people with midwifery skills (i.e., doctors, midwives, and nurses) who have been trained to proficiency in the skills to manage normal deliveries, diagnose and manage or refer complicated cases.” The skilled attendant may practice at any level of care--- in the home, health center, or hospital.

Specific tasks of the skilled attendant

- ✓ Monitoring the well-being of the mother and baby during labor by using:
 - woman-centered approach, providing encouragement;
 - partograph to record progress and identify problems early; and
 - fetal stethoscope to monitor fetal heart rate and detect fetal distress.
- ✓ Managing the normal delivery:
 - encouragement, support;
 - clean delivery;
 - drying and wrapping the newborn;
 - active management of the third stage of labor;
 - immediate administration of oxytocin (10 units IM within 1 minute of delivery of the baby);
 - controlled traction of cord (clamp the cord, apply counter-pressure to the uterus, and when the uterus contracts, pull very gently downward on the cord. Never pull without applying counter-pressure above the pubic bone with the other hand). MCPC⁽⁷⁾ for more details; and
 - uterine massage.
- ✓ Managing complications for mother and immediate complications for the newborn:
 - early identification of complications and quick response or referral; and
 - ability to resuscitate the newborn.

Increasing coverage of deliveries with skilled attendants

WHO and partners have set a goal of coverage that includes:

- ✓ training more skilled attendants, using pre-service and in-service training that is competency-based;
- ✓ providing supervision and ongoing in-service training to maintain skills and update with new practices; and
- ✓ instituting specific programs targeting populations with low coverage, i.e., rural or certain ethnic groups.

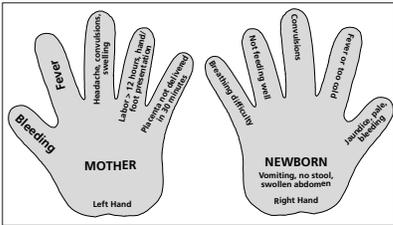
Increasing quality of care

- ✓ Standards for care, staff coverage, and supplies.
- ✓ Skilled staff, with competency maintained.
- ✓ Sustainable supplies.
- ✓ Safe blood supply.



Women, households, communities, and caregivers must be able to recognize key danger signs in labor (Table 4.3) and must have a plan to access emergency care. Skilled attendants should be able to identify potential complications early, using tools such as the partograph. In many settings, the staff's lack of competence in recognition of danger signs results in delays that can cost the lives of mothers and newborns. Facilities with regular audits of deaths and life-threatening illnesses will be able to assess this potential problem.

**TABLE 4.3
DANGER SIGNS IN PREGNANCY**

<p>What are the danger signs in labor?</p> <ul style="list-style-type: none"> ✓ Heavy bleeding (more than 500 mL or a pad soaked every 5 minutes or less). ✓ Fever more than 38°C (more than 100.4°F). ✓ Convulsions. ✓ Labor lasting more than 12 hours. ✓ Placenta not delivered within 30 minutes. <p>Who should know the danger signs?</p> <ul style="list-style-type: none"> ✓ Individual women. ✓ Households, especially decision-makers such as husbands and mothers-in-law. ✓ Other community members, especially proxy decision-makers if the husband is away (i.e., village elders). ✓ Caregivers in the informal sector (i.e., TBAs). ✓ Attendants at delivery. 	<p>See Figure 4.2</p> 
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Source: WHO/RHR/00.7.⁽⁷⁾ 

C. CARE DURING DELIVERY INTERVENTION PACKAGE

C2. PACKAGE COMPONENT: EMERGENCY OBSTETRIC CARE

Comprehensive emergency obstetric care (CEmOC) is the management of complications in pregnancy, during delivery, or in the postpartum period. This includes surgical obstetrics (cesarean-sections, treatment of lacerations, laparotomy), anesthesia, medical treatment of shock, eclampsia and anemia, blood replacement, manual procedures, and assisted delivery. However, because many obstetric emergencies occur far from institutions where comprehensive care is available, there is a need for obstetric first aid in the community and for basic emergency obstetric care (BEmOC) to stabilize the woman at a peripheral center (Table 4.4).

TABLE 4.4
EMERGENCY OBSTETRIC CARE STANDARDS

LEVEL OF CARE	STAFFING	TASKS	RECOMMENDED RATIO
Obstetric first aid in the community.	Village health workers. TBAs. Families.	Uterine massage. Oral rehydration salts. Possibly oxytoxics and antibiotics, depending on capacity and policy.	Recommended for all communities.
Basic emergency obstetric care (i.e., health center).	Midwives. Paramedics. Possibly physicians.	Vacuum extraction. Manual removal of placenta. Antibiotics, oxytoxics, magnesium sulfate, and IV fluids as indicated.	Four facilities for 500,000 people.
Comprehensive emergency obstetric care.	Physicians. Midwives. Paramedics.	Some basic emergency care. Cesarean section. Assisted removal of retained placenta. Safe blood transfusion.	One facility for 500,000 people.

Source: Fuerstein, 1993⁽⁷¹⁾.

 TABLE 4C.2  CARE DURING PREGNANCY INTERVENTION PACKAGE	
PACKAGE COMPONENT – EMERGENCY OBSTETRIC CARE	
<p>Definition</p> <p>Obstetric emergencies are life-threatening to mother and/or baby and occur in about 15 percent of deliveries.</p> <p>Specific tasks for emergency obstetric care (EmOC)</p> <ul style="list-style-type: none"> ✓ Rapid assessment and stabilization of the woman with complications (life-saving skills). ✓ Capacity to perform safe cesarean-sections. ✓ Capacity to manage major maternal complications: <ul style="list-style-type: none"> • bleeding; • infection; • obstructed labor; • pre-eclampsia/eclampsia; and • preterm labor. ✓ Ability to manage initial neonatal emergencies, particularly neonatal resuscitation. <p>Increasing coverage of EmOC</p> <ul style="list-style-type: none"> ✓ Provide a minimum of one comprehensive EmOC facility and four basic EmOC facilities for 500,000 people (Table 4.4). ✓ Provide services 24 hours a day. <p>Increasing quality of EmOC</p> <ul style="list-style-type: none"> ✓ Maintain standards for care (for staff coverage and for supplies) that are known by all involved. ✓ Train staff to competency level and foster team work with clearly defined roles. ✓ Ensure adequate levels of supplies and functional equipment. ✓ Sustain safe blood supply. ✓ Practice emergency drills to assess and reinforce roles and skills. ✓ Monitor quality and reward staff who promote better quality of services. 	<p style="text-align: center;">  Best Reading: WHO/RHR/00.7⁽⁷⁾.   </p>

One specific complication that greatly affects neonatal mortality is preterm labor. Preterm birth is a major factor in at least 20 percent of neonatal deaths globally. Even in industrialized settings, preterm labor is often of unknown cause and is very difficult to halt⁽⁷²⁾. Table 4.5 provides some suggestions on how to manage this condition. However, there are several simple and inexpensive policies that, if implemented, could dramatically reduce mortality of preterm babies. These include:

- giving intramuscular steroid injections to women in preterm labor, a treatment that would reduce respiratory distress due to surfactant deficiency and neonatal mortality by about 50 percent^(73,74); and
- giving antibiotics if there is spontaneous rupture of the membranes before 37 weeks of gestation⁽⁷⁵⁾, which has been shown to reduce infections in the neonate especially respiratory tract infections.

More information about management of preterm labor is available on the CD-ROM.

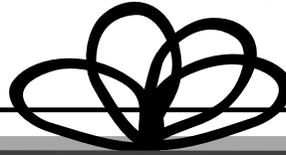
**TABLE 4.5
MANAGEMENT OF PRETERM LABOR**

<p>Definition Preterm labor is labor that starts before 37 completed weeks of pregnancy.</p> <p>Identification of preterm labor</p> <ul style="list-style-type: none"> ✓ Relies on the woman knowing her last menstrual period accurately or antenatal records estimating gestation. ✓ Requires woman and attendants to recognize the importance of additional interventions for preterm labor and to refer or implement intervention. <p>Specific tasks</p> <ul style="list-style-type: none"> ✓ If associated rupture of membranes, give antibiotics (injection ampicillin and gentamicin). ✓ Give dexamethasone six mg IM four doses six hours apart, or betamethasone 12 mg IM two doses 12 hours apart. Do not give steroids if there is obvious infection. ✓ If the cervix is dilated less than three cm and there is no amnionitis, pre-eclampsia, or active bleeding, attempt to stop labor by: <ul style="list-style-type: none"> • giving a tocolytic drug, such as ritidrine (see MCPC⁽⁷⁾). Unfortunately, no current tocolytic is ideal; and • continuing careful monitoring of mother and baby (pulse, blood pressure, uterine contractions, blood/fluid loss, fetal heart rate). ✓ If the cervix is dilated more than three cm or there is amnionitis, pre-eclampsia, or bleeding, allow the labor to progress, monitor closely, and prepare to resuscitate and care for the baby.

Source: WHO/RHR/00⁽⁷⁷⁾, Crowley⁽³⁾. 

D. Postpartum Care of the Mother Intervention Package

Postpartum care of the mother is essential in reducing maternal deaths. However, it also clearly affects the newborn because the mother's ongoing health and survival are crucial for the baby's. Ideally, the same skilled birth attendant who is responsible for postpartum care of the mother will also be responsible for assessing the progress of the stable newborn during the first week. Integration of postpartum and newborn care in this way benefits both mother and newborn. At each postpartum visit, the primary focus should be assessing the condition of the mother (as well as the newborn) for danger signs, such as bleeding, infection, and breastfeeding problems. It is important to watch for breast engorgement to reduce the risk of developing breast abscesses. For many women who have just delivered, especially for those with their first baby, one of the most valuable inputs of postpartum care is the support and encouragement in basic care for their newborn, especially for exclusive breastfeeding. Because the primary focus of this manual is the newborn, this Intervention Package is only briefly discussed. The Best Reading list on the CD-ROM includes a number of very useful resources on this topic.



POSTPARTUM CARE OF THE MOTHER INTERVENTION PACKAGE

OVERALL VISION

For every woman to have routine postpartum care, timely recognition of danger signs, and access to quality medical care in the event of complications.

Aims of key interventions in the postpartum period.

1. Contact With a Skilled Caregiver

- Timing of routine care
 - ✓ Monitor mothers/newborns for at least the first 24 hours after delivery.
 - ✓ Schedule visits at 6-12 hours, 6 days and 4-6 weeks depending on local policy.
- Content of care
 - ✓ Provide support for mother and family, especially for breastfeeding.
 - ✓ Provide early identification of complications and referral.
 - ✓ Give Vitamin A, 200,000 IU, for the mother.
 - ✓ Provide family planning counseling.
 - ✓ Immunize the baby and advise the mother on newborn care.

2. Reduce Delays in Access to Emergency Care

- Educate women, households, and communities about early recognition of danger signs.
- Provide timely decision-making for referral.
- Provide timely transportation.
- Provide quality care, including:
 - ✓ standard protocols;
 - ✓ skilled staff;
 - ✓ sustainable supplies and equipment; and
 - ✓ safe blood supply.

E. Newborn Care Intervention Package

The overall vision for all newborn care is for babies to have as healthy a start as possible. This means that there needs to be early recognition of danger signs and complications to have timely access to quality medical care for treatment, if complications arise.

A newborn may belong to one of four major categories at birth:

- ❖ normal;
- ❖ normal but requiring special attention because of a maternal condition (i.e., HIV, syphilis);
- ❖ low birth weight but stable, at least initially; and
- ❖ experiencing complications.

All newborns require essential newborn care to minimize the risk of illness and to maximize their growth and development. Babies can quickly change from appearing normal to being very sick. Emergency preparedness by the family, community, and health care system is crucial because sick newborns need to be rapidly assessed, stabilized, and managed with standard emergency care protocols. A LBW baby is more likely to become ill than a normal birth weight baby. LBW babies need extra care for their basic needs and extra attention for the prevention and identification of illness. In India and Bangladesh, where about one-third of babies are LBW, good extra care for these babies could have a large effect on newborn survival.

The Newborn Care Intervention Package is divided into three Intervention Sub-Packages, which will be further discussed below.

-  E1. Essential Newborn Care for all Babies Intervention Sub-Package.
-  E2. Extra Newborn Care for LBW babies Intervention Sub-Package.
-  E3. Emergency Newborn Care for Sick Babies Intervention Sub-Package.

Each of these Intervention Sub-Packages is outlined in the same manner as the previous Intervention Packages. Each Intervention Sub-Package will have sub-package components, which will be discussed further as well as field examples. The Intervention Sub-Packages fall naturally along three themes. Most of the prevention services are included in the Essential Newborn Intervention Sub-Package. The majority of curative services fall under the Emergency Newborn Sub-Package. Many of the activities in the Extra Newborn Care Intervention Sub-Package are similar to those in the Essential Newborn Care Intervention Sub-Package, but they include a different emphasis and implementation, in view of the special needs of the LBW.

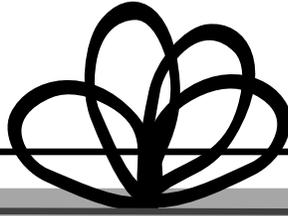
ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

E1. ESSENTIAL NEWBORN CARE

Basic needs for any newborn include breathing, warmth, cleanliness, feeding, and love⁽⁷⁸⁾. Clearly, good essential care of the newborn will prevent many newborn emergencies. For example, the umbilical cord may be the most common source of neonatal sepsis and also of tetanus infection, and good cord care could dramatically reduce the risks of these serious conditions. Breastfeeding has a significant protective effect against infections. Early breastfeeding with the baby held close to the mother reduces the risk of hypothermia, as well as hypoglycemia and jaundice.

Each of the eight aims listed for the Essential Newborn Care Intervention Sub-Package will be further discussed in the following sections.

In any setting, many traditions are associated with the care of newborns. Harmful practices can be perpetuated in hospitals as well as in the community. Part Three outlines approaches to assess local practices and categorize them as good practices to be promoted, harmful ones to be altered, and harmless ones to be ignored.



ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

OVERALL VISION

For every baby to have routine newborn care to enhance normal growth and development and to minimize risk factors for complications.

Aims of key interventions for essential newborn care.

1. Neonatal Resuscitation

- Ensure competent staff who are adequately equipped to provide quality emergency obstetric care and neonatal resuscitation.
- Encourage service providers to anticipate newborns who may require resuscitation and to plan accordingly.

2. The Clean Chain (clean hands, clean surfaces, clean blade to cut cord, clean cord tie, clean cloth)

- Promote use of clean delivery practices.
- Educate women/families/communities/skilled attendants on the importance of cleanliness and how this can be achieved.

3. The Warm Chain (dry baby, warm room, warm mother, wrap up, use hat).

- Educate women/families/communities/skilled attendants on the importance of keeping the baby warm.
- Encourage the use of simple techniques avoid hypothermia (i.e., avoiding excessive bathing, wearing hats, kangaroo care).

4. Breastfeeding

- Promote early initiation of breastfeeding (i.e., within the first hour).
- Promote exclusive breastfeeding for six months (Note: for HIV positive women see the MTCT/HIV below).
- Educate women/families/communities/skilled attendants on the benefits of breastfeeding.

5. Cord , Eye and Skin Care

- Educate women/families/communities/skilled attendants about the preventive measures to avoid infection (i.e., clean cord care).

6. Immunization

- Immunize all babies according to the local policy.

7. Vitamin K

- Provide Vitamin K 0.5 mg injection for all LBW babies (and one mg for normal birth weight babies, if this is the local policy).

8. MTCT/HIV

- Educate women/families/communities/skilled attendants about how HIV is transmitted to the newborn and ways to reduce their risk.
- Educate women/families/communities/skilled attendants on the issues surrounding HIV and breastfeeding so that they can make an informed decision.

The Essential Newborn Care Intervention Sub-Package has eight sub-package components, discussed below.

- E.1.1 Sub-Package component: Neonatal resuscitation.
- E.1.2 Sub-Package component: Clean chain.
- E.1.3 Sub-Package component: Warm chain.
- E.1.4 Sub-Package component: Breastfeeding.
- E.1.5 Sub-Package component: Cord, eye, and skin.
- E.1.6 Sub-Package component: Immunization.
- E.1.7 Sub-Package component: Vitamin K.
- E.1.8 Sub-Package component: MCTC/HIV.

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

E1.1 SUB-PACKAGE COMPONENT: NEONATAL RESUSCITATION

WHO estimates that approximately one to five percent of babies will require resuscitation at birth⁽⁷⁹⁾. This means that up to 6 million babies per year require resuscitation. Of these six million, about 1 million will die and an unknown number will have long-term disabilities. Many of these babies could be saved with very basic resuscitation. An international study found that 80 percent of babies requiring resuscitation needed only a bag and mask (ambubag) and room air⁽⁸⁰⁾. This means that oxygen and more complex procedures, such as endotracheal intubation, are not necessary to save most of these newborns. The basics of neonatal resuscitation are outlined in Table 4E.1.1.

The main barriers to effective resuscitation are lack of competent staff and lack of simple equipment. If competency in neonatal resuscitation is listed as a required skill for skilled attendants, the outlook for the asphyxiated infant will improve considerably. Competency-based training for neonatal resuscitation requires the use of a baby “dummy” with bags that inflate to show the resuscitator that they are inflating the lungs. The most common error in resuscitation is underinflation of the lungs. Correct placement of the mask and the placement of the baby’s neck are important. Watching the chest of the baby to ensure that it is moving is crucial. If the inflating bag has a blow-off valve at 30 cm of water, it is very unlikely that the baby’s lungs will be damaged. These inflating bags are available for about US \$6 but could be cheaper if mass-produced. WHO has also developed a device whereby the practitioner can blow into a tube attached to a mask without a valve to inflate the lungs. The practitioner is to be taught to blow at the right pressure by practicing with a sphygmomanometer (blood pressure machine). However, because the user is likely to be alone and also to be taking care of the mother, simultaneously evaluating the correct rate (around 40 respirations per minute) and pressure for ventilation may be unrealistic.

There are many practices associated with neonatal resuscitation that are not based on evidence and may be harmful. Some newborn resuscitation practices that should be discouraged include⁽⁸²⁾:



- slapping, blowing on, or pouring cold water on the baby;
- holding the baby upside down;
- routine suctioning of the mouth and nose of a well baby;
- heavy suctioning of the back of the throat of any baby; and
- giving injections of respiratory stimulants or routine sodium bicarbonate injections.

The introduction of a standardized resuscitation protocol in a province in China reduced harmful practices, strengthened good practices, and dramatically reduced neonatal deaths (Panel 4.9)⁽⁸¹⁾. About two-thirds of babies requiring resuscitation can be predicted before delivery as a result of obvious problems, such as preterm birth, detected fetal distress, multiple pregnancy, etc. In these cases, the attendant should try to identify a partner who can take care of the mother, while the person who is most competent in neonatal resuscitation takes care of the baby. While the goal is to have skilled attendants at all deliveries, the reality is that it will take time before this occurs in certain parts of the world. In the meantime, there needs to be pragmatic ways to save the lives of mothers and babies. Many babies with asphyxia are born at home with a TBA⁽⁸³⁾. In India, TBAs were trained to carry out resuscitation. Panel 4.11 summarizes a Chinese experience on improving neonatal resuscitation practices while Panel 4.12 shares lessons learned from a community based program in India.

Care after resuscitation is also vital for the newborn. A baby that has been successfully resuscitated will require close observation for at least the first 12 hours. This baby is at greater risk of developing hypoglycemia, and if the brain was hypoxic for a significant period, the baby may start convulsing a few hours after birth. Care of the asphyxiated newborn is discussed under the Emergency Newborn Care Intervention Sub-Package (Table 4E3.5). If the baby could not be resuscitated, the mother will need careful counseling.

Table 4E1.1 outlines the equipment and appropriate procedures needed to resuscitate a newborn, more detail about equipment for the newborn is provided in the Appendix.



PANEL 4.11
LESSONS LEARNED

RESUSCITATION PROTOCOL REDUCES NEONATAL MORTALITY BY TWO-THIRDS IN A CHINESE PROVINCE

Neonatal asphyxia is the leading cause of neonatal mortality in China, and as neonatal mortality accounts for 60 percent of infant deaths, this is the key issue to meet national goals of reducing IMR by one-third. However, “traditional” resuscitation is still widely practiced, including wiping the baby’s body with alcohol as well as administering injections, such as Vitamin C, 50 percent glucose, sodium bicarbonate, and dexamethasone.

A program in Zhuhai City, close to Macau, instituted standardized neonatal resuscitation program guidelines based on the American Academy of Pediatrics guidelines (1990). The guidelines specified oro-pharyngeal suction, followed by ventilation with bag-and-mask or endotracheal tube. Cardiac compression was performed for babies with a heart rate below 60 beats per minute after effective ventilation. Injections were rarely to be used and restricted to sodium bicarbonate or adrenaline for specified situations. Training materials were developed and certification provided for those who were trained.

Over a two-year period, the early neonatal mortality rate (deaths in the first week) dropped from 9.9 per 1,000 live births to 3.4 per 1,000 live births. Of the 21 babies with severe asphyxia (defined as an APGAR score of less than three), only one infant was found to have cerebral palsy. Hence, by changing to a standard resuscitation policy, the early neonatal mortality rate was reduced by two-thirds, still with a low rate of long-term disability.



Source: Zhu et al⁽⁸¹⁾. 



TABLE 4E1.1

**ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE****SUB-PACKAGE COMPONENT – NEONATAL RESUSCITATION****Identification of babies to resuscitate**

- ❖ Not breathing at birth.
- ❖ Blue color of mouth and body, or floppy and white.

Be Prepared!

Standards and staff:	Develop resuscitation standards for different levels at your setting. Use existing national or WHO guidelines as a basis. Provide competency-based training for all staff who will be at deliveries. Provide supervision and on-going training, as these skills can be lost.
Supplies and equipment:	Dry clean cloth. Bag and mask (ambu bag). Suction apparatus (a range of options are detailed in the WHO document). Gloves.
Additional equipment:	Shelf to put the baby on. Method to keep the baby warm, such as overhead light bulbs. Oxygen supply.

Immediate actions

- ✓ Dry the baby and cover with a clean cloth.
- ✓ Suction the mouth and nose if required (over-suctioning at the back of the throat can make the baby's condition worse).
- ✓ Place the baby correctly, with a small roll of cloth under the neck to extend it slightly.
- ✓ Place the mask (attached to the bag) firmly over the baby's mouth and nose and form a seal.
- ✓ Squeeze the bag to inflate the lungs at a rate of 40 respirations per minute.
- ✓ Watch the baby's chest carefully to see that the chest is rising and falling as you squeeze the bag.
- ✓ If the baby starts breathing regularly, stop using the ambubag.
- ✓ If there is no gasping or breathing at all, stop resuscitating after 20 minutes.
- ✓ If there was gasping but no spontaneous breathing, stop resuscitation after 30 minutes.
- ✓ Universal precautions should be observed, including hand washing, disinfecting all equipment, and use of gloves, if available.

Actions after baby is stable and breathing

- ✓ Warm the baby if she or he has become cold (see Table 4E1.3).
- ✓ Keep the baby under observation until she or he has been stable for at least 6 hours.
- ✓ Explain what happened to the mother.
- ✓ See box on neonatal asphyxia for information on how to deal with further problems.

Mouth-to-mouth resuscitation

If a bag and mask are not available, mouth-to-mouth resuscitation is effective.

The risk of infection to the resuscitator can be reduced by cleaning blood and mucus from the baby's face and mouth with a cloth and placing a cloth over the babies mouth and nose before starting to ventilate.

Seal the mouth and nose with your mouth, and blow at a rate of 40 respirations per minute.





PANEL 4.12
LESSONS LEARNED

COMMUNITY-BASED NEONATAL RESUSCITATION IN INDIA

Birth asphyxia is a major cause of neonatal deaths. Many neonates affected by birth asphyxia are born at home with TBAs. Kumar conducted a study in rural communities in India to evaluate the effect of training on the resuscitation practices of TBAs. From 8 to 100 TBAs attended training sessions on resuscitation techniques in an area near Chandigarh, India. These trainings were performed in response to the Primary Health Center's finding that TBAs relied on traditional methods of resuscitation, such as instillation of onion juice in the nostrils, milching of the umbilical cord, and warming the placenta.

TBAs were trained in several resuscitation techniques, including:

- ❖ gravity drainage of secretions and cleaning the mouth with a finger wrapped in gauze;
- ❖ physical stimulation by flicking at the soles of the feet;
- ❖ mouth-to-mouth resuscitation and cardiac massage;
- ❖ prevention of heat loss by wrapping the baby in multiple layers of cloth; and
- ❖ some TBAs were later trained to use a mucus extractor and bag-and-mask ventilation.

Results showed that most of the trained TBAs used a combination of traditional and modern resuscitation methods (30 of 45 babies). Thirteen babies were resuscitated with modern methods alone. Only two TBAs exclusively used traditional resuscitation methods. Among 21 cases delivered by the TBAs who had received advanced training, mucus extractors and bag-and-mask were used in 33.3 percent and 42.6 percent of cases, respectively. Adoption of modern resuscitation methods by TBAs who received advanced training, demonstrates that after training they are likely to change their practices. Unfortunately, no data were available on outcomes for the babies or as to whether the asphyxia could have been prevented by improved intrapartum care.



Source: Kumar⁽⁸⁴⁾.

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

E1.2 SUB-PACKAGE COMPONENT: CLEAN CHAIN

Cleanliness at delivery would be a major step forward in reducing the risk of infection for the mother and baby, especially neonatal sepsis and tetanus. However, “simple” cleanliness is often not simple to achieve⁽⁸⁵⁾. Cleanliness requires mothers, families, and birth attendants to avoid harmful traditional practices, and prepare necessary materials. Hand washing is the single most important behavior to emphasize for both family members and health care workers (Table 4E1.2).

There are six main components to using the clean chain including the following steps. First, the attendant’s hands should be washed with soap immediately before delivery, and fingernails should be kept short. In settings with high HIV prevalence, it may be important for the attendant to wear gloves to protect against the risk of transmission. Gloves may be scarce and reuse of gloves may be a source of infection. If gloves do have to be reused, they can be steamed clean as described in MCPC on the CD-ROM. Second, delivery on a clean surface is very important in reducing the risk of tetanus^(86,87) and also probably sepsis, although the risk for sepsis has not been shown as clearly as the risks for with tetanus. If the clean surface is a washed cloth or sheet on the mother’s abdomen, it can then be used to dry and wrap the baby. Placing the sheet on the mother’s abdomen can help to promote breastfeeding and reduce heat loss. Third, cutting the cord with a clean instrument is crucial. A new or freshly boiled blade is an inexpensive, clean cord-cutting implement. Fourth, the cord should be either firmly tied with clean thread or clamped with a cord clamp, if available. Subsequent care of the cord is discussed in “Umbilical Cord Care.”

The use of clean delivery kits may facilitate the promotion of cleanliness at birth, especially if there is no skilled attendant (Panel 4.13). Most clean delivery kits include soap, a plastic sheet for delivery, a clean blade, and a cord tie.

 TABLE 4E1.2 	
ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE	
SUB-PACKAGE COMPONENT – CLEAN CHAIN	
	<p>Clean delivery (WHO six cleans)</p> <ul style="list-style-type: none"> ✓ Clean attendant’s hands (washed with soap). ✓ Clean delivery surface. ✓ Clean cord-cutting instrument (i.e., razor blade). ✓ Clean string to tie cord. ✓ Clean cloth to wrap the baby. ✓ Clean cloth to wrap the mother. <p>(A clean birth kit may help promote clean deliveries).</p> <p>After delivery</p> <ul style="list-style-type: none"> ✓ All caregivers should wash hands before handling the baby. ✓ Feed only breast milk*. ✓ Keep the cord clean and dry. ✓ Use a clean cloth as a diaper/napkin. ✓ Wash baby’s bottom and your hands after changing diaper/napkin. <p>*Note: If the mother is HIV-positive, then alternatives to breastfeeding may be better for the baby, and the family should be counseled before delivery.</p>
	

Source: WHO⁽⁶⁴⁾. 

PANEL 4.13 LESSONS LEARNED

SOCIAL MARKETING OF CLEAN DELIVERY KITS IN RURAL NEPAL



Contents of clean delivery kit.

In Nepal, 92 percent of deliveries occur at home, often in unhygienic conditions. A birth is considered polluting, so a traditional birth is conducted as far from the home as possible (for example, in a cowshed or field). The dirtiest implements and materials of least value are used as the surface for delivery, cord cutting, and tying. The concept of Clean Home Delivery Kits was developed in Nepal by PATH, UNICEF, and Save the Children-USA. The purpose of the kit was to encourage clean birth practices to reduce maternal and infant mortality and morbidity. The components in the kit were sealed in a plastic bag and included:

- ❖ 1 small piece of soap for hand washing;
- ❖ 3 pieces of string for tying the cord;
- ❖ 1 new stainless-steel blade for cutting the umbilical cord;
- ❖ 1 plastic sheet to serve as the clean delivery surface; and
- ❖ pictorial instructions showing how and in which sequence to use the kit components, with an emphasis on hand-washing.

Items that have been included in kits elsewhere include wooden fingernail cleaning sticks, cord-cutting surface (for example, in Nepal, a plastic coin), latex gloves, pieces of gauze for various uses, eyedropper for placing medication (tetracycline) in the baby's eyes, flashlight, and small bowls for washing with hot water.

The kits in Nepal were developed through needs assessment and field trial research. The contents are preassembled by a self-sustaining business run by local women and are made available for sale from small shops, health posts, medical stores, health volunteers, and TBAs. Over the past five years these kits have been advertised through several social-marketing techniques:

- ❖ the Ministry of Health promoted the kits in Safe Motherhood campaigns;
- ❖ radio spots were broadcast, and advertisements were shown in cinema halls;
- ❖ local and international NGOs promoted the kits at the community level;
- ❖ posters, flashcards, banners, village billboards, and flyers gave information about the kit;
- ❖ street dramas were performed; and
- ❖ mobile units with speaker systems promoted the kits at community markets.

An evaluation of clean delivery kits was carried out in three districts in Nepal during 1998. Surprisingly, over 90 percent of those who did not use a kit still used a new or boiled blade to cut the cord, possibly influenced by the social marketing campaign. The use of a clean blade was found to be very effective in reducing infections. Untrained birth attendants who used the kit were much more likely to wash their hands than those not using the kit (91% compared to 76%). Kit users were more likely to use soap among both trained (96% vs 73%) and untrained attendants (84% vs. 46%). Interestingly, less than five percent of mothers left the cord uncovered with nothing on it, even though this was the targeted behavior. Satisfaction with the kits was high, and more than 90 percent of users planned to buy kits again.

Source: Tsu⁽⁸⁸⁾, PATH⁽⁸⁹⁾, WHO/FSE/MSM/93.10⁽⁹⁰⁾.

^a PATH is currently developing a manual on the use of clean delivery kits, with funding from the Gates Foundation.

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

E1.3 SUB-PACKAGE COMPONENT: WARM CHAIN

Avoiding hypothermia (rectal temperature less than 36.5°C [96.8°F]) is important for newborn health outcomes because hypothermia increases morbidity and mortality. LBW babies are especially susceptible to becoming cold (Table 4E1.3). All newborns, however, can easily lose heat. The risk of losing heat is greatest when the baby is wet (i.e., just after delivery or being bathed). A baby can lose one degree of body temperature per minute when wet, even in a room that is not obviously cold. To prevent heat loss, it is necessary to dry the baby and wrap him or her in a clean, dry cloth and to make sure the baby's head is covered. This may appear simple but very often is not done⁽⁹¹⁾. At both home and institutional deliveries, the baby is often left wet and unwrapped while the placenta is delivered. Preventing hypothermia for the newborn has been described as the warm chain, the opposite of the cold chain for vaccine transport. The consequences of changing temperature can be as serious as that of inactivating vaccine efficacy. Preventing hypothermia is a challenge in the community as well as institutions (Panel 4.14).

TABLE 4E1.3

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE	
PACKAGE COMPONENT – WARM CHAIN	
	<p>At delivery</p> <ul style="list-style-type: none"> ✓ Ensure the delivery room is warm (25° to 28° C), with no drafts. ✓ Deliver the baby on a clean surface. ✓ Dry the baby immediately. ✓ Wrap the baby with clean dry cloth. ✓ Keep the baby close to the mother (ideally skin-to-skin) to stimulate early breastfeeding. ✓ Postpone bathing for 6 hours*. <p>After delivery</p> <ul style="list-style-type: none"> ✓ Keep the baby clothed, wrapped with the head covered. ✓ Minimize bathing, especially in cool weather or for small babies. ✓ Keep the baby close to the mother. ✓ Use kangaroo care for stable LBW babies or for rewarming stable bigger babies. ✓ Show the family how to avoid hypothermia, how to recognize it, and how to rewarm a cold baby. The family should aim to ensure that the baby's feet are warm. <p>* In high HIV prevalence areas, early bathing may be a strategy to prevent MTCT/HIV.</p>
	

Source: WHO/FHE/MSM 97.2⁽⁹¹⁾. 

PANEL 4.14
LESSONS LEARNED

KEEPING NEWBORNS WARM IN NEPAL

The normal infant is most sensitive to hypothermia in the first 6 -12 hours after delivery. Hypothermia can easily occur in a newborn who is left exposed and wet. This can happen, if health care workers wait until the placenta is delivered and the cord is cut to dry and wrap the baby. In Nepal, TBAs were trained to take rectal temperatures. They found that 58 percent of newborns born between January and March had a temperature of less than 35°C within 12 hours of birth. TBAs were trained to:

- ❖ wrap/warm babies immediately instead of letting them rest on the floor until the cord was cut;
- ❖ postpone bathing; and
- ❖ keep babies' heads covered.

These types of community initiatives demonstrate the importance of involving local stakeholders in needs assessment activities and the potential for teaching important techniques to TBAs.

Source: Levitt⁽⁹²⁾.

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

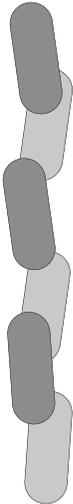
E1.4 SUB-PACKAGE COMPONENT: BREASTFEEDING

Breastfeeding provides many advantages for the baby, mother, and society. Despite the well-known advantages (outlined in Part One), early and exclusive breastfeeding requires active support at all levels of care⁽⁹³⁾.

Support for individual women is crucial. Helping the mother to position the baby correctly to avoid sore nipples and answering her concerns (i.e., inverted nipples or not producing enough milk) can increase a woman's confidence in her ability to provide adequate nutrition to her newborn. First-time mothers and mothers of LBW babies or babies with problems, such as cleft palate or lip or a very small jaw, need additional encouragement and support in breastfeeding. Counselors trained in breastfeeding support have been shown to be highly effective at increasing the proportion of babies who are fed early and who are exclusively breastfed. Support is more effective if the counselor visits the new mother at home⁽⁹⁴⁾. More details on good positioning are available on the CD-ROM.

Policy support is also required at the institutional level and can include closing “well-baby wards,” practicing “rooming in,” and taking other steps to make hospitals “baby-friendly” (Panel 4.15). At the community level, the mother can be supported to rest at home by providing more help with her work/childcare while she is lactating. Keeping the baby with the mother in the first hours and days of life not only promotes breastfeeding but reduces infections and hypothermia. National and international policy support is also effective through maternity leave policies and enforcement of the international marketing code, which limits advertising practices of breast milk substitutes.

Table 4E1.4. provides an outline of the key components of breastfeeding.

 TABLE 4E1.4 	
ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE	
SUB-PACKAGE COMPONENT – BREASTFEEDING	
	<p>Early breastfeeding = breastfeeding within the first hour, with counseling for correct positioning.</p> <ul style="list-style-type: none"> ✓ Early breastfeeding reduces the risk of postpartum hemorrhage for the mother. ✓ Colostrum (the "first milk") has many benefits for the baby, especially anti-infective properties. ✓ Lying on the mother while feeding helps the baby stay warm. ✓ The full milk supply will start more quickly and more milk will be produced in the long-term. <p>Exclusive breastfeeding = breast milk alone for the first 6 months of the baby's life.</p> <ul style="list-style-type: none"> ✓ Breastfeeding delays the mother's return to fertility because of lactational amenorrhoea. ✓ Breastfeeding provides the best possible nutrition for the baby. ✓ Unless extremely malnourished, virtually all mothers can produce enough milk. ✓ Feed day and night, at least 8 times in 24 hours, allowing on-demand suckling by the baby. ✓ If the baby is small (less than 2,500 grams), wake to feed every 3 hours. ✓ If the baby is not feeding well, seek help. ✓ Successful breastfeeding requires support for the mother, the family, and health institutions. ✓ There is no need for extra bottle feeds or water for normal babies, even in hot climates. ✓ Exposing the baby to water increases the likelihood of infections, especially diarrhea. ✓ Water reduces the effectiveness of breast milk in preventing infections and providing nutrition. <p>Note: If the mother has HIV, alternatives to breastfeeding may be better for the baby, and the family should be counseled and make an informed choice BEFORE delivery.</p>
	 

Source: LINKAGES⁽⁹⁵⁾, WHO/UNICEF/UNAIDS⁽⁹⁶⁾.

PANEL 4.15
LESSONS LEARNED

BEING FRIENDLY TO BABIES



LINKAGES- Ghana

The widespread adoption of exclusive breastfeeding has the potential to save the lives of more than 1.5 million infants each year. Since its launch by UNICEF and WHO in 1991, the Baby-Friendly Hospital Initiative (BFHI) has harnessed the support of other international organizations, health workers, breastfeeding advocates, policy makers, and mothers in both developing and developed countries. To be certified as “baby-friendly,” a maternity institution/hospital must adhere to the Ten Steps to Successful Breastfeeding presented below.

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers to initiate breastfeeding within a half-hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink unless medically indicated.
7. Practice rooming-in (allow mothers and infants to remain together, 24 hours a day).
8. Encourage breastfeeding on demand.
9. Give no artificial teats (feeding bottles) or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

As of June 1999, a total of 14,637 facilities had been designated as “baby-friendly” – 1,788 in Africa; 1,172 in Latin America/Caribbean; 10,428 in Asia; 780 in the Middle East; 230 in Eastern Europe; and 239 in other industrialized countries.

This progress has been achieved through effective partnerships at all levels (governmental, community, institutional, and individual). This initiative has improved both mother and child health and breastfeeding.



LINKAGES- Ghana

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

E1.5 SUB-PACKAGE COMPONENT: CORD, EYE, AND SKIN CARE

Umbilical cord care: As part of the clean chain, the cord should be cut with a clean implement and tied firmly with a clean tie. WHO's policy is not to leave the stump uncovered; no bandages or ⁽⁸⁶⁾. In many societies, however, this is a major change in behavior. Depending on local practices, it may be more feasible to encourage the use of an antiseptic alternative, such as Dettol or chlorhexidine, both of which have been shown to reduce colonization of the cord. Further study is required to evaluate the effect of these agents on prevention of neonatal sepsis and tetanus and the feasibility of their use in behavioral change. Delayed cutting of the cord until pulsation reduces anemia in the newborn, especially if preterm. However, the reduction in maternal postpartum hemorrhage with active management of the third stage has led to a clear policy of early clamping^(7,98) (Table 4E1.5A).



TABLE 4E1.5a


ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE
SUB-PACKAGE COMPONENT – CORD CARE
DO

- ✓ Cut the cord with a clean instrument (i.e., razor blade).
- ✓ Tie the cord tightly with clean thread or use a cord clamp.
- ✓ Keep the cord clean and dry and wash hands before touching it.
- ✓ Fold napkin or diaper below the cord stump.
- ✓ Apply chlorhexidine or an iodine compound, which may be beneficial in some settings, especially if it is an alternative to harmful local practices.
- ✓ Use topical antimicrobials only if the baby is in the hospital away from the mother and is at risk of infection with hospital organisms.

DON'T

- ✓ Bandages are unnecessary and may delay healing and introduce infection.
- ✓ Alcohol cleansing may delay healing.
- ✓ Applying traditional remedies to the cord may cause infections and tetanus.

WATCH OUT FOR

- ✓ Pus discharge from the cord stump.
- ✓ Redness around the cord especially if there is swelling.
- ✓ High temperature (more than 38° C) or other signs of infection.

Source: WHO/RHT/MSM/98.4⁽⁸⁶⁾.

Skin care: The skin of a newborn is vulnerable to infections, especially if the baby is preterm. Skin infections are more likely to result in serious infections, such as sepsis, in a newborn than in an older child. Vernix, the white greasy covering on a term baby's skin, is protective against infections and also against hypothermia. Simple principles to reduce the risk of skin infections are presented below:

- ❖ leave vernix on the skin; do not rub vernix off vigorously as this can damage the skin;
- ❖ change diapers soon after they are wet or dirty;
- ❖ ensure that caregivers wash their hands before handling the baby; and
- ❖ evaluate the local practices for skin care to decide if certain oils are helpful or harmful.

There is limited information on the use of oils on newborns' skin. Certain barrier creams may be helpful in strengthening the skin as a barrier to infection, especially for preterm babies. Some local oils, particularly mustard oil, may be harmful and damage the skin and increase the risk of infections. More evidence is needed before recommendations can be made on this subject.

Eye care: Ophthalmia neonatorum is defined as any conjunctivitis with discharge occurring during the first two weeks of life. The infection may become systemic or may result in permanent eye damage if treatment is delayed or inappropriate. The most common causes are gonococcus and chlamydia trachomatis, but these organisms cannot be distinguished on clinical examination alone, although gonococcal ophthalmitis tends to be more severe.

Gonococcal ophthalmitis can be prevented by cleaning the eyes immediately after birth and applying either silver nitrate solution (1%), tetracycline solution (1%) or erythromycin (0.5%) ointment. Silver nitrate is 93 percent effective against gonococcus, but there is a risk of chemical conjunctivitis, especially if the silver nitrate has been stored in a large container. This risk can be avoided by using single-dose or small containers and avoiding prolonged storage. Tetracycline ointment is 97 percent effective against gonococcus and also may be effective against some strains of chlamydia. Silver nitrate is not effective against chlamydia. Tetracycline and erythromycin are preferable to silver nitrate as their effectiveness is broader and their cost is similar to the unidose silver nitrate, without the risk of chemical conjunctivitis. When prophylaxis fails, it is most often because it was administered too late (after the first hour). Eye prophylaxis is a simple, highly cost-effective intervention, costing US \$1.40 per case averted when the rate of gonococcal infection is greater than ten percent⁽⁹⁹⁾. Despite the proven efficacy of this preventive measure, it has not been widely implemented (Table 4E1.5b).

If an infant develops ophthalmitis, early identification and treatment is important. Treatment involves injection ceftriaxone, 25-50 mg/kg IM in a single dose (maximum 125 mg). In addition, the eye needs to be cleaned and tetracycline (1%) should be applied or erythromycin (0.5 percent) ointment every four hours (for one to two days) until the pus has cleared.

TABLE 4E1.5b	
ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE	
SUB-PACKAGE COMPONENT – EYE CARE	
DO	<ul style="list-style-type: none"> ✓ Clean eyes immediately after birth (provided the baby is stable). ✓ Give prophylactic eye drops (tetracycline ointment 1%). This precaution costs US \$1.40 per case of ophthalmitis averted (if more than ten percent of women have gonococcal infection). ✓ Administer drops within 1 hour of birth.
DON'T	<ul style="list-style-type: none"> ✓ Put anything else in the baby's eyes.
WATCH OUT FOR	<ul style="list-style-type: none"> ✓ Discharge from the eyes, especially with redness and swelling around the eyes. ✓ Other signs of severe infection, such as fever (greater than 38°C [100.4°F]) and poor feeding.

Source:WHO/ FRH/MSM/96.13⁽¹⁰⁰⁾. 

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

E1.6 SUB-PACKAGE COMPONENT: IMMUNIZATIONS

Immunizations should be given according to the national immunization schedule. In most developing countries, BCG and oral polio are given at birth. In South Asia, hepatitis B immunization is usually given at birth. In sub-Saharan Africa, hepatitis B immunization is given first at six weeks of age along with the first diphtheria, pertussis, and tetanus immunization and the second oral polio dose. It is important to give immunizations to LBW and preterm babies according to their age and not by gestation or by weight. Sometimes clinicians delay immunizations for LBW babies. There is no evidence to support this delay, and it puts the baby at additional risk.

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

E1.7 SUB-PACKAGE COMPONENT: VITAMIN K PROPHYLAXIS

An injection of 1 mg of Vitamin K given to the newborn immediately after birth prevents bleeding due to Vitamin K deficiency and should be given to all LBW and sick neonates⁽¹⁰¹⁾. Injection Vitamin K is cost-effective for all newborns to prevent hemorrhagic disease of the newborn. It costs US \$52 per disability-adjusted life-year averted in areas of high incidence (more than 72 per 100,000 births)⁽¹⁰²⁾. Oral Vitamin K is widely used in Europe and is considerably less expensive. However, data on incidence from developing countries is lacking, and in many settings, although hemorrhagic disease of the newborn is severe, other conditions have a higher priority for intervention. A global recommendation to give Vitamin K to all neonates has not been made by WHO, although the vitamin is given in most industrialized and many transitional countries.

ESSENTIAL NEWBORN CARE INTERVENTION SUB-PACKAGE

E1.8 SUB-PACKAGE COMPONENT: PREVENTING MOTHER-TO-CHILD TRANSMISSION OF HIV

In settings where HIV prevalence is high (more than 5%), locally appropriate policies should be developed and applied in order to reduce mother-to-child transmission (MTCT/HIV). The goal is HIV-free child survival, and not merely avoiding HIV infection while increasing the risk of dying due to another cause⁽²¹⁾. Many factors will have to be examined, including attitudes towards HIV-positive individuals and available financing for MTCT/HIV programs. All stakeholders need to be involved in discussions to assess the feasibility and acceptability of potential policies. The cost of voluntary testing and counseling for HIV in antenatal clinics if HIV prevalence is more than five percent is estimated at US \$35 per disability-adjusted life-year averted, which is comparable to US \$20 to US \$40 per disability-adjusted life-year averted by polio and diphtheria-pertussis-tetanus immunization⁽¹⁰³⁾.

Indirect effects of new policies in the general population should also be considered. Examples include more violence against women who are identified as HIV-positive or increased child diarrhea deaths due reduced breastfeeding by HIV-negative as well as HIV-positive women^(104,105).

Interventions to reduce MTCT/HIV require two key actions.

Action 1: Women need to know their HIV status.

The goal is for women who consent to be tested during pregnancy to have access to full counseling. To achieve this, the following must be in place:

- Women attend an antenatal clinic.
- Women are willing to be tested for HIV.
- Trained counselors are available to allow women to be fully informed about the test, their result, and the consequences.
- Laboratory facilities are in place and reliable supplies of testing kits are available at low cost or free.
- There is a benefit to learning HIV status, such as an available intervention to MTCT/HIV.

In many settings with high HIV prevalence, this is far from the current reality for most women.

Action 2: Women must have real choices for action if they are HIV-positive.

The decision to test is based on the balance of benefits and barriers for the woman and for her baby. This balance will vary by setting and for individual women. In many settings where the stigma of HIV is high, the cost of diagnosis may be social rejection, and this is too high for most women. The M needs to be kept in MTCT programs^(104,105). Some of the benefits and costs affecting the decisional balance for women are outlined in Table 4.6.

TABLE 4.6
BENEFITS OF AND BARRIERS TO HIV TESTING OF PREGNANT WOMEN

	BENEFITS	BARRIERS
Mother	<ul style="list-style-type: none"> • Mother is able to make informed choices and plan for future. • Antiretroviral treatment is unlikely to be routinely available for most women, but other supportive care (e.g., Septrin prophylaxis, TB prophylaxis) may be available. 	<ul style="list-style-type: none"> • Mother risks rejection by family/society and possibly violence. • The fear of facing inevitable death. • Mothers choosing not to breastfeed may result in stigmatization.
Baby	<ul style="list-style-type: none"> • MTCT/HIV could be reduced from 25-35% to less than 10% depending on the availability of antiretroviral drugs and the feasibility of breastfeeding replacements⁽²¹⁾. 	<ul style="list-style-type: none"> • If mother decides not to breastfeed, there is an increased risk of infant morbidity and mortality from infection and malnutrition. • If mother gives mixed feeding (some breastfeeding, some breast milk substitutes), there is probably a higher risk of HIV transmission⁽¹⁰⁶⁾.

There are three main areas for interventions to reduce the risk of MTCT/HIV which are discussed below.:

- ❖ **Policies during labor and delivery:** Approximately 30 percent of babies who are infected with HIV from their mother are believed to be infected at delivery. Observing simple policies during delivery may reduce vertical transmission of HIV⁽¹⁰⁷⁾.
 - Avoid artificial rupture of membranes, if possible. The longer the membranes are ruptured before delivery the greater the rate of MTCT/HIV. The rate of transmission increases by two percent each hour after the membranes have been ruptured for 4 hours⁽¹⁰⁸⁾.
 - If possible, avoid an instrumental delivery (i.e., forceps) or the use of invasive procedures on the baby (i.e., scalp monitors). Avoid unnecessary episiotomies⁽¹⁰⁹⁾.
 - Giving the mother a vaginal douche with an antiseptic (such as chlorhexidine) reduces MTCT/HIV if the membranes have been ruptured for more than four hours.
 - Cesarean section combined with Zidovudine® reduces the risk of transmission to about two percent⁽¹⁰⁹⁾, but the procedure carries significant risk, especially in low-resource settings, and therefore cannot be recommended as a routine practice⁽¹¹⁰⁾.

- ❖ **Antiretroviral therapy:** There are numerous options of drugs, doses, and timing. Zidovudine[®] (antepartum/intrapartum/neonatal), Zidovudine[®] and Lamivudine[®] (3TC) (intrapartum/neonatal), and nevirapine (intrapartum/neonatal) have all been shown to be effective in randomized controlled trials. The question is how to translate this into policy for low-resource settings and how to put policy into practice⁽²¹⁾. The most feasible and cost-effective drug in low-resource settings may be Nevirapine, with one dose given to the mother during labor and one dose for the baby at 48-72 hours of age⁽¹⁰⁷⁾. A detailed discussion of the current recommendations is beyond the scope of this manual. The CD-ROM contains further information and also links to websites with updated information.

- ❖ **Policies for infant feeding:** The decision to use replacement feeding is extremely complicated due to three reasons. First, the risk of not breastfeeding in many low-resource settings may result in more infant deaths due to infections than would have occurred due to HIV transmission. Second, the cost of replacement feeding may be excessive. For example, in Kenya the cost of six months of artificial milk may be 150 percent of the average annual wage⁽¹¹¹⁾. Third, the social unacceptability of not breastfeeding is a barrier for many families. Even in a randomized controlled trial where women were carefully selected and counseled and all milk and medical care were supplied, at least 70 percent of those randomized to give artificial milk alone also gave breast milk⁽¹¹¹⁾. Women who plan to use replacement feeding may end up giving mixed breast and artificial milk, which may in fact put the baby at higher risk of MTCT/HIV and also at higher risk of infections and malnutrition⁽¹⁰⁶⁾.

There are three main options for feeding practices among women who are HIV positive or who have an unknown status. These options all presented below.

- *Replacement Feeding:* if replacement feeding is to do more good than harm, there must be availability of artificial milk at low cost or free, as well as safe water, a way to boil the water, and a way to sterilize bottles. The reality is that these prerequisites are lacking for many of the areas with high HIV prevalence.

- *Exclusive Breastfeeding:* if the mother is breastfeeding, good technique for feeding is as important as mastitis. Cracked, bleeding nipples increase the risk of transmission of HIV. An option being debated is whether HIV-positive women who choose to breastfeed in settings where there is little alternative could be supplied with an antiretroviral drug (Panel 4.16)⁽²¹⁾.

- *Breastfeeding with early rapid weaning.* Weaning at four to six months of breast milk and onto solids is another option, but data are still lacking on the reduction of MTCT/HIV by this strategy.

The considerations vary according to the setting, but also according to the individual woman. Skilled counseling and ongoing support of HIV-positive mothers is crucial. Other options for a few women include using an HIV-negative wet-nurse to feed the baby or expressing milk and heat-treating it to kill the virus.



PANEL 4.16 **LESSONS LEARNED**

PREVENTING MOTHER-TO-CHILD TRANSMISSION OF HIV IN SUB-SAHARAN AFRICA

In 1999, approximately 600,000 infants were infected as a result of mother-to-child transmission, mostly in sub-Saharan Africa. The increasing number of HIV-infected children places an enormous burden on families and the health care system. Through operations research, Horizons, a program implemented by the Population Council, seeks to identify cost-effective approaches to providing MTCT/HIV prevention services that meet the needs of women and their families.

UNICEF and UNAIDS, in conjunction with the governments of Zambia and Kenya, are supporting Horizons' research related to MTCT/HIV. This research examines several interventions:

- access to voluntary counseling and testing for all mothers; access to antiretroviral drugs for HIV-positive mothers; and
- access to breast milk substitutes for HIV-positive mothers.

This project found that several operational challenges accompanied the introduction of MTCT/HIV prevention services:

- identifying the best counseling approach and maintaining confidentiality;
- improving care during pregnancy for all women in the context of the MTCT/HIV prevention initiative; and
- including outreach activities and seeking community involvement and support.

Horizons has developed a training curriculum that addresses the roles of clinics and communities in preventing MTCT/HIV. Nearly 200 staff at three pilot sites in Kenya have received training using this curriculum. Participants report that the realization that they can do something to prevent MTCT/HIV has motivated them to offer care during pregnancy and counseling on HIV/AIDS.



Source: Population Council/Horizons. September 2000. "Prevention of Mother-to-Child Transmission of HIV."



PANEL 4.17
LESSONS LEARNED

BREASTFEEDING AND HIV IN NDOLA, ZAMBIA

In Zambia, one of every five persons between the ages of 15 and 49 years is infected with HIV, one of the highest HIV prevalences in the world. Approximately 25,000 Zambian infants are infected each year, either in utero, during delivery, or through breastfeeding. However, most Zambians do not know their HIV status.

The Ndola Demonstration Project is part of national efforts to address MTCT/HIV. The project is designed to enable women to make an informed choice to optimally feed their infants in the context of high HIV prevalence and to carry out that choice.

The following are key findings from the project's research all presented below.

- Breastfeeding is the norm, but exclusive breastfeeding is not common.
- Women who do not breastfeed may be stigmatized as promiscuous and/or having HIV.
- Community members and health workers tend to overestimate the rate of transmission of HIV through breastfeeding.
- Household food insecurity is widespread, and infant feeding options are limited because of economic concerns; replacement feeding with infant formula or modified cow's milk costs 4 months of the average wage.

The project has integrated improved counseling on infant feeding practices and maternal nutrition as well as providing HIV voluntary counseling and testing by existing community health services. Since this is a new project, there are no available evaluations yet.



Source: Linkages⁽¹¹²⁾.

E.2 EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE

E2 EXTRA NEWBORN CARE FOR THE LBW BABY

LBW babies are at much greater risk of dying than are normal-weight babies. A LBW baby born at term has about a 3-fold greater chance of dying than one with normal birth weight. However, a preterm baby has a 9- to 10-fold higher death rate depending on how premature the baby is.

Yet many babies weighing 1.75 to 2.5 kg (the majority of LBW babies) could be saved with simple interventions. In settings such as Bangladesh and India, where the LBW rate is about 30 percent and the majority of deaths are LBW babies, a little extra care of these babies could dramatically reduce neonatal mortality rates. In sub-Saharan Africa, where LBW rates are lower (usually about 15% or less) and a bigger proportion of LBW may be due to preterm birth, the effect of extra care for LBW babies may be less dramatic. However, other vulnerable groups of babies may benefit from the same philosophy of extra care, particularly babies of multiple pregnancies (twins, triplets) or babies with birth defects, such as cleft palate.



**EXTRA NEWBORN CARE FOR THE LBW BABY
INTERVENTION SUB-PACKAGE**

OVERALL VISION

For every baby to have routine newborn care to enhance normal growth and development and to minimize risk factors for complications.

Aims of key interventions for extra newborn care for the LBW baby.

1. Identification of the LBW Baby

- Identify LBW newborns using locally appropriate methods.
- Educate women/families/communities/skilled attendants on the special needs of a LBW baby and how they can address them.

2. Extra Clinical Care of the LBW Baby

- Promote breastfeeding and warmth of the well LBW baby.
- Educate women/families/communities/ skilled attendants on danger signs for the LBW baby.
- Provide quality care and simple appropriate technology for the care of the ill LBW baby.

3. Extra Support for Feeding

- Promote breastfeeding and warmth of the well LBW baby; including express breast milk.
- Provide support for women/families to care for the ill LBW baby.
- Educate women/families/communities/skilled providers on the newborn danger signs.

4. Extra Support for Warmth

- Educate women/families/communities/skilled providers about the importance of keeping the baby warm.
- Educate women/families/communities/service providers to use simple methods to ensure that the baby stays warm, such as kangaroo care.

5. Vitamin K

- Provide Vitamin K 0.5mg injection for all LBW babies.

The Extra Newborn Care Intervention Sub-Package has five sub-package components, which will be further discussed below:

- E2.1. Sub-Package component: Identification of the LBW baby.
- E2.2. Sub-Package component: Extra clinical care of the LBW baby.
- E2.3. Sub-Package component: Extra support for feeding.
- E2.4. Sub-Package component: Extra support for warmth.
- E2.5. Sub-Package component: Vitamin K prophylaxis.

E.2 EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE

E2.1 SUB-PACKAGE COMPONENT: IDENTIFICATION OF LBW BABIES

To target LBW babies for extra care, they must first be identified. However, it should be stressed that it is not necessary to weigh all babies with digital scales. For the purposes of targeting those babies most likely to need extra care, a simple alternative assessment, such as foot size or chest circumference with a color-coded tape, is all that is required (Figure 4.5). As more deliveries occur with a skilled attendant, recording of birth weight will become the norm. Ideally, each baby should be weighed and have the birth weight recorded.

In a study of 843 babies in Addis Ababa, Ethiopia, researchers attempted to identify a practical screening tool to identify LBW neonates. Gestational age, birth weight, and four body measurements (chest, head, and mid-arm circumference and length) were accurately recorded. The group used a simple predictive algorithm. Infants were classified as high risk if the head circumference was less than 31 cm or if chest circumference was less than 30 cm; otherwise they were classified as low risk. This algorithm has over ninety percent sensitivity and specificity for prediction of preterm and LBW births. This study shows that neonatal body measurements can be combined into a pragmatic, accurate screening tool⁽¹¹³⁾.

Figure 4.5 describes alternatives that can be used to identify BLW babies.

FIGURE 4.5
ALTERNATIVE METHODS FOR IDENTIFYING LBW BABIES

	<p>FOOT SIZE</p> <p>One community-based program in India taught village health workers to refer all babies whose foot length was less than 6.5 cm to the subcenter and to make frequent follow-up visits for newborns if foot size was 6.5–7.0 cm to supervise feeding and thermoprotection⁽¹¹⁴⁾.</p>
<p>CHEST, MID-ARM OR HEAD CIRCUMFERENCE</p> <p>Chest circumference has been used as a simple, accurate surrogate for birth size, but there is no agreed international cut-off point. A study in Ethiopia found that a chest circumference of less than 30 cm sensitively predicted LBW. The same study found that a head circumference of less than 31 cm was a good predictor⁽¹¹³⁾. Sensitivity and specificity are improved by combining measurement of chest circumference with either mid-arm circumference (less than 8.7 cm used in India) or with head circumference (less than 33 cm used in Brazil)⁽¹¹⁵⁾. The Brazilian study covered 5,000 newborns and identified 92.8 percent of LBW preterm babies and 76.5 percent of neonatal deaths⁽¹¹⁶⁾.</p>	
<p>SPRING BALANCE</p> <p>A simple spring balance developed by TALC (Teaching Aids at Low Cost, London) can be hung from a tree or held by hand with the baby in a cloth sling. The scale can be color-coded for illiterate users. It is accurate to within +0.02 kg in the range 1.6–4.8 kg⁽¹¹⁷⁾. A simpler spring-based device is available from PATH (BIRTH weigh IITM) that indicates if the baby's weight is more than 2.5 kg, but it is not useful for monitoring on-going weight gain.</p>	
	<p>BALANCE SCALES</p> <p>Most hospitals and many health centers are equipped with balance scales, and while these are more accurate, they are expensive and require maintenance as well as competency in use.</p>
<p>ASSESSING GESTATIONAL AGE</p> <p>Ultrasound assessment of gestational age in utero is often considered the gold standard, but it is not available for most of the world's pregnancies. Basing gestational age on the last menstrual period may be more inaccurate in settings where western calendars are not used and also where prolonged lactational amenorrhoea is common. Assessment of gestational age traditionally requires a high level of clinical skill, and the Dubowitz examination score may take two doctors 20 minutes to perform on a stable baby. Simpler scores are available, such as the Parkin score or the simplified Ballard score. The use of breast nodule size alone for assessing gestation has been piloted⁽¹¹⁸⁾. These alternative methods are not widely validated as yet.</p>	

E.2 EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE

E2.2 SUB-PACKAGE COMPONENT:**EXTRA CLINICAL CARE FOR LBW BABIES**

Babies weighing between 1.75 kg and 2.5 kg (corresponding to more than 34 weeks of gestation) have a high probability of survival without major disability and can be managed in a lower-level facility or even at home with careful supervision. Babies weighing less than 1.75 kg are likely to be preterm and are more likely to require skilled care, although not necessarily intensive care. The WHO Essential Care Practice Guidelines recommend that babies weighing less than 1.75 kg at birth should be looked after in an institution with basic equipment for tube feeding and giving oxygen therapy. Whether the baby is cared for at home or in a facility, the mother should be present and actively involved in care, unless she is too ill to do so. Her presence and input are the most important “equipment.”

For most of the world’s preterm babies, complex management of respiratory distress with ventilation and surfactant therapy is not likely to be available for a long time. Yet many deaths could be prevented by better care of preterm labor and also by better simple care of small babies.

Tables 4E2.2a and 4E2.2b provide information on care for the well LBW baby and the ill LBW baby.



TABLE 4E2.2a

**EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE****SUB-PACKAGE COMPONENT –
CARE FOR THE WELL LBW BABY (1.5 TO 2.5 KG)****Where?**

- ✓ In a health care facility or at home with extra support.

Do

- ✓ **Provide breastfeeding support.** A well baby this size may require cup or spoon feeding for the first few days at least to "top-up" after sucking and then learn to suck well. The mother will need support to express breast milk, to learn to cup feed safely, and to learn how to feed well. The baby will need to be woken to feed every three to four hours until she or he weighs more than 2.5 kg. More details on cup or spoon feeding and expressing breast milk are available on the CD-ROM.
- ✓ **Ensure warmth.** Depending on the climate and season, a warm room and dressing and wrapping the baby, especially with the head covered, may be adequate for thermal control. Kangaroo care or hot cots (wire baskets with light bulbs to warm them) may be necessary for colder settings. Aim to ensure warm feet.

Watch out for

- ✓ **Danger signs** (Figure 4.2). These may be more subtle in a LBW baby, especially if the baby is preterm and not feeding well or inactive because of prematurity. The mother and other caregivers need to be aware of danger signs and need to know how to respond.





TABLE 4E2.2b

**EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE****SUB-PACKAGE COMPONENT – CARE FOR A LBW BABY WHO IS ILL AND ALL VERY LBW BABIES (LESS THAN 1.499 KG)****Where?**

- ✓ In a health care facility with basic equipment and staff with newborn care skills.

Do

- ✓ **Avoid hypoglycemia.** A stable baby can be tube-fed with expressed breast milk, if necessary, giving less volume more often (for example, dividing the every-3-hour feeding volume into three and giving this amount every hourly). A baby with significant respiratory distress will require IV fluids, administration of which should be supervised very carefully. Even if a micro-dropper drip is available, it is very easy to give too much fluid.
- ✓ **Prevent hypothermia.** Babies this small, or who are unstable, need to be observed more carefully, and so a "hot cot" or an incubator is the best for them. Incubators, if available, need to be used appropriately and well maintained (see explanation in the focus box about Extra Warmth).
- ✓ **Identify and treat complications,** such as hypoglycemia, neonatal sepsis, or jaundice?

Watch out for?

- ✓ **Danger signs** (Figure 4.2). These will be more subtle in a LBW baby, especially if the baby is not feeding well and is inactive because of prematurity. Jaundice damages the brain of a preterm baby or a sick baby at a lower level than for a well term baby.



Panel 4.18 provides examples of how newborn care within an institution can be improved.

PANEL 4.18 LESSONS LEARNED

SIMPLE CARE SAVES SMALL BABIES IN A GHANAIAN HOSPITAL



Although the majority of neonatal deaths occur at home, in urban areas of the developing world, hospitals may have high numbers of neonatal admissions. Mortality rates could often be reduced with simple approaches to improve quality of care. One hospital in Kumasi, Ghana, has approximately 3,000 admissions to neonatal nurseries each year, of which almost 1,000 are LBW, mainly preterm, and are admitted to one room called Prens. The mortality in Prens was higher than in the other nurseries, even though most babies who died within the first 6 hours of admission were not recorded in mortality statistics.

A review of performance indicated that apart from the lack of an ambubag for resuscitation, basic equipment was not the main problem. The room had been fitted with hot cots (wire baskets with light bulbs to warm them). There were a few functional incubators, locally made phototherapy units (fluorescent lights fitted in wooden frames), and an oxygen supply. The main issues identified were the absence of standard protocols for care, and a lack of consistent nursing and medical care. The nursing matron had a policy of moving nurses at least every year, even if they wanted to stay and develop more skills in the care of LBW babies. Junior doctors were only sporadically allocated to Prens, and there was no clear system of supervision. Mothers were banned from entering the ward because of fear of infection, and there was limited support for expressing breast milk. An outbreak of diarrhea on Prens resulted in 19 deaths in one week, and this precipitated a review by the Department of Child Health to see how care could be improved.

Several improvements were implemented.

- ❖ Mothers were encouraged to stay in the room next to Prens, and support for expressing milk was provided.
- ❖ A simple sterilizer was installed for boiling cups for feeding, and a new ambubag was placed on the ward.
- ❖ Standard, written protocols for feeding, thermal control, and management of sepsis, jaundice, and other emergencies were developed, laminated, and displayed on the walls.
- ❖ The matron gave permission for nurses to choose to continue working on Prens, and a group of motivated nurses gradually gained skills in resuscitation, cup and nasogastric tube feeding, and supporting mothers.
- ❖ Junior doctors were more consistently allocated to Prens. The resident for the nurseries provided daily support, as did a consultant. Priority was given to early identification and management of sepsis and jaundice.
- ❖ At weekly mortality meetings, staff discussed all deaths on Prens after the junior doctor presented each case, and avoidable deaths were identified in a nonjudgmental fashion.

During a 3-year period, mortality dropped from 220 per 1,000 to 160 per 1,000, despite the fact that all babies were now being counted even if they died a few minutes after admission. The nurses took real pride in their care of babies, and one baby weighing 870 grams at birth went home and was doing well at one year of age.

E.2 EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE

E2.3 SUB-PACKAGE COMPONENT: EXTRA SUPPORT FOR FEEDING

Breast milk provides the best nutrition for all babies, including LBW and preterm babies. As discussed under the Essential Newborn Care Intervention Sub-Package, the choice is more complex for women known to be HIV-positive. Babies who are term LBW due to IUGR will often feed very well and may experience a growth spurt if the mother is encouraged to feed on demand. Preterm babies often struggle to breastfeed, and so supporting the mother to express milk and feed is crucial for them to thrive in low-resource settings where infections are a high risk.

As outlined in the section on care of the baby weighing less than 1.5 kg, many of these babies will require tube feeding or intravenous fluids and are better managed in a health institution (Table 4E2.3). With time these babies will transit to sucking at the breast and then cup-feeding to “top-up” volume. For those who are supporting mothers to care for preterm babies, one of the key skills is the ability to encourage the mother as she expresses milk and as the baby learns to suckle. The CD-ROM contains more details.



TABLE 4E2.3

**EXTRA NEWBORN CARE INTERVENTION SUB PACKAGE****PACKAGE COMPONENT – EXTRA SUPPORT FOR FEEDING****What to feed?**

Breast milk is always best, and this is especially true for the LBW baby. The only exception is the mother with HIV. If the mother is expressing milk, she will need special support and encouragement

How to feed?

This depends on the condition and maturity of the baby, as well as the delivery setting. The following provides rough guidelines:

- a well baby weighing more than 1.5 kg can be cup-fed or spoon-fed. Then, they can learn to suckle at the breast unless she or he is sick;
- a baby weighing less than 1.5 kg may need to be tube-fed (use a fine tube size Fr. 5 or 6, check the position by aspirating, and fix well with tape that will not damage the baby's skin) and is more likely to be unwell and need IV fluids; and
- a very preterm baby (less than 32 weeks) will gradually progress from IV to tube-fed to cup-fed to sucking at the breast over a period of days or weeks.

How often to feed?

Feeds are usually given every 3 hours, until the baby weighs more than 2.5 kg. In the first few days of life, the baby may require smaller volumes more frequently (hourly), especially if the baby is very preterm or slightly unwell. If the baby has marked respiratory distress or is very unwell, an IV drip is indicated.

What volume to feed?

There are several guidelines for total (oral plus IV) recommended daily volume of fluid intake for newborns. The most commonly used guidelines are:

Day 1	60 mL/kg total in one day
Day 2	90 mL/kg total in one day
Day 3	120 mL/kg total in one day
Day 4	150 mL/kg total in one day
After day 4	Some babies, especially IUGR babies will tolerate up to 200 mL/kg/day by mouth, but this should be never be given IV.

What to watch out for?

- ✓ The baby becoming unwell while feeding, significant vomiting, or the stomach swelling up. If this happens, stop feeding and set up an IV line.
- ✓ Is the baby gaining weight? Ideally, weigh the baby every two to three days.



More information is available on the CD-ROM, especially about expressing breast milk and cup-feeding.



E.2 EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE

E2.4 SUB-PACKAGE COMPONENT: EXTRA SUPPORT FOR WARMTH FOR THE LBW BABIES

LBW babies, especially preterm babies, are much more likely to become hypothermic. The priority should be prevention of hypothermia, as discussed under warm chain in the Essential Newborn Care Intervention Sub-Package. The main “links” are drying the baby at birth and wrapping well, keeping the baby very close to the mother unless either the mother or the baby is very ill, and keeping the room warm (Table 4E2.4). Kangaroo care^(120,121) is particularly suited for the stable baby of intermediate birth weight (1.5 to 2.5 kg). The evidence for kangaroo care is discussed in Part One.

Increased awareness of hypothermia could be achieved by using a simple low-cost liquid crystal thermometer. Morley has developed a thermospot (approximately 20 cents US each), which is a 1-cm-diameter sticker with a smiley face to be stuck in the baby’s axilla. The thermospot color changes from green to red below the temperature of 35°C and has been shown to have a sensitivity of 83 percent and a specificity of 96 percent. This means that the tool is a positive predictive value of 98 percent for the detection of hypothermia⁽¹²²⁾. This device could be used by mothers or by health care workers to reduce the rate of hypothermia among LBW babies.

Warming a hypothermic (temperature less than 36°C) baby can be achieved by various methods. If the baby is stable, kangaroo care is the most efficient method (Panel 4.19). If the baby is unwell, an overhead radiant heater is the best method if available. Hot cots or incubators are alternatives.

E.2 EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE

E2.5 SUB-PACKAGE COMPONENT: VITAMIN K PROPHYLAXIS

Vitamin K should be given to all LBW babies as they are at increased risk of developing bleeding due to Vitamin K deficiency (hemorrhagic disease of the newborn). The dose is 0.5 mg intramuscular injection (1 mg for babies weighing more than 2.5 kg).

 TABLE 4E2.4 	
EXTRA NEWBORN CARE INTERVENTION SUB-PACKAGE	
SUB-PACKAGE COMPONENT – EXTRA WARMTH	
<p>✓ Warm room, avoid bathing, dress, cover head, and wrap For many LBW babies, simple attention to these principles will avoid hypothermia.</p> <p>✓ Kangaroo care This is skin-to-skin contact of the baby with the mother. Typically, the baby is tied with cloth to the mother's chest. Kangaroo care has been used extensively and shown to be more effective than incubators for thermoregulation of medically stable LBW babies, usually starting several days after birth with intermediate-sized babies. This technique has not been systematically evaluated for home use and cannot be used for a baby who is unstable and needs to be observed closely.</p> <p>✓ Sleeping bags These are simple bags made of warm fabric. They have been used by the SEARCH team in India.</p> <p>✓ Hot cots These small wire baskets, heated by light bulbs, can be a very inexpensive, low-tech, effective method of keeping newborns warm.</p> <p>✓ Incubators These are very expensive to purchase, often difficult to maintain, and can be major sources of infection. They are best used in settings where correct use and maintenance is feasible.</p>	 

Source: WHO/FHE/MSM 97.2⁽⁹¹⁾.

Available form Teaching Aids at Low Cost, PO Box 49, St Albans, Herts AL1 5TX UK. Fax: 44 1727 846852. 



PANEL 4.19
LESSONS LEARNED

KANGAROO CARE

The use of incubators for care of babies in low-resource settings is problematic for many reasons, including:

- expense of purchase and maintenance;
- unreliability of electricity supplies; and
- increased infection risk because they are difficult to clean and are often shared by several babies.

In the kangaroo care method, a well preterm infant, wearing only a diaper, is placed between the mother's breasts in skin-to-skin contact. Kangaroo care can also be provided by the father or another relative, although this has been less well studied. Many early studies in Colombia in the 1970s and more recent studies all over the world have demonstrated improvements in outcomes and other advantages of kangaroo care, such as higher maternal satisfaction. The improvement in survival for hospitalized LBW infants has been documented to be 20-60 percent in randomized controlled trials. In a randomized control trial of preterm babies weighing less than 1,500 grams in a hospital in Zimbabwe, Dr. Kambarami found that the infants allocated to kangaroo care had better health outcomes than infants placed in a standard incubator setting. For the babies in the kangaroo care group, median weight and hospital discharge weight was higher, frequency of illness and median duration of hospital stay was less, and survival rates were better. It should be noted though that these babies were all several days old and were medically stable.

A longitudinal, randomized, controlled trial conducted at the Isidro Ayora Maternity Hospital in Quito, Ecuador, studied the long-term benefits of kangaroo care. The researchers in this study found that after a 6-month follow-up the kangaroo care group had a significantly lower rate of serious illness (lower respiratory tract disorders, apnea, aspiration, pneumonia, septicemia, and general infections) than did the control group.

Implementation is not as simple as it may appear, partly due to behavioral and cultural barriers among mothers concerned about indecency. Medical staff may also be resistant to shifting away from technological solutions. Home use of kangaroo care has not been well-studied, but this is a potential method to improve home care of the LBW baby.

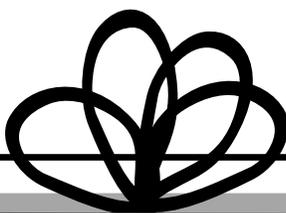


Source: Child Health Research Project⁽¹²³⁾. 

E3. EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

E3. EMERGENCY CARE FOR THE SICK NEWBORN

While many newborn lives can be saved with simple interventions, there are some newborns that require more institutional services to save their lives. To this point, we have largely discussed prevention of neonatal complications. However, service providers also need to be prepared to deal with sick newborns. The main areas to focus on are infections (i.e., sepsis, tetanus), which may result from or contribute to other conditions that may jeopardize the newborns condition, such as: hyperthermic (fever) or hypothermia; hypoglycemia; and dehydration. Prompt recognition of danger signs/complications and timely treatment is essential to prevent a neonatal death.



EMERGENCY NEWBORN CARE INTERVENTION PACKAGE

OVERALL VISION

To identify illness as fast as possible and to receive quality care.

Aims of key interventions for emergency newborn care for the sick baby.

1. Identification of Neonatal Danger Signs

- Educate women/families/communities/skilled attendants on the newborn danger signs and the importance of seeking prompt treatment.

2. Quality Emergency Care of the Sick Newborn

- Build the capacity of health institutions to provide quality services for the sick newborn.

3. Severe Neonatal Infection

- Educate women/families/communities/skilled attendants on the danger signs of severe and the importance of seeking prompt treatment.
- Promote preventive practices to avoid severe infection (i.e. treatment of maternal infections, clean delivery, clean cord care).
- Ensure competent staff are adequately equipped to provide quality services, with prompt recognition, investigation and treatment.

4. Neonatal Tetanus

- Educate women/families/communities/skilled attendants about the importance of using clean delivery practices, particularly maintaining the clean chain.
- Promote tetanus toxoid immunization for women of reproductive age
- Educate women/families/communities/skilled attendants on the danger signs of tetanus and the importance of seeking prompt treatment.

5. Neonatal Asphyxia

- Ensure staff are adequately equipped and are competent to provide quality emergency obstetric care and neonatal resuscitation if required.
- Develop and apply standard protocols for the management of asphyxia.
- Prevent asphyxia by encouraging service providers to anticipate which neonatal might be at risk of asphyxia and plan accordingly.

6. Neonatal Jaundice

- Educate women/families/communities/skilled attendants about the signs of jaundice and appropriate treatment.
- Ensure competent staff is adequately equipped to provide identify jaundice and provide appropriate treatment and services.

7. Birth Defects

- Provide family centered care for babies with birth defects
- Prevent major defects by:
 - Meeting unmet need for family planning for older women
 - Promoting the use of preconceptual folic acid
 - Providing rubella immunization if this is national policy
 - Increasing information regarding avoiding known toxins

8. Severe Bleeding

- Identify babies with severe bleeding and manage them appropriately.
- Prevent severe bleeding by providing Vitamin K 0.5mg injection for all LBW babies (and 1mg for normal birth weight babies if this is the local policy).

The Emergency Newborn Care Intervention Sub-Package has three sub-package components, which will be further discussed below, including:

- E3.1. Sub-Package component: Identification of the danger signs;
- E3.2. Sub-Package component: Quality newborn care;; and
- E3.3. Sub-Package component: Severe neonatal infection.

E3. EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

E3.1 SUB-PACKAGE COMPONENT: IDENTIFICATION OF NEONATAL DANGER SIGNS

Numerous attempts have been made to develop algorithms for early identification of severe illness in the neonate, but those that have been shown to be sensitive and specific are usually highly complex in terms of the clinical skills and laboratory investigations required (124,125). Approaches that have worked at the community level involve identification of simple symptoms/signs; such approaches may result in over-treatment of some babies without serious illness. Given the high risks associated with failing to detect severe illness, using simple symptoms/signs seems to be the most feasible approach until a specific algorithm is available.

TABLE 4E3.1

EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

SUB-PACKAGE COMPONENT – NEONATAL DANGER SIGNS

What are the danger signs?

- ✓ Breathing difficulty, irregular, or fast (more than 60 per minute).
- ✓ Not feeding well (less than 50% of usual).
- ✓ Convulsions, spasms, jittery.
- ✓ Fever greater than 38°C or less than 36°C.
- ✓ Jaundice, pale, bleeding.
- ✓ Vomiting green, no stool in first 24 hours of life, very swollen abdomen.

See Figure 4.2

THE PRESENCE OF ONE DANGER SIGN IS A CAUSE FOR CONCERN!

Who should know the danger signs?

- ✓ Individual women.
- ✓ Households, especially decision-makers, such as husbands, mothers-in-law.
- ✓ Community leaders.
- ✓ Care-givers in the informal sector such as TBAs.
- ✓ Attendants at delivery.

Source: WHO/RHR/00.7(7).

E3. EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

E3.2 SUB-PACKAGE COMPONENT:**QUALITY EMERGENCY CARE OF
THE SICK BABY**

Good supportive care (detailed attention to preventing hypoglycemia⁽¹²⁶⁾, hypothermia, provision of oxygen if required, etc.) may contribute as much to the reduction of neonatal mortality as specific treatment conditions. While antibiotic therapy is crucial for severe infections, other conditions, such as asphyxia, depend largely on supportive care. Once again, it is important to involve the mother in caring for the baby and to offer family-centered care that takes a welcoming, communicative approach. Motivated nursing care is also invaluable. Some of the principles of quality emergency newborn care are summarized in Table 4E3.2.



TABLE 4E3.2

**EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE****SUB-PACKAGE COMPONENT – QUALITY CARE OF THE SICK BABY****Identification**

Early identification of sickness makes a big difference to the baby's survival. (See Figure 4.2).

Family-centered care

- ✓ Involve the mother actively in care unless she is too ill to do so.
- ✓ Communicate with the mother and family and support them.

Supportive treatment

- ✓ Stabilization, including basic resuscitation with bag and mask if needed.
- ✓ Oxygen therapy, given by nasal cannula if required.
- ✓ Thermal protection – wrap baby well (although still need to be able to maintain close observation).
 - Kangaroo care is probably not good to use for the very sick newborn.
 - Use overhead lights, hot cots, or sleeping bags (see Warm Chain).
 - Use an incubator, if available.
- ✓ Correct/prevent hypoglycemia – measure blood glucose (i.e., using blood sugar stick for diabetics).
 - If blood sugar is less than two mmol/L, correct with a bolus of 10 percent dextrose 20 mL/kg and set a 10 percent dextrose drip to avoid rebound hypoglycemia.
 - If the blood glucose level is greater than two mmol/L but the baby is very ill, set an IV line to prevent hypoglycemia. If the baby is stable, support the mother to breast-feed or to express milk and feed. Chart how much milk should be given and when, and record how much is actually given.

Specific treatment

- ✓ Standards - it is very important to set locally-agreed, feasible guidelines for management of important conditions, including severe infection, neonatal asphyxia, severe jaundice, and bleeding.
- ✓ Standards and guidelines need to be visible, i.e., laminated and displayed on walls.
- ✓ Skills - attendants at birth and other providers need to be competent in applying these guidelines.
- ✓ Supplies and equipment – basic drugs, equipment, and other supplies should be available consistently.
- ✓ Investigations improve the accuracy of specific treatment considerably, especially:
 - blood sugar level;
 - hemoglobin level or packed cell volume (see CD-ROM for PATH/WHO guidelines);
 - bilirubin – accurate management of jaundice without under- or over-treatment requires a bilirubin level; and
 - blood cultures and cerebral spinal fluid (CSF) culture.



E3. EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

E3.3 SUB-PACKAGE COMPONENT: SEVERE NEONATAL INFECTION

Severe infection in neonates is the single largest cause of neonatal deaths globally⁽¹²⁷⁾. Severe infections include neonatal sepsis and meningitis, as well as acute lower respiratory tract infections. In low-resource settings, infections are more common and case-fatality rates are higher both because of delays in access to care and lack of quality care. The priority is prevention, but mortality can be markedly reduced by better identification and management, as shown by the story of SEARCH in rural India⁽⁹⁾. This community-based project reduced neonatal mortality by about 62.2 percent in three years, and 75 percent of the reduction was due to the prevention and management of sepsis in the community (Panel 4.20).

While treatment is possible without investigation, if feasible, blood and central spinal fluid cultures are important to guide management. If most cases are being treated without investigation, it is important to have some tracking, at least at the hospital level, of what the organisms are and how sensitivity to antibiotics is changing so that antibiotic policies can be adjusted with time. Table 4.7 lists the presenting problem, possible organisms, and likely treatment for various infections. These treatments are intended only as a guideline, and national or local policies, as well as local patterns of organisms and sensitivities, need to be taken into account before developing a local policy.

Other more novel approaches may soon be available to prevent severe newborn and young infant infections. Pneumococcal vaccine given to pregnant women has been shown to increase antipneumococcal antibody levels in newborns, but the antibody levels dropped quickly and the effect on pneumococcal infections has yet to be demonstrated⁽¹²⁸⁾.

Table 4E3.3 describes the main elements that the program managers need to consider in terms of prevention, identification and treatment of neonatal infections.

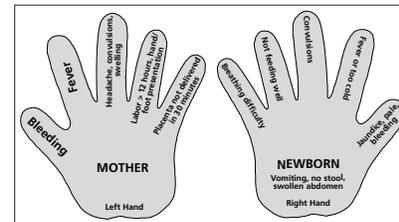
TABLE 4E3.3
EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

SUB-PACKAGE COMPONENT – SEVERE INFECTION

Identification of severe infection

- ❖ Fever more than 38°C (LBW babies especially may become hypothermic).
- ❖ Poor feeding (especially after feeding well).
- ❖ Difficulty breathing or irregular breathing.
- ❖ Convulsions, spasms, or being jittery.
- ❖ Redness around the umbilicus with or without pus discharge.

See Figure 4.2



Investigations (if available)

- ✓ Blood sugar level.
- ✓ Hemoglobin level.
- ✓ Blood cultures.
- ✓ Lumbar puncture.

Specific treatment – See Table 4.9 for possible antibiotics to use.

Prevention

- ✓ Treatment of STIs in the mother during pregnancy.
- ✓ Antibiotics for prolonged rupture of membranes (more than 24 hours before delivery).
- ✓ Antibiotic cover for preterm rupture of membranes (rupture before the 37th week of pregnancy).
- ✓ Clean delivery.
- ✓ Good cord care, address local cord care practices that are dangerous.
- ✓ Eye prophylaxis, if local policy.

At present, there is not enough evidence to recommend use of pneumococcal vaccine in pregnancy to reduce severe pneumococcal disease in newborns and infants.

For further information, see the materials by Stoll and Darmstadt in the Best Reading List.

**TABLE 4.7
 PRESENTATIONS, POSSIBLE ORGANISMS, AND TREATMENT FOR SEVERE NEONATAL INFECTION**

PRESENTING PROBLEM	POSSIBLE DIAGNOSIS	LIKELY ORGANISMS	SUGGESTED ANTIBIOTIC THERAPY ^a
Temperature change (more than 38°C or less than 36°C axilla)	Possible septicemia or other infection	Streptococcus pneumoniae Staphylococcus aureus Escherichia coli Salmonella spp	Injection Ampicillin & gentamicin Injection Ampicillin & gentamicin
Poor feeding (less than 50% of normal) (alone or with one of the other signs)	Possible septicemia or other infection	S. pneumoniae S. aureus	Injection penicillin & gentamicin
Irregular breathing or fast difficult breathing (respiratory rate more than 60 per minute)	Lower respiratory tract infection	S. pneumoniae	Injection penicillin & gentamicin
Convulsions or twitching, extreme irritability or lack of activity	Meningitis	S. pneumoniae	Injection penicillin & gentamicin
Very stiff with spasms	Tetanus	Clostridium tetani (often associated with gram-negative sepsis)	Injection penicillin & gentamicin
Skin rashes with pustules and/or umbilical cord discharge, especially with surrounding redness	Localized skin infection which may spread to cause septicemia	S. aureus Streptococci	Injection cloxacillin
Eye discharge, especially if the eyelid and surrounding tissues are red Note: It is important to treat the mother and her partner(s) as well as the baby.	Ophthalmitis	Gonococcus Chlamydia S. aureus	Injection ceftriaxoneb 25-50 mg/kg single dose not to exceed 125 mg. Also, wash eyes every 4-6 hours and apply tetracycline 1% ointment.
Neonate of mother with syphilis or neonate with suspected congenital syphilis (rhinitis, skin rash especially pustules on soles/palms, hepatosplenomegaly, jaundice). Note: 50% of cases are asymptomatic.	Possible congenital syphilis	Treponema pallidum	Procaine penicillin G 50,000 units/kg single daily dose for 10 days (should be given even if the mother has been treated unless her RPR or VDRL has been shown to decrease 4-fold).

Source: MMWR⁽⁶⁰⁾, WHO⁽¹²⁴⁾, Stoll⁽¹²⁷⁾.

^a Chosen antibiotic treatment will depend on national or local policies, local information about common organisms and their resistance pattern, and also the specific signs and condition of the ill baby.

^b Use with caution in babies who have jaundice.



PANEL 4.20 LESSONS LEARNED

HOME-BASED NEWBORN CARE PACKAGE REDUCES NEONATAL MORTALITY BY OVER 60 PERCENT IN RURAL INDIA



Gadchiroli is a poor district in rural Maharashtra State, India with a low rate of female literacy (37.9 percent). A community-based organization, SEARCH, found that neonatal mortality was about 60 per 1,000, which is 20 times the rates in Western Europe, and that the LBW rate was 43 percent. The major causes of death included infections, prematurity, and asphyxia. Most of the babies were born at home, and a combination of practical difficulties and traditional beliefs meant that few parents were taking sick newborns to the hospital. Families said that they would prefer newborn care at home from trained community health workers (CHWs).

During a 4-year period, home-based newborn care was introduced in 39 villages; 47 similar villages had no special care, thus allowing comparison later. Traditional care practices in the area were studied carefully before the package was designed. The newborn care package included the following:

1. Preparation and education of mothers during pregnancy, especially training for essential care of their babies with use of a photo album of pictures, flip chart, and discussions.
2. TBAs are trained to reinforce health-promoting beliefs and practices.
3. Village CHWs trained in newborn care, including:
 - resuscitation skills;
 - weighing the newborn at birth using a spring balance, and giving Vitamin K injection;
 - visiting the mother and baby eight times in the first month to assist with breastfeeding and warmth, early detection of illness, and reweighing of the baby;
 - detecting high-risk babies, especially those weighing less than 2 kg, to be visited more often;
 - diagnosing neonatal sepsis using simple clinical criteria and treating with antibiotics at home (injection gentamicin and syrup co-trimoxazole); and
 - managing other neonatal problems, such as breastfeeding difficulties, conjunctivitis, skin or umbilical infections.
4. Visits by a doctor or nurse to each village twice a month to supervise and support the CHWs.

By the third year, 93 percent of newborns in the intervention areas were receiving home-based care. SEARCH was able to record 98 percent of births and child deaths in the area. Neonatal mortality was reduced by 62.2 percent, mostly as a result of fewer deaths from neonatal sepsis. No complications due to the injections were detected, possibly because the CHWs were carefully trained and well supervised. The package was estimated to cost US \$5.3 per newborn, and one death was avoided for every 18 babies who received care. The estimated cost-per-life saved was US \$95.40, which is less than the cost-per-life saved with measles vaccination.

Source: Bang et al⁽⁹⁾.



E3. EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

E3.4 SUB-PACKAGE COMPONENT: NEONATAL TETANUS

Neonatal tetanus accounts for about 300,000 deaths annually and has one of the highest case-fatality rates of any infection. Approximately 90 percent of babies with neonatal tetanus will die (this represents a case-fatality rate higher than for Ebola virus infection). Even with high technological care, the case-fatality rate is very high. The key lies in prevention, clean deliveries, and good core care, not just with increased coverage with tetanus toxoid. Most neonatal tetanus deaths occur in certain countries and in certain subpopulations. The reasons vary by setting, but generally fall into three major categories:

- ❖ low coverage of care during pregnancy or poor quality care during pregnancy resulting in low tetanus toxoid coverage;
- ❖ inadequate care during delivery with unhygienic cord-cutting procedures and cord care; and
- ❖ poor newborn care, particularly local traditional cord care practices or circumcision practices.

Achieving high tetanus toxoid coverage for pregnant women is more complex than immunization coverage in young infants. One remaining challenge is the development of a record card that covers one pregnancy to the next, thereby allowing on-going information on the expected immunity of women to tetanus. Tetanus toxoid coverage alone is not the answer to preventing tetanus; programs also need to address intrapartum care and newborn care for high-risk populations. More details on the importance of cord care for the prevention of neonatal tetanus are covered in Table 4E1.5a.



TABLE 4E3.4

**EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE****SUB-PACKAGE COMPONENT – NEONATAL TETANUS****Identification**

- ✓ Poor feeding (especially after feeding well).
- ✓ Spasms and stiffness, especially stiff jaw.
- ✓ Fever.

Investigations (if available)

- ✓ Blood sugar level.
- ✓ Hemoglobin level.
- ✓ Blood cultures.
- ✓ Lumbar puncture.

Specific treatment

The case fatality rate for neonatal tetanus is around 85 percent, making prevention critical.

The principles are:

- ✓ neutralize tetanus toxoid by giving tetanus antitoxin 5,000 units intramuscularly as a single dose;
- ✓ treat the tetanus infection using penicillin 30 mg/kg per day for 5 days;
- ✓ cover for associated gram-negative sepsis (i.e., gentamicin), depending on local antibiotic policies;
- ✓ control spasms – Treatment is controversial and very difficult because once the baby is sedated to stop spasms, respiratory arrest is a major risk. The goal is to sedate well, and then titrate sedation very carefully against the spasms, tailing off sedation quickly when the spasms stop. Consult your local guidelines for sedation protocols; and
- ✓ avoid hypoglycemia by giving IV fluids or by nasogastric tube feeding when the baby's condition is more stable.

Supportive treatment

The principles are listed under Emergency Newborn Care, Quality Care of the Sick Baby..

Prevention

- ✓ Tetanus toxoid coverage for the mother antenatally (2 shots during pregnancy or 5 shots in a lifetime).
- ✓ Clean delivery, especially a clean surface and a clean implement to cut the cord (consider clean delivery kits, if appropriate).
- ✓ Good cord care and address local cord care practices that are dangerous.
- ✓ Consideration of antiseptics on the cord if the cord is a major source of infection and advise that nothing be put on the cord.





PANEL 4.21
LESSONS LEARNED

CORD CARE, COW DUNG, AND NEONATAL TETANUS

Neonatal tetanus causes an estimated 300,000 deaths each year. Most of these cases occur in ten countries. Within these countries, many of the cases occur in certain subpopulations that have high-risk, traditional practices regarding newborn care and also have low coverage of maternal and newborn health care. Because of clean delivery and newborn care, neonatal tetanus was virtually unheard of in industrialized countries even before tetanus toxoid immunization was developed.

In addition to increasing tetanus toxoid coverage, programs to prevent neonatal tetanus need to address intrapartum care and newborn care with an understanding of the local practices. For example, in rural Northern Pakistan, there is a traditional practice called bundling that involves covering the baby from waist to toes in cow dung and then wrapping the baby tightly in a sheepskin. The practice is usually started at birth and continues until about 3 months of age and is believed to give strength and warmth to the baby.

A case-control study in this area identified 59 cases of neonatal tetanus and 295 matched controls. The fact that only 12 cases were seen by a physician indicates the lack of access to health care. The strongest risk factor for developing neonatal tetanus was delivery on a straw floor. Protective risk factors identified were hand washing by the birth attendant and use of a clean razor to cut the cord. Bundling was common among cases and controls, but for those who were bundled before day 3 of life, the risk of neonatal tetanus was significantly higher. This suggests that the cord is most susceptible to infection during the first 3 days of life. Another study in the same area of Pakistan identified circumcision as an independent risk factor for neonatal tetanus and found that the use of topical antibiotics on the circumcision wound was protective.

Behavioral change programs addressing traditional cord care practices are notoriously difficult. Advising families to put nothing on the cord can be part of this problem. A possible solution may be to substitute a harmful practice, like putting cow dung on the cord, with a beneficial one. A number of topical agents may be beneficial including chlorhexidine, Dettol, and tincture of iodine. These agents have both been shown to reduce bacterial growth on the cord, although no community-based results are available on their effect on cord infection, sepsis, or tetanus outcomes. Iodine may potentially interfere with thyroid metabolism in the neonate. Topical antimicrobial powders on the cord have been shown to reduce tetanus and sepsis, but these carry the risk of increasing resistance and of hypersensitivity reactions. Chlorhexidine wipes could be incorporated into a clean delivery kit or marketed separately for all mothers to use. Use of one of these agents as part of a behavioral change program and evaluation of the impact on morbidity and mortality would be a valuable contribution to our knowledge.



Source: Bennett et al. 1996⁽¹³⁰⁾, Bennett et al. 1999⁽¹³¹⁾.

E3. EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

E3.5 SUB-PACKAGE COMPONENT: NEONATAL ASPHYXIA

Each year an estimated 1 million babies die of birth asphyxia. As with other emergency conditions newborns face, the key lies in prevention – better intrapartum care and resuscitation at birth, if required. In the absence of intensive care, many babies with severe asphyxia (now often termed hypoxic ischaemic encephalopathy) will die or have a high probability of severe disability. For babies with moderate or milder effects of asphyxia, the probability of long-term survival without disability is reasonably good⁽¹³²⁾. Careful supportive management of these babies in the first few days of life is critical.

Babies who are very big at birth or post-term (after 42 weeks of gestation) are at increased risk of obstructed labor and resultant asphyxia. Pregnant women with diabetes or gestational diabetes need to be monitored closely for control of blood sugar during pregnancy, as uncontrolled high blood sugars result in a greater risk of congenital abnormalities and of high birth weight. Maternal high blood sugar levels also increase the probability that the baby will have too much insulin circulating at birth and will have recurrent hypoglycemia for the first few days. Any full-term baby weighing more than 4kg at birth should be considered at risk of being an infant of a diabetic mother, as many cases of gestational diabetes are not detected in low-resource settings. These babies should have blood sugar checked at least once in the first 6 hours of life and should have extra attention to support breastfeeding and correction of hypoglycemia if detected.

Preterm babies are more sensitive to injury from asphyxia and more likely to be severely affected and die or to have a long-term handicap.

The actions required to resuscitate a newborn are outlined in Table 4E3.5.



TABLE 4E3.5

**EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE****PACKAGE COMPONENT – NEONATAL ASPHYXIA****Identification**

- ✓ Baby did not cry at birth or did not breathe and required resuscitation.
- ✓ History of difficult or prolonged delivery.
- ✓ On the first day of life, baby is very lethargic or twitching.

Specific treatment – Unfortunately, there is no specific treatment. Good supportive care is essential.

Supportive treatment – as listed under Essential Newborn Care

- ✓ Give oxygen, if available, and observe the baby closely for convulsions or ceased breathing.
- ✓ Control seizures with medication as per local protocol (i.e., paraldehyde).
- ✓ Take care to avoid hypoglycemia by feeding the baby regularly by cup or nasogastric tube if the baby is fairly stable, or giving IV dextrose if unstable.
- ✓ Pay close attention to temperature control.
- ✓ Explain carefully to the parents that the next delivery should be in a setting where the baby can be resuscitated well.

Prevention

- ✓ Provide good care during delivery.
- ✓ Identify babies who are more likely to need extra resuscitation (preterm, mothers with complications of pregnancy or delivery) and prepare before delivery, ideally moving the mother to a center where more skilled staff are available.
- ✓ Ensure attendants at delivery are skilled in resuscitation and equipment is available and functional.
- ✓ Have standard resuscitation policies that are understood and used.



Source: WHO/RHR/MSM/98.1⁽⁷⁹⁾.

E. NEWBORN CARE INTERVENTION PACKAGE

E3.6 SUB-PACKAGE COMPONENT: NEONATAL JAUNDICE

Jaundice may be an under-reported cause of neonatal mortality and is certainly an important cause of long-term disability in many developing countries⁽¹³³⁾. Neonatal jaundice is a special concern in areas such as South Asia and West Africa where the inherited red cell defect of glucose-6-phosphate dehydrogenase deficiency is common and a major cause of neonatal jaundice. Any baby with jaundice noted in the first 48 hours of life should be considered to have serious jaundice. These babies need to be assessed quickly and treated appropriately with phototherapy or exchange transfusion, if indicated (Table 4E3.6).

Quality management of jaundice is difficult in the absence of investigations to detect the level of the bilirubin in the blood, but these investigations are unavailable in many settings. Simple devices have been developed to estimate bilirubin levels including the icterometer, which is a Perspex strip with a series of four colors to compare with the blanched gums of a jaundiced baby. While this improves tracking of jaundice in one baby, it still is not very sensitive for making major decisions, such as whether to undertake an exchange transfusion. The lack of accurate testing may result in undertreatment of jaundice or the overuse of phototherapy and unnecessary separation of mother and baby. The bilirubin level at which to start phototherapy or carry out an exchange transfusion depends on the gestation of the baby, time since birth, whether the baby is ill, and how fast the bilirubin is rising. More details will be available in the WHO manual, "Care of the Sick and Low Birth Weight Newborn," to be released in 2002.



TABLE 4E3.6

**EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE****SUB-PACKAGE COMPONENT – NEONATAL JAUNDICE****IDENTIFICATION**

- ✓ Yellow skin, especially high levels of bilirubin, starting in the first 2 days of life (assess by looking at the bridge of the nose or at the gums and gently pressing and letting go).
- ✓ Obvious yellow jaundice on the soles of the feet is more likely to be serious jaundice.
- ✓ Convulsions or jitteriness with jaundice may be a sign of the bilirubin crossing into the brain.

INVESTIGATIONS (if available)

- ✓ Blood sugar level.
- ✓ Bilirubin level.
- ✓ Hemoglobin level.
- ✓ Mother's and baby's blood groups; looking for ABO or Rhesus blood group incompatibility.
- ✓ Blood cultures if signs suggest infection (i.e., fever more than 38°C).
- ✓ Screening test for glucose-6-phosphate dehydrogenase (G6PD) deficiency, especially if it is common locally.

SPECIFIC TREATMENT

- ✓ Phototherapy if the bilirubin level is above the threshold for treatment given age and gestation. Technical tip – Phototherapy units can be made with fluorescent light bulbs in a wooden frame above a simple cot. If there is no other option for phototherapy, use direct sunlight on the baby's skin but not in the middle of the day.
- ✓ Exchange transfusion if the bilirubin level is above the threshold for treatment, given age, and gestation.
- ✓ Antibiotic therapy if infection is suspected.

SUPPORTIVE TREATMENT – See Table XXX.

- ✓ Pay careful attention to avoiding hypoglycemia and dehydration, helping the mother to breast-feed the baby or to express and cup feed.
- ✓ If G6PD deficiency or ABO/Rhesus incompatibility is identified, take time to explain to the parents.

PREVENTION

- ✓ Breastfeed all babies early and support mothers to feed preterm babies who are at higher risk of jaundice and more likely to be damaged by jaundice.
- ✓ Identify before delivery if a woman is at risk of her baby developing serious jaundice and observe the baby in a center where phototherapy and management of jaundice is possible. Major risk factors are:
 - history of a previous baby with severe jaundice; and
 - mother with blood group Rhesus negative.
- ✓ If a baby does develop jaundice in the first 48 hours or high jaundice between day two and day six, identify early and refer quickly.
- ✓ Start phototherapy as soon as it is indicated (also stop as soon as it is not indicated!).



E3. EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

E3.7 SUB-PACKAGE COMPONENT: BIRTH DEFECTS

Congenital abnormalities are estimated to account for only 11 percent of neonatal deaths globally, but as the incidence of infectious diseases fall, the relative importance of congenital abnormalities will increase. Congenital abnormalities are also a major cause of fetal deaths. In industrialized nations, congenital abnormalities are a leading cause of infant death. It has been estimated that between 50 and 70 percent of congenital abnormalities could be prevented with policy and environmental interventions⁽¹³⁴⁾. There are four major categories of congenital abnormalities that could be addressed at district, national, and international levels at present. These four were selected because they are severe, common in many settings, and intervention is currently feasible:

- ❖ neural tube defects, which can be prevented very cheaply through folic acid supplements and account for an estimated 300,000 cases globally⁽²⁰⁾;
- ❖ severe iodine deficiency, which can be prevented by intake of iodized salt;
- ❖ down's syndrome (trisomy 18) cases, which can be avoided by meeting unmet need for family planning in older women; and
- ❖ congenital rubella syndrome, which causes heart defects, profound deafness, cataracts, severe failure to thrive, and many other abnormalities, can be prevented by rubella immunization. There are an estimated 110,000 to 308,000 infants born with congenital rubella syndrome annually^(135,136).

Management of babies born with severe abnormalities in low-resource settings is very difficult. Some defects, such as cleft palates, can undergo surgery in several phases and then do very well. Other conditions will require long-term access to expert neurosurgical or cardiac care that is generally not available. For babies born with abnormalities, one of the main priorities is support for the parents, and particular attention to informing the husband and relatives that the mother is not at fault. Often there is considerable stigma associated with the birth of a baby with abnormalities, and mothers are blamed.



TABLE 4E3.7

**EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE****SUB-PACKAGE COMPONENT – BIRTH DEFECTS****Identification**

Congenital abnormalities vary from small skin marks to major, obvious defects. Many babies with congenital abnormalities can grow up to live a normal life if treated well. The most common serious abnormalities include:

- ✓ cleft lip and palate;
- ✓ neural tube defects (swelling at the bottom of the baby's back and/or extra fluid on the brain (hydrocephalus)); and
- ✓ congenital heart defects, which may not become obvious for hours or even days.

Specific treatment

Certain abnormalities, such as cleft lip and palate, may do very well with surgery if this procedure is available. Careful help with feeding is also important. Other abnormalities, such as neural tube defects and serious heart defects, are very complex to repair and likely need ongoing expert medical help. With neural tube defects, it is important to remember to advise the mother to take folic acid tablets regularly to avoid recurrence.

Supportive treatment

It is especially important to listen to the parents and support the mother, specifying that she is not to blame for the baby's abnormality.

Prevention

- ✓ Community awareness about the risks of consanguinous marriages, especially first-cousin marriage. Such marriages dramatically increase the risk of having children with autosomal recessive conditions, which are usually rare.
- ✓ Preconceptional folic acid to prevent neural tube defects.
- ✓ Rubella immunization, depending on national policy, to prevent congenital rubella syndrome.
- ✓ Iodine supplementation of salt to prevent cretinism due to severe iodine deficiency during pregnancy.
- ✓ Avoid known toxins, particularly irradiation and heavy metals.
- ✓ Inform women and health care personnel about the risk of taking medications during pregnancy without careful consideration of the consequences.



E3. EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE

E3.8 SUB-PACKAGE COMPONENT: SEVERE BLEEDING IN THE NEONATE

Although severe bleeding in the neonate is not common, it is life-threatening. The most common causes of severe bleeding are hemorrhagic disease of the newborn (due to Vitamin K deficiency) and sepsis with associated bleeding. Hemorrhagic disease of the newborn usually presents at two to five days of life with bleeding from the gut (vomiting blood or passing stool) or with excessive bleeding from circumcision wounds. The baby is apparently otherwise well, with no fever and no history of feeding poorly. The baby with sepsis has a fever (more than 38°C) and may be bruised and jaundiced.

The management priority is to assess whether the baby requires a blood transfusion, and if so, to organize this intervention and give the transfusion as soon as possible. Hemoglobin levels for transfusion depend on several factors, including the age of the baby, the gestation of the baby, and whether there is active bleeding. Commonly chosen levels for the first week of life are 12 g/dL for term babies and 15 g/dL for preterm babies. Even when the hemoglobin or packed cell volume seems to be well above the transfusion level, if the baby is actively bleeding, blood should be organized for transfusion. If no fresh frozen plasma is available to stop the bleeding in a baby with hemorrhagic disease of the newborn, fresh whole blood can be used instead. However, it should, of course, be screened first for HIV and other transfusion-related infections. All babies with active bleeding should be given Vitamin K intravenously (not intramuscularly as this can cause an intramuscular bleed).



TABLE 4E3.8

**EMERGENCY NEWBORN CARE INTERVENTION SUB-PACKAGE****SUB-PACKAGE COMPONENT – SEVERE BLEEDING****Identification**

- ✓ Baby with obvious blood loss or history of blood loss (usually from cord or circumcision).
- ✓ Very pale baby who is not jaundiced (may have bled into the abdomen or head especially if preterm).

Investigations (if available)

- ✓ Hemoglobin or packed cell volume.
- ✓ Blood group and mother's blood group (always cross-match neonatal transfusions on the mother as well as the baby because maternal antibodies may be circulating in the baby and cause a transfusion reaction).
- ✓ Blood cultures if neonatal sepsis is suspected.

Specific treatment

If a term baby's hemoglobin is less than 12g/dL or above this but the baby is actively bleeding, transfuse the baby with fresh whole blood at 20 mL per kg body weight. For a preterm baby, transfuse if the Hb is less than 15g/dL.

Give IV Vitamin K 2mg daily for 3 days.

Prevention

- ✓ Injection of Vitamin K 0.5 mg intramuscular to all LBW babies (WHO policy).
- ✓ There is current debate as to whether Vitamin K should be given to all newborns. Almost all industrialized countries do so; European countries use oral Vitamin K which has been shown to be effective against early hemorrhagic disease.
- ✓ Early identification and treatment of severe sepsis.



Source: Puckett and Offringa⁽¹⁰¹⁾.

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