

Promoting Effective Perinatal Care

Essential Newborn Care and Breastfeeding

Training modules



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PREFACE

This workshop is one in a series developed for the countries of central and eastern Europe and the newly independent states (CCEE/NIS). The series is focused on health providers who serve women during the childbearing and early childrearing periods and children, in particular, the unborn fetus, the newborn and children through the first years of life. The workshops emphasize selected factors related to health status, health system and health providers in order to reduce maternal and infant mortality and morbidity and promote family planning.

The overall goal is to promote maternal and infant health and family planning through workshops on current Mother and Child Health (MCH) and family planning services. The workshops are designed to develop health providers' professional and managerial capabilities and create awareness among health providers to make lasting improvements in the quality and extent of MCH services for the populations most vulnerable groups. These groups are young girls, pregnant women and mothers, and their infants during the first years of life.

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INTRODUCTION

Why this manual was developed

Each year, about 4 million deaths occur in the world to infants below the age of four weeks. The great majority of these newborn deaths occur in the first days. Early newborn deaths in many countries represent a substantial proportion of infant mortality, often over 30%.

These early deaths and the severe sequelae that may develop in some of the babies who survive, can be greatly reduced through appropriate preventive, diagnostic or early therapeutic interventions. These interventions do not need sophisticated technology. On the contrary, neonatal care is an example of how short and simple interventions can achieve both immediate and long-term benefits. However, there is still a lack of knowledge in newborn care and particularly about the appropriate interventions that can be carried out at first and second levels of care.

This course aims at increasing understanding and knowledge about principles and practice of essential newborn care, including breastfeeding management and at developing the corresponding skills and attitudes among health professionals in charge of delivery and neonatal care. The final session aims at leading the participants to action at their own health facility level through the preparation of a “Plan of Action”.

This course deals with all the clinical and organizational problems of newborn care, including breastfeeding that should be managed at primary and secondary levels of care and also provides indications for referral to tertiary care centres.

For whom this course is designed

This course is designed to meet the clinical training needs of health professionals (doctors, nurses and midwives) who give care to newborn babies in health centres and small hospitals. The course is not designed for highly specialized, sophisticated care such as that provided at tertiary level.

How this course will be conducted

The course is based on adult learning methods and on principles of quality development through group work and inter-professional collaboration. These are the same methods which have proved to be most successful in training activities and in implementing change in real-life situations.

It is conceived to promote active, participative learning and is supposed to increase knowledge, skills and attitudes. Therefore it includes various types of training activities:

Presentations

Formal presentations of information will be used to cover technical issues. The information that will be given in such sessions is contained in the manual that will be given to participants, so there will be very little need to take notes by participants.

Exercises (true/false and multiple-choice questionnaires and case-studies)

These exercises are aimed at providing participants with opportunities of self-evaluation of knowledge on epidemiology, diagnostic and therapeutic interventions and of organization of

neonatal care. Participants will also have the opportunity to discuss in small groups their answers and receive support by the facilitators, if needed.

Field visits

A number of visits to the delivery room, maternity ward and neonatal unit will be arranged. They are designed to increase participants' skills in organizing care, in case-management and in communication to mothers and other family members.

Plenary discussions and small group work

These sessions provide good opportunities for participants to exchange their opinions on a given subject and to discuss how to adapt and implement the guidelines in their own local context.

The course materials

The course materials consist of sessions giving all information required for understanding the technical basis of essential newborn care and breastfeeding for carrying out the interventions and an appendix including references, exercises, checklists, transparencies and monitoring materials.

There is a separate guide for instructors on how to plan and conduct the course.

Training objectives

The educational objectives of a training activity define what participants should know (objectives related to knowledge and understanding) or should be able to do (objectives related to skills and attitudes) upon completion of the course.

The list of educational objectives represent a guide for both instructors and participants and should be presented at the beginning of the course (general objectives) as well as at the beginning of each training session (specific objectives).

The following general training objectives have been identified for this course:

a) Objectives related to knowledge and understanding

At the end of the course, participants should be able to:

- know the indicators used in perinatal health and understand the epidemiology and the main determinants of perinatal and neonatal morbidity and mortality;
- understand the strategies for improving perinatal care and the principles of essential neonatal care and their impact on neonatal health;
- describe the essential preventive diagnostic and therapeutic interventions for the care of the healthy newborn, the asphyctic newborn, the low-birth-weight newborn and newborns with other problems manageable at the first and second level of care and the related appropriate technologies;
- analyse the routine practices related to neonatal care and breastfeeding management in their own health facilities and make practical suggestions on how to improve them;
- know the basic elements of breastfeeding management.

b) Objectives for improving skills

At the end of the course, participants should be able to:

- carry out the appropriate procedures for preventing hypothermia, asphyxia and infections in newborn babies and for promoting and facilitating breastfeeding;
- assess and classify all newborns shortly after birth and identify and manage asphyctic newborns, low-birth-weight (LBW) newborns, newborns with infections, birth defects, birth trauma and jaundice;
- organize appropriately the transfer of newborn babies that need referral;
- have skills as basis for changing hospital routine practice;
- support hospital administrators and programmes and policy-makers in ensuring long-term implementation of all The Ten Steps of the Baby-Friendly Hospital Initiative in their hospitals.

c) Objectives for increasing attitudes

At the end of the course participants should be able to:

- promote a friendly environment for childbirth and facilitate mother-infant bonding;
- communicate effectively to parents about breastfeeding, thermal protection, prevention and early diagnosis of infections during hospital stay and at home;
- disseminate information about the principles and technologies of Essential Newborn Care and Breastfeeding Management and promote the relevant changes in routine practices at their own facility;
- change the attitudes on breastfeeding management by assisting hospitals in transforming their maternity facilities into Baby-Friendly institutions and implement The Ten Steps to Successful Breastfeeding.

Evaluation**Self evaluation**

Besides continuous feedback provided by other course participants and facilitators, self evaluation can be done during the course by the means of questionnaires and/or case studies. It is suggested that participants receive and go through the same exercises before the course so that during the course they will be able to verify their progress and achievements.

Evaluation of the training course

By means of a simple questionnaire, at the end of the course the facilitators will ask participants how they think the training has helped them and how it might be improved. This questionnaire will be anonymous and participants should feel free to make criticism and suggestions for improvements on the content of the course and on the training methods.

WORKSHOP SCHEDULE

Day 1

- Welcome, introduction, overview of workshop, self-introduction of the participants
- Pre-test
- Understanding the determinants of perinatal and neonatal health
- Strategies to improve perinatal and neonatal health and principles of essential newborn care and breastfeeding management
- Why promote breastfeeding?
- Definitions of breastfeeding (exclusive, dominant, bottle-feeding, etc.)
- Advantages of breastfeeding/disadvantages of artificial feeding
- Video

Exercises

Day 2

- Care of the healthy newborn
- Preparing the delivery room
- Drying the infant
- Assessment of the health of the newborn
- Giving the baby to the mother
- Baby-mother contact – The first feed
- Cleaning airways
- Cord care
- Prophylactic procedures
- Bathing the baby
- Exercises
- Breastfeeding management in healthy newborn
- Anatomy and physiology
- The sucking action
- Positioning the baby and attachment
- Breastfeeding difficulties
- Expressing and feeding breast-milk
- Feeding by cup
- Special situations (twins, Caesarean section)

Day 3

- Visit to the delivery room and a maternity ward
- Video
- Exercises
- Care of the low-birth-weight newborn
- Methods of feeding the low-birth-weight newborn
- Care of asphyctic newborn (assessment and management)
- Care of the newborn with birth defects or birth trauma
- Care of the newborn with jaundice
- Care of the newborn with infection

Day 4

- Practical session in resuscitation
- Exercises
- Sick children and breastfeeding
- Special situations (trauma, abnormalities, jaundice)
- Early problems of lactation
- Discharge from hospital, talking with parents
- Criteria for referral

Day 5

- Making your Hospital “Baby-Friendly”
- “The Ten Steps”
- The International Code of Marketing of Breast-milk Substitutes
- How to improve the organization of care (interprofessional collaboration, protocols of care)
- Recording and evaluating data and indicators
- Newborn Indicator System
- Practical session: observation in rooming-in and breastfeeding
- Evaluation of the course

Day 6

- Self-evaluation test
- Plan of action for improving organization of care:
- Working-groups
- Plenary discussion of the “Plan of action”
- Presentation of the results of the Evaluation of the course
- Conclusion of the Workshop

SESSION 1: UNDERSTANDING THE DETERMINANTS OF PERINATAL AND NEONATAL HEALTH

Perinatal, neonatal and infant mortality: current levels and time trends

It is interesting to observe the relationships among these indicators in different countries and time periods.

Of the 12.9 million estimated deaths of children under five years of age that occurred throughout the world in 1990, it is estimated that one-third occurred in the first month of life, one-third in the period from one to 12 months and the remaining third among those from one year to five years of age.

In many countries between 40 and 60 percent of infant mortality occurs in the first four weeks of life, the majority occurring during the first week. This relationship, however, varies greatly depending on the level of social and economic development of a country and on the coverage and quality of its health services.

Usually, the lower the infant mortality, the greater the part of it is concentrated in the neonatal period.

In most countries, about half of the perinatal deaths occur during the antepartum or intrapartum period; the other half occur during the first week of life but there is a tendency to a faster decrease of early neonatal deaths with respect to late fetal deaths.

Usually neonatal and perinatal mortality decline more slowly than infant mortality. There are two main reasons for this: the first is that infant deaths after the neonatal period are more sensitive to general social changes and more easily affected by preventive activities and appropriate case management; the second is that more efforts have been made to decrease the post-neonatal components of infant mortality.

When analysing perinatal, neonatal and infant mortality rates the *quality of data* must be evaluated. In fact, incomplete reporting of perinatal and/or neonatal deaths is common in many countries and the underestimation of the problem surely contributes to the lack of priority being accorded to neonatal health. In addition to the general inadequacies in vital statistics registration systems in many countries, the recording of neonatal mortality is flawed for a variety of reasons, including varying interpretations in the definition of a live birth; delays in the recording of live births; bureaucratic and political pressure on health professionals who are expected to produce continuously improving results; sometimes also bureaucratic difficulties encountered by families in the recording of death occurring at home.

As complete and reliable recording of data is an important component of good perinatal care, this issue will be especially addressed during this course.

Perinatal and neonatal mortality rates are usually considered reliable indicators of a country's quality of health services. However, even when completely registered and correctly used, crude mortality rates are not sufficient to make comparisons and to decide interventions. More useful information can be derived from the analysis of *birth weight-specific* and *cause-specific mortality rates*. These are more directly related to the frequency of different clinical problems and to effectiveness and organization of health services.

According to WHO recommendations, birth weight is grouped in 500 or 1000 grams classes starting from 500 grams. For international comparisons three categories are usually employed: 500–1499 grams, 1500–2499 grams, >2500 grams. The distribution of perinatal and neonatal deaths by time of deaths and birth weight allows more valid comparison among countries and among areas of the same country and provide a quick estimation of the problems that must be addressed by the health system.

These data are usually made available for analysis only in the most developed countries, but can be rather easily obtained where the percentage of institutional deliveries is very high.

As far as the causes of deaths are concerned, the disorders leading to fetal, neonatal or infant deaths should be classified according to 10th revision of the International Classification of Diseases (ICD-10) developed by WHO. The International Collaborative Effort on Perinatal and Infant Mortality (ICE) has recently suggested a simple functional classification of causes of infant deaths. The first four groups of this classification includes the great majority of causes of death in the neonatal period and therefore can be suggested for classifying neonatal deaths for internal evaluation, national and international comparison. They are:

- Asphyxia-related conditions
- Infections
- Immaturity-related conditions
- Congenital anomalies.

Causes of neonatal mortality and morbidity

The causes of neonatal mortality and morbidity are also generally poorly documented, with the exception of some developed countries. In addition to lack of diagnostic facilities, there is the difficulty in identifying the cause of death in newborns where many factors may contribute to death, such as very low birth weight, asphyxia and infection. Diagnostic grouping is also different from country to country. As a consequence, wide variation is noted in the proportion of neonatal deaths attributed to different causes.

Regional variation in the causes of perinatal and neonatal mortality relate to the level of social and economic development, the quality of health services, the environmental circumstances and cultural practices.

In general, immaturity-related disorders, asphyxia, infections and congenital conditions account for the great majority of neonatal deaths in all countries. The share of congenital conditions and disorders related to immaturity and/or very low birth weight increases with the lowering of neonatal mortality rates. In the most developed countries, neonatal mortality in newborns with birth weight over 1500 g and without severe congenital anomalies is extremely rare.

The same conditions that are responsible for neonatal deaths are also the most important causes of neonatal morbidity.

Neonatal morbidity, particularly when it is associated with severe asphyxia, severe infections, severe congenital anomalies and severe respiratory distress often results in delayed mortality or severe disability.

Some additional information about the epidemiology of the main causes of neonatal mortality and morbidity is useful in order to understand the principles of good perinatal care and to be able to identify the most appropriate interventions.

Birth Asphyxia

Birth asphyxia from a practical point of view can be defined as failure to establish a normal respiration at birth due to impaired oxygenation during labour and delivery.

Fetal and neonatal asphyxia is one of the most common causes of perinatal, neonatal and infant mortality and morbidity. Surveys estimate the prevalence of birth asphyxia between 4–50 per thousand births. Difficulties in ascertaining the severity and duration of asphyxia and lack of follow-up have precluded a precise assessment of the extent and distribution of birth asphyxia and its outcome in many countries. According to the most recent estimates, nearly 840 000 newborns out of four million who suffer moderate-to-severe birth asphyxia die each year in the world. An equal number survive but develop sequelae such as cerebral palsy, epilepsy and mental retardation. It can be estimated that the percentage of neonatal deaths attributable to asphyxia range from 15% to 40%. Actually, all these figures may be underestimated, since current criteria (Apgar score) for the assessment of birth asphyxia are usually nonspecific and their predictive value is low. In developed countries hypoxic-ischemic encephalopathy (HIE) as a cause of birth asphyxia has proved to be a better predictor of neonatal death or neurological sequelae, but data on HIE in less developed countries are lacking. More information is also needed on the incidence of risk factors for asphyxia.

Abruptio placentae, cord accidents and obstructed labour due to cephalo-pelvic disproportion underlie most of the cases of birth asphyxia. Aspiration of meconium or anaesthetics given to the mother may also impair respiration. Severe immaturity in very preterm infants is also a cause of lack of spontaneous breathing at birth.

Low Birth Weight (LBW)

A low weight at birth may be the result of a preterm delivery (preterm infants), of an intrauterine growth retardation (small for gestational age infants) or of both.

The risk of dying during the neonatal period of LBW infants and particularly of VLBW babies – is much higher than the risk of normal weight infants because the former are highly exposed to birth asphyxia, trauma, hypothermia, hypoglycaemia, respiratory disorders and infections. LBW infants are also at higher risk of neuro-sensory disabilities such as cerebral palsy, mental retardation, seizure disorders or learning disabilities. The percentage of neonatal deaths due to LBW varies depending on the quality of care available and the prevalence of LBW. Generally, the better the quality of neonatal care the higher the proportion of death attributable to LBW. In the most developed countries from 30 to 50% of neonatal death are caused by LBW but in these cases the mortality is confined to the extremely premature babies.

The prevalence of LBW varies greatly among countries although the sources and the reliability of national statistics, as we have already pointed out, vary from one country to another. This limits the validity of comparisons. Differences in prevalence of LBW are important, considering that LBW is the best documented factor affecting neonatal and infant mortality and subsequent morbidity, and must therefore be taken into account when comparison between countries, or different areas within the same country, are made.

Compared to full-term infants, LBW infants have also a greater risk of dying in the post-neonatal period, from diarrhoea diseases and acute respiratory infections. Thus, although they constitute only a small percentage of all births (in the CARAK countries around 6%), they probably account for over 20% of infant deaths.

Recently a review of factors having an effect on LBW has been made. The relative impact of various factors is quite different in developed and developing countries, with malnutrition and diseases during pregnancy being the major cause of LBW in developing countries and heavy smoking during pregnancy being the most important single determinant of LBW in developed countries.

Infections

The great majority of clinically relevant severe bacterial infections (SBI) in newborn babies is represented by pneumonia, sepsis and meningitis. The relative contribution of SBI to overall neonatal mortality varies greatly across countries, ranging from less than 5% in the most developed countries to over 30% in developing countries. The most important factors influencing the risk of dying from infection in the neonatal period are the percentage of institutional deliveries, the percentage of LBW babies and the quality of care during and after delivery including practices at the nursery, early breastfeeding and others. Asphyxia and hypothermia also are risk factors for SBI.

The importance of sexually transmitted diseases for perinatal health also warrants mention. With the exception of concern over the perinatal transmission of HIV infection, little attention has been given in recent years to the immediate and long-term effects of sexually transmitted diseases on the fetus and the newborn. Some of such diseases increase the risks of spontaneous abortion, stillbirth, premature onset of labour and preterm delivery.

Syphilis, for example, is a well-established cause of stillbirths. The risk of a stillbirth is at least five to seven times greater in a woman with a positive serology for syphilis. If, for example, 10% of pregnant women have a positive test for syphilis, then between 30% and 47% of stillbirths in that community could be attributed to syphilis. An effective control programmes of screening and early treatment would therefore be expected to decrease the stillbirth rate proportionately.

Some studies suggest that maternal gonococcal or chlamydial infections double the risk of premature rupture of the amniotic membranes, resulting in a preterm birth. With prevalence rates of *Neisseria gonorrhoea* infection among women attending antenatal clinics ranging from 0.2% to nearly 14%, between 1% and 25% of preterm deliveries could be attributed to this infection. Other neonatal morbidity caused by gonococcal infection includes ophtalmitis which could lead to blindness and neonatal sepsis. Amongst other sexually transmitted agents *Chlamydia trachomatis*, cytomegalovirus and *Herpes simplex* virus can result in congenital defects of newborn, neonatal conjunctivitis, postnatal pneumonia, sepsis, encephalitis and death.

Babies born to women infected with HIV have about a 25% chance of contracting the virus from their mothers during the perinatal and neonatal period.

Recent studies show that this percentage can be significantly reduced through a series of interventions including use of drugs and perhaps choice of mode of delivery (Caesarean versus vaginal). Transmission can also occur through breastfeeding; however, the benefits of breastfeeding are numerous, including protecting infants from death due to diarrhoea, pneumonia

and other infections. The baby's risk of HIV infection through breastfeeding must be weighed against its risk of dying of other causes if denied breastfeeding.

Congenital anomalies

Congenital anomalies are present in about 1–1.5% of all newborns. Severe congenital anomalies, that may cause death or very severe disability, are usually much rarer, around 1.5 per thousand live births. They may account for a significant proportion of neonatal deaths – from 20 to 30% – especially among full term infants, where other causes of death are much rarer. The incidence of congenital anomalies must be monitored because an increase in the overall incidence, or of the incidence of a specific group of anomalies, indicates that an environmental risk is present. Prevention of congenital anomalies is possible through appropriate interventions, such as folic acid supplementation, rubella immunization and avoidance of teratogens (alcohol, drugs, radiation and environmental pollutants) during pregnancy. Early diagnosis programmes, such as ultrasound screening for at risk cases, are less cost-effective and should always accompany and not substitute preventive interventions.

Hypothermia

Hypothermia, defined as body temperature below 36.5°C, is a frequent finding in newborn babies, particularly in LBW babies, who are at increased risk of becoming hypothermic because of an inadequate thermo regulation and of insufficient awareness of this problem among health professionals. Hypothermia is not usually considered among the direct causes of neonatal deaths, although it has been demonstrated that it can be the primary cause of some neonatal deaths and an important contributory factor in many more. Studies carried out on hypothermia and breastfeeding confirm that even small departures from the optimal range for neonatal body temperatures are detrimental to health, especially in LBW babies. Even minor degrees of hypothermia below the optimal range have an adverse effect upon essential bodily functions such as oxygen consumption and acid-base equilibrium. It is also a risk factor for intra-ventricular haemorrhage in preterm and low-birth-weight infants and appears to be a risk factor associated with neonatal pneumonia.

Other factors that influence the health of the newborn

The majority of conditions suffered by a woman during pregnancy and delivery that increase the risk to her of death or severe morbidity also have an adverse effect on the fetus or newborn. The most important among these conditions are:

- hypertensive disease of pregnancy
- anaemia
- obstructed labour
- haemorrhage
- puerperal sepsis
- perinatal infections.

Other maternal factors such as poor nutritional status, heavy smoking and alcohol consumption, hard work during pregnancy and exposure to environmental hazards and pollutants may also affect the outcome of the pregnancy resulting in premature delivery, intrauterine growth retardation leading to LBW and congenital malformations.

Besides these conditions and factors, the whole reproductive health of the mother and the educational and social status of women in a country play a very important role in determining the ultimate outcome of pregnancy.

Many studies demonstrate the increased relative risk of neonatal and infant mortality in association with adolescent pregnancy, low level of maternal education and high birth order. The advantage that a mother's schooling confers on her infant's health are felt even before birth. Better educated women start their families later, thus diminishing the risk to the child. Educated women tend to make greater use of prenatal care and trained assistance. Well-educated mothers often manage to reduce the damage to health caused by poverty. The status of women in a society influences the health of newborns, their growth and development. Violence against women increases the risk of miscarriage by two-fold and the risk of having a baby below average weight is four times greater.

Reasons for not giving enough priority to newborn health care

As we have said at the beginning of this section, one of the determinants of the relatively high neonatal mortality in many countries is the lower priority given to newborn care with respect to other health interventions.

There are several reasons for the lack of priority being given to neonatal health and they should be taken into account and discussed when strategies for reducing neonatal mortality and morbidity at national as well as local level are to be identified.

The first reason is *incomplete reporting leading to underestimation of the problem*. Also, the long-term consequences of inadequate neonatal health on those newborn who survive substantial morbidity in the neonatal period, are not sufficiently considered, for lack of follow-up on the neurological development of these infants.

Second, *the potential savings deriving from improved neonatal care are not adequately evaluated*. The costs to health system and to the social services deriving from the morbidity and disabilities consequent to inadequate newborn care are particularly high and include the cost for initial hospitalization; subsequent re-hospitalizations in the first year of life; and long-term costs for institutional care, foster care, early intervention, special education and adult services. Whereas traditional societies with extended families frequently absorb the handicapped child into a supporting social environment, with urbanization and the decline of the extended family such social support is less likely to continue.

Finally, another factor that appears to have contributed to the low priority accorded to newborn health care is *the mistaken idea that improvements in newborn health require highly sophisticated and expensive technology and highly specialized staff*. The improvements in perinatal mortality that have been observed in the industrialized countries have occurred parallel to, but not because of, the growth of technology for neonatal care. On the contrary, many if not most of the conditions that result in neonatal death can be either prevented or treated without resorting to sophisticated and expensive technology, merely requiring a better understanding of pregnancy and delivery risks and the physiological needs of the newborn immediately upon birth and in the first few days of life.

SESSION 2: STRATEGIES TO REDUCE PERINATAL AND NEONATAL MORTALITY AND MORBIDITY AND PRINCIPLES OF ESSENTIAL NEWBORN CARE

Learning from experience

Many health professionals and policy-makers still believe that the decline of perinatal and neonatal mortality noted in the industrialized countries is a direct result of the use of highly sophisticated and expensive technology. This is not true. First of all, improvements of women's health education and social status led to a sharp decline in fertility rates and better planning of pregnancies, with consequent great reduction of at risk pregnancies, well before that major investments in specific technology and services for perinatal and neonatal care were made. Second, **generalized access to antenatal care, regionalization of perinatal care** and a greater understanding of the pathophysiological basis of perinatal morbidity and mortality, with **better management of pregnancy and delivery**, have in many instances contributed to a decline in mortality without major investments in facilities and equipment. On the contrary, the high technology response often has negative effects; diversion of resources from essential care for the majority of newborns, escalating costs and dehumanization of birth and newborn care. *Only when the majority of neonatal deaths occur either in VLBW babies or in babies born with congenital anomalies an investment in advanced technology may result in substantial reduction of mortality.*

Antenatal care includes surveillance for signs of impending complications, infections or early onset of labour. The norm that is generally promoted favours beginning antenatal care in the first trimester of pregnancy. Various forms of incentives for maternity benefits have been successfully used to ensure registration early in the first trimester of pregnancy.

In most industrialized countries perinatal care is increasingly built around the concept of levels of care or **regionalization** to correspond to the anticipated or actual level of clinical skills and facilities required for care. It has evolved in the context of a well-developed infrastructure of transport, communications, health facilities and different categories and levels of specialized personnel. *By identifying and referring women with impending complications or at risk of a very preterm delivery and by ensuring an appropriate transport service for obstetrical emergencies or particularly vulnerable newborn infants to referral centres, many countries have experienced a sharp fall in perinatal mortality.*

Better pregnancy and delivery care have been made possible by the advancement of medical science that has shown which interventions can really be beneficial and by the dissemination of these results among health professionals. Although the incorporation of the current knowledge into routine medical practice still has a long way to go, there is no doubt that in the most advanced countries there has been a move towards evidence-based medicine as well as an increased awareness of women about their right to obtain the best care.

Even in countries with advanced perinatal care systems there are problems that are still difficult to be solved. Among these are: the high perinatal and neonatal mortality found among some marginal, disadvantaged or particularly vulnerable groups; lifestyles that may have adverse consequences for the mother or infant, such as the use of alcohol, tobacco and drugs; and inappropriate use, over-use or misuse of some of the technology and procedures in perinatal and neonatal health care. Interventions directed at changing behaviour relating to substance abuse,

for example, encountered many difficulties, mainly due to the scarce capability of health professionals to carry out health promotion and health education programmes.

Strategies to improve perinatal and neonatal health

Taking into account the various determinants of perinatal and newborn health that have been briefly analysed in the preceding session and learning from the experience made in the past, programmes aimed at improving perinatal and neonatal health should be based on four different strategies.

- Improvement of women's education, status and health and particularly reproductive health.
- Improvement of antenatal care including surveillance for signs of impending complications, infections or early onset of labour.
- Improvement of pregnancy and delivery care.
- Better organization of the referral system for both at-risk deliveries and babies (regionalization of care).
- Improvement of neonatal care.

Principles and appropriate technologies for essential newborn care

The aim of this course is enable health professionals working in peripheral health facilities to reduce neonatal mortality and morbidity that still occur in newborn babies whose birth weight is adequate or low, but not very low and who are not affected by severe congenital anomalies. These babies represent over 98% of total newborns and in most countries more than 80% of neonatal deaths are still concentrated in this group.

As has been shown in the previous section of the module, most of these deaths are due to asphyxia and/or infection, with hypothermia often being an important contributing factor.

The analysis of the causes of perinatal and neonatal morbidity and mortality and knowledge on the pathophysiology of fetal distress, birth asphyxia and physiology of thermo regulation, as well as research on the management of labour, resuscitation and thermal control of newborn babies have led to the identification of a few basic principles of care:

- identification of women at high risk of obstetric complications or very preterm delivery and provision of the appropriate care (transfer the mother to a higher level when necessary);
- active observation and management of labour, with early identification of complications of labour and fetal distress;
- friendly environment for childbirth and promotion of mother-infant bonding;
- maintenance of body temperature;
- initiation of spontaneous respiration;
- breastfeeding beginning shortly after birth;
- prevention and management of infections.

For each of these basic principles, appropriate technologies – including procedures, tools, devices and organizational routines – have been identified and should be introduced into routine

practice as components of **essential newborn care**, i.e. **the minimum set of interventions that should be made available for all births**.

All these technologies have been shown to be highly effective in reducing neonatal mortality and morbidity, and capable to substantially reduce also the post neonatal mortality and morbidity.

All these technologies are low-cost and can be fully implemented without any major investment for capital or running costs. They represent highly cost-effective interventions and should be given priority within the health system.

However, the introduction into routine care of these technologies and approaches requires the **upgrading of the skills, knowledge and practice of health professionals in charge of newborn care**, including midwives, doctors and nurses and this is precisely the aim of this course. Early identification and appropriate management of at risk pregnancies and active management of labour are dealt with separately in courses devoted to pregnancy and delivery care. They will be mentioned, however, during this course as they represent essential components of good perinatal care and therefore the understanding of their importance as well as the active collaboration with professionals in charge of obstetric care fully pertain to the tasks of health professionals responsible for newborn health.

Let us now focus our attention to the principles and technologies specifically concerning the newborn baby. These principles must be applied at all levels of the health system and should be exercised even in the small percentage of deliveries that for various reasons take place at home. They do not require sophisticated and expensive equipment, but rather the appropriate use of simple technologies (see definition below) based on the full understanding of the psychological and emotional dimensions of birth and of the basic physiology and physiopathology of neonatal adaptation.

The physiological and technical basis of these principles of essential newborn care represent the necessary background for understanding the importance of specific technologies and procedures that will be dealt with during the following part of the course.

The term “*technology*” is better defined as a complex of actions which includes methods, procedures, techniques, equipment and other tools, all applied in a systematic way to solve a specific problem.

The most important criteria to judge the appropriateness of a technology are effectiveness and safety. Once these are established, costs, acceptability for both patients and health personnel and feasibility should also be evaluated to determine if the technology should be introduced.

Friendly environment for childbirth and promotion of maternal-infant bonding

In all countries there has been a trend towards institutional deliveries. In many developed countries, the vast majority of deliveries take place in hospitals. There is no doubt that this allowed to greatly improve delivery care and particularly the management of complications of labour and delivery. Also newborn care has improved as a consequence of hospital deliveries, although to a smaller extent.

On the other side institutional deliveries have transformed childbirth to a merely clinical event, with physiological and technical aspect receiving far more attention than the psychological wellbeing of mother and child. The more technology is used – and the more doctors are taking

care of the various aspects of labour and delivery, – the greater are the difficulties in combining the emotional needs of the mother and her family with the technical and organizational needs of the institution.

But today the emotional needs of mothers, fathers and newborn babies are becoming to be recognized, as well as some of the disadvantages of institutional deliveries, such as the difficulty for the mother to receive some psychological support during labour and delivery, the separation between mother and baby, the loss of many aspects of the crucial experience of childbirth for the whole family. Besides their cultural meaning, these negative aspects bear also some consequences on the health of mother and newborn. For example, it has been shown that psychological support during labour diminishes the incidence of labour and delivery complications and that late initiation of breastfeeding and mother-baby contact may compromise successful breastfeeding and mother-infant bonding later.

The key features of the concept of bonding are that there is a limited sensitive period, initiated at birth and persisting for a number of days, during which a mother is particularly open to form a relationship with her baby. During this period separation may lead to disturbances of the mother-child relationship which can be persistent. These disturbances include increased anxiety and psychological distance and can contribute to greater problems, such as child neglect and abuse, later on time.

Besides being a request of many women and a need for the baby, a more friendly environment for childbirth and early and close contact between mother and baby are now recognized as essential features of good delivery and newborn care.

Appropriate technologies to ensure the above principles are the following:

- The father or another member of the family should be allowed to assist the woman during labour and delivery and to visit her during her hospital stay.
- Unnecessary traumatic procedures for both mother and baby during childbirth should be avoided.
- Traditional practices should be allowed if they do not interfere with good care.
- Early contact between mother and baby should be encouraged and any unnecessary procedure that separates the baby from his/her mother should be avoided.

They will be described in Session 3 (*Care of the healthy newborn*) and Session 11 (*How to improve the organization of care*).

Initiation of spontaneous respiration

As it has been said in Session 1, birth asphyxia is one of the major causes of perinatal morbidity and mortality and of serious neurological sequelae in later life. Asphyxia also contributes to hypothermia, hypoglycaemia, infections, thus contributing indirectly to neonatal mortality and morbidity.

Labour carries a particular risk of fetal asphyxia since the transfer of oxygen across the placenta is reduced during uterine contractions. The normal fetus can withstand a moderate fall in pO₂ and may manifest no sign of birth asphyxia. When the fetus is compromised as a result of fetal disease, premature birth or severe growth retardation, the tolerance for hypoxia is reduced and a

state of asphyxia can supervene. Causes of birth asphyxia are numerous and have been mentioned in Session 2. It is important to underline that interventions to reduce perinatal asphyxia may be the most cost-effective method for achieving further reductions in neonatal mortality and preventing future disabilities. Unfortunately, as health professionals involved in delivery care know very well, in about 50% of cases it cannot be anticipated, even with technological approaches (for example electronic fetal monitoring), that the newborn infant will have trouble in initiating breathing. As a consequence, the necessary equipment and skills for prompt neonatal resuscitation are needed for every birth. By ensuring the availability of skilled personnel and appropriate devices and procedures for resuscitating asphyctic newborns, many countries have been successful in reducing the incidence of birth asphyxia.

Appropriate technologies involved are therefore:

- assessment of the newborn immediately after birth for need of resuscitation (this will be dealt with in Session 9);
- resuscitation by bag and mask and other cardiopulmonary resuscitation procedures if spontaneous breathing is not started;
- management of the post-asphyctic newborn (Session 9).

Maintenance of body temperature

Hypothermia occurs when the body temperature drops **below 36.5°C (97.7°F)**. The newborn infant with a body temperature of between 36.0–36.4°C may be already under cold stress and prolonged and more severe hypothermia is the starting point for the development of multiple health problems. In studies in Ethiopia and Nepal, infants have been observed to have temperatures of only 26–27°C (78.8–80.6°F) within 2 hours of birth, if not cared for properly. A baby who is cold immediately after delivery will become acidotic and hypoglycaemic, have abnormal clotting and will be at increased risk of respiratory distress and infection. The baby which becomes hypothermic and is not with the mother is less likely to feed properly, which will increase the risk of prolonged hypothermia due to lack of heat production and continued heat loss. Prolonged cold injury leads to: oedema, sclerema, general haemorrhage (especially pulmonary haemorrhage) and jaundice. Impaired cardiac function and impaired growth have all been found in babies who developed neonatal hypothermia.

The newly born baby almost always experiences an immediate fall in body temperature. Leaving the warmth of the mother's womb, the wet newborn infant may lose enough heat for the body temperature to fall by 2–4°C (3.6–7.2°F), the greatest amount of heat being lost in the first 10–20 minutes after birth. This heat loss is due in first instance to evaporation of amniotic fluid from the infant's body. If the baby is not dried, given to the mother for skin-to-skin contact and covered immediately more heat will be lost in the following minutes through further evaporation, contact with cold surfaces or exposure to cold environments and draughts.

Besides the exposure to heat losses, the newborn is particularly at high risk of hypothermia because at birth the infant's ability to respond to cold by increased metabolism and heat production is not fully developed. However, this response will develop provided the baby is healthy and receives food.

Sick or small (LBW) infants are at increased risk of hypothermia. Preterm and low-birth-weight infants have less subcutaneous fat for insulation and thus lose heat more easily through their thin skin. Small and sick infants do not have the ability to respond by increasing their metabolic rate.

The amount of heat gained by crying and moving, in these infants, is minimal. Sick infants do not feed properly and infections may increase their metabolic requirements. These are the reasons for paying special attention in preventing hypothermia in these infants.

There are a number of “*appropriate technologies*” that have been developed and tested for prevention and treatment of hypothermia. They include action at four different levels:

- Health personnel must be aware of the problem and prevent it from developing. This means that the concept of “**the warm chain**” should be applied right after birth, by drying the infant immediately after birth placing in direct skin-to-skin contact with the mother and covering both with a heavy, clean blanket (see Session 4).
- The second component of appropriate thermal protection is **early diagnosis of hypothermia**. This means that temperature should be taken routinely in all newborn babies and with increased frequency in LBW or sick newborns (see Sessions 8, 11).
- The third component of thermal protection is **rewarming hypothermic babies** and ensuring special thermal protection to babies at special risk of becoming hypothermic, that is LBW and sick babies. The following methods are appropriate: Skin-to-skin contact, Water filled mattresses and Air-heated incubators (see Session 9).
- The fourth component is to ensure **adequate thermal protection** during internal transfer of the baby, from the delivery room to the maternity and during external transport in case of referral to other centre (see Session 15).

Initiation and support of breastfeeding

Breastfeeding is one of the most important contributors to neonatal, infant and child health, growth and development. The benefits are enhanced if breastfeeding starts within one hour after birth, with demand feeding and no prelacteal feeds. Many neonatal health problems can be avoided or reduced by such a pattern of breastfeeding. These include such conditions as hypothermia, neonatal hypoglycaemia, infections and neonatal jaundice.

Breastfeeding protects against death and morbidity also in the post-neonatal period and throughout infancy and childhood. The protective effect is particularly strong against infectious diseases that are prevented through both direct transfer of antibodies and other anti-infective factors and long-lasting transfer of immunological competence and memory.

The risk of morbidity and of hospitalization is much higher among infants who are not breastfed and this is true also in industrialized countries, where evidence indicates that very severe illness is less likely among breastfed infants.

“*Appropriate technologies*” to promote breastfeeding include:

- giving the baby to the mother for breastfeeding shortly after birth
- promoting breastfeeding on demand, 24 hours a day
- promoting rooming-in (mother and baby are together 24 hours a day)
- informing mothers about the benefits of breastfeeding and dangers of artificial feeding
- showing mothers how to breastfeed and inform them about the problems that may arise
- avoiding any use of breast-milk substitutes and bottle-feeding

- avoiding hospital routines that may interfere with breastfeeding.

All these will be dealt with in detail later.

Prevention and management of infections

Together with asphyxia, several forms of bacterial infection (neonatal tetanus, sepsis, meningitis, pneumonia, diarrhoea) are the major causes of neonatal mortality. Neonatal infections can be the consequence of contamination during the late stage of pregnancy, during delivery and during the first days of life. Besides ensuring a clean environment and aseptic techniques during delivery newborn care must include procedures aimed at:

- preventing infections acquired during the delivery to develop to a clinical stage;
- preventing the acquisition of infections during the first days of life;
- early diagnosis of infections in order to ensure a prompt treatment and avoid complications.

In addition to hygiene during delivery, clean hands (gloves), clean environment, sterilized/disinfected equipment and supplies, these principles should include special measures for newborns to prevent hospital infections such as rooming-in, prevention of overcrowding, provision of clean water and washing hands by health personnel.

Appropriate technologies to ensure the above principles include:

- appropriate cord care;
- avoiding routines that may facilitate infections, such as putting more than one baby in incubators, not ensuring appropriate cleanliness of incubators and other devices, etc.;
- ensuring cleanliness of personnel in charge of newborn babies;
- keep babies with mothers as much as possible and avoid crowded nurseries;
- prevention of ophthalmia neonatorum;
- clinical observation of newborns for early recognition of signs of infection;
- prompt treatment of local and systemic infections.

They will be described in Sessions 3 and 11.

Regionalization of neonatal care

As national authorities consider the development or strengthening of their perinatal care services the question raised is: What is the minimum configuration for the structure and content of neonatal care at each level? The answer depends on the needs and available resources. As in the case of maternal health and in contrast to many of the other elements of primary health care, significant impact can only be sustained through a structure of care, linking at least the levels of the community and the health centre, preferably also the district hospital and optionally, as a fourth level, a specialized group at provincial or national level.

The three levels of care and their essential content are described below. In principle, supervision and in-service training should be linked and there should be a two-way flow of relevant clinical and managerial information.

In most instances the *first level* of maternal and neonatal care would be a health facility with several maternity beds, such as might be found in a rural hospital. It would have one or more midwives or nurses always in attendance and would be served and supervised by a physician.

The staff of such a facility, in addition to being able to provide the same functions as those performed in the community, would be of a sufficient level to be able to:

- make clinical judgements and provide resuscitation of asphyxiated infants;
- ensure thermal control and warming of hypothermic infants (below the level of incubator use);
- provide diagnosis and basic treatment of infections, jaundice and hypoglycaemia.

The facility should also have a *means of communication and access to transport permitting referral to a higher level* when continuing care is not possible at this level.

The *second level* of care, that is the district or regional hospital, would provide 24-hour coverage by a physician with training and experience in essential obstetric and neonatal care and by general nurses and midwives. The qualifications of staff at this level should include competence in: **thermo-regulation and use of incubators; phototherapy and blood transfusion; gavage feeding; basic laboratory investigations such as haemoglobin, urinalysis, glucose, bilirubin, Combs, blood group, X-rays and so forth. There should also be a well-insulated nursery unit with running water and facilities for controlling infections and there should be access to oxygen.**

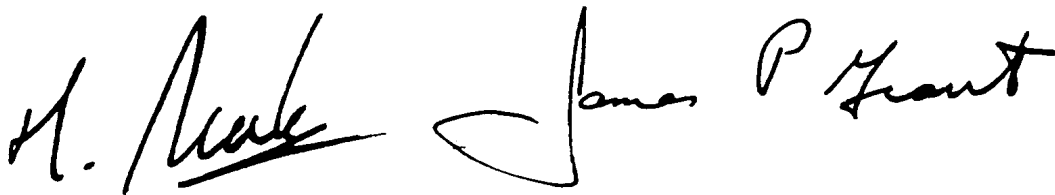
The *third level* would probably be part of a regional or national academic or university setting with a neonatal intensive care unit staffed by physicians and nurses specifically trained in neonatology. Such a facility should be placed in the context of the training and research needs for neonatal care and **its functions should also include training and supervision for the whole regional system of neonatal care.** Measures should be taken to ensure that research activities are appropriate and useful for the whole newborn care network, for example including the **development of national guidelines, evaluation of service quality and programmes impact through continuous monitoring or ad hoc surveys.**

National guidelines should define exactly which task must be performed at each level of care and the indications for referral to the higher level should take into account any constraint, geographical or economical, to prompt access to higher levels of care.

SESSION 3: WHY PROMOTE BREASTFEEDING?

Advantages of breastfeeding and Disadvantages of artificial feeding

While discoveries are still being made about the many benefits of breast milk and breast-feeding, few today would openly contest the maxim “breast is best”. Yet slogans, however accurate, are no substitute for action. That is why we invite all those concerned with providing maternity services to study this statement to see how they are helping or hindering breast-feeding. Are they encouraging and supporting mothers in every possible way? We urge them, wherever they might be, to ensure that their services are fully mobilized to this end and thereby to bear witness to the unequalled excellence of breast-feeding for infants and mothers alike.



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Source: WHO/UNICEF Joint Declaration, 1989

Breastfeeding and two million infant lives

Forty thousand children die each day (28 every minute) in developing countries, the victims of malnutrition and frequent illnesses made worse by malnutrition. In many developing areas, 25% of all children die before reaching their fifth birthday. In the last few years, it has become clear that seven simple techniques can be effective in saving millions of these children’s lives:

G rowth monitoring and promotion	F amily planning
O ral rehydration therapy	F emale education
B reastfeeding	F ood distribution
I mmunization	

These techniques, known by the acronym GOBI-FFF, form the core of the *CHILD SURVIVAL STRATEGY*.

Breastfeeding is a fundamental component of this strategy. The superbly balanced nutrients and enzymes, the life-protecting immunological substances and epidermal growth factor and the adjustment of this content to match the changing needs of the infant are remarkable. Exclusively breastfed infants have 2.5 times fewer episodes of illness and are 25 times less likely to die of diarrhoea during the first six months of life than those fed substitutes. The frequent physical contact entailed in breastfeeding assures continuing protection and warmth for the infant, while

the cooperative nature of the dyad interaction during nursing enhances the baby's emotional development and socialization.

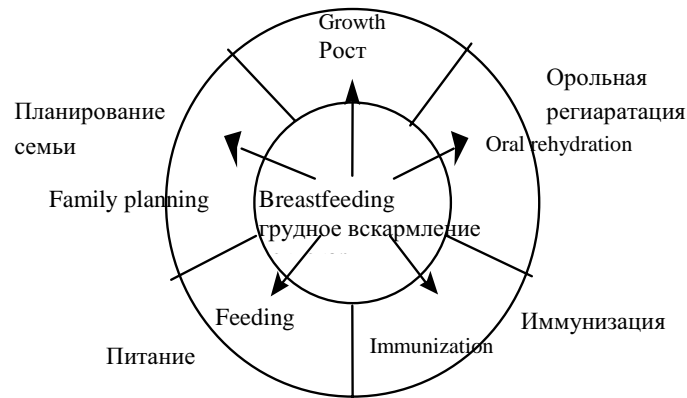
Breastfeeding also contributes to a mother's maternal sensitivity and to her successful transition from a pregnant to non-pregnant state. Postpartum bleeding is minimized and uterine involution assured by the oxytocin-induced uterine contractions which accompany suckling. Maternal protein, iron and other nutrients needs during the postpartum period are conserved by lactational amenorrhea. The anovulatory state which accompanies the frequent nursing pattern characteristic of exclusive breastfeeding is estimated to provide 30% more protection against pregnancy than all organized family planning programmes in the developing world combined. Lactation infertility can extend pregnancy intervals to 18 months or more. A totally dependent infant can thus become a somewhat more independent toddler before maternal attention must be diverted to the next baby. Overall it is estimated that if more women were to breastfeed optimally (i.e. exclusively through the first four to six months and with appropriate weaning foods through at least the first year) an additional TWO MILLION infants lives could be saved each year.

The loss of these benefits through the gradual decline in both the incidence and duration of breastfeeding reported in developing nations since the 1970s is a major concern to all who have an interest in child survival. The declines, concentrated in the urban and peri-urban areas, are the result of the complex interaction of several phenomena: availability and aggressive marketing of a substitute; an erroneous belief that to use the substitute is more modern and healthier; a widespread and incorrect assumption that breastfeeding and working are always incompatible; and the absence of extended families to assist new parents during their adjustment to parenthood.

The declines are also influenced by increasing utilization of modern health care systems for prenatal, intrapartum and postpartum care. Nurses, physicians and others who provide care and establish institutional policies and procedures for new mothers and infants rarely have the necessary knowledge and skills to support and assist lactation and the breastfeeding mother and infant. In addition, many health care providers are still not well informed regarding the extent of the benefits of breastfeeding and have minimal professional commitment to it. These deficiencies in health care provider knowledge result in expectant and new mothers being faced with a variety of barriers to both the initiation and continuation of breastfeeding. Thus a successful *CHILD SURVIVAL STRATEGY* must include lactation management education for health care providers.



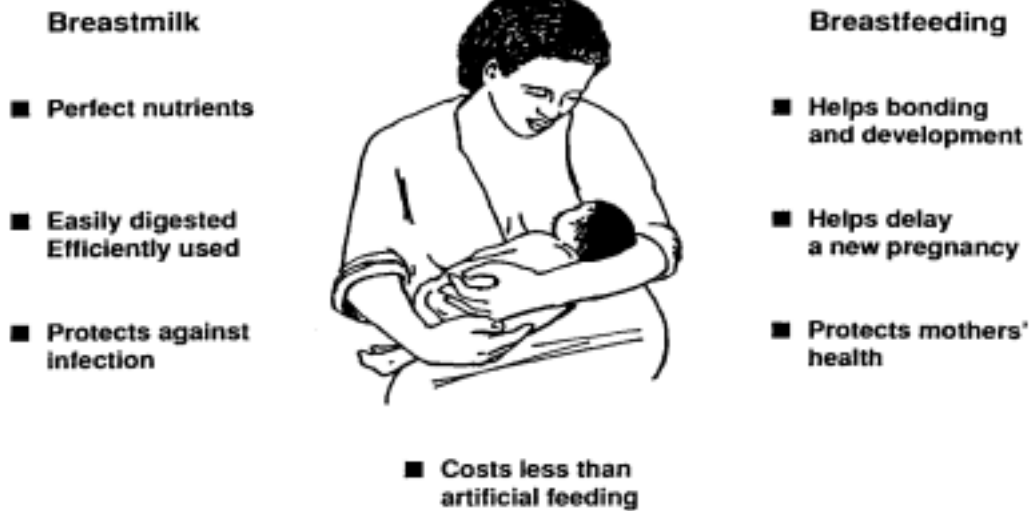
Source: Wellstart International



Why we need to promote breastfeeding

- Beneficial to the infant's health
- Beneficial to the mother's health
- Beneficial to bonding of mother and baby
- Economic advantages
- Ecological advantages
- Mother's right to informed choice of how to feed her baby
- Reduced levels of breastfeeding
- Initiatives of international organizations.

ADVANTAGES OF BREASTFEEDING



Breastfeeding has important psychological benefits for both mothers and babies.

Breastfeeding helps a mother and baby to form a close, loving relationship, which makes mothers feel deeply satisfied emotionally. Close contact from immediately after delivery helps this relationship to develop. This process is called *bonding*.

Babies cry less and they may develop faster, if they stay close to their mothers and breastfeed from immediately after delivery.

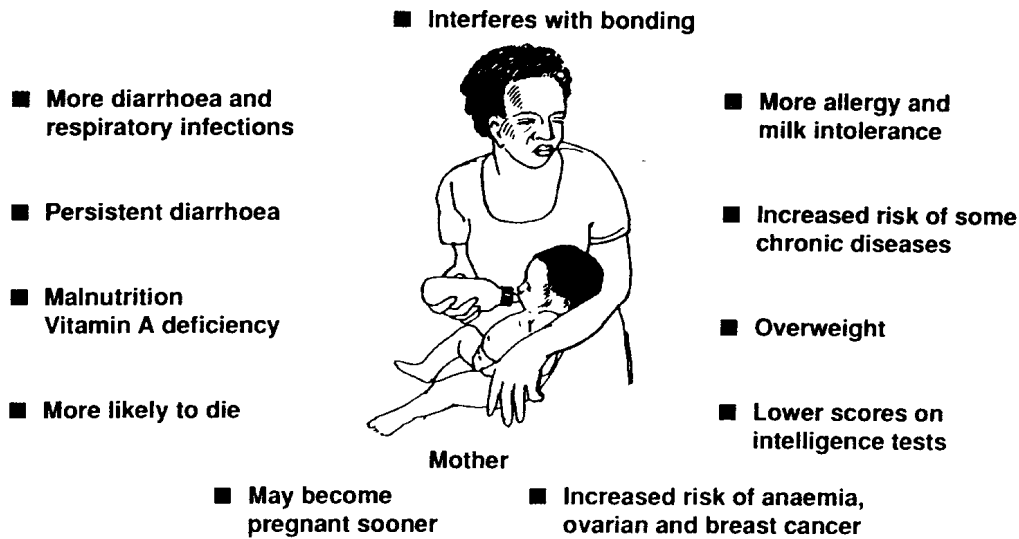
Mothers who breastfeed respond to their babies in a more affectionate way. They complain less about the baby's need for attention and feeding at night. They are less likely to abandon or abuse their babies.

Psychological benefits of breastfeeding

Emotional bonding

- close, loving relationship between mother and baby
- mother more emotionally satisfied
- baby cries less
- mother behaves more affectionately
- less likely to abuse or abandon baby.

DANGERS OF ARTIFICIAL FEEDING



Benefits to society

- The cost of an adequate diet for the mother is less than the cost of feeding a baby artificial formula.
- Mothers can use food money for other family members. There is no need to purchase breast-milk substitutes or feeding equipment and no need for extra fuel or water.
- Family time is not needed for food preparation and extra health care visits.
- The costs of medical consultation, medicine, lab tests and hospitalization are reduced. Mothers and babies are healthier.
- Mothers can space pregnancies with the Lactation Amenorrhea Method which improves the health of mothers.

A comprehensive study from Indonesia calculated that the cost of producing sufficient human milk to feed an infant was about US \$0.05 per day or about US \$1.62 per month. In 1988, the cost of sufficient infant formula for one month ranged from US \$16.87 to US \$56.25 depending on which brand was chosen.

Clearly then, in addition to being a better food for a baby, breast-milk is much cheaper than artificial milks.

However, there are other costs involved: the mother's time; the health costs of the different feeding methods; the social and economic costs of losing the birth-spacing effect of breastfeeding.

In all the calculations, breast-milk and breastfeeding come out as the most cost-effective method of infant feeding.

The economics of breastfeeding

If the mother is the only person who feeds the baby, then the time taken to breastfeed is generally less than the time required to shop for the milk powder, sterilize the feeding bottle and teat (and in rural areas of some countries go in search of firewood to boil the water), prepare the feed and give it to the baby.

On the other hand, an “advantage” of bottle-feeding is that someone else could feed the baby allowing the mother to earn income. The time required for breastfeeding each day is probably no more than two hours, so in theory there is a loss of two hours worth of income.¹ In practice, given that maternity legislation does not always provide for breastfeeding breaks, the decision to breastfeed may mean foregoing any work in a formal job, so the loss of income may be higher. Nonetheless, in most developing countries, a large percentage of income would have to be spent on the baby’s milk, so the advantage of working would rapidly disappear.

Health costs of bottle-feeding, in purely economic terms, are considerable. If 25% of mothers in Indonesia stopped breastfeeding, the cost of treating the resulting increase in diarrhoea cases has been estimated at more than US \$40 million, or about 20% of the total annual health budget. Even in New York, the total cost for hospital treatment of bottle-fed infants during their first four months is some 15 times the cost of treating breastfed infants.²

In Indonesia, the contraceptive effect of breastfeeding is calculated at being roughly equivalent to the entire National Family Planning Programmes. Without breastfeeding, an additional US \$80 million would have to be spent to achieve the same contraceptive effect.³

Today in Indonesia, mothers produce over one billion litres [of breast-milk] annually with a conservatively estimated net market value of over US \$400 million ... savings in health and fertility reduction to the economy. Mother’s milk is one of Indonesia’s most precious natural resources, exceeding tin and coffee in gross monetary value and approaching that of rubber.

Benefits to ecology

Breastfeeding: Ecology – with love

“In the past ten years profound changes have been wrought in our environment ... bringing recrudescence of diseases, such as malaria and destruction of the natural habitat. ... Natural resources are irretrievably lost, the health of populations is damaged and the under-budgeted health services are left to bear the burden.”

(Dr H. Nakajima, Director-General, World Health Organization, May 1989.)

Bottle Baby Disease resulting from artificial feeding is a man-made illness that damages health and the environment by squandering a unique natural resource – breast-milk.

The key words of ecology are: living, pure, nature. All of these apply to breastfeeding. Breastfeeding promotes growth and the healthy development of the human species; it is a pure natural resource which does not tax the environment.

1 Commonwealth Secretariat & UNICEF in association with WHO, Action Guide on Implementing the International Code of Marketing of Breast-milk Substitutes, London/New York, 1984, pp75-80.

2 IBFAN, ‘The Economic Value of Breastfeeding’, Breastfeeding Briefs, Jan 1988, p1.

3 Rhode, J.E., ‘Mother Milk and the Indonesian Economy: A Major National Resource’, Journal of Tropical Pediatrics, 28(4), 1982, pp166-174.

Breastfeeding

Living: breast-milk is a living substance. "Human milk contains almost as many live cells as blood itself. It is called 'white blood' in one culture. These cells can actively destroy bacteria, fungi and intestinal parasites and help to regulate the immune response... Mother's milk is good medicine, as well as good food."⁴

Pure: breast-milk is a pure product. Germs multiply less rapidly in breast-milk than in artificial milks; breast-milk kept in a clean cup, covered and at room temperature will remain uncontaminated for up to 10 hours.⁵

Breast-milk is natural, uniquely adapted to the needs of each baby at its particular stage of growth and development. Anti-infective proteins are protective factors which increase in human milk as the baby gets older, adapting to the baby's environment. By fifteen months, immunoglobulin A in human milk increases, lactoferrin reaches a peak and lysozyme has increased six times.^{6,7}

Artificial feeding

Infant formula is a dead product. At every stage of the manufacturing process, the initial cow's milk is processed, dried and manipulated. The living cells and antibodies are killed. Once the feed is mixed, the only living things remaining may well be the bacteria in the milk powder and in the water, on the teat and on the bottle.

"Despite the presence of pesticide residues in human milk, breastfeeding should be encouraged and promoted on the basis of convincing evidence of the benefits of human milk to the overall health and development of the infant"⁸

Feeding with baby milk and bottles is far from natural. Every time an ingredient is added to modify the composition, contaminants are also accidentally introduced. Metals such as aluminium may contaminate formula during the manufacturing process. Contaminants may also be present in packaging, or in soldered cans. "Lead is a cumulative poison which damages the brain": one Washington study showed lead levels in formula leading to a lead intake by babies which was nine times higher than the threshold of risk.⁹

Bottle-feeding: a waste of money, a waste of natural resources, a waste of time?

We "often forget or trivialize a key resource, breast-milk, which contributes to the conservation of life on many different levels".¹⁰ Breast-milk is not the only valuable natural resources which is wasted by bottle-feeding. In many parts of the world water and firewood are precious resources which are disappearing at an alarming rate.

To prepare 6 feeds correctly everyday, bottles and teats must be boiled for 10 minutes and the water for each separate feed must be boiled for at least 10 minutes.¹¹ This brings the boiling time up to 90 minutes per day. It takes 200 g of wood to boil one litre of water, so in one year feeding a child artificially requires 73 kg of wood.¹²

4 Maureen Minchin, *Breastfeeding Matters*, Alma Publications, Australia, 1985.

5 *Breastfeeding Briefs*, IBFAN Geneva, December 1988. Barger, J. et al, Comparison of the bacterial Composition..., in *Breastfeeding Review*, Australia, November 1988.

6 Nwankwo, M.U. et al, Bacterial growth in express breast-milk, in *Journal of Tropical Paediatrics*, U.92-95-1988.

7 Atta N'da Wamalah, *Etude longitudinale du contenu en protéines anti-infectieuses du lait maternel en Côte d'Ivoire*, Diplôme de Doctorat, 1989.

8 WHO Environmental Health Series No.29, *Assessment of health risks in infants associated with exposure to PCBs, PCDDs and PCDFs in breast-milk*, Copenhagen, 1988.

9 INFACT Canada Newsletter, Spring, 1989.

10 Palmer, Gabrielle, *The Politics of Breastfeeding*, Pandora Press, UK, 1988.

11 Instructions on a tin of Milumil, (Milupa), purchased in Nigeria in 1989.

12 Gilman, R.H. and Skilikom, P. Boiling of drinking water: can a fuel-scarce community afford it?, *Bulletin of WHO*, 1985, 63 (1), pp157-163.

To prepare the feeds for a baby of three months takes one litre of water a day, plus 2 litres to boil the bottles and teats and more to wash and rinse the bottles. “The women have too little water, too little fuel to sterilize bottles and feeds”;¹³ once these essential precautions are neglected, germs multiply and diarrhoea and disease take their toll on children’s health.

In other parts of the world, rubbish hills are rapidly turning into rubbish mountains. “For every 3 million bottle fed babies, 450 million tins of formula are used. The resulting 70 000 tons of metal in the form of discarded tins is not recycled.”¹⁴

Breastfeeding, on the other, is the best way of using scarce resources. By eating a little extra food, by drinking a little extra water, a woman produces the highest quality food for her baby: “The lactating mother is an exceptional national resource, for not only does she process coarse cheap foods to produce a unique and valuable infant food, but also the production process of lactation provides measurable benefits to health and contributes to fertility reduction.”¹⁵

Benefits of breastfeeding to infant’s health

Breast-milk provides many health benefits for the baby. When babies are exclusively breastfed, these benefits are highest. Overall, there is less illness requiring health care among exclusively breastfed babies. Exclusive breastfeeding provides the best infant nutrition and growth, with continued growth if other foods begin at around six months.

Protection against infection

- Breastfed babies have less diarrhoea, less gastrointestinal (GI) infection and less respiratory infection than artificially-fed babies.
- A substance called the bifidus factor helps special bacteria to grow in the baby’s intestine and prevents other harmful bacteria from growing.
- Dozens of anti-inflammatory agents reduce the harm caused by uncontrolled inflammation.
- Lymphocytes and macrophages, which are living cells, fight disease.
- Each mother’s milk has antibodies to protect her baby against diseases to which she has been exposed.
- Growth factors enhance the baby’s development and maturation of the immune system, the central nervous system and organs such as skin.

13 Letter from Mexico, April 1989.

14 Jelliffe, Derrick B. and Jelliffe, Patrice, E.F., Human Milk in the Modern World, Oxford University Press, 1978.

15 Rohde, Jon E., Mother milk and the Indonesian economy, a major national resource, Journal of Tropical Paediatrics, 28, (4), 1982.

Protective components in breast-milk against infection

Table 1. Anti-infective and anti-inflammatory components in human milk

Milk Component	Function
Secretory IgA	Prevents bacterial adherence. Limits antigen penetration. Inhibits neutrophil chemotaxis.
<u>Cells:</u> T cells	Transfer of cell mediated immunity?
B cells	Role unclear.
Macrophages and Neutrophils	Phagocytosis – microbial killing. Poor response to chemoattractants.
<u>Non-immunologic antimicrobial agents</u>	
Lactoferrin	Inhibits complement. Inhibits bacterial growth by binding iron (Fe+3).
Lysozyme	Inhibits chemotaxis and production of toxic oxygen radicals. Produce free fatty acids and monoglycerides which disrupt virus envelopes and lyse protozoa.
Lipases	
<u>Anti-inflammatory agents</u>	
Catalase	Degrades hydrogen peroxide.
Alpha-tocopherol, cysteine, ascorbic acid	Scavengers of oxygen radicals.
Histaminase	Degrades histamine.
Aril sulfatase	Degrades leukotrienes.
Alpha-1-anti-trypsin	Neutralize enzymes that act in inflammation.
Alpha-1-antichymotrypsin)	
Prostaglandins (E2,F2)	Cytoprotective.
Oligosaccharides	Inhibit microbial attachment.

Table 2. Hormones and growth factors in human milk

Hormones	Growth factors
Adrenal steroids	Epidermal Growth Factor (EGF)
Calcitonin	Human milk growth factors
Erythropoietin	Mammary derived growth factor
GRF	Nerve growth factor (NGF)
GnRH	Transforming growth factor
Insulin	Colony stimulating factor
Neurotensin	Bifido bacterium Bifidum growth factors
Oxytocin	
Ovarian steroids	
Prolactin	
Relaxin	
Somatostatin	
Trilodothyronine, thyroxine	
TRH	
TSH	

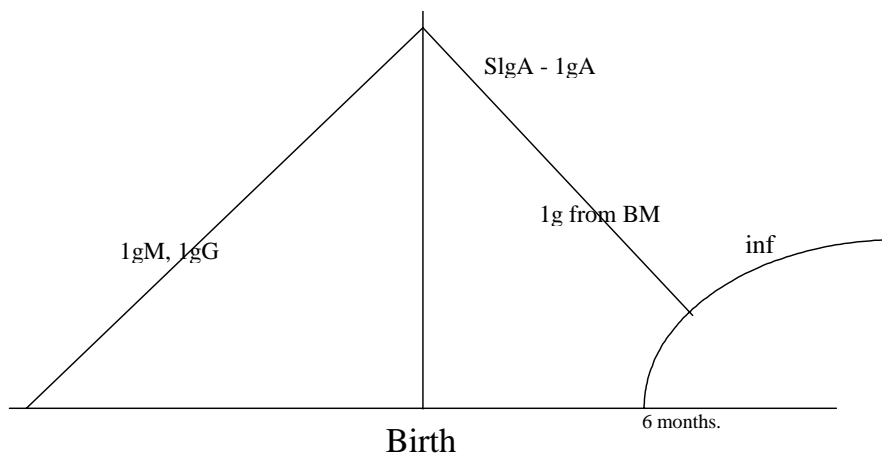
Table 3. Enzymes in human milk with specific functions in the newborn

Enzyme	Function
Amylase	Digestion of polysaccharides
Lipase (bile salt dependent)	Digestion of fat (triglyceride)
Proteases	Proteolysis (?)
Xanthine oxidase	Iron, Molybdenum carrier
Glutathione peroxidase	Selenium carrier (antioxidant activity)
Alkaline phosphatase	Zinc, Magnesium carrier
Antiproteases	Protection of bioactive components-enzymes
Sulphydrylase	Immunoglobulins, growth hormone factors
Lysozyme	Maintenance of structure and function of milk proteins and GI Mucus (?)
Peroxidase	Bactericidal
Lipases	Anti-infective (see Table 1)

Table 4. Milk components with specific functions in the newborn*

Components	Function
Long chain polyunsaturated fatty acids	Brain development, membrane structure and function
Carnitine	Essential for oxidation of fatty acids in mitochondria
Taurine	Fat absorption; needed for brain development
P-casamorphins	Opioid agonists
Polysaccharides	Inhibits bacterial binding to mucosal surfaces

*This is a selective listing of only a few milk components



Antenatally mother supplies baby via placenta with immunoglobulins (1gM, 1gG). After birth the placental shifts from BM. If baby is artificially fed he does not receive external supply of 1g and is exposed to infection, because his own immuno-protected system is not able to produce immunoglobulins right

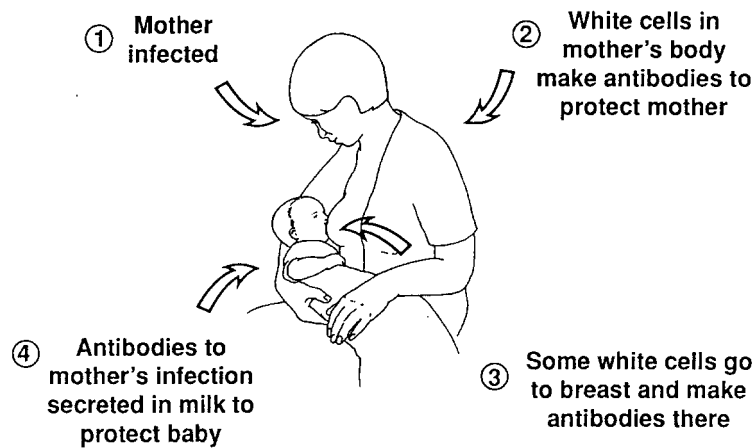
Protection against infection

Breast-milk is not just a food for babies. It is a living fluid, which protects a baby against infections. For the first year or so of life, a baby's immune system is not fully developed and cannot fight infections as well as an older child's or adult's. So a baby needs to be protected by his mother.

Breast-milk contains white blood cells and a number of anti-infective factors, which help to protect a baby against infection. Breast-milk also contains antibodies against infections which the mother has had in the past.

This picture shows the special way in which breast-milk is able to protect a baby against new infections which his mother may have, or which are in the family's environment now.

Protection against infection



When a mother becomes infected (1), white cells in her body become active and make antibodies against the infection to protect her (2). Some of these white cells go to her breasts and make antibodies (3) which are secreted in her breast-milk to protect her baby (4).

So a baby should not be separated from his mother when she has an infection, because her breast-milk protects him against the infection.

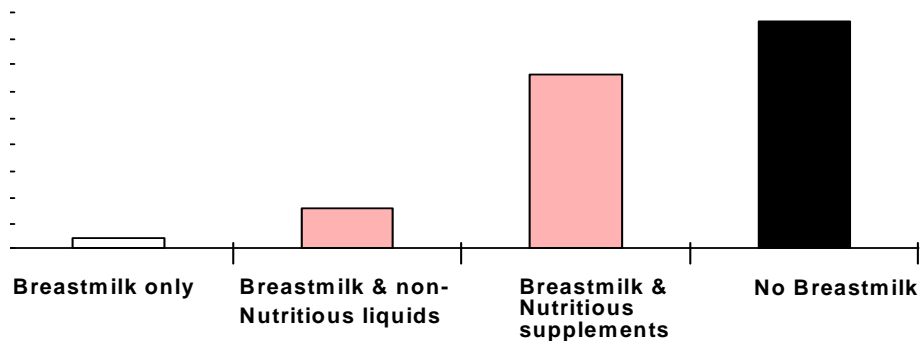
Artificial feeds are dead. They contain no living white cells or antibodies and few other anti-infective factors, so they provide much less protection against infection.

The main immunoglobulin in breast-milk is IgA – often called “secretory” immunoglobulin A. It is secreted within the breast into the milk, in response to the mother's infections. This is different from other immunoglobulins (such as IgG) which are carried in the blood.

Protection against diarrhoea

This chart of a study from the Philippines shows how breastfeeding protects a baby against diarrhoea. It compares how often babies fed in different ways get diarrhoea.

Risk of diarrhoea by feeding
Philippines' infants aged 0-2



Source: Popkin, Paediatrics 1990

The bar on the left is for babies who were fed only on breast-milk. This is called *exclusive* breastfeeding. The bar is very small, because very few exclusively breastfed babies get diarrhoea.

The bar on the right is for artificially fed babies, who received no breast-milk. This column is 17 times taller, because these babies were 17 times more likely to get diarrhoea than babies fed only on breast-milk.

Some of the babies were given breastfeeds and artificial feeds, here called “nutritious supplements”. This is *partial* breastfeeding: These babies were more likely to have diarrhoea than exclusively breastfed babies, but less likely than babies who received no breast-milk.

Some babies were breastfed and also given non-nutritious liquids such as tea. They were *predominantly* breastfed. These babies were more likely to have diarrhoea than exclusively breastfed babies, but less likely than partially breastfed or artificially fed babies.

Artificially fed babies get diarrhoea more often partly because artificial feeds lack anti-infective factors and partly because artificial feeds are often contaminated with harmful bacteria. Breast-milk is not contaminated.

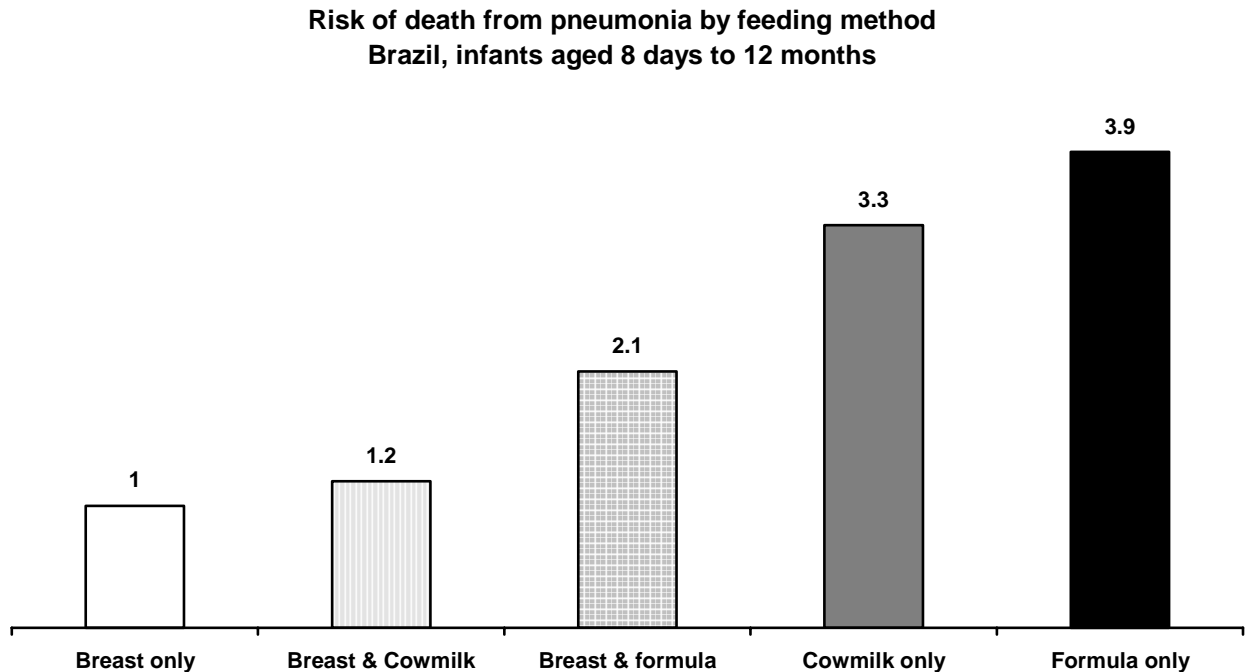
This study was of babies of 0–2 months only. The risks of infection are greater for young infants. However, other studies have shown that breastfeeding protects against death from diarrhoea in babies up to one year of age and up to two years of age in children who are malnourished. Breastfeeding can protect against some forms of diarrhoea, for example cholera and shigellosis, up to the age of 2–3 years.

Protection against respiratory infection

Breastfeeding also protects babies against respiratory infections.

This chart shows some of the findings from a study in Brazil, of babies aged 8 days to 12 months. It compares how many babies fed in different ways died from pneumonia. In this study, artificially fed babies were 3–4 times more likely to die from pneumonia than were exclusively breastfed babies. Partially breastfed babies came somewhere in between.

Other studies have shown that breastfeeding also protects babies against other infections, for example ear infections and meningitis.



Colostrum, foremilk and hindmilk

The composition of breast-milk varies according to the age of the baby and from the beginning to the end of a feed. It also varies between feeds and may be different at different times of day.

Colostrum is the thick, yellowish or clear milk that women produce in the first few days after delivery.

Now we will speak about the special properties of colostrum and why it is important.

Property	Importance
<ul style="list-style-type: none"> • Antibody rich • Many white cells • Purgative • Growth factors • Vitamin A rich 	<ul style="list-style-type: none"> • protects against infection and allergy • protect against infection • clears meconium helps to prevent jaundice • help intestine to mature • prevents allergy, intolerance • reduces severity of infection • prevents eye disease

- It contains more antibodies and other anti-infective proteins than mature milk. This is part of the reason why colostrum contains more protein than mature milk.
- It contains more white blood cells than mature milk.

These anti-infective proteins and white cells provide the first immunization against the diseases that a baby meets after delivery. Colostrum helps to prevent the bacterial infections that are a danger to newborn babies. The antibodies probably also help to prevent a baby from developing allergies.

- Colostrum has a mild purgative effect, which helps to clear the baby's gut of meconium (the first rather dark stools). This clears bilirubin from the gut and helps to prevent jaundice.
- Colostrum contains growth factors, which help a baby's immature intestine to develop after birth. This helps to prevent the baby from developing allergies and intolerance to other foods.
- Colostrum is richer than mature milk in some vitamins – especially vitamin A. Vitamin A helps to reduce the severity of any infections the baby might have.

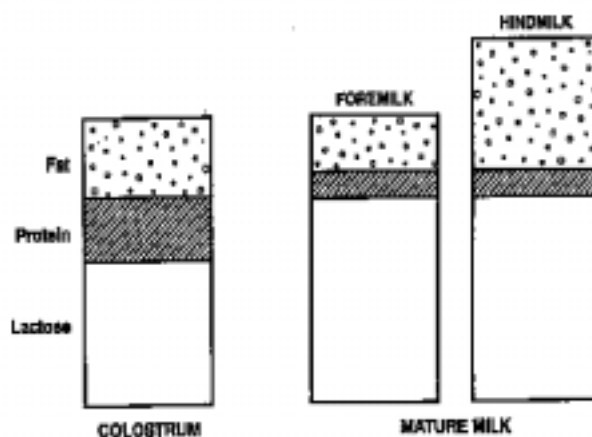
So it is very important for babies to have colostrum for their first few feeds. Colostrum is ready in the breasts when a baby is born. It is all that most babies need before the mature milk comes in.

Babies should not be given any drinks or foods before they start breastfeeding. Artificial feeds given before a baby has colostrum are especially dangerous.

Mature milk is the milk that is produced after a few days. There is a larger amount of milk and the breasts feel full, hard and heavy. Some people call this the milk “coming in”.

Foremilk is the bluish milk that is produced early in a feed.

Hindmilk is the whiter milk that is produced later in a feed.



What differences are there between these different kinds of breast-milk?

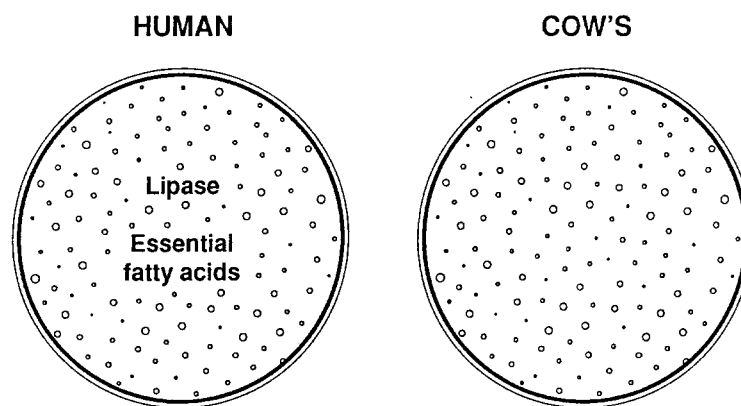
- Colostrum contains more protein than later milk
- Hindmilk contains more fat than foremilk.

The extra fat in hindmilk makes it look whiter. This fat provides much of the energy of a breastfeed, **which is an important reason not to take a baby off a breast before he has had all he wants.**

Foremilk is produced in larger amounts and it provides plenty of protein, lactose, water and other nutrients. Because it looks watery, mothers sometimes worry that their milk is “too thin”. Milk is never “too thin”. It is important for a baby to have both foremilk and hindmilk to get a complete “meal”.

There is no sudden change from “fore” to “hind” milk. The fat content increases gradually from the beginning to the end of a feed.

Differences in the fats of different milks



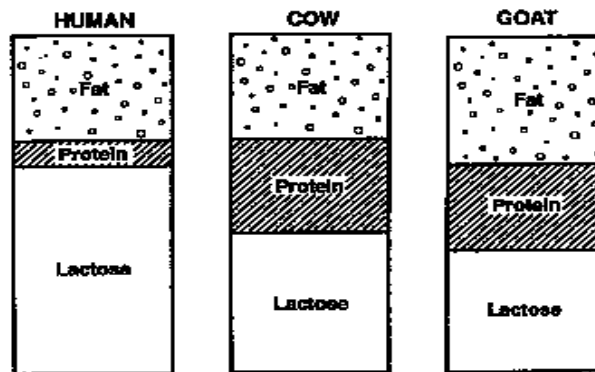
There are important differences in the quality of fat in different milks.

- Human milk contains essential fatty acids that are not present in cow’s milk or formula. These essential fatty acids are needed for a baby’s growing brain and eyes, and for healthy blood vessels.
- Human milk also contains an enzyme lipase which helps to digest fat. This enzyme is not present in animal milks or formula.
- Digestive enzymes, lactase and lipase, and many other important enzymes, protect babies born with immature or defective enzyme systems.
- So the fat in breast-milk is more completely digested and more efficiently used by a baby’s body than the fat in cow’s milk or formula.

Protection from allergy

- The baby’s GI tract develops more quickly when fed breast-milk, preventing foreign proteins from entering his system.
- A lower exposure to foreign proteins creates tolerance rather than allergic response.

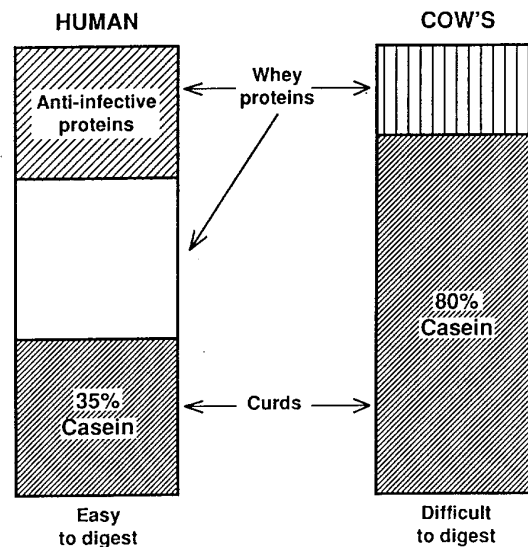
- Nutrients such as zinc and the long-chain polyunsaturated fatty acids help the development of the baby's immune response.
- Giving babies even a single bottle of artificial formula in the first days of life can increase the rates of allergic disease. All formulas, including soy formulas, carry a risk of allergy.



This chart shows the main nutrients in milk and compares it to three commonly used kinds of animal milk – cow's, goat's and buffalo's.

- All milk contains fat, which provides much of the energy; protein, for growth; and the special milk sugar *lactose*.
- Lactose helps to prevent rickets, helps calcium absorption and aids brain development.
- All animal milks have more protein than human milk.
- Protein is an important nutrient and you might think that more protein must be better. However, animals grow faster than humans, so they need milk with a higher concentration of protein. Animal milks contain too much protein for babies. It is difficult for a baby's immature kidneys to excrete the extra waste.

Differences in the quality of the proteins in different milks



This chart shows some of the ways in which the protein in different milks varies in *quality*, as well as in quantity.

Much of the protein in cow's milk is *casein*, which forms thick, indigestible curds in the babies stomach. There is less casein in human milk and it forms softer curds which are easier to digest.

The full names of the whey proteins are *alpha*-lactalbumin and *beta*-lactoglobulin. The anti-infective proteins in human milk include lactoferrin (which binds iron and prevents the growth of bacteria which need iron) and lysozyme (which kills bacteria) as well as antibodies, immunoglobulin, mostly IgA.

Other important anti-infective factors include the *bifidus factor* (which promotes the growth of *Lactobacillus bifidus*. *L. bacillus* inhibits the growth of harmful bacteria and gives breastfed baby's stools their yoghurt smell). Breast-milk also contains anti-viral and anti-parasitical factors.

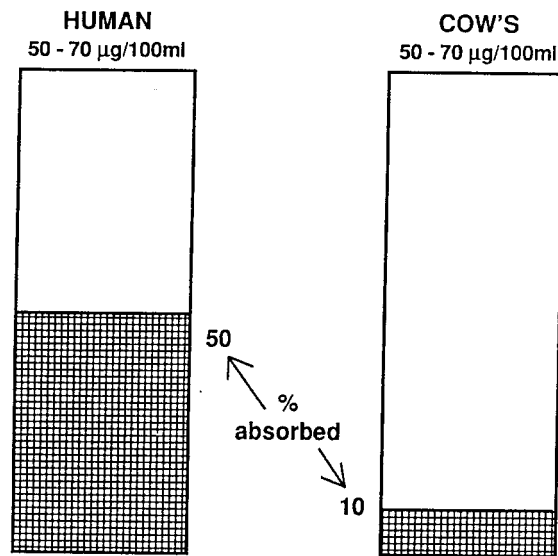
Proteins in animal milks and formula contain a different balance of amino acids to breast-milk. Animal milk and formula may lack the amino acid *cystine* and formula may lack *taurine* which newborns need especially for brain growth. Taurine is now sometimes added to formula milks.

Artificially-fed babies may develop *intolerance* to protein from animal milk. They may develop diarrhoea, abdominal pain, rashes and other symptoms when they have feeds which contain the different kinds of protein. Diarrhoea may become persistent, which can contribute to malnutrition.

Babies who are fed animal milks or formula are also more likely than breastfed babies to develop allergies which may cause eczema and possibly asthma.

A baby may develop intolerance or allergy after only a few artificial feeds given in the first few days of life.

Iron in milk



Iron is important to prevent anaemia. Different milks contain similar very small amounts of iron (50–70 µg/100 ml, i.e. 0.5–0.7 mg/l). But there is an important difference.

Only about 10% of the iron in cow's milk is absorbed, but about 50% of the iron from breast-milk is absorbed.

Babies fed cow's milk may not get enough iron and they often become anaemic. Exclusively breastfed babies do get enough iron and they are protected against iron deficient anaemia until at least 6 months of age and often longer.

Some brands of formula have iron added. However, this added iron is not well absorbed, so a large amount has to be added to ensure that a baby gets enough iron to protect against anaemia. Added iron may make it easier for some kinds of bacteria to grow, which may increase the chances of some kinds of infection, for example, meningitis and septicaemia.

Vitamins in different milks

- Cow's milk contains plenty of the B vitamins. But it does not contain as much vitamin A and vitamin C as human milk.
- Health workers often recommend giving babies fruit juice from a very early age, to provide vitamin C. This may be necessary for artificially fed babies, but it is not necessary to apply the rule to breastfed babies.
- Breast-milk contains plenty of vitamin A, if the mother has enough in her diet. Breast-milk can supply most of the vitamin A that a child needs even in the second year of life.
- If you are worried about a woman's diet and you think that there may not be enough vitamins in her breast-milk, give extra vitamins to the mother.

Differences between milks

	Human	Cow's	Formula
Bacterial contamination	none	Likely	likely when mixed
Anti-infective factors	antibodies, white blood cells, others	not present or not active	not present
Growth factors	present	not present	not present
Protein total	1%	3.5%) too	1.5%
casein	0.4%	2.8%) much	1.1%
whey	0.6% (lactalbumin + anti-infective)	0.6% (lactoglobulin)	0.4%
Amino acids	ideal balance	too few of some	too few of some
Fat	4% (average) – enough essential fatty acids	3.7% – not enough essential fatty acids	2.4–3.6% – not enough essential fatty acids
Lipase to digest fat	present	None	none
Lactose (sugar)	7% – enough	3–4% – not enough	may contain other sugars
Minerals (mg/l)	33) correct	125) too	less than cow's but
calcium	15) amount	58) much	more than in human
sodium	43)	103)	milk
Iron	small amount well absorbed	small amount not well absorbed	extra added not well absorbed
Vitamins	enough	may not be enough vitamin A and vitamin C	vitamins added
Water	enough	extra needed	may be too little or too much if not mixed correctly

Sources: Lawrence R.A. Breastfeeding; a guide for the medical profession 3rd edition, 1989 CV Mosby

Jelliffe, D.B. and Jelliffe, E.F.P. Human milk in the modern world 1979, Oxford University Press.

United Kingdom manufacturer's and DHSS information

Summary of differences between milks

- Breast-milk contains important anti-infective factors and growth factors which are not present in animal milks or formula.
- Breast-milk contains the most suitable protein, in the right amount for a baby and it is easily digestible.
- Animal milks contain too much indigestible casein. Neither cow's milk nor formula milks contain the ideal balance of amino acids.
- Breast-milk contains the most suitable fat, with enough essential fatty acids for a baby's developing eyes and brain; and it contains lipase to help to digest the fat. Animal milks and formula lack essential fatty acids and lipase.

- Breast-milk contains the correct amounts of minerals. Animal milks contain too much of some minerals. In formula, the amounts are less than in cow's milk and formula is not well absorbed, though extra iron is added to formula.
- Breast-milk contains enough vitamins, provided the mother is not deficient. Animal milks may not contain enough vitamins A and C. Vitamins are added to formula milks.

So animal milks and formulas can never adequately replace breast-milk for babies.

Other benefits to the baby:

- A lower incidence of cot death (sudden infant death syndrome).
- A lower risk of childhood diabetes, cancer and ear infection.
- A better response to vaccinations and a faster ability to fight disease.
- Fewer orthodontic and dental problems (no bottle-associated tooth decay).
- Better psychomotor, emotional and social development.

Health benefits for mothers:

- Oxytocin that is released while breastfeeding contracts the uterus and helps to stop bleeding after delivery. This makes it important that breastfeeding begin immediately after birth and continue frequently.
- Breastfeeding women are energy efficient; they can produce milk even with limited caloric intake.
- There is a lower risk of breast and ovarian cancer.
- Frequent breastfeeding delays the return of menses and helps to protect against another pregnancy. This conserves iron stores and spaces children.

Breastfeeding to delay a new pregnancy

Breastfeeding can delay the return of ovulation and menstruation, so it can be a useful way to help space pregnancies.

Breastfeeding can give effective protection against a new pregnancy if the mother breastfeeds in the following way.

- She should breastfeed exclusively and frequently, whenever the baby wants, both night and day.
- She should breastfeed at least 8–10 times or more in 24 hours with no interval longer than 6 hours between feeds.

When a baby is more than 6 months old, breastfeeding is less effective for family planning. A baby of this age needs complementary foods, so breastfeeding can no longer be exclusive. However, breastfeeding still provides partial protection against a new pregnancy if the mother breastfeeds frequently. She should breastfeed the baby each time before she gives complementary foods.

This partial protection can be useful for a mother who cannot use any other method of family planning.

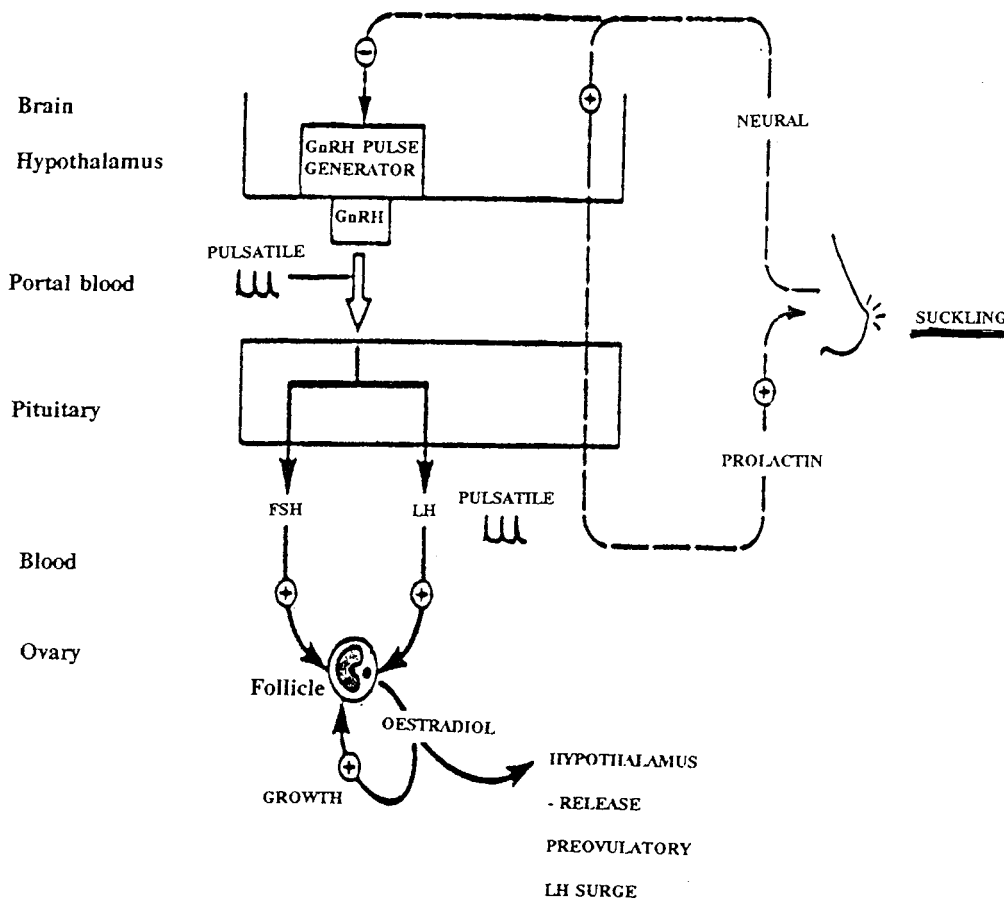
- After a child is a year old, protection is less. The child now needs to have food before breastfeeding, to ensure that he eats enough. However, frequent breastfeeding may still give some protection, if menstruation has not returned.
- When menstruation returns, the woman is fertile again. Breastfeeding will not protect her, even if her baby is still less than 6 months old. She needs another family planning method.

In most women, menstruation returns before conception. So menstruation is the main sign that a woman is fertile again. However, a few women ovulate and can conceive BEFORE they start to menstruate again. This is more likely to happen when the baby is more than 6 months old.

Physiology of Lactational Infertility

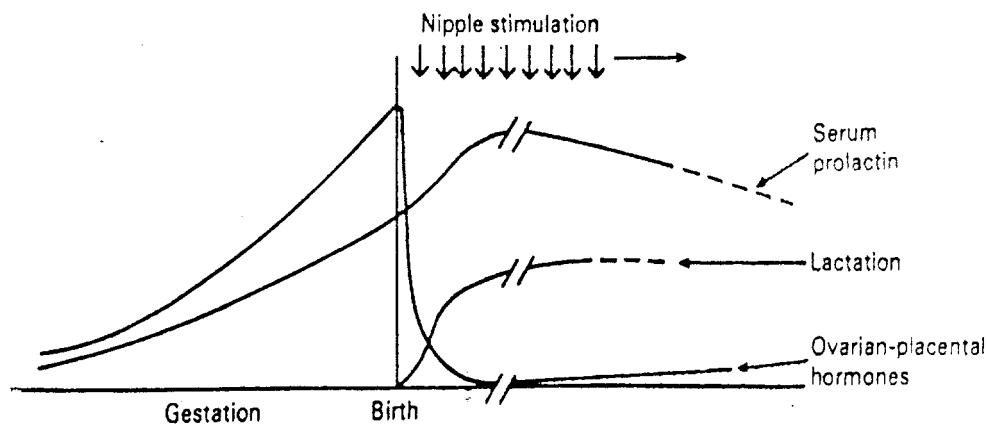
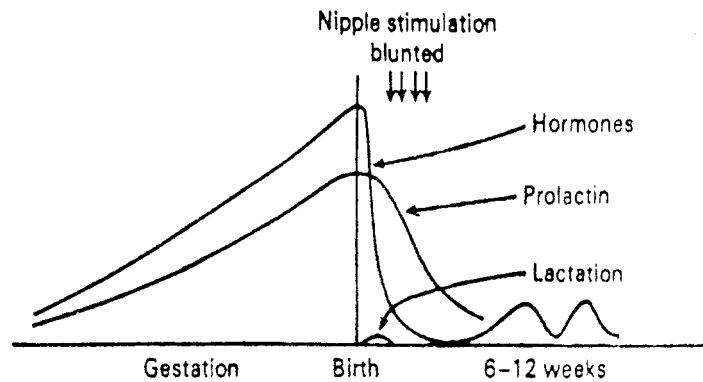
The effect of breastfeeding on fertility is mediated by a complex hypothalamic-pituitary-ovarian feedback mechanism.

Breastfeeding regulation of both menstrual cycle and milk production begins with suckling and its effect on the hypothalamus. The changes in the hypothalamic production of hormones is caused by nipple stimulation. This in turn alters pituitary hormone production and as a result, the ovary does not receive pulsatile stimulation for ovum development and release and concurrently, milk production is stimulated.



Source: McNeilly, A.S, Glasier, A. & Howie, P.G. (1985). Endocrine control of lactational infertility. In J. Dobbing (Ed.). Maternal nutrition and lactational infertility (pp1-24). New York: Raven Press.

Immediately following delivery there is a rapid drop in levels of circulating placental hormone. In the non-lactating state, all systems return to their pre-pregnant functions and ovulation resumes in an average of about 7 weeks.



Suckling however, suppresses the release of gonadotropin releasing hormone (GnRH) by the hypothalamus. The secretion patterns of the luteinizing hormone (LH) and follicle stimulating hormone (FSH) are dependent upon GnRH patterns. LH and FSH release patterns are therefore disrupted during suckling and consequently, follicle development is irregular and estrogen is suppressed. Thus during lactation there is disorganized follicle stimulation and limited estrogen production, and the release of a mature ovum may be prevented. (see fig.1)

GnRH release may also be influenced by dopamine, beta-endorphins and norepinephrine. The levels of these neurotransmitters seem to be affected by certain hormonal level changes by suckling.

The use of pacifiers and bottles, introduction of other foods and liquids, long intervals between feedings, stress and maternal or child illness are factors that decreases suckling and consequently lead to decreased milk production and the return of ovulation.

As time passes postpartum, or as other feedings are initiated or the feeding pattern is disrupted, prolactin secretion will diminish leading to decreased milk production. The release of GnRH will chance, leading to organized stimulation of ovarian follicle development.

The Lactational Amenorrhoea Method (LAM)

This figure summarizes the Lactational Amenorrhoea Method of child spacing, or LAM.

If the baby is less than 6 months old and fully breastfeeding and the mother's menstrual periods have not returned, then the chances of a new pregnancy are very small (less than 2%).

In this situation, it is not necessary to use another family planning method.

If the baby is more than 6 months old, or has started to have regular complementary feeds, the chances of a new pregnancy increase. If the mother's menstrual periods have returned, then her fertility is back to normal.

In any of these situations, it is advisable for the mother to use another method of family planning.

If a woman does not want to rely on breastfeeding, for family planning, (for example, because she is returning to work and the baby will not breastfeed while his mother is away from home), she should start another method within the first six weeks after delivery.

Lactational Amenorrhoea Method (LAM)

No other family planning method needed if Baby LESS than 6 months old AND Baby fully breastfed, AND No menstruation	Use other family planning method, if Baby MORE than 6 months old OR Complementary feeds started, OR Menstruation returned
--	--

Terms for Infant Feeding

Exclusive breastfeeding:

means giving a baby no other food or drink, including no water, in addition to breastfeeding (except medicines and vitamin or mineral drops; expressed breast-milk is also permitted).

Studies show that most babies who are exclusively breastfed for the first 6 months grow well and are healthy. It is important for health workers to know how and how often mothers are breastfeeding their babies. Health workers can help mothers to understand the importance of breastfeeding their babies exclusively for the first 6 months.

Any of the following interferes with exclusive breastfeeding:

- A baby is given any drinks or foods other than breast-milk.
- A baby is given a pacifier or dummy.
- Limits are placed on the number of breastfeeds.
- Limits are placed on suckling time or the length of a breastfeed.

Predominant breastfeeding:

means breastfeeding a baby, but also giving small amounts of water or water-based drinks, such as tea.

Full breastfeeding:

means breastfeeding either exclusively or predominantly.

Bottle-feeding:

means feeding a baby from a bottle, whatever is in the bottle, including expressed breast-milk.

Artificial feeding:

means feeding a baby on artificial feeds and not breastfeeding at all.

Partial breastfeeding:

means giving a baby some breastfeeds and some artificial feeds, either milk or cereal, or other food.

Timely complementary feeding:

means giving a baby other food in addition to breastfeeding, when it is appropriate, around the age of 6 months.



Recommendations

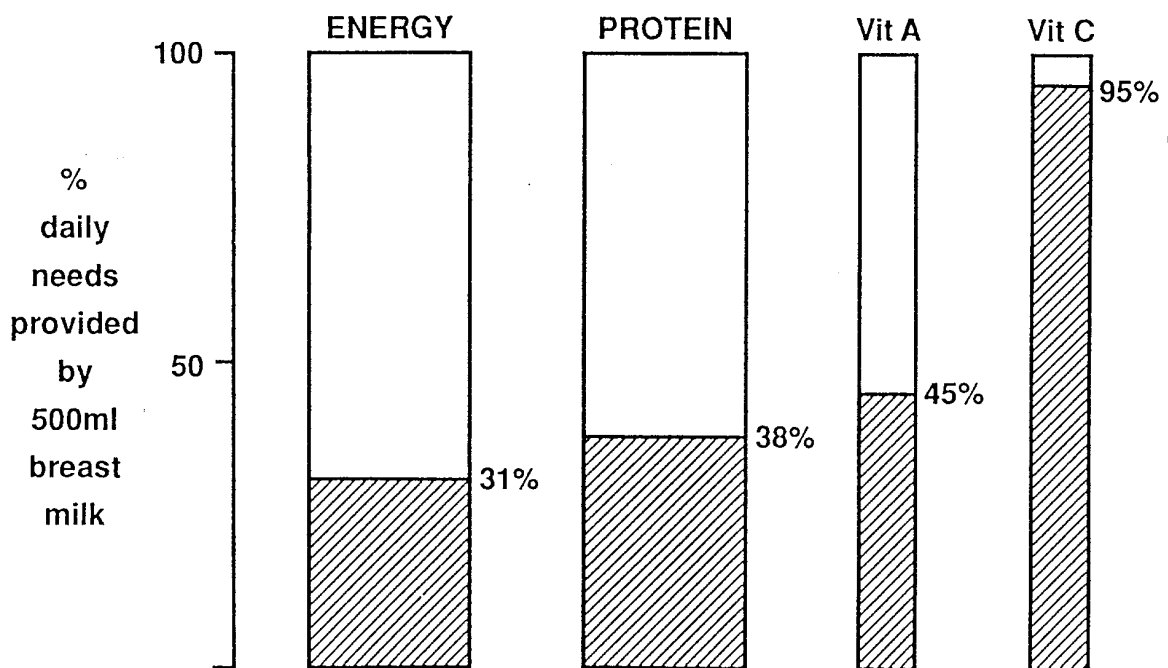
- Start breastfeeding within one-half to one hour after birth.
- Breastfeed on demand day and night and no less than 8–12 times a day.
- No time limits during one feeding.
- Breastfeed exclusively from 0 up to around 6 months.
- Complementary foods can begin around 6 months (exact age varies).
- Give complementary foods to all children from 6 months of age.
- Continue breastfeeding up to 2 years of age or beyond.

Breast-milk in the second year of life

For up to the first 6 months of life, exclusive breastfeeding can provide all the nutrients and water that a baby needs.

From the age of 6 months, breast-milk is no longer sufficient by itself. From 6 months, all babies should receive other foods, known as *complementary foods*, in addition to breast-milk. A few babies need complementary foods at 4 or 5 months. Complementary foods can be given by cup or cup and spoon, and feeding bottles are not necessary.

However, breast-milk continues to be an important source of energy and high quality nutrients through the second year of life and beyond. This chart shows how much of a child's daily energy and nutrient needs can be supplied by breast-milk during the second year of life.



SESSION 4: CARE OF THE HEALTHY NEWBORN

The procedures illustrated in this session should be performed for **all births** and newborn babies. Procedures for babies requiring special care are described in later sessions.

Preparation for delivery in a maternity unit

Careful preparation of the delivery area and provision of suitable equipment are important for the health of the newborn at birth.

In a maternity unit there should always be the provision of the following:

- a resuscitation table with an overhead heater manually controlled;
- resuscitation equipment (infant face mask, ventilating bag);
- cord-cutting/cord-clamping kit;
- suction apparatus;
- suction catheters;
- low-reading infant thermometers (down to 25°C/77°F) – an ordinary thermometer only reads down to 35°C (95°F) and will not detect significant hypothermia;
- baby weighing scale;
- heat source to warm the delivery room;
- blanket (to wrap the infant);
- air-heated incubators or water filled mattresses to warm the infant (for internal or external transport).

The following principles of cleanliness should be carefully observed:

- clean hands (in health facilities, sterile gloves)
- clean perineum
- clean delivery surface
- nothing unclean to be introduced into the vagina
- cleanliness in dividing the umbilical cord and taking care of the newborn baby
- instruments, gauze and ties used for delivery and cord care should be sterile
- nothing should be applied either to the cutting surface or to the stump
- the stump should be left uncovered to dry and mummify.

Drying the infant

The evaporative heat loss from the skin results in a lowering of skin temperature within seconds after birth. This is the most intense of the sensory stimuli provoking spontaneous breathing at birth. This heat loss is both physiologic and impossible to avoid. But if cooling continues in the minutes that follow, the body temperature will drop below 36°C and hypothermia will occur. Thus immediate drying of the baby is necessary; it is also important to change the first wet towel to a dry one.

Assessment of the infant

As soon as the infant is born, while drying him/her, the health professional should immediately assess the wellbeing of the child in order to identify an infant that requires special care and a healthy infant that can be given immediately to the mother.

The assessment of the infant is made by looking for:

- Spontaneous breathing and heart rate in order to identify babies who need immediate resuscitation. This is the most important thing and must be done within 30 seconds from delivery.
- Birth weight/gestational age in order to identify a LBW/preterm infant who needs special care.
- Birth defects/birth trauma in order to ensure appropriate and adequate treatment as soon as possible.

Definitions

Breathing: normal breathing of an infant means initiation of spontaneous breathing within 30 seconds after delivery.

Heart rate: a heart rate (HR) >100/min is considered acceptable at birth and should be well over 120/min after the first few minutes.

Birth weight: the first weight of the newborn obtained after birth. This weight should be measured preferably within the first hours of life.

Gestational age: the duration of gestation is measured from the first day of the last normal menstrual period. Gestational age is expressed in completed days or weeks. An at-term delivery occurs after 37 to less than 42 completed weeks of gestation (259–293 days). This information should be available before birth.

Give the baby to the mother

Every birth attendant should be aware of the fact that a newborn baby is a person with neuro-sensory behaviour; the capability to see, feel (pain, warmth, cold), smell, taste and cry out (happily or unhappily). Bearing this in mind we should treat every newborn baby as a human being.

Several studies have shown that for the mother the first few hours after birth are a special and sensitive period, and that this period is important for the promotion of maternal bonding. Separation of the child from the mother even for a day or two disturbs this sensitive period and may have a detrimental effect on the mother's care of the baby and on breastfeeding.

When the baby has been dried, he/she should be wrapped in a cloth to avoid heat loss and given to the mother. She may put him/her to the breast, which will give her the opportunity to watch the baby and to touch him/her. Within 15–30 minutes most babies will start to try to find the nipple of the mother's breast.

The baby should stay with her/his mother as long as desired (night and day), without any schedule for feeding and the mother should be able to participate actively to the care of the infant (rooming-in). Sadly, separation is the routine in many hospitals and much effort should be made

to promote a different plan of organization of the nursery to facilitate early breastfeeding and maternal-infant bonding.

In some instances either the mother – who might have to recover from an operative delivery or suffer from complications – or the baby – who might be in need of special care, may not be available for early contact. In these cases the separation between mother and infant should be restricted to a period as brief as possible. As soon as the mother is feeling better or the child is recovering, frequent visits to the neonatal unit should be permitted in order to enable the mother to take care of her child as soon as possible.

When transporting the baby from the delivery room to the nursery, always bear in mind the need of preventing hypothermia. The baby should therefore be wrapped in a soft blanket either with his/her mother or within the arms of another person (father, nurse, relative) if the mother is not ready for transport. A heated cradle or incubator can also be used for transport.

The principles of the “warm chain” (see below) should be always kept in mind.

Preventing heat loss at birth: drying, wrapping, weighing, breastfeeding

The “**warm chain**” is a concept introduced to describe a set of interlinked procedures which will minimize the likelihood of hypothermia and will assure the wellbeing of the baby. Failure to implement anyone of them will break the chain and increase the possibility of undesirable cooling of the infant. The links in the “warm chain” include:

- training all persons involved in the birth and subsequent care of the baby; preparation of the place of delivery, by ensuring a clean, warm, draught-free room;
- provision of a clean and warm surface, drying and wrapping warm materials;
- immediate drying of the newborn baby;
- wrapping the baby and giving it to the mother quickly after birth;
- putting the baby to the mother’s breast;
- putting a warm cap on the baby’s head;
- covering the baby and mother together;
- ensuring warm, safe transport, if necessary.

If this cannot be done, a satisfactory arrangement is to dry and wrap babies and keep them as close as possible to the mother. Ensure that the room is warm. It is difficult to warm infants who become hypothermic – wrapping a baby who is already cold may simply keep him/her cold. It is much easier to keep the infant warm in the first place.

Cleaning the airways

Aggressive prolonged suction can delay the onset of spontaneous breathing in the healthy newborn and cause prolonged spasm and is not indicated unless the amniotic fluid is severely stained with thick meconium or blood.

If suction is required, a 10 FG (or if preterm an 8 FG) soft suction catheter should be connected to a suction source not exceeding 100mmhg. This should not continue for longer than 5 seconds in the absence of meconium. The catheter should normally not be inserted further than 3cm from the baby’s lips at term.

Table 1: Assessment, classification and management of the newborn

BIRTH
↓
1. DRY THE BABY
2. GIVE THE BABY TO THE MOTHER

ASSESSMENT FOR:	↓	↓	↓	↓
BREATHING	NORMAL	IRREGULAR OR ABSENT	NORMAL	NORMAL
HEART RATE	HR > 100/MIN	HR < 100/MIN	HR > 100/MIN	HR > 100/MIN
WEIGHT/GESTATIONAL AGE	BW > 2500/> 37 WEEKS	BW > <2500/><37WEEKS	BW < 2500/>< 37 WEEKS	BW > <2500/>< 37 WEEKS
BIRTH DEFECT/BIRTH TRAUMA	ABSENT	ABSENT	ABSENT	PRESENT (SPECIFY)
	↓	↓	↓	↓
CLASSIFY	HEALTHY INFANT	ASPHYXIA	LOWBIRTH WEIGHT	BIRTH DEFECT/ BIRTH TRAUMA
	↓	↓	↓	↓
MANAGEMENT	CARE OF A HEALTHY NEWBORN	CARE OF THE ASPHYCTIC NEWBORN	CARE OF THE LOW-BIRTH-WEIGHT INFANT	CARE OF THE INFANT WITH BIRTH DEFECT/ TRAUMA

The conditions mentioned above (healthy infant, asphyctic and low-birth-weight infant or with a birth defect or trauma) can be variably associated and therefore need integrated procedures for care. This session deals with the healthy infant. The following with other conditions requiring special care.

Cord care

There is no need to rush to clamp and divide the cord except in an emergency situation. The baby could be dried and given to the mother first and the cord cut when the pulsation stops. The cutting of the cord and handling the placenta may be bound by tradition in different cultures. It is important that health personnel is aware of these traditions and of the mother’s own requests and that they try to fulfil these as far as possible if they are safe for the mother and baby.

When to clamp the cord

In vaginal delivery the expulsion of the placenta results in an increase in pressure that could cause a passage of blood from the placenta to the baby.

Early clamping of the cord (i.e. immediately after birth) results in low haemoglobin values and may result in anaemia after 1–2 months. On the other hand, too late clamping of the cord results in hypervolaemia and possibly hyperviscosity of the blood (packed red cell volume > 70 per cent in central venous blood), which may lead to respiratory difficulties and volume overload of the heart.

If the newborn baby is placed on the mother's breast, the cord could be left unclamped until the pulsations have disappeared, without an increase of the haemoglobin value of the infant. Thus, clamping of the cord at approximately 1 minute after birth seems to be most advantageous.

How to clamp and cut the cord

Inelastic tying material such as strings or bands are commonly used. However, this old, widely used procedure results in a very temporary closing of the vessels. As early as 1/2 to 1 hour after birth the shrinkage of the cord loosens the band and reopens the vessels, increasing the risk of both bleeding and infection.

The most accurate method of clamping the cord is to use a rubber band. After clamping the cord with a forceps and cutting it, the rubber band is applied around the cord with the help of a forceps. In many developed countries a plastic cord clamp is used. This is expensive, is not reusable and thus inappropriate for use in countries with limited resources.

How to clean the cord

The cord stump remains the major means of entry for infections after birth. Principles of clean cord stump care (keep it dry, clean and do not apply anything) apply at home as well as in the health facility. The stump will dry and mummify if exposed to the air without any dressing, binding or bandages. It will remain clean if it is protected with clean clothes and is kept from urine and soiling. No antiseptics are needed for cleaning. If soiled, the cord can be washed with clean water and dried with clean cotton or gauze.

Local practices of putting various substances on the cord stump – whether in health facilities or homes – should be carefully examined, discouraged if found harmful and substituted with acceptable ones if necessary.

If the umbilical stump is draining pus, the skin around it is becoming red and it has a foul smell, these may be signs of umbilical infection that requires treatment with antibiotics.

The First Feed

Immediately after delivery the healthy baby instinctively searches for food. In the first couple of hours of life, the baby is alert, active and ready to feed. If the mother has been given certain drugs during labour then the baby may not be so alert.

Placed on the stomach of the mother, a healthy, term baby is able to crawl towards the breast. If it has not been disturbed or sedated, the baby can find the breast without any help, usually within the first hour. The birth of the placenta is facilitated by increased maternal oxytocin production, stimulated by the baby's contact with the nipple.

Some babies need a couple of hours or more and some may not be ready to feed until they wake up after their first sleep. The process of childbirth is not finished until the baby has safely transferred from placental to mammary nutrition.

What the health professional can do

- Support the woman during labour and delivery in a way that minimizes the need for interventions.
- Encourage the woman to try measures of pain relief which will not interfere with breastfeeding. Avoid, if possible, medication which will eventually have a sedative effect when passed on to the baby transplacentally.
- Allow the baby to remain with the mother, skin-to-skin, from immediately after birth until the baby has finished the first feed.
- Let mother and baby interact at their own pace. Assist only when you believe it to be absolutely necessary or when the mother asks for assistance.
- Postpone any routine procedures following birth that can safely wait until mother and baby are ready, i.e. for at least one to two hours. Examples are the measuring and dressing of the baby.
- Separate mother and baby only if absolutely necessary. The preliminary observation of the baby can usually be done while it stays close to its mother. Even a brief separation before the first feed can disturb the process.
- If the mother is sedated or feels too tired, help the searching baby to have the first feed, at the breast, without any effort from the mother.
- Encourage and help the mother to have skin-to-skin contact with her baby as much as possible during the first days after delivery. If their interaction in the first hours was disturbed for some reason, it can be “re-enacted” at any time during the first days and even weeks after the birth.
- Discourage the use of pacifiers and bottles during the establishment of lactation when the baby is learning to breastfeed. When some babies are fed with an artificial teat they develop a preference for it and this can reduce their enthusiasm for the breast.
- Let the baby start to feed when it shows that it is ready.

Prophylactic procedures

a) Vitamin K

A neonatal deficiency of vitamin K exists in at least 0.5% of all newborn babies. The risk of gastrointestinal or other types of neonatal bleeding is especially high in preterm babies and small for gestational age babies.

To prevent early bleeding and the later haemorrhagic disease of the newborn, vitamin K prophylaxis is suggested.

The oral administration of two doses of 2 mg, one on the first day and one on the 7th day of life has been shown to be almost as effective as one single dose of 1 mg intramuscular injection. Although the oral administration is easier and cheaper, it presents the disadvantage of a more complicated schedule of administration.

b) Ocular prophylaxis

In regions with a high frequency of gonorrhoea the prophylactic treatments with 1% silver nitrate, 1% tetracycline and 0.5% erythromycin ointment have a similar efficacy. We recommend the use of 1% tetracycline ointment which is harmless, affordable and effective. The main disadvantage of silver nitrate is that it frequently causes chemical conjunctivitis.

c) BCG vaccination

In every country where there is a significant risk of acquiring tuberculosis and therefore national policy for immunizations include BCG. Since the only contraindication is the symptomatic HIV infection – a situation which never occurs in the neonatal period, BCG vaccination should be given intra-dermally to all babies before discharge from the hospital.

Bathing the infant

It is best to postpone bathing of the infant or cleaning the vernix with oil. If cultural practices in some areas demand bathing, or if the baby is particularly soiled with blood or meconium, washing 2–6 hours after birth is permissible as long as the baby's temperature is normal. When the bath is given the midwife or nurse should:

- warm a small area or corner of the room;
- use warm water tested with the elbow, sit close to the heat source and undress the infant on her lap;
- bath the infant quickly and gently;
- immediately wrap the infant in a dry warm towel and dry thoroughly from head to toe;
- quickly dress and wrap the infant, remembering to place a cap on the baby's head;
- place the infant close to the mother and allow breastfeeding.

When nursing care is given, such as changing the nappy (diaper), care should be taken not to unduly expose infants to a cold environment but to do all procedures rapidly and keep the baby covered as much as possible.

Swaddling

Sometimes after bathing, the procedure of swaddling the baby tightly is practised. It used to be thought that *swaddled* babies were protected from external infections. There is no scientific evidence that this is the case. It is preferable to wrap the baby loosely in a cotton cloth or a warm shawl, or, as a compromise, to swaddle only the lower part of the body, leaving the arms and head free to move.

The mother should not hesitate to keep the baby with her in bed, if she thinks this is more comfortable. There is no risk of “smothering” or “infecting” the baby.

Tight swaddling should be discouraged for several reasons:

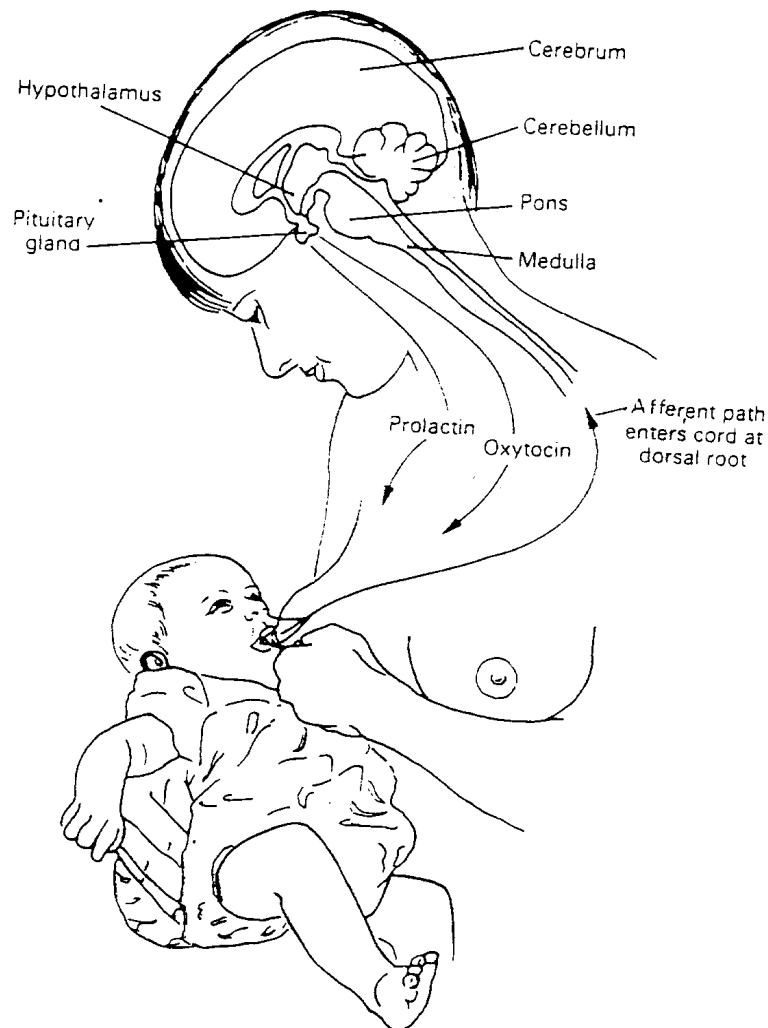
- blockage of diaphragm's movement reduces the lungs' ventilation;
- blood circulation is decreased in different parts of the body;
- lack of air space between body and swaddling sheets prevents baby from keeping warm;

- restriction to free movement of limbs prevents the development of neuro-muscular coordination;
- tight swaddling with head swaddling can discourage breastfeeding as baby cannot move its head and open mouth properly for correct breast-attachment;
- swaddled baby is more sleepy and less responsive to frequent breastfeeding, which interferes in the stage of breastfeeding and lactation-establishment.

SESSION 5: BREASTFEEDING MANAGEMENT IN THE HEALTHY NEWBORN

How milk gets from breast to baby

In normal breastfeeding, there are two elements necessary for getting milk from the breast to the baby: a breast that produces and releases milk; and a baby who is able to remove the milk from the breast with effective suckling. The manner in which the baby is attached at the breast will determine how successfully these two elements come together. It is important to recognize and reassure mothers, that there are many variations in the size and shape of women's breasts and that milk production does not depend on breast size. Be sure to tell every mother that her breasts are good for breastfeeding and avoid frightening words like "problem".



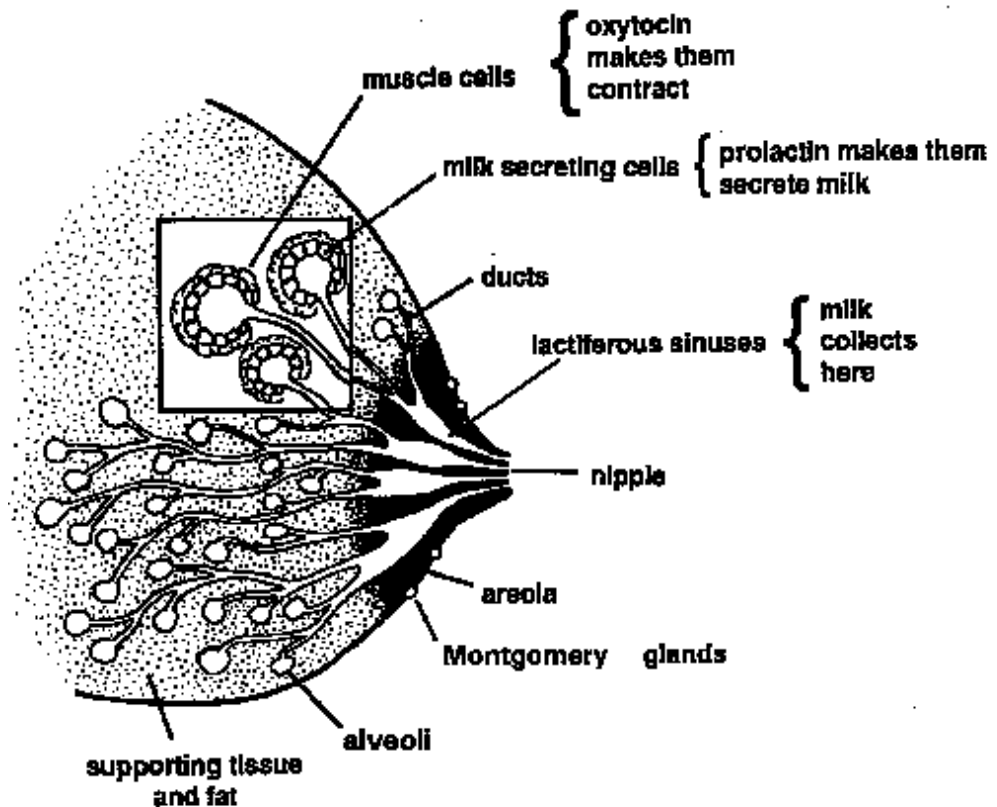
Anatomy of the breast

First, look at the nipple and the dark skin called the *areola* which surrounds it, in the areola are small glands called *Montgomery glands* which secrete an oily fluid and keep the skin healthy.

Inside the breast are the *alveoli* or little sacs made of *milk secreting cells*. The box in the drawing shows three of them enlarged. A hormone called prolactin makes these cells produce milk.

Around the alveoli are muscle cells, which contract and squeeze out the milk. Another hormone called oxytocin makes the muscle cells contract. The milk flows down ducts or small tubes, which carry milk to the nipple. Beneath the areola, the ducts become wider and form lactiferous sinuses, where milk collects in preparation for a feed.

The secretory alveoli and ducts are surrounded by supporting tissue and fat. It is the fat and other tissue which gives the breast its shape and which makes most of the difference between large and small breasts. Small breasts and large breasts both contain about the same amount of gland tissue, so they can both make plenty of milk.



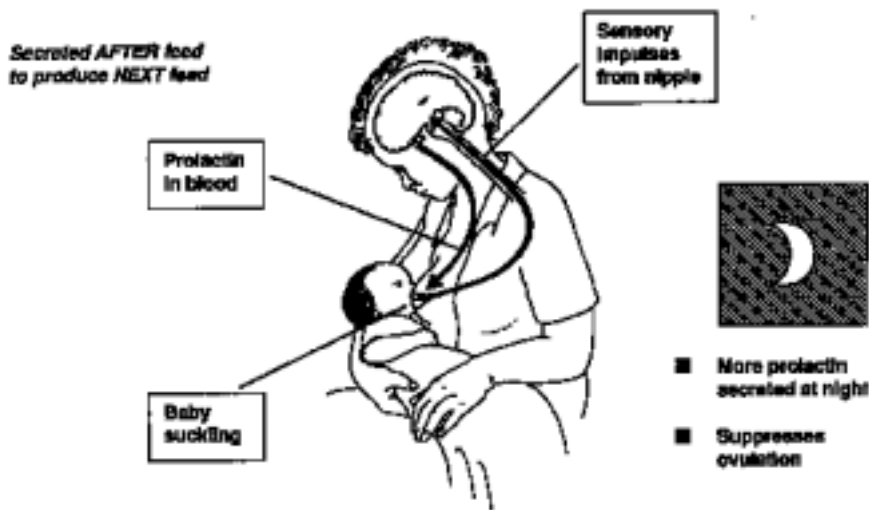
“Breasts”

There are many different shapes and sizes of breast, determined genetically. Babies can breastfeed from almost all of them, because glandular tissue is presented at the same average in all forms and because forms mainly depend on the amount of fat tissue.



Source: *Breastfeeding counselling: A training course*, WHO/UNICEF 1993

Prolactin



When a baby suckles at the breast, *sensory impulses* pass from the nipple to the brain. The anterior part of the pituitary gland at the base of the brain secretes prolactin, which goes in the blood to the breast and makes the gland cells secrete milk.

Most of the prolactin is in the blood about 30 minutes after the feed – so it makes the breast produce milk for the *NEXT* feed: For this feed; the baby takes the milk which is already in the breast.

It tells us that if a baby suckles more, more milk is produced. So **MORE SUCKING MAKES MORE MILK.**

The milk does not go on increasing for ever – it increases to a limit which is probably different for different women. However, most women could produce more milk than their baby needs. If there are two babies and they both suckle, the breasts make milk for two. Most mothers can produce enough milk for at least two babies.

If a baby suckles less, or stops suckling, the breasts make less milk, or dry up completely.

Other special things to remember about prolactin are:

- More prolactin is produced at night, so breastfeeding at night is especially helpful for keeping up the milk supply.
- Prolactin and hormones related to it, suppress ovulation. So breastfeeding can help to delay a new pregnancy. Breastfeeding at night is important for this effect.
- Prolactin also makes a mother feel relaxed and sometimes sleepy. So she usually rests well even if she breastfeeds at night.

Prolactin

- Prolactin makes the alveoli produce milk.
- It can make the mother feel sleepy and relaxed.
- Prolactin levels need to stay high in order for the alveoli to produce milk. The levels are increased while the baby is suckling.
- Even when prolactin is high, if suckling is inefficient and milk is not removed from parts of the breast, milk production will shut down in those parts.

Teach mothers how they can keep prolactin levels high

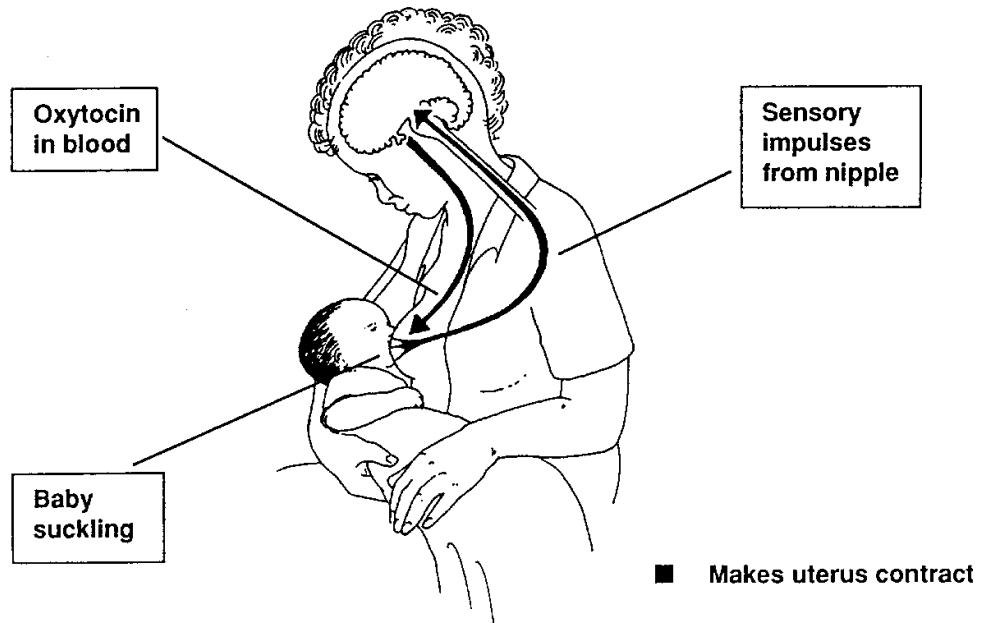
- The baby is attached effectively at the breast and is not given any artificial dummies or teats that would confuse his suckling.
- The baby breastfeeds as frequently as he wants, usually every 1–3 hours.
- The baby breastfeeds as long as he wants at a feed.
- The baby breastfeeds at night, when prolactin release in response to suckling is greatest.

Oxytocin reflex

This diagram explains the hormone oxytocin.

OXYTOCIN REFLEX

*Works BEFORE or DURING feed
to make milk FLOW*



When a baby suckles, sensory impulses from the nipple go to the brain. The posterior part of the pituitary gland at the base of the brain secretes the hormone oxytocin, which goes in the blood to the breast.

In the breast, the oxytocin makes the muscle cells around the gland cells and ducts contract, which makes the milk flow. It makes the milk which has collected in the alveoli move forward to the lactiferous sinuses. This is the *oxytocin reflex* or the *milk ejection reflex*.

Oxytocin is produced more quickly than prolactin. It makes the milk in the breast flow for THIS feeding. Oxytocin can start working before the baby suckles, when the mother learns to expect a feed.

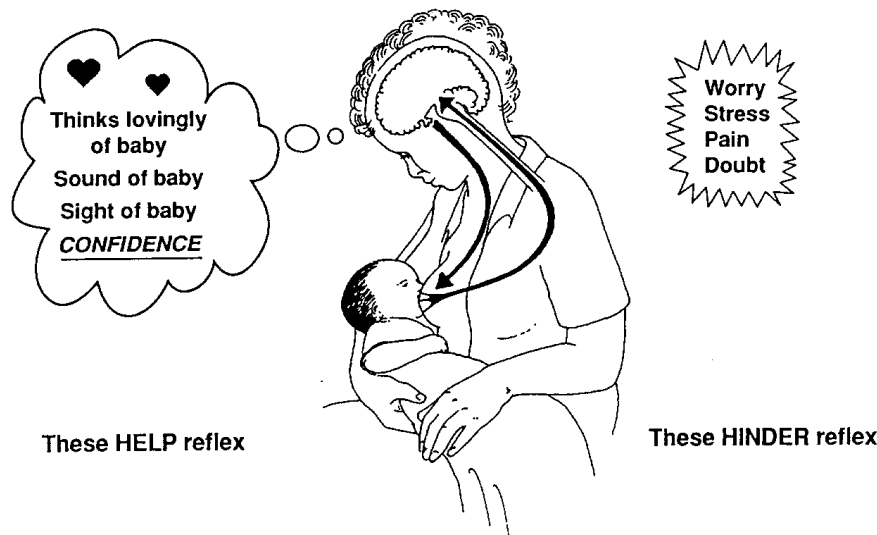
If the reflex does not work well, the baby may have difficulty getting the milk. It may SEEM as if the milk has dried up. But it may simply be that the mother has not released it.

Another important point about oxytocin is that it makes the uterus contract. This helps to stop bleeding, but it may cause uterine pain during a feed for the first few days.

Helping and hindering the oxytocin reflex

This diagram shows how the oxytocin reflex is easily affected by the mother's thoughts and feelings.

OXYTOCIN REFLEX



Good feelings, such as feeling confident that her milk is the best for her baby, feeling pleased with him or thinking lovingly of him, can help the reflex to work and the milk to flow. Sensations such as seeing the baby, or hearing him cry can also help the reflex.

But bad feelings, such as pain, or worry, or doubt that she has enough milk, can hinder the reflex and stop the milk from flowing.

Why is it important to know this?

It is important to remember a mother's feelings whenever you talk to her. It is important to make her feel good and help to build her confidence, to help her breast-milk to flow well. You must not say anything which may make her worry or doubt her breast-milk supply.

Mothers are often aware of their oxytocin reflex. If one or more of the signs or sensations are present, it can help to reassure a mother that her breast-milk is flowing. However, mothers may not feel these sensations and the signs may not be obvious, even if the reflex is active.

The main signs and sensations of an active oxytocin reflex are:

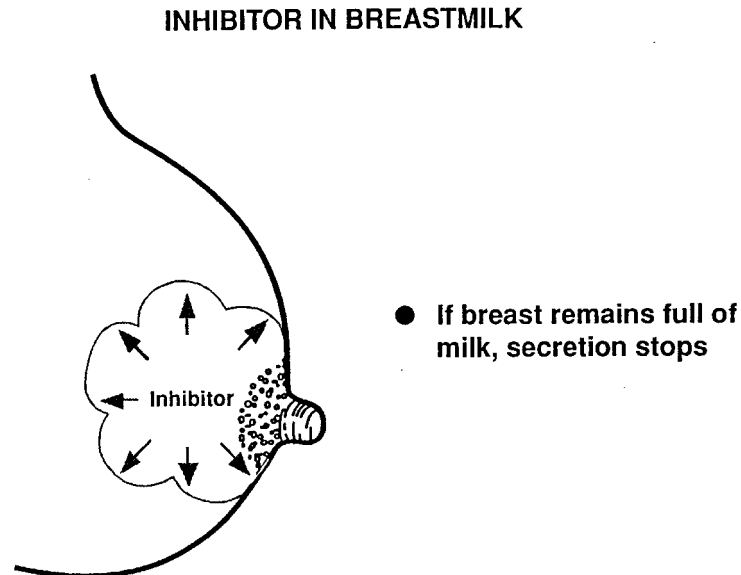
- A squeezing or tingling sensation in the breasts just before feeding the baby, or during a feed;
- Milk flowing from the breasts when the mother thinks of her baby, or hears him crying;
- Milk dripping from the other breast, when the baby is suckling;
- Milk flowing from the breasts in fine streams, if the baby comes off the breast during a feed;
- Pain from uterine contractions during the first week. These can be quite strong;
- Slow deep sucks and swallowing by the baby, which show that breast-milk is flowing into his mouth.

Inhibitor in breast-milk

Breast-milk production is also controlled within the breast itself.

You may have wondered why milk in one breast sometimes dries up, when the other breast continues to make milk – although oxytocin and prolactin go equally to both breasts.

The diagram shows why.



There is a substance in breast-milk which can reduce or inhibit milk production. If a lot of milk is left in a breast, the inhibitor stops the secretory cells from producing more. This helps to protect the breast from the effects of being too full. It is obviously necessary if the baby dies or stops breastfeeding for some other reason.

If the breast-milk is removed, by suckling or expression, the inhibitor is also removed. Then the breast makes more milk.

This helps you to understand why:

- if a baby stops suckling from one breast, that breast stops making milk
- the breast that the baby does suckle from makes more milk and becomes larger.

It also helps you to understand why:

- for the breasts to continue to make milk, the milk must be removed
- if a baby cannot suckle from one or both breasts, the breast-milk must be removed by expression to enable production to continue.
 - Sometimes people talk as though to make the mother produce more milk, we should give her more to eat, or more to drink, but these things will not help her to produce milk if the baby does not suckle.
 - The baby must suckle often enough and he must suckle in the right way. Important new research has shown us how babies suckle, so that we now understand the difference between effective suckling and ineffective suckling.

Oxytocin

- Oxytocin contracts the cells around the alveoli and sends milk down the ducts to the milk sinuses, where it is available for the baby to remove. This process is called the milk ejection reflex, or *letdown*.
- Early postpartum, when the milk ejects, the mother may feel uterine contractions or a sudden thirst. She may see milk leaking from the other breast. However, mothers do not always feel a physical sensation.
- When the milk ejects, the rhythm of the baby's suckling will change from rapid to regular deep, slow sucks (about one per second).

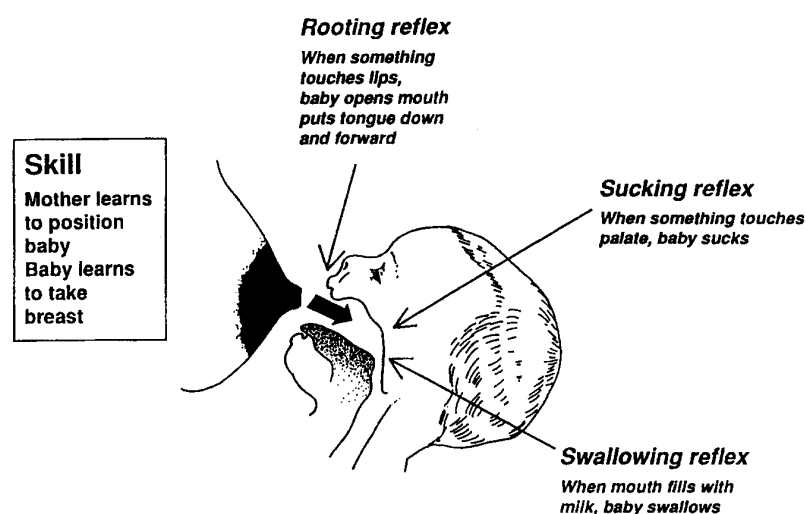
Oxytocin release can be inhibited temporarily by:

- Extreme pain (such as a fissured nipple)
- Stress hormones resulting from doubt, embarrassment, or anxiety
- Nicotine and alcohol.

The mother can reduce this inhibition by:

- Relaxing and getting comfortable for feeds
- Avoiding embarrassing or stressful situations for feeds
- Expressing a little milk and gently stimulating the nipple
- Asking someone to massage her upper back, especially along the sides of the backbone.

Reflexes in the baby



We have looked at the reflexes in the mother, but it is also useful to think about the reflexes in the baby. There are three main reflexes – the *rooting reflex*, the *sucking reflex* and the *swallowing reflex*.

When something touches the baby near his mouth, the baby opens his mouth and may turn his head to find it. This is the “rooting” reflex. It should normally be the nipple that he is “rooting” for.

When something touches the baby’s palate, he starts to suck it and when his mouth fills with milk, he swallows. All these are reflexes, which happen automatically without the baby having to learn to do them.

But there is no “reflex” which helps to get the nipple from the baby’s lips to his palate. The mother and her baby have to learn what to do to get it right. Many mothers and babies do it easily and there are no problems. But some mothers need help.

Attachment and positioning of the breast is very important for effective milk intake and successful breastfeeding.

Attachment and suckling at the breast

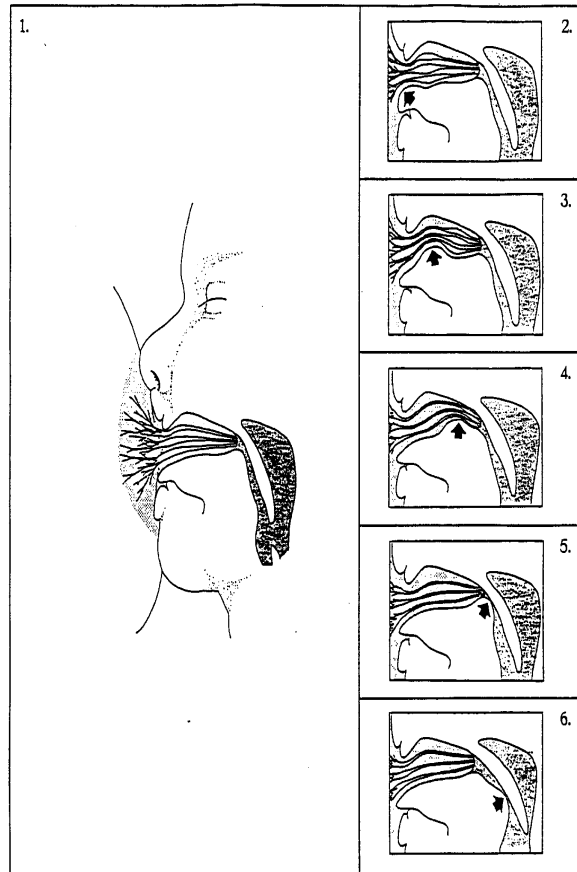
Suckling action

Suckling at the breast and bottle-feeding have different mechanisms of sucking movement. In bottle-feeding the baby’s tongue goes up in order to stop extra flow from the bottle, thus giving bottle and breast can confuse the baby and his oral-moto function and lead to ineffective suckling or refusal of the breast.

This shows what happens to the baby’s tongue as he suckles:

- So the baby does not get the milk out of the breast by suction. He uses suction to draw out the breast tissue to form a teat and to hold the breast tissue in the mouth.
- But the oxytocin reflex is necessary to make the milk flow to the lactiferous sinuses; and the correct action of the baby’s tongue is necessary to move the milk into the baby’s mouth.
- It is also important to see that when a baby suckles in this way, his mouth and tongue do not rub the skin of the breast and nipple.
- For successful breastfeeding the shape of the nipple is less important, but correct attachment and positioning is crucial for any shape.

1. The teat that is formed by the breast and nipple fills the baby's mouth.
2. The lower jaw raises to pinch off milk.
3. A peristaltic wave of compression moves along the tongue toward the back of the mouth, pushing on the hard palate.
4. The sinuses are compressed.
5. Milk flows from the breast and is swallowed.
6. The jaw lowers to allow milk to flow back into the nipple.

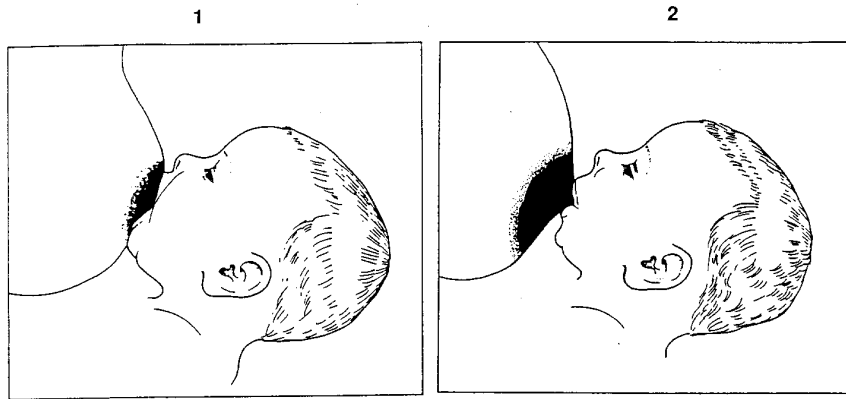


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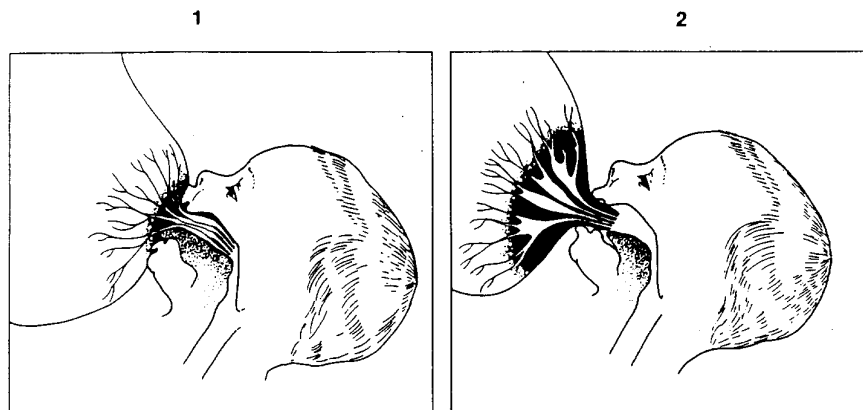
Attachment – outside appearance

These pictures show the same two babies from the outside, so that you can see the external appearances of good and poor attachment.

What differences do you see?



What differences do you see?



The baby in picture 1 is well attached.
 He is closer to the breast, with his chin touching
 He has his mouth wider open
 His lower lip is curled back
 He has more of the areola inside his mouth and you can see
 more areola above his mouth and less below.

The baby in picture 2 is poorly attached.
 He is further away from the breast and his chin is
 not touching it
 His lips are pointing forwards
 More of the areola is outside the baby's mouth.

Remember these points, when you observe babies breastfeeding. They can help you to decide if a baby is suckling effectively or not.

How to position: step by step

1. Make mother comfortable so that she can relax. Make her sit or lie in a position which makes it easy for her to keep the baby close to her breast for a considerable length of time. There are many positions, lying, sitting, squatting... None can be labelled "correct" or wrong so long as she relaxes and the baby gets well to the breast.
2. Hold the baby in a way that it does not have to turn its head to reach the breast. Who would like to eat with the head turned? This means that the baby's chest is turned to the mother's chest, or tummy to mother's tummy. See to it that the baby is comfortable, too.

3. Hold the baby so close that it does not have to tug at the mother's breast while it is feeding. If the baby has to use its considerable suction power to keep the breast in the mouth, it is very likely to hurt the nipple.
4. Support the baby's back, do not hold onto the head. If the baby is forced to take the breast with the back of its head locked in a firm grip, it may instinctively try to bend away, "fighting" at the breast.
5. When the mother starts the feed, the baby's nose should be at a level with the nipple. This means that the baby will need to tilt the head back a little to reach the nipple. You can steer the position of the baby's body by its bottom!
6. Do not use fingers to keep the breast away from the baby's nose. If the mother does this, she will distort the shape of her breast and the baby may be unable to get a good hold of the breast. When well positioned, the baby breathes through the sides of its nostrils.
7. Do not hold and move the breast as if it were a bottle. This will make it difficult for the baby to grasp the breast well. The baby should have a good mouthful of breast so that it gets at the milk stores. If it is necessary to support the breast, do so from below, preferably with a flat hand against the ribcage. The fingers should at all times be well (say, 10 cm) away from the nipple.
8. If the baby is sleepy or fussy you can focus its mind on feeding by gently stroking the cheek or mouth, or touching them with the nipple. If you milk out a drop of milk and leave it on the nipple this may awaken the appetite further. When you do this the baby will usually open its mouth, often making "milking" movements with the tongue.
9. When you see that the baby's mouth is wide open, the tongue well down in the lower part of the mouth, the trick is to quickly pull the baby towards the mother, giving it a chance to "latch on". Several tries may be necessary, this is not always successful at the first attempt!
10. If the baby was angry, hungry or crying when put to the breast, the tongue may have got on to the overside of the nipple, making the milking movement of the mouth impossible. Try to calm the baby down before you try to feed again. Some babies have periods of protest each time you try to feed. You may then have to make the baby take the breast almost without it noticing, whenever there is a good opportunity. If the baby prefers only one breast, let it have it! The mother may be a little lopsided, but it does no harm to the baby.
11. Remember that it is the baby who comes to the breast, not the breast to the baby.

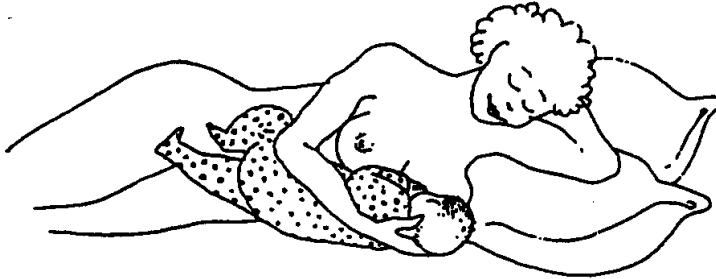
Checklist for positioning

- The baby's mouth should be wide open and the lips turned outward.
- When it is well latched on, the baby's lips and gums can effortlessly compress some of the area around the nipple (areola).
- The tongue should be in the baby's lower jaw, so that tongue and lower jaw together may make the wavelike, "milking" movement which squirts out the milk by compressing the milk stores against the palate.
- The tongue may be visible between the lips and your breast.
- The baby suckles slowly and deeply and the movement may even extend to its ears! Swallowing can often be seen or heard.
- Because it is being held so close, the baby's chin and nose may touch the breast. The mother need not fear that the baby cannot breathe; babies' noses are specially designed to

ensure breathing in this position. Exceptionally a baby may have difficulties and responds by “fighting” at the breast. More often “fighting” is triggered by the baby being unable to move the head freely, for example if it is being locked in place by an adult hand.

- When the baby is well positioned and the milk is flowing, breastfeeding does not hurt.

Some good breastfeeding positions:



Source: *How to breastfeed in an emergency: a guide for mothers*, Nutrition Unit, WHO Regional Office for Europe.



a) Sitting, with the baby cradled in her arms - The mother holds the baby on her lap with his head resting on her forearm directly in front of the breast. This is sometimes called the cradle hold.



b) Lying down - The baby lies on his side facing the mother. His whole body is tucked close to her. This position helps mothers rest while they are breastfeeding. *Lying down while breastfeeding is a tradition to encourage.*



c) Sitting, with the baby's body supported along her arm and his legs wrapped loosely around her side - The mother supports her baby's shoulders and holds the base of his head below the ears. *Make sure there is enough room to fit the baby along the mother's side without having to flex the baby's head forward to bring him close to the breast; his legs can be tucked up if necessary.*



d) With the baby's body supported along her arm, She can move him from one breast to the other without changing the way she holds him. She also controls the baby's head movement, which is helpful for a preterm baby or one who has difficulty attaching at the breast.

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In Summary:

Helping a mother to position her baby at her breast

1. Make the mother comfortable and relaxed.
2. Sit down yourself in a comfortable, convenient position.
3. Show her how to hold her baby:
 - with his head and body straight
 - with his body almost facing her and close to her
 - with his mouth opposite the nipple – not too high, too low or too far out
 - supporting his bottom with the other hand (if newborn).
4. Show her how to support her breast, with her fingers against her chest, her first finger under the breast and her thumb above.
5. Show her how to touch the baby's lips with her nipple.
6. Explain that she should wait until the baby's mouth is opening wide.
7. She then moves the baby quickly onto the breast, aiming his lower lip well away from the nipple.
8. Ask her how it feels and notice how she responds.
9. Look for signs of good attachment.
10. Try again if necessary.

How to meet the needs of the baby

1. Each baby is a very special person, no two babies are alike. Babies' needs for food vary widely. As milk composition changes during the day and over time, so does babies' needs. Fortunately most babies are able to regulate what they take very precisely in accordance with what they need.
2. Put the baby to the breast when it shows signs of hunger or discomfort, day or night, from the first day onwards. Some days the baby may need to feed 10–12 times in a day or more. Some days, it may only need to feed 6–8 times.
3. Do **not** wait for the baby to start crying before you offer the breast.
4. Be aware that if you give the baby a “pacifier” with a rubber nipple, or if you keep it tightly swaddled, it may be difficult for you to see the signs babies normally make when they are hungry. Hungry babies turn their head, wave their arms and touch their mouth with the hands, while salivating and making “sucking movements” with mouth and tongue, as if they imagine a lovely feed. They actually have many ways of telling you about their hunger – crying is only the last, desperate resort!
5. Remember that breast-milk is more easily and rapidly digested than infant formula so the baby will probably need to feed more frequently at the breast than it would have done on the bottle.
6. Accept that most babies also need to breastfeed at night. To make this easy, keep the baby close to the mother's bed at night, so that she can feed it in her bed while dozing. This is

- not dangerous, she will instinctively be attentive to her baby in this situation. Breastfeeding makes her relax, so that she can rest while feeding the baby even if she is not fast asleep.
7. Let the baby suckle the breast until it is satisfied. Do not pay any attention to the clock during the feed. Some days the baby may feed fast; other days more slowly. The baby may feed in spurts and rest a little in between; or it may feed more steadily. The mother will learn to listen to the sounds her baby makes when it swallows, especially whether it is still taking milk from the breast. If the baby is well positioned (see below) it will not damage the mother's nipples even if it is suckling frequently and for long periods.
 8. If the baby spontaneously lets go of the breast, make a pause. Then try to offer the same breast once more, to make sure the baby takes as much of the fat rich "hindmilk" as it needs. Then, if the baby refuses the first breast, offer the second one. If this offer, too, is refused, it means that the baby has taken what it wants.
 9. Offer an alternate breast first in each feeding. If the baby has a "favourite" breast this is not a problem. In fact one breast alone can produce enough milk to feed the baby. Remember that women have successfully breastfed twins and even triplets.
 10. Try to give the baby only breast-milk and *nothing else* for around the first six months. The milk covers all the baby's needs for food and drink for this period. Even when it is very hot, or the baby has a fever, there is *no need for extra water* if the baby gets the breast as often as it wants.
 11. Remember that "normal" growth in babies will include some deviation from the average both on the over- and the underside of the growth curve! In the first months "normal" weight gain usually varies between 500–800 grams per month. If the monthly weight gain is less than this, there is no reason to panic or to resort to infant formula. See if the baby can be coaxed to feed more often. Have an experienced woman check that the baby is well positioned at the breast and that it feeds "efficiently" (see below).
 12. Be aware that babies grow in spurts. At any time, the baby may suddenly want to feed more often for some days and the milk will increase. Babies are very good at regulating demand and supply, if they are allowed to set the pace for themselves.
 13. **There is no need to wash** the nipples or breasts before breastfeeding the baby. Human milk is a very efficient disinfectant. Soap, disinfectants or alcohol remove the natural skin oil and increases the risk of developing sore nipples.

Effects of poor attachment

The baby may cause pain and damage to the nipple.

If a baby is poorly attached and he "nipple sucks", it is painful for the mother. As the baby sucks hard to try to get milk, he pulls the nipple in and out of his mouth. The nipple skin rubs against the baby's mouth. If he continues to suck in this way, he can damage the nipple skin. This is the most important cause of sore nipples.

So sucking in a poor position causes pain; and if it continues, it damages the nipple skin and causes fissures (cracks).

Suction on the tip of the nipple can cause a fissure across the tip. Rubbing the skin at the base of the nipple can cause a fissure around the base.

The baby does not remove breast-milk efficiently

Suckling in a poor position is called *ineffective suckling*. It can have several results:

- The breasts may become engorged.
- The baby may be unsatisfied and fuss and cry and want to feed often. If the oxytocin reflex works well, the baby may get enough milk at least for a few weeks, by feeding inefficiently very often. But it can exhaust his mother.
- The baby may get insufficient milk. He may be so frustrated that he refuses to feed altogether. He may fail to gain weight.
- If a baby does not remove enough milk, the breasts will make less milk and the supply will really decrease.

So poor attachment can cause both *apparent* and *real* milk insufficiency. It can lead to poor weight gain in the baby and breastfeeding failure.

This may seem to contradict what we say about “more suckling makes more milk”.

“More suckling makes more milk” only applies if a baby is attached to the breast well and suckling effectively and allowed to finish the feed. If a baby is suckling effectively, he should get all the milk that he needs and he should not want to feed very often, though the interval between feeds may be irregular. If a baby wants to feed more often than about every 1–1 ½ hours, it is likely that he is either not well attached, or that he is having very short feeds and frequent suckling is not making more milk for him. See also Session 6 *Breastfeeding difficulties*.

SESSION 6: BREASTFEEDING DIFFICULTIES

“Not enough milk”

Signs that a baby may not be getting enough breast-milk	
Reliable	Possible
Not gaining weight (less than 500 g a month) (less than birth weight after 2 weeks)	Baby not satisfied after breastfeeds Baby fusses and cries often Very frequent breastfeeds Very long breastfeeds Baby refuses to breastfeed Stools dry, hard, or green
Not passing enough urine (less than 6 times a day) (yellow or strong smelling)	Mother cannot express her milk Breasts did not enlarge during pregnancy Breast-milk did not “come in” (after delivery)



The more the baby urinates, the more he is receiving milk. To have many wet diapers is a good sign of sufficient milk intake.

Reasons why a baby may not get enough breast-milk	
Breastfeeding difficulty	Mother: psychological factors
Infrequent feeds	Lack of confidence
No night feeds	Worry, stress
Short feeds	Dislike of breastfeeding
Poor attachment	Rejection of baby
Poor emptying	Tiredness
Bottles, dummies	
Supplementary feeds	

Infrequent feeds

- A common reason for a baby not getting enough milk, is that he does not feed often enough. If a baby breastfeeds less than 5–6 times a day, it may be a cause of insufficiency. This may be because the mother is not responding to her baby when he cries, or she may be missing feeds, or she may be too busy or at work. Sometimes a baby is sleepy and does not demand to be fed often enough.

No night feeds

- If a mother stops night breastfeeds before her baby shows that he is ready, her milk supply may decrease.

Short feeds

- Breastfeeds may be too short or hurried.
- Sometimes a mother takes her baby off her breast after only a minute or two. This may be because the baby pauses and the mother decides that he has finished. Or she may be in a hurry, or she may believe that her baby should suckle from the other breast.
- Sometimes a baby stops feeding too quickly, for example if he is too hot because he is wrapped in too many clothes.
- If a breastfeed is very short, the baby may not get enough of the fat rich hindmilk and he does not get enough energy.

Poor attachment

- If a baby is suckling in a poor position, he does not get the milk efficiently and he may not get enough. This may make him want to suckle very often, or for a long time.

Poor emptying of the breasts

- If a mother's breasts remain full for a long time, less milk is produced. This happens where there is engorgement or milk stasis.

Bottles, dummies (pacifiers)

- A baby who has prelacteal feeds from a bottle may have difficulty attaching to the breast in a good position. A baby who has supplements from a bottle may lose interest in breastfeeding, or may suckle less at the breast, so that the breast-milk supply decreases. Babies who suck from dummies may suckle less at the breast.

Supplements

- If a baby has other foods before about 4–6 months of age, he is less hungry and suckles less at the breast. Then the breast-milk supply decreases.

These do not affect the breast-milk supply

- Age of mother
- Sexual intercourse
- Menstruation
- Disapproval of relatives and neighbours
- Returning to a job (if baby continues to suckle often)
- Age of baby
- Caesarean section
- Many children

The common reasons for a baby not getting enough milk are:

- breastfeeding difficulties
- psychological factors

A physical difficulty in producing breast-milk is only occasionally the cause.

How to help mother whose baby is not getting enough milk

Look for a cause

1. Listen and learn
 - Help her to talk about how she feels
 - Help her to talk about pressures from other people
 - Empathize
2. Take her history
3. Assess a breastfeed
4. Examine the mother, including breasts
5. Examine the baby

Build confidence and give support

Help mother to believe that she can produce enough breast-milk.

Accept

Ideas about breast-milk supply
Feelings about breastfeeding and baby.

Reinforce

That she is still breastfeeding
That she comes for help.

Give practical help

Improve baby's attachment to breast
Improve drainage of breast.

Give relevant information

Explain how baby's suckling controls milk supply
Explain how baby can get more breast-milk.

Suggestions

Breastfeed more often, longer, at night
Stop using bottles or dummies (use cup if necessary)
Reduce or stop other feeds and drinks (if baby aged less than 4–6 months)
Ideas to reduce stress, tiredness.

Less common causes

If baby ill or abnormal – treat or refer
If mother taking estrogen pill or diuretic, help her to change it.

Follow up

See daily, then weekly until baby gaining weight and mother confident.

Less common reasons why a baby does not get enough milk

If a baby has an obvious illness or abnormality, you should treat or refer him.

If a mother is taking estrogen containing contraceptive pills, or diuretics, help her to find an alternative.

Occasionally you may not be able to find the cause of a poor milk supply; or the milk supply does not improve (the baby does not gain weight) even though you have done everything you can to help the mother, then you may need to look for one of the less common causes and help or refer the mother accordingly.

Occasionally you may need to help a mother to find a suitable supplement for her baby. Encourage her to:

- continue breastfeeding as much as possible
- give only the amount of supplement that her baby needs for adequate growth
- give the supplement by cup
- give the supplement only once or twice a day, so that her baby suckles often at the breast.

Expressing and feeding breast-milk

Mothers and babies should be kept together. However, if a mother must be separated from her breastfeeding baby, she may need help learning how to maintain milk production, keep her breasts comfortable and store the breast-milk for feeding her baby. She will also need to learn ways to feed her baby that will not interfere with breastfeeding. Ideally, in a hospital birth, a mother should be allowed to remain with her baby until they can be discharged together. If a mother is discharged before her baby, she will need special help.

Maintaining lactation in spite of separation

When mothers cannot begin breastfeeding

If a mother is not able to begin breastfeeding her baby soon after birth, she will need to express her milk to maintain milk production.

- Help her to begin expressing milk as soon after delivery as possible (at least by 12 hours postpartum). She should express for about 15–20 minutes, at least 6–8 times in 24 hours.
- Give her written instructions about milk expression and storage at home.
- Give her some clean containers for milk storage.
- Advise her to express her milk frequently.
- Help her to find a place where she can express milk and talk with other mothers at the hospital.

How to express breast-milk by hand

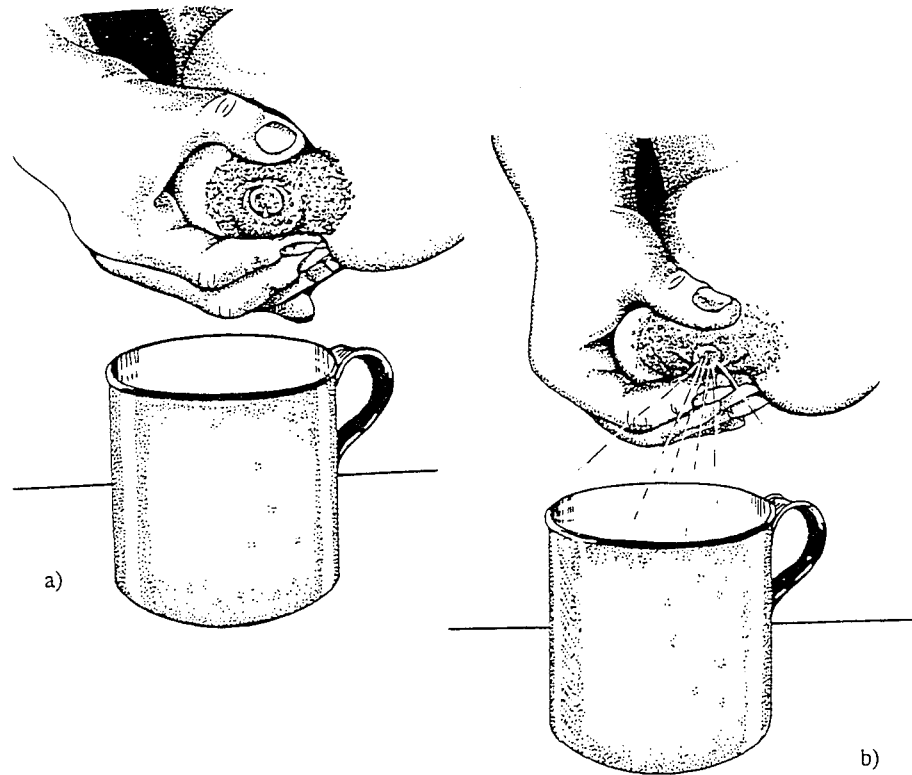
- Wash your hands thoroughly.
- Sit or stand comfortably and hold the container near your breast.
- Put your thumb on the areola ABOVE the nipple and your first finger on the areola BELOW the nipple, opposite the thumb. Support the breast with the other fingers.
- Press your thumb and first finger slightly inwards towards your chest wall. (Do not press too far or you may block the milk ducts).
- Now press the areola behind the nipple between your finger and thumb. You must press behind the nipple, so that you press on the lactiferous sinuses beneath the areola. (Sometimes in a lactating breast you can feel the sinuses. They are like pods, or cords.)
- Press and release, press and release. This should not hurt – if it hurts, the technique is wrong. Explain that at first no milk may come, but after pressing a few times, milk starts to drip out. It may flow in streams if the oxytocin reflex is active.
- Press the areola in the same way from the SIDES, to make sure that milk is expressed from all segments of the breasts.
- *Do not rub* or slide your fingers along the skin. The movement of the fingers should be more like rolling.
- *Do not squeeze* the nipple itself. Pressing or pulling the nipple cannot express the milk. It is the same as the baby sucking only the nipple.
- Express one breast for at least 3–5 minutes until the flow slows; then express the other side; and then repeat both sides again. Use either hand for either breast and change when they tire.

To express breast-milk adequately takes 20–30 minutes, especially in the first few days when only a little milk may be produced. It is important not to try to express in a shorter time.

How to prepare a container for expressed breast-milk (ebm)

- Choose a cup, glass, jug or jar with a wide mouth.
- Wash the cup in soap and water and leave it in the sun to dry. (She can do this the day before).

- Pour boiling water into the cup and leave it for a few minutes. The sun and boiling water will kill most of the germs.
- When ready to express milk, pour the water out of the cup.



- a) Place your finger and thumb on the areola and press inwards towards the chest wall.
- b) Press the areola behind the nipple between your finger and thumb.

How to stimulate the oxytocin reflex

Oxytocin releasing is very important for successful breastfeeding expression

- Help the mother psychologically
- Build her confidence
- Try to reduce any sources of pain or anxiety
- Help her to have good thoughts and feelings about the baby.

Help the mother *practically*. Help or advise her to:

Sit quietly and privately or with a supportive friend.

- Some mothers can express easily in a group of other mothers who are also expressing for their babies.

Hold her baby with skin-to-skin contact if possible.

- She can hold the baby on her lap while she expresses. If this is not possible, she can look at the baby. If this is not possible, sometimes even looking at a photograph of the baby helps.

Take a warm soothing drink.

- The drink should not be coffee.

Warm her breasts

- For example, she can apply a warm compress, or warm water, or have a warm shower.

Massage or stroke the breasts lightly

- Some women find that it helps if they stroke the nipple and areola gently with finger tips or with a comb.
- Some women find that it helps to gently roll their close fist over the breast towards the nipple.

Ask a helper to rub her back

- The mother sits down, leans forward, folds her arms on a table in front of her and rests her head on her arms. Her breasts hang loose, unclothed. The helper rubs down both sides of the mother's spine. She uses her closed fist with her thumbs pointing forwards. She presses firmly with small circular movements with her thumbs. Her knuckles also press below the thumbs. She works down both sides of the spine at the same time, from the neck to the shoulder blades, for two or three minutes.

Feeding by cup

Expressed breast-milk and supplements are often given by bottle. Some babies can cope with both methods, but many others start to prefer the bottle and unless breastfeeding is well established, they may become less eager for the breast. Feeding by cup is one way to avoid the problem and this is therefore recommended.

What the health professional can do

Encourage the mother to feed her milk to her baby by cup if the baby for some reason it can not be put to the breast.

Help the mother understand the advantages of cup feeding:

- The risk of poor attachment at the breast is less.
- The baby experiences using its tongue while feeding.
- The baby paces its own intake.
- The baby takes only the milk it needs and is less likely to vomit.
- The risk of infection is diminished since cups are easier to keep clean than bottles.

Explain to the mother how to feed by cup.

- Place the baby in an upright position on your lap.
- Support the baby's back and neck with one arm.
- Place the cup at the baby's mouth, so that the milk almost touches the upper lip.
- Let the baby lap the milk with the tongue (like a kitten), or just drink it, whichever comes naturally.
- Be patient.
- Do not try to make the baby drink a certain amount, let it decide when it has had enough.

Storage and re-heating of breast-milk

Expressed breast-milk must be stored in a sterilized, closed container in the coolest place available. It can be kept for 24 hours at 18–20°C in a shady place, for about 72 hours in a refrigerator (at 4–5°C) and for about four months in a freezer (at -18 to -20°C).

What the health professional can do

Encourage the mother to:

- Express milk for the next day or days and keep it in a shady place or refrigerator. Milk kept cool conserves more cells than freezing, though frozen milk contains sufficient levels of all the important properties. Stored milk can be frozen up to 24 hours after expression, but no longer, though it can still be used by the baby.
- Freeze milk in small, ready-to-use, portion-size amounts.
- Let frozen milk thaw at room temperature. Do not heat the milk as this destroys some anti-infective substances. It is quite all right to give the baby milk that is cooler than milk from the breast. Thawed milk must not be refrozen, but it can be kept refrigerated for use within 48 hours.
- If you have not thawed the milk in time and must thaw it quickly, place the container in warm water.
- Never heat the milk in a microwave oven. The milk may be boiling in parts, while the bottle remains cold.

Re-lactation and induced lactation

Any woman who has given birth can re-lactate and any woman with ordinary mammary glands can induce milk production in her breasts, even if she has never been pregnant. Many adopted or fostered babies have been breastfed, even by women who have never had a child.

Re-lactation is a little easier than induced lactation. A woman who has been through the process of pregnancy usually has more milk producing gland tissue. However, the process of breastfeeding in itself stimulates gland proliferation.

What the health professional can do

- Reassure the mother that her baby's suckling at the breast will produce enough stimulus for her milk production to continue or get started. If she really wants to try, you can help her.
- Prepare the mother that in re-lactation it usually takes from 1–7 days for the milk to “come in” and it may take from 2–6 weeks before she is able to breastfeed exclusively. If lactation is to be induced it may take longer.
- Explain to the mother that during the period when she is building up her milk supply, it will be best if she can find somebody else to help with her responsibilities regarding other children, housekeeping, cooking etc.
- Explain to the mother that she will need to stay near her baby and offer her breast at least 8–10 times a day. She should sleep with her baby either in the bed or very near so she can pick up any signals of interest. She must not use a pacifier.

- Make sure the mother understands the principles of good attachment and, if necessary, help the mother and baby achieve this. Suggest to the mother that she can further stimulate her milk production by hand-expression between feeds.
- Show her your admiration and approval of any progress, no matter how small it is.
- If, at the start, the mother has no, or almost no, milk, the baby will need to be fed in the meantime. At first the baby can be fed sufficient artificial milk (150 ml per kilo per day) in a cup. Each day, reduce the total by 30 – 50 ml.
- Check the baby's weight and urine to make sure it is getting enough milk and cut out more artificial milk as the breast-milk increases.
- A helpful method of re-establishing or inducing lactation is the nursing supplementer.
- If a baby refuses to feed from an "empty" breast or for some reason is too weak to get enough milk while feeding from the breast, a nursing supplementer may be useful.
- With a nursing supplementer the baby receives additional milk (either donated pasteurized breast-milk or artificial milk) by a fine tube, which passes from a container (cup or bottle) to the baby's mouth, while the baby suckles the breast.
- In this way the baby is satisfied at the breast and the production of milk is stimulated by the baby's suckling.

How to use the nursing supplementer

What the health professional can do

- Help the mother to use a nursing supplementer if you both agree that this may improve her chances of successful breastfeeding. Show in practical ways how to keep the nursing supplementer absolutely clean.
- Help the mother to regulate the flow of milk from the nursing supplementer so that the baby does not feed too fast and hence stimulate the breast too little. The flow is regulated either by closing the tube a bit with a paper clip, a loose knot or a finger pinch, or by lifting or lowering the container or by attaching the tube to a syringe and pressing the piston.
- Explain to the father and/or another relative or friend of the mother that she may need an extra pair of hands in the beginning during the procedure, so assistance is welcome.

Caesarean section

Breastfeeding is certainly possible after a Caesarean section. The health worker should give the mother extra help with the initiation of breastfeeding.

The mother may be sedated and so may the baby. She may suffer from blood loss, is less mobile and often in pain. Also, she may feel disappointment or anger. In addition, the baby may sometimes need special care. Successful breastfeeding can help heal the negative feelings some mothers have about their need for a Caesarean section.

What the health professional can do

- Reassure and prepare the mother before the surgery that she can indeed breastfeed. Tell her about other mothers with Caesarean section who have breastfeed successfully.

- Put the baby skin-to-skin with the mother immediately after birth, if at all possible. The mother may not consciously remember this event, but her body and the baby will. Even a brief contact is better than none.
- Assist the baby to have the first feed as soon as it starts searching, even if the mother is still sedated.
- Assist the mother to let her baby feed as often and for as long as needed. She may have difficulty in lifting and holding her baby. Make sure someone is always available to help give her baby to her whenever she or the baby wish this. A relative or friend can do this when there is a shortage of staff.
- Encourage the mother to stay skin-to-skin with her baby as much as possible.
- Assist the mother in finding suitable feeding positions. She can feed lying on her side (see illustration below and Session 5).
- Offer assistance to the mother to get the baby well positioned and attached, especially with the early feeds.
- Listen to the mother who may need to talk about her experience again and again. This will help her to re-build confidence that her body can function well.
- If the baby is in a special care unit, the mother needs to know as much as possible about the situation and to talk about it. Let her stay close to her baby. Even if the baby is in an incubator, it will help for her to look at it or touch it whenever possible.
- Teach her how to express her milk and explain how this will help her sick baby.
- Treat the mother like a princess. Only she can breastfeed.



Special situations

Multiple births

The great majority of women are able to produce enough milk to feed more than one baby without supplements.

Twins and triplets breastfeeding management

It is possible to nurse twins and triplets. The key deterrent is not milk supply, but time. The following are suggestions that the health care provider can make to assist with the challenge of breastfeeding more than one infant.

- A. Ongoing support and encouragement from health care providers, family and friends is essential.

B. General considerations:

1. Set household priorities – do only essentials
2. Ask for help with caring for other children and doing household chores
3. Rest as often as possible
4. Eat properly and drink sufficient nourishing fluids
5. Try to spend time alone with each infant so you can get to know them
6. Dual feeding is possible
7. With twins, alternate breasts between each infant daily

C. Triplets

With triplets, feeding choices include totally breastfeeding all babies at each feeding or providing alternative feeding for one infant and breastfeeding two infants on rotating basis.

What the health professional can do

- Assure the mother that she can breastfeed her twins or triplets. The stimulation of a second or third baby will ensure greater milk production.
- Prepare her for the possibility of feeling that she spends a lot of time breastfeeding, especially during the early weeks.
- Explain to her that if she starts supplementing with breast-milk substitutes her milk supply may decrease because the babies will not stimulate her own milk so much. If one baby is weak and does not suckle well and supplementation is medically indicated, then her own expressed breast-milk is the best supplement.
- Help the mother work out the best way for her to manage breastfeeding her children. Some prefer to feed one baby at a time, while others prefer to feed from both breasts at the same time. Some mothers alternate breasts between the babies; others let each baby choose a favourite breast.
- Help the mother find feeding positions suitable for her and her babies. It is possible to feed two babies in the “backwards” position or with one “backwards” and the other in the “classical” position.
- Sometimes one twin or triplet suckles less effectively than the other(s). Here the mother of multiples has a great advantage. The baby (or babies) who suckle more effectively will maximize the stimulation for the weaker baby and thus enhance its supply. The “good” suckler will keep both breasts producing well and help its weaker sibling to get plenty of milk.
- Help the mother contact other parents who have successfully breastfed twins or triplets.



Breast Problems

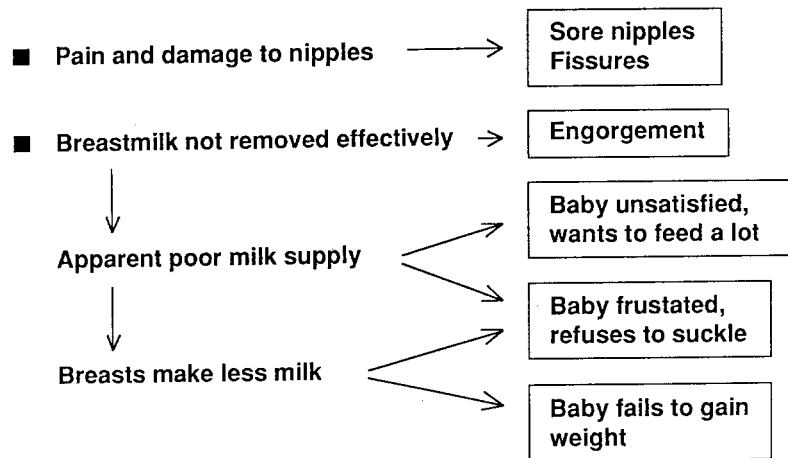
Some breastfeeding difficulties need careful diagnosis and treatment. The care giver must be skilled in how to examine the breast, diagnose the problem and to give the right treatment.

How to examine a woman's breasts

1. Examine before a breastfeed, or wait until the baby has finished.
2. Build the mother's confidence. Do not sound critical.
3. Explain what you want to do. Ask the mother's permission.
4. Inspect her breasts without touching. Look for:
 - Size and shape of breast (may affect confidence)
 - Size and shape of nipple (may affect attachment)
 - Dripping milk (oxytocin reflex)
 - Full, soft, engorged
 - Fissures, white spots
 - Redness (inflammation or infection).
5. Ask if she has noticed any symptoms. Ask her to point to the place.
6. Explain that you would like to palpate. Ask her permission.
7. Palpate gently all parts of both breasts.
 - Use the flat of your hand (fingers together and straight).
 - Do not pinch or poke.
 - Watch mother's face for tenderness.
8. Feel for:
 - generalized fullness, hardness, engorgement
 - localized hardness, hot areas, lumps.
9. Ask mother to show how easily her nipples pull out (protract).
 - (She places her finger and thumb on the areola either side of her nipple and tries to pull the nipple out.)
10. Reassure and thank the mother. Tell her what you have found.

Many problems may be caused by poor attachment.

RESULTS OF POOR ATTACHMENT



CAUSES OF POOR ATTACHMENT

- Use of feeding bottle**
 - before breastfeeding established
 - for later supplements
- Inexperienced mother**
 - first baby
 - previous bottle feeder
- Functional difficulty**
 - small or weak baby
 - breast poorly protractile
 - engorgement
 - late start
- Lack of skilled support**
 - less traditional help and community support
 - doctors, midwives, nurses, not trained to help

Management of flat and inverted nipples

The size and shape of the breasts and nipples are genetically determined. But sometimes the mother is worried that her breasts are too small or her nipples are flat or inverted and that is why she cannot breastfeed. In most cases, flat nipples do not cause any problems for breastfeeding if the mother understands how to attach the baby properly to the breast. Sometimes, however, she can lose her confidence. In this case, she needs to get instructions on how to manage breastfeeding if she has flat or inverted nipples.

<i>Antenatal treatment</i>	Probably not helpful
<i>Soon after delivery</i>	Build mother's confidence Explain about suckling <u>breast</u> not nipple Help her to position baby Try different positions, e.g. underarm Make nipple stand out more, use pump, syringe Express breast-milk and feed with cup Express breast-milk into baby's mouth

- Antenatal treatment, for example, stretching nipples, or wearing nipple shells, is probably not helpful. Most nipples improve around the time of delivery.
- Help is most important when the baby starts breastfeeding. Try to give the mother confidence. Explain that it may be more difficult at the beginning, but with patience and persistence she can succeed.
- Make sure that the mother understands that her baby needs to take a large mouthful of breast – not just her nipple. She also needs to know that as her baby feeds, he will draw the nipple out and its protractility will improve.
- Help her to position her baby so that he suckles more effectively. Try to help her before her breast-milk “comes in” and her breasts become full. Sometimes it helps to shape the breast so that the baby can take it more easily.
- Make the nipple stand out more. A mother may find that it helps to stimulate her nipple just before a feed, so that it stands out better. She can also use a hand breast pump, or a syringe to pull her nipple out. If it is acceptable to both partners, the woman’s husband can suck on the nipples to draw them out a few times.
- If a baby cannot suckle effectively in the first week or two, his mother can express her milk and feed it from a cup. She should not use a bottle, because that might make it more difficult for her baby to take her breast later.
- Expressing milk helps to keep breasts soft, so that it is easier for the baby to suckle and it helps to keep up the supply of breast-milk.
- Some mothers find it helpful to express a little milk directly into the baby’s mouth. The baby gets some milk straight away, so he is less frustrated. He may be more willing to try to suckle.

Sore and damaged nipples

Nipple soreness may be common in the first period of breastfeeding, especially when skills to achieve good attachment and frequent early feeding are still to be learned.

Poor attachment of the baby at the breast is the main cause of nipple pain and damage. Restricted feeding can result in engorgement which in turn can lead to poor attachment. Washing the nipple more than once a day for normal hygiene will remove the protective skin secretions and lead to damage.

Management of sore nipples

- Check attachment
- Examine breasts – engorgement, fissures, Candida
- Check baby for Candida and tongue tie
- Improve suckling position
- Reduce engorgement – frequent feeds, expression
- Advise against frequent washing and soap
- Advise against creams, lotions, ointments
- Suggest hindmilk on nipple after feeds, dry breast in air
- Treat for Candida if white spots, redness, deep pain, persistent soreness

- If sore nipples persist, the cause can be Candida infection.

Treatment of Candida of the breast

Gentian violet paint 1%: apply to nipples and to baby’s mouth, repeat daily for 5 days.

Engorgement

Breasts become full between the second and fifth day after birth. Sometimes they feel swollen, hard, hot and painful. This is called engorgement and this is more common when there is restricted feeding, separation of mother and baby and the use of pre-lacteal and supplementary fluids. Fullness is normal, engorgement is preventable.

Early fullness is due to the increased blood supply and activity in the breast tissue as milk production really gets going. If the baby is well attached and fed whenever it shows signs of hunger the milk will flow freely and there should be no problems. Engorgement, when the breasts are painful and the skin may appear tight and shiny because of oedema may result in problems with the milk flow.

Causes and prevention of breast engorgement	
Causes	Prevention
Plentiful supply of milk	Start breastfeeding soon after delivery
Delay starting to breastfeed	Ensure good attachment
Poor attachment to breast	Encourage unrestricted breastfeeding in both frequency and duration
Infrequent removal of milk	
Limiting feed length	

Treatment of breast engorgement	
Do not “rest” breast	
<i>If baby able to suckle:</i>	Feed frequently, help with positioning
<i>If baby not able to suckle:</i>	Express milk by hand or with pump
<i>Before feed to stimulate oxytocin reflex:</i>	Warm pack or warm shower
	Massage to neck and back
	Light massage of breast
	Stimulate nipples’ skin
	Help mother to relax
<i>After feed to reduce oedema:</i>	Cold pack on breasts

Blocked milk ducts and mastitis

Milk ducts can be blocked if breastfeeding is restricted or if the baby is poorly attached, or for other reasons that are not well understood.

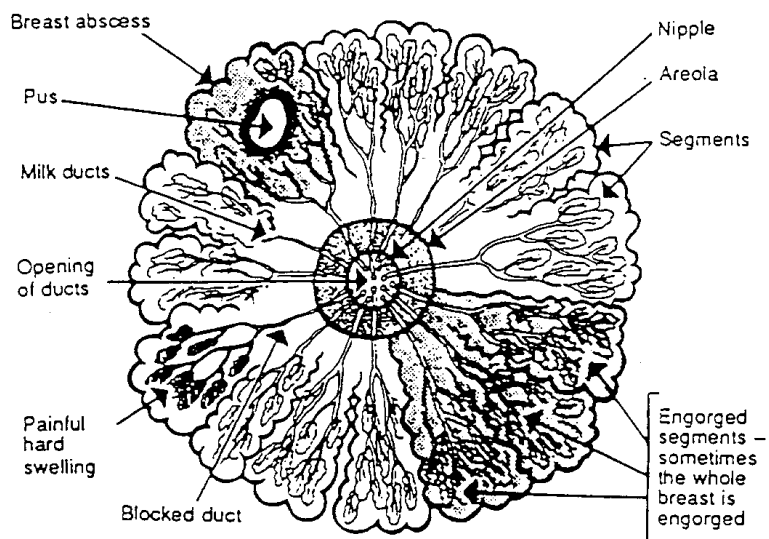
A blocked duct can become a hard painful lump in the breast. The skin over the lump may become red and tender. The woman may also have fever.

Non-infective mastitis is an inflammation of the breast occurring when milk has leaked into breast tissue. It may develop as a result of engorgement or blocked milk ducts. The inflamed part of the breast becomes red, hot and painful. The woman often develops a fever, up to 40°C,

usually accompanied by a flu-like feeling. With improved drainage of the breast through improved suckling this mastitis can improve in 24 hours.

If the mastitis continues or worsens, then the mother may have infective mastitis where bacteria are present.

Symptoms of blocked duct and mastitis		
<i>Blocked duct ---> milk stasis ---> non-infective mastitis ---> infective mastitis</i>		
Lump	--->----->	Swollen area
Tender	--->----->	Severe pain
Localized redness	--->---progresses to---	Red area
No fever	--->----->	Fever
Feels well	--->----->	Feels ill



Blocked duct: milk from one part of the breast does not flow well and a lump of thickened milk blocks the duct.

Mastitis: localized tenderness, redness and heat. Mastitis may result from unrelieved engorgement.

Breast abscess: an area in the breast that feels hot and painful and is full of fluid. If mastitis is not treated early, it may develop into an abscess.

Source: Helping Mothers to Breastfeed, by F. Savage King, 1992.

Causes of blocked duct and mastitis	
Poor drainage of part or all of breast	→due to: infrequent breastfeeds → inefficient suckling → pressure from clothes → pressure from fingers during feeds → large breast draining poorly
Stress, overwork	→which reduce frequency of feeds →may reduce resistance to infection
Trauma to breasts	→which damages tissues
Nipple fissure	→which allows bacteria to enter

Treatment of blocked duct and mastitis	
<i>First:</i> Improve drainage of breast Check for and correct: poor attachment pressure from clothes or fingers large breast draining poorly	<i>Then:</i> If: symptoms severe fissure no improvement in 24 hours
Advise: frequent breastfeeds gentle massage towards nipple warm compresses	Treat in addition with: Antibiotics
Suggest if helpful: start fed unaffected side vary position	Complete rest Analgesics

Antibiotic treatment for infective mastitis

The commonest bacterium found in breast abscess is *Staphylococcus aureus*. Therefore it is necessary to treat breast infections with a penicillinase resistant antibiotic such as either flucloxacillin or erythromycin.

<i>Drug</i>	<i>Dose</i>	<i>Instructions</i>
Flucloxacillin	250 mg orally 6 hourly for 7–10 days	Take dose at least 30 minutes before food
Erythromycin	250–500 mg orally 6 hourly for 7–10 days	

Infection and abscess

Ineffective mastitis is rare. Delay in the treatment of both types of mastitis can lead to a breast abscess.

Pay attention if the mother with mastitis has sudden cold shivers.

If a fever continues for more than 24 hours, even though the milk is extracted frequently from both breasts, treat with antibiotics. The commonest bacterium found in breast infection is *Staphylococcus aureus* so a penicillinase-resistant antibiotic such as flucloxacillin or erythromycin is necessary.

Encourage the mother to continue breastfeeding. Infected matter in the milk will not harm the baby. Antibiotics may give the baby loose stools, but these will do no harm. Both the breast and the baby will recover more quickly if breastfeeding is continued. The breast-milk will re-establish a desirable microflora in the baby's intestines.

If a soft, hot, painful swelling appears in the breast this may be a breast abscess. It can follow untreated mastitis or appear without mastitis or illness. The latter usually happens with an older baby. Medical attention is necessary.

Treatment of abscess

- Treat a distinct abscess with incision and drainage. If the feeding technique has been improved and the mother's fever subsides there should be no need for antibiotics at this stage, but if signs of infection persist treat with antibiotics (see above).
- Encourage the mother to continue frequent breastfeeding, even from an infected breast, unless the milk contains pus. Pus is easily identified by dripping the milk on a pad of cotton wool. The milk is absorbed; pus is not.
- If the breast-milk is mixed with pus, help the mother to express milk from the infected breast frequently and very gently. Then discard the milk.

It is essential to remove the milk from an infected breast. Even with pus, there is no harm to the baby, its digestive enzymes will deal with it. However many mothers and health workers do not like the idea of a baby taking in pus. Therefore, effective expression must take place. "Resting" the breast will make the condition worse.

SESSION 7: CARE OF THE LOW-BIRTH-WEIGHT BABY

Appropriate care of low-birth-weight infants must take into account both the prenatal and the postnatal period. This session will mainly deal with the low-birth-weight infant after birth. However, a few notes are given on intervention before birth in order to sensitize the health professional involved in the care of the newborn to promote appropriate pre-delivery care through collaboration with obstetricians and midwives.

Care before birth

Preterm labour

The diagnosis of preterm labour evidently depends on a reasonably correct estimation of gestational age. If many weeks remain until term and the woman reports a distinct increase in uterine contractions, longer duration of contractions, painful contractions and periods of longer contractions, this is a cause of concern. Careful questioning can often distinguish these symptoms of imminent preterm labour from the normal irregular contractions that gradually increase during any normal pregnancy. Low pelvic pressure and lower back pain strengthen the likelihood of imminent preterm labour in women with suspicious patterns of uterine contractions. In case of preterm labour the following interventions are recommended:

- **Bed rest at home** (if cervical ripening or cervical dilatation)
- **Refer to hospital + infusion of Tocolitic drugs* and Corticosteroids**** if cervical opening/dilatation is far advanced and pregnancy is very preterm)

*Tocolitic drugs (Ritodrine is frequently used) are effective in postponing delivery.

**Corticosteroids (Bethametasone 4 mg i.m. every 8 hours for 48 hours, or dexamethasone 6 doses of 6 mg. Every 12 hours, or hydrocortisone 100 mg every 8 hours for 48 hours) accelerate lung maturation in the fetus thus reducing the risk of the “respiratory distress syndrome” (hyaline membrane disease). They are indicated when gestational age is less than 34 weeks.

Premature Rupture of membranes (PROM)

- **Refer to hospital**
- **Induction of labour if infection suspected**

Antibiotics* in preterm PROM

*In preterm PROM antibiotics are effective in reducing maternal morbidity including chorioamnionitis and neonatal infections.

Intrauterine Growth Retardation

- **Refer to hospital (for monitoring if very severe)**

Induction of labour or Caesarean section

Care after birth

Classification of the low-birth-weight infant

It is important to classify the low-birth-weight (LBW) newborn according to weight and gestational age.

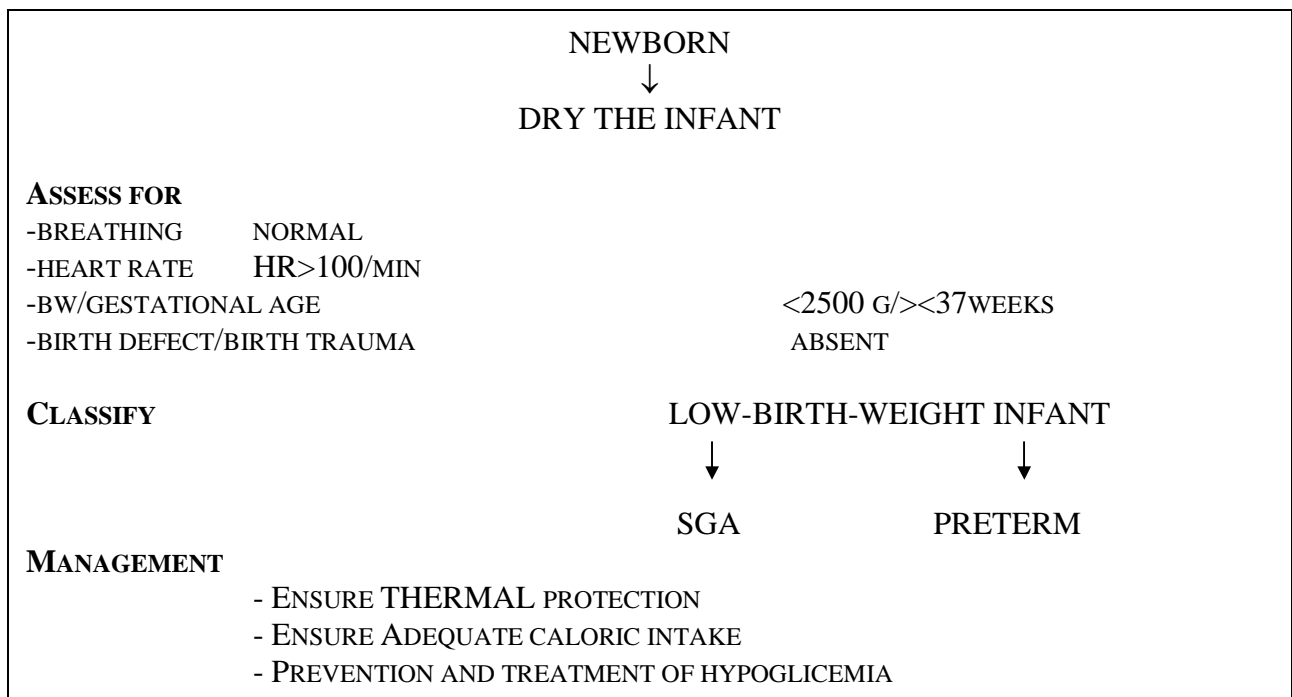
With the use of intrauterine growth charts, where birth weight is plotted against gestational age, it is possible to distinguish low-birth-weight infants who have grown appropriately for their gestational age and are born preterm (normal intrauterine growth) from those who are small for gestational age (SGA; intrauterine growth retardation).

The assessment of maturity of the low-birth-weight baby is of considerable practical interest due to the differences between preterm babies and SGA babies in both complications and outcome. The evaluation of the gestational age can be made by:

- maternal menstrual data
- clinical assessment of the newborn.

Taking into account that the menstrual data can be inaccurate or not available it can be very helpful to use a scoring system which classifies the maturity of the infant on the basis of 6 physical and 6 neurological signs. This maturation scoring system (Ballard system) is quite reliable and very easy to use.

Assessment, classification and management of the LBW newborn



Although there is some overlap, the incidence of certain neonatal complications varies with birth weight, gestational age and birth weight for gestational age.

The final outcome of these infants depends on the causes of LBW and on the management of the complications that they may develop.

Small for gestational age (SGA) infants are at increased risk of:

- respiratory difficulties at birth (neonatal asphyxia, meconium aspiration)
- hypothermia
- hypoglycaemia
- difficult feeding
- infections
- congenital malformations
- polycythemia.

Preterm infants are at risk of:

- respiratory difficulties after birth (apnoeic spells, hyaline membrane disease)
- hypothermia
- hypoglycaemia
- difficult feeding
- infections
- hyperbilirubinemia
- hypocalcemia
- intraventricular haemorrhage.

Management of the low-birth-weight infant

The management of an otherwise healthy LBW baby consists of:

- ensuring thermal protection
- ensuring adequate caloric intake
- preventing and treating hypoglycaemia.

Other possible problems (infections, trauma, jaundice) are dealt with in the following sessions.

Ensuring thermal protection

As illustrated in Session 2 on “Principles of Essential Newborn Care”, LBW infants are at risk of developing hypothermia. Therefore, the health professional should:

- apply carefully the “warm chain” principles
- utilize appropriate technologies for maintaining adequate thermal regulation
- measure routinely the temperature by using a low-reading thermometer
- rewarm the hypothermic infant.

The following methods for thermal protection and rewarming are appropriate:

- A. Skin-to-skin contact
- B. Water filled mattresses
- C. Radiant warmers

D. Air heated incubators.

A. Skin-to-skin contact

Besides other advantages when used for prolonged periods as a global system for the care of LBW babies (see Kangaroo care, below), skin-to-skin contact can be used also for shorter times as a method for ensuring thermal protection or for rewarming hypothermic infants.

The infant is kept naked, except for a nappy (diaper) or lightly dressed and is held in contact with the skin of the mother, between her breasts. The mother covers the infant with her own clothes and an added blanket if she wishes. If the mother is wearing clothes, a belt around her waist can help to keep the infant in good position. This position allows the mother to know immediately when the infant moves and to attend to his/her needs more quickly.

This method is appropriate for infants who are breathing regularly, exhibit no signs of cyanosis or severe neurological deficits.

The father or another member of the family should be encouraged to participate. Infant, mother and father all seem to benefit psychologically when this procedure is used, strengthening the commitment among all three.

This method helps mothers to initiate breastfeeding within a half hour after birth. A mother should have access to guidance from trained personnel, for example a health worker or lactation counsellor, on the proper positioning of her baby and other breastfeeding management techniques.

B. Water filled mattresses

The heated water-filled mattress is a relatively new method of keeping babies warm. The mattress is placed in the cot/bed and filled with 5 litres of water. An electric heating plate fits into a compartment in the bottom of the mattress and warms the water to 36.5–37°C (97.7–98.6°F). The infant is kept clothed and covered with a blanket in the cot.

Unlike other heating devices dependant on electricity, the mattress can be used for several hours without power after being heated to the optimum temperature. The temperature of water falls very slowly. This device has been tested extensively and functions well as an alternative to incubators, where there is no need to observe the baby naked.

C. Radiant warmers

Radiant warmers are overhead heating elements that provide a warm environment by radiant heat transfer and at the same time allow direct observation of and free access to the infant. For short term use, when needed only for a few hours, a 400W radiant warmer placed 50 cm above the baby will be sufficient. Spot lights or bulbs are dangerous because they may burn or may fall on the infant, causing injury. Long-term radiant heat care requires expensive equipment and very skilled personnel and is suitable only for sophisticated centres of care.

D. Air-heated incubators

Air heated incubators are now widely used to provide a clean, warm environment with control of temperature and humidity and an oxygen supply. Humidity is achieved with a water reservoir. They allow adequate observation of the naked infant and isolation when needed. Newer models are furnished with double walls to maximize their ability in maintaining a stable environmental temperature. Two main types of air-heated incubator are available.

- One depends on convection for the internal distribution of warmed air, the air currents being produced naturally by the heater in the incubator without the use of a fan.
- The other circulates warm air by a fan with a small heating element within the incubator.

Incubators with manual regulation of temperature are safer (automatic devices can be impaired) and more cost-effective.

Because of the need for trained staff, maintenance and back-up support, incubators should only be used in hospitals where such skills are available.

Rewarming hypothermic babies

A diagnosis of hypothermia is confirmed by measuring the actual body temperature with a low-reading thermometer. If the temperature is 32–36°C (89.6–96.8°F) (moderate hypothermia), the baby can be rewarmed by skin-to-skin contact; in a warm room and a warm bed; or in an incubator. The rewarming process should be continued until the baby's temperature reaches the normal range, the temperature being monitored every 15–30 minutes.

In severe hypothermia (body temperature below 32°C; 89.6°F) there have been different options.

A recent review concludes that rapid rewarming of severely hypothermic babies is preferable (increasing the body temperature by 1°C per hour is recommended). This can be facilitated by using a thermostatically controlled heated mattress set at 37–38°C (98.6–100.4°F) in addition to measures to reduce heat losses. The importance of early breastfeeding needs to be emphasized so that adequate fluid intake will compensate for the vasodilatation that occurs and also to meet energy needs. Oxygen consumption is known to increase during rapid rewarming. Therefore oxygen may be administered at this time to avoid apnoea due to hypoxaemia.

If an air-heated incubator is available, the air temperature should be set at 35–36°C (95–96.8°F) and the body temperature of the baby checked frequently, at least every 30 minutes.

Once the baby's temperature reaches 34°C (93.2°F), the rewarming process should be slowed down to avoid overheating.

Ensure adequate caloric intake

LBW infants can present feeding problems (weak sucking reflex), in this case alternative methods may be used. However capability of even partial breastfeeding should be tested before deciding for other methods since suckling stimulates milk production. An alternative method could be feeding the baby with a *small cup* or a *small spoon* which can be both useful and effective (even in preterm infants >30 weeks of gestation). *Gavage feeding* is a method often used in hospitals; it is fast and safe if certain precautions are considered before starting feeding. A thin naso-gastric tube should be used. The distance from the mouth to the ear and to the stomach is estimated and marked on the tube. The tube is installed gently through the nose into the stomach. The position of the tube should be checked by aspiration of gastric content and by injecting a few millimetres of air into the stomach while listening with a stethoscope placed over the stomach.

The tube may remain in place for 1–2 days and feeding takes place intermittently over 15–20 minutes. The main principle in the feeding of LBW and preterm infants is to proceed cautiously and gradually.

Nutritional requirements of preterm infants are entirely satisfied by maternal milk which contains an adequate amount of proteins, vitamins, lipids and minerals together with a protective anti-infectious effect in these children who are at increased risk of infections. Thus gavage feeding should always be made with breast-milk from the infants' own mother (for adequate amounts see Table below); if, for some reason, this milk is not available, use the milk expressed from a donor.

Table: The amounts of breast-milk for healthy LBW infants (ml/kg/day)

W (GR)	AY 1	2	3	4	5	10	14
< 2500 G	60 ML	90 ML	120 ML	150 ML	150 ML	180 ML	200 ML

Prevention and treatment of hypoglycaemia

Hypoglycaemia can occur in 15% of premature and 67% of infants with intrauterine growth retardation. **Early and frequent feeding (by breastfeeding or gavage feeding if the infant is unable to suckle)** can reduce its incidence to less than 5%.

As LBW babies do not have any fat stores at birth, but do have a high metabolic rate, it is important that starvation does not continue after birth. Food from fat stores should instead be replaced by appropriate early feeding with breast-milk within 1–2 hours after birth. In case of hypoglycaemia (blood glucose values <1.65mmol/L or 30 mg/dl) clinical signs such as convulsions, apnoeic spells, hypotonia, poor sucking and lethargy can occur.

Symptomatic hypoglycaemia is treated by a i.v. bolus of 10% glucose 2 ml/kg over 5–10 minutes. Continue with 10% glucose at a glucose infusion rate of 6–7 mg/kg/min. After 2 hours test blood glucose; if >2.2mmol/L or 50 mg/dl, continue with the same infusion rate otherwise you can increase the infusion rate to 8 mg/kg/min always monitoring glycaemia. Internal feeding should be increased in the next few days as quickly as possible whilst decreasing the i.e. glucose infusion.

Breastfeeding the LBW baby

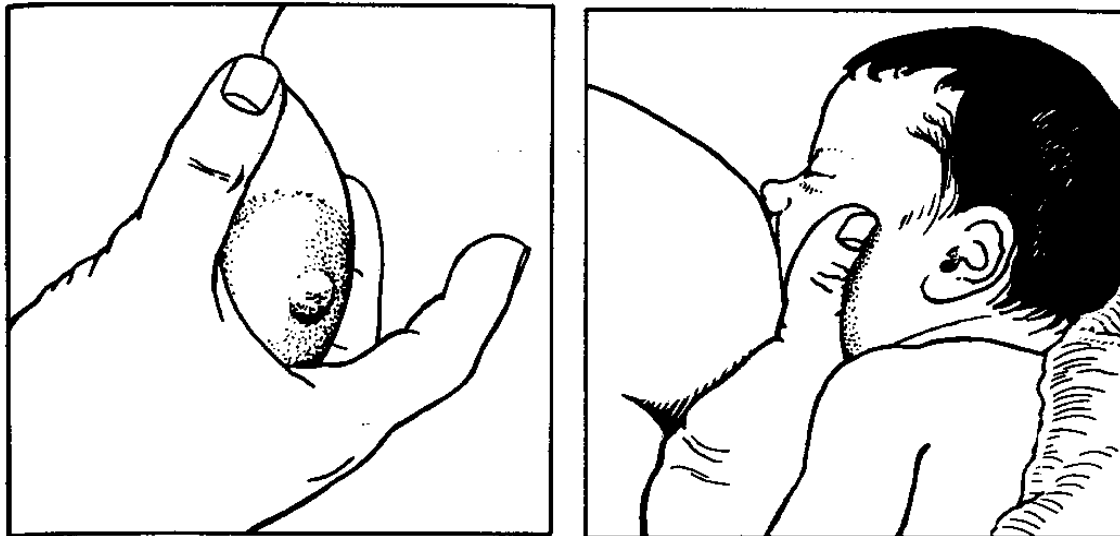
Readiness criteria for early breastfeeding in the premature infant:

- Usually post-conception age 32 weeks or more (current studies of Kangaroo Care may alter the age): other criteria noted below are more important.
- Infant is:
 - able to coordinate suck and swallow
 - clinically stable
 - able to feed with only occasional apnoea and bradycardia periods.
- Observable waking/readiness to feed signs.
- Weight is not an accurate criterion for evaluating ability to suck as there is variation among premature infants.
- Encourage early and frequent contact between mother and preterm infant.

- Contact mothers and discuss value of feeding colostrum and breast-milk to the premature infant.
- Discuss the process of establishing and maintaining milk supply, storage and transportation of milk.

Feeding process

- Avoid neck extension as it inhibits muscular movements of swaddling.
- Lips flanged (opened out like “fish lips”).
- Tongue grooved –moves out and over bottom gum.
- Encourage infant by expressing milk to nipple.
- Rhythm: → rapid suckle → slower, more ongoing pace → swallow → breathe → repeat pattern. More organized at beginning of feed.
- Burping and choking – common due to decreased muscle tone:
 - position infant so that back of neck and throat are higher than the nipple
 - mother leaning back will assist in slowing milk flow to back of throat.
- Continually read infant’s reactions; watch for fatigue and over-stimulation.
- Individualize support plan to include frequent contact with and encouragement of the mother.



Dancer hand position

Promoting the Kangaroo-mother method

Hospitalized LBWI represent a heavy burden for health structures lacking resources and materials. It is well known that overcrowding of neonatal units creates a high risk of cross-infections, hypothermia, medical hyperthermia and milk inhalation, especially if hospitalization is prolonged.

Moreover, separation from mothers in the first days of life hinders adequate breastfeeding, which is extremely precious for the wellbeing of the LBW infant.

So different needs of the newborn, the mother and family call for a strong mother infant bonding during hospital stay and a rapid return home.

The kangaroo method is a safe and effective alternative to conventional care for stabilized LBW. It maintains an adequate thermo-regulation, facilitates breastfeeding and allows close monitoring of the wellbeing of the infant.

The mother (in a similar way to marsupials) keeps the newborn closely in contact with her body in a prone and vertical position (see also paragraph “skin-to-skin contact”) offering the maximum protection during the entire stay in the hospital. The sooner the experience begins after birth the more successful it is.

The safety and effectiveness of this method has been proven by several studies. The specific advantages include:

- reduced risk of hypothermia which is related to increased neonatal mortality and morbidity especially in LBWI;
- reduced risk of cross-infections and hospital acquired infections;
- improvement of overall psychomotor performance in response to neuro-sensorial stimuli received from the mother.

Infants cared for with this method have more deep sleep and alert activity, less crying, greater weight gain and earlier discharge compared to traditional care methods.

However, not all LBW babies are ready for kangaroo care soon after birth.

The admission criteria to the kangaroo method are:

- a gestational age > 30 weeks
- a birth weight > 1100 g
- good general health conditions
- at least a partial ability to suck.

Organization of a Kangaroo method area

Keeping in mind that the stay in the hospital can be very long (usually several weeks), it is important to organize adequately a Kangaroo mother area according to the specific needs of the mother and infant.

The Kangaroo-method area should be placed within or next to a neonatal or paediatric unit able to provide care for newborns when needed especially for the LBW infant weighing less than 1500 g. The presence and continuous availability of a nurse is necessary at least at daytime. The nurse’s tasks include not just routine care but also health education of the mothers (care of the baby during hospitalization, postpartum hygiene, cleaning of a baby, information on risks at home, attendance to follow-up visits, feeding requirements, how to store breast-milk).

During the stay in the hospital the mothers should have an appropriate accommodation consisting in a separate bed, a pillow, a chair, a toilet. A small room for social activities should be provided with a television, the possibility to read, to write, to receive visits. Adequate nourishment for the mothers should also be made available. The mother may need to leave the

baby for short periods for personal needs. During those times the infant must be wrapped in several layers of warm clothing, covered with blankets and kept in a warm place.

All newborns in this hospital area require a clinical examination at least 3 times a week (for instance on alternate days). The daily clinical inspection (performed by a nurse) can be short, but must always consider general clinical conditions, body temperature and the weight graph.

Discharge criteria for LBW

For the reasons outlined above, LBW infants should not be kept in hospital longer than necessary. The following discharge criteria can be suggested:

WEIGHT 1800–2000 G OR EVEN 1500 G IF THE FOLLOWING CONDITIONS ARE SATISFIED:

- GOOD HEALTH CONDITIONS
- WEIGHTGRAPH SHOWING AN UPWARD TREND (AT LEAST IN 3 SUBSEQUENT DAYS)
- GOOD THERMO-REGULATION
- GOOD SUCKING REFLEX
- MOTHER ABLE TO TAKE CARE OF THE BABY AT HOME.

SESSION 8: METHODS OF FEEDING LBW BABIES

Development of suckling

At what gestational age can babies suckle at the breast?

Babies vary a lot. However, they can almost all suckle effectively by 36 weeks. Some babies can suckle at 32 weeks, though they are not able to suckle for as long as a larger baby.

Babies can already swallow and suck long before 32 weeks. From about 32 weeks, many babies can suckle from the breast, but they have difficulty coordinating sucking, swallowing and breathing. They need to pause during a breastfeed to breathe. They can suckle effectively for a short time, but they often cannot suckle long enough to take all the milk they need.

By about 36 weeks, most babies can coordinate suckling and breathing and they can take all that they need by breastfeeding.

Gestational age is a better guide to a baby's feeding ability than weight. However, it is not always possible to know gestational age. Many babies start to take milk from the breast when they weigh about 1300 g. Many can breastfeed fully when they weigh about 1800 g.

Methods of feeding LBW babies

Some LBW babies cannot take any kind of oral feed and they need intravenous feeding for the first few days. This chart shows the different ways to feed babies when oral feeding becomes possible. Give expressed breast-milk until the baby is breastfeeding fully.

Before about 32 weeks:

Most babies need to be fed by naso-gastric tube, often for several weeks. It may also be helpful for the mother to let the baby suck on her finger while he has tube feeds. This may stimulate the digestive tract and help weight gain.

From about 30–32 weeks:

Babies are able to take feeds from a small cup, or from a spoon. You can start trying to give cup feeds once or twice a day while a baby is still having most of his feeds by tube. If he takes cup feeds well, you can reduce the tube feeds.

Cup feeds give a baby valuable experience of taking food by mouth and the pleasure of taste. Many babies show signs of wanting to take things into their mouths at this stage, yet they are not able to suckle at the breast.

From about 32 weeks:

Some babies are able to start suckling on the breast. Let the mother put her baby to her breast as soon as he is well enough. He may only root for the nipple and lick it at first, or he may suckle a little. Continue giving expressed breast-milk by cup or tube, to make sure that the baby gets all that he needs.

When a baby starts to suckle effectively, he may pause quite often during feeds. It is important to leave him on the breast, so that he can suckle again when he is ready. Offer a cup feed after the

breastfeed. Or offer alternate breast and cup feeds. Make sure that the baby suckles in a good position. Good attachment may make effective suckling possible at an earlier stage.

From about 36 weeks:

Most babies can take all that they need directly from the breast. Supplements from a cup are no longer necessary. Continue to follow babies up and weigh them regularly to make sure that they are getting all the breast-milk that they need.

Methods of feeding LBW Babies

Weeks gestational age	Approximate weights	Oral feeding method
Before 30		Naso-gastric tube
30–32		Cup feed
32 +	± 1300 g	Breastfeeding possible
36 +	± 1800 g	Breastfeeding well coordinated

Time of first oral feed

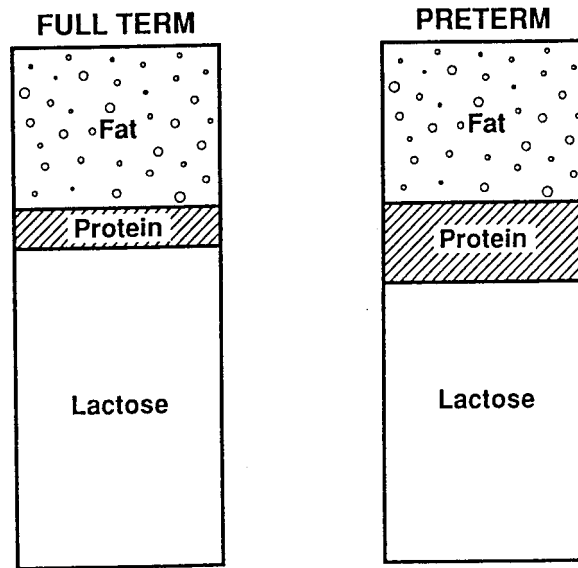
If oral feeding is possible as soon as a baby is born, the first feed should be given within the first 2 hours and every 2–3 hours thereafter to prevent hypoglycaemia, (low blood sugar). Until the mother has produced colostrum, give feeds of donated breast-milk. If breast-milk is not available, give glucose water. (Glucose water is not necessary for well term babies who are not at risk of hypoglycaemia).

“Learning” to feed from a bottle

It is not necessary for a baby to “learn” to feed from a bottle before breastfeeding. Research has shown that breastfeeding is easier for a baby than sucking from a bottle. Bottle-feeding can make it more difficult for a baby to learn to suckle from the breast.

Full term and preterm breast-milk

This chart compares full term and preterm milk:



What difference does it show?

It shows that preterm milk contains more protein than full term milk.

Much of the extra protein consists of anti-infective proteins. To grow well, preterm babies need milk with more protein than full term babies. Preterm babies also need extra protection from infection.

So preterm milk is especially adapted to the needs of a preterm baby. The best food for a low-birth-weight baby is his own mother's milk.

Mothers sometimes have difficulty expressing enough breast-milk. However, if they have a good technique and enough support, it is usually possible. It is important to start expressing on the first day. This helps to start breast-milk flow, in the same way that suckling from soon after delivery helps breast-milk to "come in". If the mother can express just a few ml of colostrum it is valuable for her baby.

If necessary, give a baby pasteurized donated breast-milk until his mother can produce enough of her own.

The "Hind milk"

Low-birth-weight and preterm infants need more intake per kilogram and per day compared with term infants. Infants can be fed with expressed breast-milk fortified with expressed hind milk (which is richer in fat) by using a special technique.

Hind milk collection guidelines

Mothers should follow this technique on each breast at each pumping:

1. Review method of breast-milk expression using hand or electric pump.
2. Supply mother with glass bottles for separation and collection.
3. Label “bottle 1” and empty first 2 minutes of expressed breast-milk after let down into this bottle. This is the foremilk and should be stored in the freezer for later use.
4. Using “bottle 2” have mother finish emptying her breast into this bottle. This is the “hind milk” containing a higher fat content.
5. Have mothers bring all “bottles 2” to the nursery or milk bank.
6. Pool all the milk from “bottle 2”

Adapted from Valentine CJ. Neonatal nutrition in the 1990's "Milking it for everything you can!" Building Block for Life (Pediatric Nutrition Practice Group newsletter) 1994 (Spring); 18(2):1-2,5-6

Several points about the volume of breast-milk:

If a mother is expressing more than her LBW baby needs:

Let her express the second half of the milk from each breast into a different container. Let her offer the second half of the EBM first. Her baby gets more hindmilk, which helps him to get the extra energy that he needs. This helps some babies to grow better.

If a mother can only express very small volumes at first:

Give whatever she can produce to her baby. Even very small amounts help to prevent infection. Make the mother feel that it is valuable. This helps her confidence and will help her to produce more. Supplement if necessary with donated milk.

How to feed a baby by cup

(see also Session 6)

Advantages of cup feeding:

Cups are safer and better than bottles

- Cups are easy to clean with soap and water, if boiling is not possible.
- Cups are less likely than bottles to be carried around for a long time, giving bacteria time to breed.
- Cups cannot be left beside the baby, for the baby to feed himself. The person who feeds a baby by cup has to hold the baby and give him some of the contact that he needs.
- Cups do not interfere with suckling at the breast.



Cup feeding is usually better than feeding with a spoon

- Spoon feeding takes longer than cup feeding. You need three hands to spoon feed, to hold the baby, the cup of milk and the spoon. Mothers often find it difficult, especially at night.
- Some mothers give up spoon feeding before the baby has had enough. Some spoon-fed babies do not gain weight well.
- Mothers are more likely to continue with cup feeding.
- However, spoon feeding is safe and can be useful if a mother is worried about cup feeding, or if she feels that the baby will get milk too fast. Also, if a baby is very ill, for example with difficult breathing, it may be better to feed the baby with a spoon for a short time.

To cup feed, follows these steps:

- Put some water into one of the small cups.
- Hold a doll on your lap, closely and sitting semi-upright.
- Hold the small cup or glass to the dolls slips. Tip it so that the water just reaches the lips. (At this point, a real baby becomes quite alert and opens his mouth and eyes. He makes movements with his mouth and face and he starts to sip the milk and take it with his tongue. Some milk may spill from the baby's mouth. You may want to put a cloth on the baby's front to protect his clothes.)
- You should not pour the milk into the baby's mouth – just hold the cup to his lips.
- Explain that when a baby has had enough, he closes his mouth and will not take any more this feed. If he has not taken the calculated amount, he may take more next time, or he may need to be fed more often. Measure intake over 24 hours, not just at each feed.

SESSION 9: CARE OF THE ASPHYCTIC NEWBORN

Strategies in the control of birth asphyxia

Certain conditions during pregnancy are associated with an increased risk of birth asphyxia (e.g. preterm labour, pre-eclampsia) and early signs of asphyxia may occur during labour (intrapartum asphyxia). Four strategies for controlling birth asphyxia can be identified.

1. Referral of high-risk pregnant women to a tertiary care level.
2. Early recognition of prenatal signs of possible asphyxia (meconium stained amniotic fluid, abnormal fetal heart beat pattern).
3. Management of the newborn with asphyxia, in terms of both urgent and skilled resuscitation.
4. Management of post-asphyctic conditions.

The first two points are under the responsibility of the obstetricians and midwives. Health professionals involved in neonatal care should make sure that these interventions are made by promoting interprofessional communication and collaboration (see Session 17.)

The following session will deal with points 3 and 4.

Clinical signs and classification of asphyxia in the newborn baby

A quick and easy system can be used in order to identify newborn babies who need immediate resuscitation, by looking only for the two most important parameters:

- breathing
- heart rate.

Assessment of the newborn by these two parameters allows to rapidly identify babies with mild or severe neonatal asphyxia and to provide resuscitation accordingly to response to treatment (see Table 1.)

A more complex system, the **Apgar score** (that was originally aimed for classifying the condition of infants exposed to obstetric analgesia and anaesthesia, see Table 1) has been used to systemize observations on the vitality of the newborn infant, for both therapeutic and prognostic purposes. There are many problems in the use of this method, however:

- too often it is not correctly evaluated. If it is correctly performed, the evaluation of the Apgar score takes some time and so precious time may be wasted when rapid evaluation and resuscitation are needed;
- it is not predictive of outcome (only very low Apgar score at 10 and 20 minutes after birth are predictive of neurological damage).

Table 1. Evaluation of the newborn infant: Apgar score

SIGN	0	1	2
HEART RATE	ABSENT	<100	>100
RESPIRATORY EFFORT	ABSENT	SLOW IRREGULAR	GOOD CRY
MUSCLE TONE	LIMP	SOME FLEXION OF EXTREMITIES	ACTIVE
RESPONSE TO CATHETER IN NOSTRIL	NO RESPONSE	GRIMACE	COUGH
COLOUR	BLUE	BODY PALE PINK, EXTREMITIES BLUE	PINK

Management of the asphyctic newborn

If the child has an irregular/absent breathing and/or a heart rate <100/min within 30" from delivery assisted ventilation should be initiated and the child reassessed after a few minutes. Too much time should not be wasted trying cutaneous stimulation or airway cleaning.

In every child requiring immediate resuscitation the cord is clamped and cut immediately and the baby is moved to a resuscitation table.

A more detailed management of the asphyctic baby (with mild or severe neonatal asphyxia) is described below.

In **mild neonatal asphyxia** the infant's breathing is slow, irregular or even absent. The heart rate is >100 beats per minute, the muscular tone is relatively good and there is cyanosis. The baby should be ventilated with bag and mask for 1–2 minutes and then reassessed. If she/he is breathing regularly and the heart rate is steadily >120 beats/min she/he can be given to the mother. In case she/he is still irregularly breathing and the heart beat lowers to below 100/min) endotracheal intubation and external cardiac massage should be performed. Intermediate situations with breathing still irregular and hearth rate above 100/min but below 120/min should receive ventilation for a few more minutes and then be reassessed.

The most commonly used artificial ventilation aid is the bag and mask. Provided that adequate technique and appropriate equipment are used, 85% of infants even with severe asphyxia can be effectively ventilated using this method. No other procedure or equipment is necessary in such cases.

The bag must:

1. be self-expanding with a volume of approximately 300–500 ml
2. be easy to take apart for cleaning and sterilization in boiling water
3. be easy to put together without risk of malfunctioning.

Many bags have pressure limiting valves. With mask ventilation there is no significant risk of the pressure being too high (due to oesophageal leakage) and valves are not therefore needed. The mask should be easy to fit tight to the face. Soft and circular masks are more effective than the triangular ones.

How to position and use correctly the bag and mask? The infant should be put in the supine position with the head lowered and tilted slightly backwards (see Fig. 1). The first breaths

require high insufflation pressures (50–70 cm H₂O); the first insufflation should be prolonged for at least 5 seconds. When the lungs are filled, ventilation is easier and only 30–40 cm H₂O is needed to continue with a frequency rate of 60 cycles/min. Ineffective insufflation is caused either by inadequate insufflation or obstructed airways. It is always important to measure heart rate to assess the effect of assisted ventilation and to check the expansion of the thorax at every cycle.

The **severely asphyxiated baby** will make no respiratory efforts during the first 30 seconds of life, the heart rate will be low (<100/min), the muscular tone low and the skin is grey/pale.

The baby should be treated with bag and mask for 1–2 minutes and then reassessed. If the baby has still an irregular/absent breathing but a heart rate >100/min continue bag and mask for other 3–4 minutes and then reassess. If the breathing and heart rate become steadily regular you can give the baby to the mother. If the baby is not breathing at all and the heart rate is <100/min after 1–2 minutes of bag and mask endotracheal intubation and external cardiac massage are necessary. If, during endotracheal intubation and external cardiac massage, the heart does not improve or progressively worsens use vasoactive drugs.

Endotracheal intubation is rarely the first thing to do. It can be appropriate as the first intervention only for:

- very low-birth-weight infants with severe asphyxia
- infants with absent breathing and very slow heart rate.

Supplementary oxygen

This is generally recommended for resuscitation, although oxygen enriched air (50–60% O₂) should be used. Theoretically use of oxygen enriched air is of uncertain value. The use of 100% oxygen may result in atelectasis of the lungs and might well be toxic. In most hospitals, however, pure oxygen is the only gas available. When only pure oxygen is available use it only until cyanosis disappears. There are good reasons for assuming that air is as effective as oxygen enriched air in resuscitating babies at birth and there is certainly no reason to refrain from assisted ventilation due to lack of oxygen.

Drugs

During endotracheal intubation and external cardiac massage, if the heart rate does not improve or progressively worsens, then a significant metabolic acidosis can be presumed as well as a need for myocardial stimulation by epinephrine in a dose of 0.1 ml/kg of 1:10.000 solution administered via an umbilical catheter or endotracheal.

Administration of sodium bicarbonate (2mEq/kg as a 0.5mEq/ml) may partially correct the metabolic acidosis and improve the effectiveness of the epinephrine dose, which can be repeated. Avoid the use of such drugs in infants weighing less than 1500 g.

Indications for discontinuing resuscitation

Resuscitatory efforts should be discontinued if an adequate circulation has not been achieved within 15 minutes. If the baby has an adequate circulation but is failing to make any respiratory effort by 30 minutes, he/she should be transferred to a neonatal unit for further respiratory support and reassessment.

Treatment of post-asphyctic infants

Post-asphyctic infants are at high risk of **metabolic disorders** such as **hypoglycaemia and hypocalcemia) and hypothermia**. Infants who were severely asphyxiated may begin to manifest transient failure of various organs. Some evidence of renal injury, even after moderate asphyxia, myocardial failure and hypoxic-ischemic encephalopathy usually after more severe asphyxia.

- Provide warm environment.
- Promote early and frequent breastfeeding (gavage feeding with mother's milk if unable to suck, see Session 5).
- Promote early and frequent contact mother-to-infant, skin-to-skin.
- Monitor heart rate, respiratory rate and if possible renal function, blood glucose and calcium.
- Plan close follow-up visits for better evaluation of growth and development of these infants.

BIRTH

- 1. CLEAN THE AIRWAYS AND DRY THE INFANT
- 2. PLACE ON A HEATED SURFACE

ASSESS FOR

- BREATHING
- HEART RATE

CLASSIFY

IRREGULAR/ABSENT

NORMAL (HR > 100/min)

MILD NEONATAL ASPHYXIA

IRREGULAR/ABSENT

SLOW/ABSENT (HR < 100/min)

SEVERE NEONATAL ASPHYXIA

MANAGEMENT

O₂ BAG AND MASK (1-2 MINUTE)

O₂ BAG AND MASK (1 -2 MINUTE)

REGULAR BREATHING
HR > 100/min
> 120/min

IRREGULAR/ABSENT BREATHING HR > 100/min

APNEA

GIVE TO MOTHER

O₂ BAG AND MASK (3-4 MIN.)

ENDOTRACHEAL
INTUBATION
+

REGULAR BREATHING

IRREGULAR BREATHING

EXTERNAL CARDIAC

HR > 120/min

HR < 100/min

MASSAGE

SESSION 10: CARE OF THE NEWBORN WITH BIRTH DEFECTS OR BIRTH TRAUMA

Birth defects

Mild or severe birth defects occur in 3–4% of births; some of them can be recognized at birth, many become obvious later in childhood while some are never identified. Many deaths due to birth defects in the perinatal period come from lethal malformations and malformations where survival is not possible without surgical interventions.

In this session we describe only congenital anomalies for which early recognition can lead to immediate and simple treatment. Major anomalies that require sophisticated care could be a reason for referring the baby to a tertiary care level and therefore are out of the scope of this course.

Table 1. Assessing and classifying the infant with a birth defect or birth trauma

<p>BIRTH ↓ DRY THE INFANT</p>		
ASSESS FOR:	<p>BREATHING HEART RATE BW/GESTATIONAL AGE BIRTH DEFECTS/BRITH TRAUMA</p>	<p>NORMAL HR>100/MIN >2500 G/>37WEEKS PRESENT</p>
CLASSIFY:	SPECIFY BIRTH DEFECT/BIRTH TRAUMA	
TREATMENT:	APPROPRIATE TREATMENT (WHEN POSSIBLE)	

Cleft palate

This is a relatively frequent malformation. The severity of the malformation is variable:

- involves the upper lip
- involves lip and palate mono or bilaterally.

The most urgent problem is difficult feeding. If the defect is small, breastfeeding is possible; if the defect is wide, the mother should express her milk and give it to the child with a spoon or a syringe. In the hospital a naso-gastric tube can be useful. The child is at risk of milk aspiration and poor growth.

Surgery of the defect must be planned within the first 3 months.

Oesophageal atresia

It is essential to avoid feeding the baby who must be transferred rapidly to a surgical centre for closure of the fistula and repair of the oesophagus. The oesophagus should be drained during transport.

Club foot

If the feet are not reducible, they require early strapping which, if started at birth, is thought to improve the prognosis.

Imperforate anus

Some would include this in the urgent group, but in fact one waits for one or two days to allow air to reach the lower end of the rectum so that an x-ray can be taken to estimate the length of the atresia. Some babies have only a covered anus with a flap of skin over the anus, but even here operation is still often delayed for one or two days.

Birth Trauma

This term is to denote avoidable and unavoidable mechanical trauma incurred by the infant during labour or delivery. Predisposing factors include macrosomia, prematurity, cephalopelvic disproportion, dystocia, prolonged labour and breech presentation.

Cephalohaematoma

This birth trauma is a subperiosteal haemorrhage and may be large and bilateral. Bleeding is restricted by the sutures between the bones. Swelling is usually not visible until several hours after birth since subperiosteal bleeding is a slow process. The blood contained in a cephalohaematoma may take several weeks to resorb and prolongs neonatal jaundice. Systemic disorders such as coagulation defects are not associated to this birth trauma. The trauma is a benign condition and does not need any treatment which can be potentially harmful (infections), such as drainage, cooling with ice or any other procedure. Mother-infant contact and early breastfeeding must be promoted and the parents reassured.

Subaponeurotic haemorrhage

This is a haemorrhage below the epicranial aponeurosis where a large volume of blood can accumulate. Swelling may not be clinically apparent in an infant lying on its back who develops a boggy mass on the occipital region. The trauma comes after repeated trials with vacuum extraction. The treatment is conservative. In rare cases bleeding may be serious and a blood transfusion could be necessary.

Fracture of the clavicle

This is often seen after shoulder dystocia or a breech delivery. The fracture can be palpated easily. There is no need for any kind of treatment.

Other traumas such as Erb palsy or hematoma of the sternocleidomastoideus muscle when recognized early can be referred to a physiotherapy centre and thus have an appropriate treatment.

SESSION 11: CARE OF THE NEWBORN WITH INFECTION

The primary objective of the health professional caring for infants at risk of neonatal infections is to identify all potential cases of bacterial disease quickly and begin antibiotic treatment promptly since infections in newborn infants may become serious very rapidly. Beyond the predisposing factors (mother and infant) there are numerous features of the infant which may be helpful in determining the likelihood of infection. These include clinical signs, culture data and haematological investigations.

Predisposing factors

The Infant

- poor hygiene during delivery
- asphyxia
- hypothermia
- poor feeding
- cross-contamination (from one infant to another or from staff members to the child)
- prematurity
- low birth weight.

The Mother

- prolonged rupture of membranes
- poor sanitation and hygiene
- sexually transmitted diseases
- lack of immunization coverage.

Dangerous signs

There are a variety of clinical signs which commonly occur with neonatal infection but unfortunately these signs are common to many newborn disorders so their presence indicates only that there is a “problem” and that this child needs further evaluation.

The *dangerous signs* are the following:

- hypo-hyperthermia
- poor feeding
- hypotonia or irritability
- weight loss
- vomiting or diarrhoea
- apneic spells
- fast breathing (>60/min)
- nasal flaring, chest indrawing.

Haematological investigations

Isolation of bacteria from blood, cerebrospinal fluid or urine stands as the most specific way to diagnose bacterial sepsis and should always be performed.

The inability of any single laboratory test to provide rapid, reliable and early identification of neonates with bacterial sepsis has led to efforts to devise a panel of screening tests as a means of increasing predictive accuracy. A sepsis screen involving four tests to discriminate infants with early onset sepsis from non infected neonates has been developed and successfully tested.

The *screening test* is the following:

- leukocyte count <5000/mm³ or >20 000/mm³;
- immature (mononuclear) to total (mature, i.e. polynuclear, plus immature) neutrophil ratio (IT >0.2);
- latex C-reactive protein positive (>0.8 mg/dl);
- erythrocyte sedimentation rate >15mm.

This screening test is considered positive when two or more of the above laboratory abnormalities are present.

Treatment

When should treatment be started?

- infant with evident clinical signs of infection
- infant with probable signs of infection with low birth weight or birth asphyxia
- infant with probable signs of infection and positive culture and/or screening test.

Treatment of neonates with suspected sepsis or meningitis should begin immediately after blood or CSF samples have been provided. Treatment should not wait for the result of cultures but rather should be based on epidemiological data available.

The most frequent bacterial pathogens in neonates are:

- gram negative enteric bacilli (especially Escherichia Coli)
- Streptococcus group B
- Lysteria monocytogenes.

Therapy should include the combination of antibiotic treatment and supportive care (Tables 1 and 2). Antibiotic treatment includes penicillin and aminoglycoside or ampicilline and aminoglycoside if there is meningeal involvement. Initial antibiotic treatment for infants with suspected nosocomial infections must cover the above pathogens along with hospital acquired organisms such as Staphylococcus aureus or other pathogens present in the nursery mostly responsible for nosocomial infections (Klebsiella).

After an organism has been isolated from culture, the antibiotic therapy should be tailored according to antibiotic susceptibility.

Table 1. Antibiotic treatment

(Without meningeal involvement) Penicillin crystalline (100 000u/kg/day i.m. or i.v. every 6–8 hours)* Gentamicin (5 mg/kg/day i.m. or i.v. every 12 hours)**or Cefalotine (100 mg/kg/day every 6–8 hours)* Amikacine (15 mg/kg/day every 8–12 hours)***	(With meningeal involvement) Ampicilline (200 mg/kg/d i.v. 6–8h)**** Gentamicin (5 mg/kg/d i.v. 12–12h) Ampicilline (200 mg/kg/d i.v. 6–8h) Cefotaxime (100 mg/kg/d 6–6h)
<p>* every 12 hours in the first week of life</p> <p>** mg/kg for <2kg every 24 hours in the first week of life</p> <p>*** 10 mg/kg for <2kg every 24 hours in the first week of life</p> <p>**** 100 mg/kg for <2kg every 12 hours in the first week of life</p>	

Table 2. Supportive care

<ul style="list-style-type: none"> • Nutritional support • Warm environment • Monitoring of clinical conditions • Oxygen therapy
--

In case of proven infection the antibiotic treatment should be discontinued after 10–14 days in infected infants without meningeal involvement and 14–21 days when meningeal involvement occurs.

Prevention of perinatal infections

Since it is well known that the newborn baby will easily acquire infections, *rigorous hygiene routines* should be practised in maternity wards and neonatal units. The most dangerous source of infections is the hands of the staff. Consequently *hand washing* is the most important method for combating infections. Hands must be washed before clean and after dirty activities. Separation of the infant from the mother in order to avoid infection is never to be recommended. Only one infant should be put in each bed or incubator (if needed) in order to avoid cross-contamination. A *rooming-in* system, keeping the mother and child together, is to be preferred to care of mother and child in separate rooms.

- *Avoid invasive methods* if possible: do not use suction on the babies unless necessary; if you have to use suction, do it carefully and for short periods.
- Do not use endotracheal tubes unless necessary; use bag and mask.
- Do not use intravenous or intra-arterial catheters unless necessary.
- If possible *avoid putting more than one baby in each incubator*. In such conditions it is better to use the mother as a source of heat. In incubators, the humidifying system implies a risk of contamination of the baby. It must be cleaned properly and the water replaced regularly.
- Tools and instruments used in care such as forceps, tubes and masks, must be cleaned carefully and sterilized with boiling water for 20 minutes before use.

SESSION 12: CARE OF THE NEWBORN WITH JAUNDICE

Physiologic and pathologic jaundice

Jaundice is observed during the first week of life in approximately 60% of term infants and 80% of preterm infants. In some countries the incidence of jaundice is relatively high, for instance in Japan, parts of India and in the Mediterranean region. These differences are partly due to genetic differences and may also be due to differences in handling and the supply in micro-nutrients to newborn babies.

In most neonatal wards throughout the world jaundice is one of the main problems requiring neonatal care.

Since there is an over-treatment of jaundice in infants in most countries, we will try to delineate a simple practical approach for assessing and treating jaundice. The first step is classifying jaundice as “physiologic or pathologic jaundice”.

Physiologic jaundice

Under normal circumstances, the level of indirect reacting bilirubin in umbilical cord serum is 22.2 micron-Moli/L (1.3 mg/dl) and rises at a rate <85.5 micron-Moli/L/24h. (5 mg/dl/24h); thus jaundice becomes visible on the 2–3rd day, usually peaking the 3rd–4th day and decreasing between the 5–7th day of life without treatment. Jaundice following this pattern is considered physiologic and is believed to be the result of a breakdown of fetal red cells combined with transient limitation in the conjugation and excretion of bilirubin by the liver.

Pathologic jaundice

Jaundice and its underlying hyperbilirubinemia are considered pathologic if their time of appearance, duration or pattern of serially determined serum bilirubin concentrations (>85.5 micron-Moli/L/24h or >5 mg/dl/24h) varies significantly from that of physiologic jaundice.

The most frequent causes of *pathologic jaundice* are:

1. **Blood group incompatibility:**

ABO incompatibility: mother with blood group O and child with blood group A or B
Rh incompatibility: mother Rh negative and child Rh positive. This blood group incompatibility can be prevented, for the following births, by the administration of immunoglobulins IgG anti-D to all Rh negative mothers within 72 hours after delivery.

2. **Infections**

3. **Other causes (enzymatic deficiencies, hypothyroidism, obstructive causes).**

Treatment

Interventions include:

- Interventions aimed at reducing serum bilirubin level
- Intervention is aimed at identifying other pathologic causes.

Appropriate ways for reducing bilirubin level include:

- Phototherapy
- Exchange-transfusion.

1. Phototherapy

When: *

- BT > 10 mg/dl in the first 24 hours
- BT > 15 mg/dl between 25–48 hours
- BT > 17 mg/dl > 48 hours.

* Lower cut-offs should be applied to preterm babies.

For how long:

- At least 24 hours

When to control bilirubin:

- Every 24 hours

When to suspend:

- When bilirubin value is lower than risk level for that day of life (see charts).

Phototherapy has been extensively investigated and used during the last 20 years. It has been established that the method is effective and if properly used has no long-term adverse effects on infants. It is thus a method that is regarded as appropriate.

Phototherapy works in such a way that the light converts bilirubin into the skin into an isomer that can be excreted through the liver. The efficiency depends upon the intensity of the light, which should be at wavelengths 425–475 nm. Many authors studied the efficacy of different combinations of special blue and daylight lamps and found that a combination of 4 special blue lamps and 4 daylight lamps are effective and do not produce discomfort in the nursery staff. Lamp life lasts at maximum 800 h and thus must be checked routinely.

The usual recommendation is 6–8 light tubes at a distance of 40 cm from the infant. To protect the infant from light and from glass splinters in case a lamp might break the tubes must be separated from the infant by Plexiglas, which must be clean. All babies undergoing phototherapy must have their eyes covered by a piece of dark cloth to avoid damage of the retina. During treatment the whole child should be exposed to light and his position varied at intervals.

During phototherapy breastfeeding should not be discontinued. In fact, phototherapy could be discontinued for half-an-hour without losing efficacy.

2. Exchange-transfusion

The need for exchange-transfusion should be considered a criterion for transfer to a tertiary care level, avoiding treatment at a peripheral level. Breastfeeding and phototherapy must not be discontinued.

- consider if → BT = 20–24.9 mg/dl
- do if → BT > 25 mg/dl.

Investigations

In order to detect the cause of neonatal jaundice you should first consider Rh or ABO incompatibility. The following are examinations that should be performed routinely both in the mother and the infant at birth that can help to identify the cause of jaundice:

The infant-blood group and the mother-blood group

- Rh-Rh
- Direct Coombs test -Coombs test (if mother Rh neg.)

If jaundice is clinically relevant:

- ask for family history (previous blood incompatibility);
- ask for risk factors (hypoxia, hypoglycaemia, hypothermia, hypoproteinemia, infection, acidosis);
- perform a bilirubin dosage (total, direct and indirect bilirubin).

Other causes of jaundice should be searched for if no other cause is evident (infection, other causes).

SESSION 13: FEEDING THE SICK BABY

Why do babies stop breastfeeding when they are ill?

Difficulty with Breastfeeding	Difficulty suckling (e.g. respiratory infection) Loss of appetite (e.g. severe infections) Oral feeds not possible (e.g. some surgery)
Misinformation	Someone says breastfeeding caused illness Health worker advises mother to stop

Why breastfeed a sick baby?

<p><i>If breastfeeding stops</i></p> <p><i>Baby:</i></p> <ul style="list-style-type: none"> • gets less nourishment • loses more weight • takes longer to recover • lacks comfort of suckling <p><i>Breast-milk decreases</i> <i>Baby may refuse to start again</i></p>	<p><i>If breastfeeding continues</i></p> <p><i>Baby:</i></p> <ul style="list-style-type: none"> • gets best nourishment • loses less weight • recovers more quickly • is comforted by suckling <p><i>Breast-milk is produced</i> <i>Breastfeeding continues</i></p>
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How to help breastfeeding if baby sick

The general approach on how to help breastfeed a sick baby is shown in the following table. Later we will discuss some particular cases of feeding LBW, neurological and impaired babies and infants with birth defects.

<p>If baby:</p> <ul style="list-style-type: none"> • is in intensive care unit • can suckle well • suckles less than before • is not able to suckle or refuses • cannot take oral feeds • is recovering 	<p>Help mother to:</p> <ul style="list-style-type: none"> • stay in hospital with baby and continue breastfeeding on demand • breastfeed more often • give more frequent, shorter feeds • express her breast-milk by cup or tube • express 3 hourly to keep up supply • start breastfeeding again. Breastfeed more often to build up supply
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Feeding infants with jaundice

Factors leading to increased bilirubin:

- lack of breast-milk, poor feeding
- water supplementation.

Factors contributing to reduced bilirubin

- frequent, efficient nursing
- more stooling.

Prevention

- demand feeding, at least 8–12 feedings/24 hours, day and night
- effective breastfeeding
- frequent stooling
- no supplementary fluids
- feed expressed breast-milk if needed to increase volume of intake.

Management

- the same as prevention
- further evaluation if over 15.5 mg/100 ml bilirubin
- DO NOT stop breastfeeding
- colostrum as early as possible and on demand.

The breast-milk jaundice

- Rare and harmless form of hyperbilirubinemia sustained by some substance (yet unidentified in some mothers' milk);
- incidence: <1%;
- age of onset – end of first week: persists for 3 weeks to 3 months;
- diagnosis: normal infant, normal weight; if infant appears lethargic or sick consider another diagnosis.

Management

- exclude other causes;
- if bilirubin >20 mg/100 ml, interrupt nursing for 24 to 48 hours (mother continues expressing milk);
- feed infant expressed mother's milk heated at 56°C for 15 minutes.

Cleft lip/palate

Because breast-milk flow from mother to infant is primarily due to the letdown reflex and peristaltic-like movements of the infant's tongue on the mother's areola, breastfeeding can be possible, even in extreme cases of cleft lip/palate.

Breast-milk is especially important to these infants, who are at higher risk or recurrent respiratory infections:

- immunological factors in breast-milk help prevent these episodes of respiratory infections and allows better growth;
- growth and other factors in mother's milk also help tissue healing after surgery.

Positioning – side sitting is best

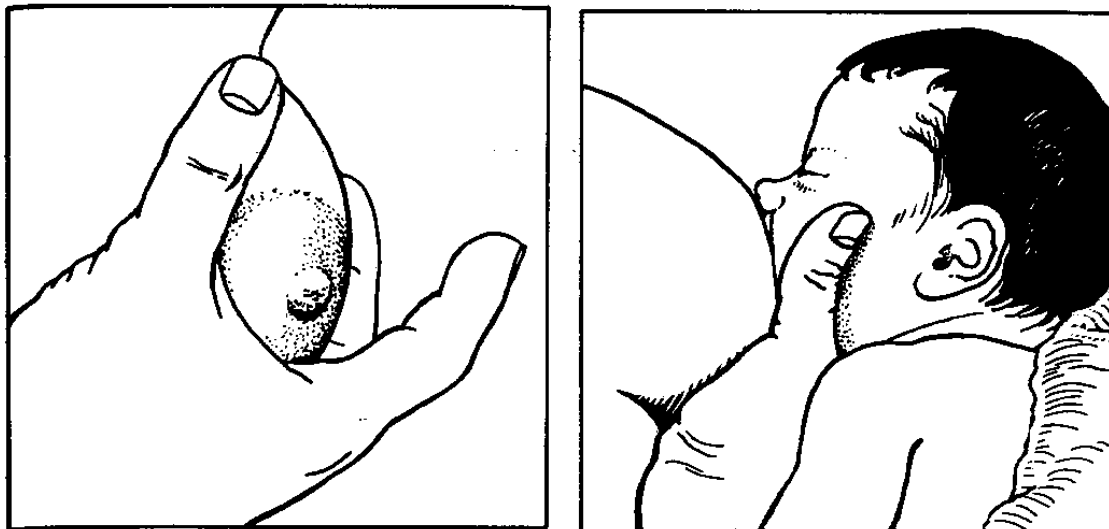
Maintaining milk supply – mothers can help by hand expressing while nursing to improve letdown:

- express after feeding
- give infant expressed milk by cup and spoon.

How to breastfeed a neurologically impaired baby and sick baby

- Use a position that supports the baby's head for breastfeeding. The most effective position is with the baby bent at the hips, his feet up against the back of the chair and his head supported in the mother's hand.
- Support her breast and her baby's chin to stabilize the baby's jaw and maintain good attachment throughout the feed. She can gently cup the baby's chin between her thumb and first finger, and cup the remaining three fingers under the breast. This is called the Dancer Hand Position, also a good position for breastfeeding LBW and premature infants.

The Dancer Hand Position



- The baby may need to be awakened for frequent breastfeeds.
- Feedings may take a long time. The mother may need to express her milk and feed it to her baby in a cup.

How to help the mother when the baby is ill

- Be sure the mother stays with her baby day and night, including in the hospital.

- Advise the mother to breastfeed more frequently to increase her baby's fluid intake: breast-milk helps to treat and cure illnesses.
- If a baby or child of any age is hospitalized, let the mother sleep with or next to the child and breastfeed freely.
- If her baby cannot be breastfed, help the mother to express her milk to maintain milk production. The breast-milk can be fed in a cup.
- Advise the mother to breastfeed more frequently when the baby recovers to increase milk production and to encourage catch-up growth.

SESSION 14: DISCHARGE FROM HOSPITAL: TALKING TO PARENTS

Appropriate care of the newborn must also take into account the discharge procedure of the newborn.

The health professional responsible for newborn care should always check for a few simple things (to be checked also during the stay of the infant in the maternity ward) before discharge and should also be able to teach the mother about normal routine care of the infant and when to seek help by looking for certain aspecific signs that could be dangerous (Tables 1 and 2).

A concise neonatal card containing general characteristics of the infant (type of delivery, birth weight, length and cranial circumference, gestational age, degree of asphyxia if any and need for resuscitation, any kind of complications, weight at discharge, suggested control visits) is a very useful tool for the follow-up of the infant and should be given to every mother before going home.

It is important to clearly explain to the family how and whom to contact in the health system in case of problems.

Table 1

<p>What must the health professional check?</p> <ul style="list-style-type: none">• Adequate cord care (clean stump)• Adequate thermo-regulation• Good suckling• Prophylactic procedures (vitamin K, eye prophylaxis, BCG)• Good clinical conditions (skin, muscular tone, reactivity, regular breathing, malformations.)• Mother is able to take care of the baby• Neonatal card of the baby properly filled out <p>What must the mother do at home?</p> <ul style="list-style-type: none">• Keep the stump dry and clean• Keep the infant always warm• Breastfeeding at request

The discharge examination should be performed with the mother and possibly the father aside and the newborn card should be given to parents together with the necessary explanations. Parents should be encouraged to make questions and clarify any possible doubt on home care.

Table 2

When should the mother seek help?

- When the baby is suckling poorly
- When the baby has convulsions
- When the skin around the umbilicus red or discharging pus
- When the baby has breathing difficulties or fast breathing
- When the baby has hypo- or hyper- thermia
- When the baby has hypotonia or irritability
- When the baby is vomiting or has diarrhoea

Sudden infant death syndrome (SIDS)

To prevent “cot death”, it is recommended to:

- Put the baby on its back to sleep (avoid tight swaddling)
- Make sure the baby’s face is not covered during sleep
- Keep the baby’s environment smoke-free.

SESSION 15: CRITERIA FOR REFERRAL

Indications for referral

Sometimes it is necessary to transport a newborn baby to a tertiary care hospital where he can receive more specialized or intensive care. Indications for referral may vary according to the quality of care available, including technology and personnel, at first and second level maternities. In general there will be three main groups of babies who may require to be referred to a higher level of care:

- very low-birth-weight infants and particularly those under 32–33 weeks of gestational age, for the risk of respiratory distress syndrome and other complications related to preterm delivery;
- infants with severe respiratory disease who need assisted ventilation;
- infants with severe congenital conditions requiring surgery or other specific diseases requiring specialized and/or intensive care.

Four general principles should be followed with respect to referral:

1. It is highly preferable to transfer the fetus in utero whenever a very preterm delivery or other conditions at high risk for the fetus are expected.
2. The risks and the benefits of the referral should be carefully weighed, including the availability of the needed skills and technology at the higher level.
3. Whenever the baby is transferred every effort should be done to ensure the best care during transport including thermal control and respiratory assistance.
4. Parents should be informed about the reasons for referral and the expected benefits; the possibility or opportunity that the mother accompanies the baby should also be discussed.

Since indications for referral may vary depending on local factors, a policy for referral should be established at national level and if necessary at local level (see also Session 17).

Transport

Preparation for transport

If a newborn baby is transported to a referral centre soon after birth because he/she is too small or too sick to remain in the peripheral maternity, the risk of cooling during transport should be remembered. Therefore every effort should be made to ensure adequate thermal protection during transport. Precautions must also be taken when transporting an infant from the delivery room to an intensive care area within the same hospital.

When internal or external transport of the baby is needed, certain procedures should be followed. First, allow the infant to recover from the stress of birth. Prior to transport, babies should be warmed for 2–6 hours until the hands and feet are as warm as the central parts of the body. During this time suitable transport may be planned. *Exceptions to this are infants whose conditions are critical or deteriorating and who would probably die without immediate medical attention.*

Avoid undressing for cleaning, weighing or examination. Postpone it until the infant is warm.

If possible, take the infant's temperature. If it is below 36°C (96.8°F) extra heat will have to be provided. If there is no thermometer and the infant's feet and hands are cold, the infant is cold and should be warmed.

It is desirable that a description of the maternal obstetric history and all events during labour and delivery are sent together with the baby to allow the receiving physician to take care of the baby in an appropriate manner.

A mucus extractor and a bag and mask must accompany the baby, and be used if the baby stops breathing or vomits during transport.

Keeping infants warm during transport

Depending on the circumstances at the time, any of the following methods may be used to keep the baby warm during transport:

- Skin-to-skin contact, making sure the infant is in an upright position and is covered with a blanket on the outside and a cap.
- If skin-to-skin contact is not possible (because the mother is sick and cannot be transferred), the fully wrapped infant including a cap may be transported in the arms of an adult in a closed vehicle.
- Electrically heated transport incubators do not have the capacity to store heat and therefore depend upon a continuous supply of electricity from the main supply or the vehicle. Water filled mattresses (see session on LBW babies) can provide thermal protection for hours after being unplugged.

SESSION 16: MAKING YOUR HOSPITAL BABY-FRIENDLY

Introduction

The Baby-Friendly Hospital Initiative (BFHI) was started by WHO/UNICEF in 1991 and has two major goals: 1) to ensure that all babies have access to the benefits of breastfeeding through the reorganization of routine practices in maternity wards, based on the “Ten Steps to Successful Breastfeeding” and 2) to stop the free or low-cost supplies of breast-milk substitutes to the maternity wards.

Baby-friendly hospitals have hospital routines, policies and staff that are committed to supporting breastfeeding. Knowledgeable staff can work together to make necessary changes, eliminate unsupportive practices and develop Baby-Friendly practices. The aim is not to gain a plaque, but to increase breastfeeding in the whole community. Many good practices are not measured by the Baby-Friendly Hospital Initiative, but those in the Ten Steps are a minimum for global use.

The role of the maternity staff

Recognize what may affect a woman’s decision to breastfeed.

- Cultural customs, what everyone else does.
- Feelings about being touched.
- Feelings about pregnancy.
- Earlier training and beliefs about breasts.
- Knowledge or lack of knowledge about the benefits of breastfeeding.
- Commercial messages about breast-milk substitutes and bottle-feeding.

Show that you value breastfeeding.

- Serve as a model to motivate mothers and other staff. Breastfeed your own babies.
- Assume that all mothers will breastfeed.
- Eliminate all bottle-feeding messages from group education (classes, leaflets, books, magazines distributed at clinic).

Build every woman’s confidence in breastfeeding.

- A woman breastfeeding for the first time may lack confidence. Give her assurance, both verbally and through your body movements.
- Recognize that mothers’ needs are different from those of other patients.
- Help mothers to talk about their feelings and worries.
- Encourage self esteem by giving approval and warmth to mothers.
- Encourage women to learn about breastfeeding from a relative or through classes, reading, or a health clinic.
- Ensure that every mother knows whom to contact if she develops any difficulty with breastfeeding. This may be a family member, a clinic or health worker, or a mother-to-mother community support group.

Appraising the hospital

An internal self-appraisal:

- The Global Criteria for the Baby-Friendly Hospital Initiative
- Self-Appraisal
- Action to make the necessary changes.

An external assessment:

- An assessment using Global Criteria follows a good Self-Appraisal and the making of any needed changes.
- When invited by the hospital, a multidisciplinary assessment team will visit.
- The assessment will take two intensive days or three days at a slower pace. It will include meetings with senior officers, 20–30 interviews of staff and mothers, observations in maternity and antenatal services, and review of written materials.
- If the hospital meets 80% of the criteria, it receives a Global Baby-Friendly Hospital designation and plaque.
- If the hospital fails to meet the criteria, it receives a Global Certificate of Commitment to becoming Baby-Friendly.

Assessing a breastfeeding policy

In order to be Baby-Friendly, a hospital must have a written breastfeeding policy that addresses all of the *Ten Steps to Successful Breastfeeding*.

Factors affecting breastfeeding

Practices in health care facilities which discourage breastfeeding, such as:

- separating mother and baby
- routine bottle-feeding
- delay in introducing the baby to the breast
- rigid feeding schedules
- poor training of health workers about how to help mothers breastfeed
- low cost or free supply of breast-milk substitutes to the maternity hospitals.

A study in Turkey found that babies delivered at home were more likely to be breastfed than those born in hospital and that 95% of all hospital-born infants routinely received feeds of glucose and/or infant formula. Infants and their mothers were kept separated and the first breastfeed did not occur until 12 hours after birth. Company mother-craft nurses visited 25% of the mothers in hospitals.¹

In a study in the United Kingdom, university educated mothers were almost twice as likely to want to provide breast-milk for their low-birth-weight infants as those with no educational qualifications. First time mothers who were married, were aged over 20 and who had delivered a

¹ Kockturk, T.O. "Hospital practices and doctors' attitudes leading to early introduction of complements to infants diets in Istanbul", Scandinavian journal of Primary Health Care, 5:46-50, 1987.

boy by Caesarean section were 1000 times more likely to want to provide breast-milk than other mothers.²

Breastfeeding will continue to decline unless:

- women get more social support
- there is adequate maternity leave and crèches
- health care practices no longer undermine breastfeeding
- training of health workers is improved
- the promotion of bottle-feeding is restricted.

Research in the United States found that a mother was more likely to be exclusively breastfeeding at 10 weeks if she fed for the first time soon after birth. The amount of supplemental milk given to infants while in hospital was found to be inversely proportional to the duration of breastfeeding and women who returned to work did not breastfeed for a shorter duration than those who remained at home.³

A study of 5000 women in Bangladesh found that girls were breastfed on average 5 months less than boys. Older women tended to breastfeed longer, while urban mothers breastfed for a shorter duration than rural mothers. Mothers who worked outside the home tended to breastfeed longer than those who were at home, except among younger women.⁴

In Finland, the factors which positively affected breastfeeding duration were a higher socio-economic status, the mother working outside the home, the mother working in the health, educational or social sectors and non-smoking parents.⁵

Establish the following policies:

- No time limits or schedules for breastfeeding.
- No rules about washing the nipples before or after feeds.
- No use of nipple ointments, use hindmilk if the mother's nipples are sore.
- No routine separation of mothers and babies without special medical reasons.
- No bottle feeds or artificial teats of any sort.
- No prelacteal feeds of glucose or breast-milk substitutes.
- No teaching of bottle use to all mothers.
- No test weighing of babies before or after feeds.
- No rules about mothers wearing brassieres, gowns, or other particular clothing.
- No rules that mothers sup up to feed, hold their breast during a feed, etc.
- No gifts to mothers of infant formula samples or booklets that mention bottle feeds.

2 Lucas, A., et al, „Factors associated with maternal choice to provide breast-milk for low-birth-weight infants“, Archives of Disease in Children, 63: 48-52, 1988.

3 Ferris, A.M., et al, „Biological and sociocultural determinants of successful lactation among women in eastern Connecticut“, Journal of the American Dietetic Association, 87: 316-21, 1987.

4 Mohiuddin, A.M., „Breastfeeding in Bangladesh“, Journal of Biosocial Science, 18:425-434, 1986.

5 Stahlberg, M.R., „Breastfeeding and social factors“, Acta Paediatrica Scandinavica, 74:36-39, 1985.



Ten steps to successful breastfeeding

A Joint WHO/UNICEF Statement (1989)

Every facility providing maternity services and care for newborn infants should:

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 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 other than breast-milk, unless medically indicated.
7. Practise rooming-in. Allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

The Ten Steps and global criteria for designation of BFHI

Step 1

Have a written breastfeeding policy that is routinely communicated to all health care staff

The health facility should have a written breastfeeding policy that addresses all 10 steps and protects breastfeeding. The senior nursing officer for the institution and/or the senior nursing officer on maternity duty should be able to locate a copy of the policy and describe how the other staff are made aware of it.

The policy should be available so that all staff who take care of mothers and babies can refer to it. The policy should be visibly posted in all areas of the health care facility which serve mothers, infants, and/or children, particularly in the maternity ward, all infant care areas, including the well baby nursery (if there is one), the infant special care unit and the antenatal care services. The policy should be displayed in the language(s) most commonly understood by patients and staff.

Model Hospital Breastfeeding Policies for full-term normal newborn infants

Definition and Purpose:

To promote a philosophy of maternal and infant care which advocates breastfeeding and supports the normal physiologic functions involved in this maternal-infant process. The goal is to assure

that all families who elect to breastfeed their infants will have a successful and satisfying experience.

Policy:

1. Hospital administrative, medical nursing and nutrition staff should establish a strategy which promotes and supports breastfeeding through the formation of an interdisciplinary team responsible for the implementation of hospital policies and provision of ongoing educational activities.
2. All pregnant women should receive information regarding the benefits and management of breastfeeding prior to delivery.
3. Infants are to be put to breast as soon after birth as feasible for both mother and infant. This is to be initiated in either the delivery room or recovery room.
4. Every mother is to be instructed in proper breastfeeding technique and re-evaluated before discharge.
5. Breastfeeding mother-infant couples are to room-in together on a 24 hour basis.
6. The infant is to be encouraged to nurse at least every 2 to 3 hours, for a minimum of 8 feedings per 24 hours.
7. The time at the breast at each feeding should be approximately 10–15 minutes per side.
8. Infants should feed from both breasts at all feedings.
9. If a feeding at the breast is incomplete or ineffective, the mother should be instructed to begin regular expression of her breasts in conjunction with continued assistance by an experienced staff member. The colostrum or milk obtained by expression should be given to the baby.
10. No supplementary water or milk is to be given unless specifically ordered by a physician or nurse practitioner.
11. Pacifiers are not to be given to any breastfeeding infant unless specifically ordered by a physician or nurse practitioner. The use of bottle nipples and nipple shields should be discouraged.
12. Breastfeeding mothers are to have breasts examined for evidence of lactation or breastfeeding problems at least once every nursing staff shift.
13. Discharge gift packs offered to breastfeeding mothers should contain only non-commercial materials which provide educational information and promote breastfeeding.
14. All breastfeeding mothers are to be advised to arrange for an appointment for their baby's first check-up within one week after discharge.
15. At discharge, each mother is to be given a phone number to call for breastfeeding assistance.
16. Policies 1, 2, 4, and 10 through 15 apply when mothers and babies are separated. Mothers who are separated from their babies are to be instructed on how to maintain lactation.

Government of Pakistan
Ministry of Health, Special Education and Social Welfare

Breastfeeding Policy for health facility

Breast-milk is the ideal food for babies. The health facility should do the following to protect, promote and support breastfeeding:

1. Hospital administrative, obstetric, paediatric, nursing and paramedical staff shall form a team that ensures the implementation of this breastfeeding policy.
2. Relevant health care staff shall be trained in the skills necessary to implement this policy.
3. All expectant mothers shall receive education on the benefits and management of breastfeeding, the dangers of bottle-feeding and the dietary needs during pregnancy and lactation. Prenatal exams shall include breast examination.
4. In the delivery room, newborn infants, including premature infants, shall be put on the breast within one hour of delivery. Babies should be fed on demand, every 2–3 hours for a minimum of eight feedings within 24 hours.
5. Exclusive breastfeeding shall be promoted from birth to 4–6 months. No water, ghutti, fresh animal milk, infant formula or other liquid is to be given to an exclusively breastfed infant. Trained health care staff shall help mothers having breastfeeding problems to continue to breastfeed.
6. Staff shall promote the introduction of semi-solid foods at 4–6 months with continued breastfeeding up to 2 years.
7. No feeding bottles and pacifiers shall be allowed in the health facility.
8. No promotional materials about formula, feeding bottles and pacifiers, such as posters, free samples or gift items, shall be allowed in the facility nor shall they be given to the mother.
9. No health care staff shall receive gifts, free samples, donations, free training, etc. from formula manufacturers.
10. Mothers shall be given sufficient education so that they can explain that:
 - breastfeeding shall be started within one hour of delivery after birth because:
 - colostrum is important for babies and protects them from infection;
 - frequent breastfeeding increases breast-milk production;
 - babies should be fed only mother's milk for the first 4–6 months because:
 - it is the best food for babies
 - it prevents infections;
 - bottle-feeding can cause serious illness and death;
 - supplementary foods should be started between 4–6 months;
 - lactating mothers should eat more food and drink more liquids to maximize their milk supply.

Step 2

Train all health care staff in skills necessary to implement this policy.

The senior responsible nursing officer should report that all health care staff who have any contact with mothers, infants, and/or children have received instruction on the implementation of the breastfeeding policy and be able to describe how this instruction is given.

A copy of the curricula or course outlines for training in breastfeeding and lactation management for various types of staff should be available for review and a training schedule for new employees should exist. The training should be at least 18 hours in total, including a minimum of three hours of supervised clinical experience and cover at least 8 steps.

The senior nursing officer should report that all staff caring for women and infants have participated in breastfeeding and lactation management training or, if new, have been oriented on arrival and scheduled for training within six months. Out of 10 randomly selected maternity staff members, at least 80% should confirm that they have received the described training, or, if they have been on the maternity ward less than 6 months, have at least been oriented. 80% should be able to answer 4 out of 5 questions on breastfeeding management correctly.

Step 3

Inform all pregnant women about the benefits and management of breastfeeding

If the hospital has an affiliated antenatal clinic or antenatal ward, the senior nursing officer in charge should report that breastfeeding counselling is given to most pregnant women using those services. A written description of the minimum content of the antenatal education should be available, or appropriate senior staff asked to prepare it. The antenatal discussion should cover the importance of exclusive breastfeeding for the first 4–6 months, the benefits of breastfeeding and basic breastfeeding management.

Out of 10 randomly selected pregnant women of 32 weeks or more gestation who are using the hospital antenatal service, at least 80% should confirm that the benefits of breastfeeding have been discussed with them and are able to list at least two of the following benefits:

- Nutritional
- Protective, including the role of colostrum
- Bonding
- Health benefits to the mother.

Additionally, at least 80% of these women should confirm that they have received no group education on the use of infant formula. They should be able to describe at least two of the following breastfeeding management topics:

- Importance of rooming-in
- Importance of feeding on demand
- How to assure enough milk
- Positioning and attachment.

Step 4

Help mothers initiate breastfeeding within a half-hour of birth

Out of 10 randomly selected mothers in the maternity ward who have had normal vaginal deliveries, 80% should confirm that within a half-hour of birth they were given their babies to hold with skin contact, for at least 30 minutes and offered help by a staff member to initiate breastfeeding.

When possible, observations in the delivery room of up to ten normal vaginal deliveries confirm this practice.

Out of five randomly selected mothers who have had Caesarean deliveries, at least 50% should confirm that within a half-hour of being able to respond, they were given their babies to hold with skin contact, for at least 30 minutes and offered help by a staff member to initiate breastfeeding.

The first breastfeed

The mother is holding her baby immediately after delivery. This is early contact. They are both naked so that they have skin-to-skin contact. The mother should hold her baby like this as much as possible in the first two hours after delivery, to give the baby the opportunity to suckle.

This early contact helps the mother to bond with her baby – that is to develop a close, loving relationship. Also, this makes it more likely that the mother will start to breastfeed and breastfeed for longer.

Separating the mother and baby, and delay starting to breastfeed should be avoided. It interferes with bonding and makes it less likely that breastfeeding will be successful. A baby should have the first feed as soon as he is ready – certainly within the first two hours after delivery. Babies are very alert and responsive at this time. Most of them want to feed between half to one hour after delivery, but there is no exact fixed time. If the first feed is delayed more than about an hour, breastfeeding is less likely to be successful. The mother is more likely to stop breastfeeding early.

Sometimes in the past we have tried to make babies feed immediately they are born, before they or their mothers are really ready. This is not necessary and there is no evidence that it is helpful to insist that a baby breastfeeds in the first minute.

Encourage a mother to let her baby feed as soon as she feels that he is ready. You may need to help her to put her baby to the breast – especially if this is her first baby.

What practices can interfere with a baby wanting to suckle in the first hour or so?

- Analgesics and sedation given to the mother during delivery may make the baby unresponsive and unwilling to breastfeed.
- Drugs given during labour can interfere with the success of breastfeeding. Their use should be kept to a minimum.

- Other practices such as putting silver nitrate drops in a baby's eyes and routine gastric suction, can also alter a baby's behaviour and interfere with breastfeeding.

What can the health worker do to prevent a baby from getting cold?

- Dry the baby and cover both him and his mother with the same blanket.

Mothers may not be aware of bonding happening immediately. Strong affectionate ties grow gradually. But early close contact gives them the best possible start. Separation makes bonding more difficult, especially in high risk families, for example, young mothers with poor support. However, the effects of early separation can be overcome and bonding can also take place later, particularly during the first nine months of the baby's life. If initiation is delayed, for example, if the mother or baby is ill, or for cultural reasons, breastfeeding can still be successfully established. It is helpful if the mother and baby have prolonged skin-to-skin contact as soon as possible and if the mother is well supported.

However, separation and delay put bonding and breastfeeding at risk and should be avoided.

Step 5

Show mothers how to breastfeed and how to maintain lactation, even if they should be separated from their infants.

Out of 15 randomly selected postpartum mothers (including Caesarean), at least 80% report that nursing staff offered further assistance with breastfeeding within six hours of delivery and that they were shown how to express their milk or given written information on expression and/or advised where they could get help, should they need it. Out of the same group of mothers, at least 80% of those who are breastfeeding are able to demonstrate correct positioning/attachment with their own babies.

Out of five randomly selected mothers with babies in special care, at least 80% report that they have been helped to initiate and maintain lactation by frequent expression of breast-milk.

Out of 10 randomly selected health care staff on duty in maternity wards, 80% report that they teach mothers positioning/attachment and techniques for manual expression of breast-milk. 80% of these same staff demonstrate correct teaching of positioning/attachment with one mother on the ward. In addition, 80% can describe an acceptable technique for expressing milk manually that they teach to mothers.

Make your own conclusions about breastfeeding by observing a breastfeeding session. The following checklist will help you.

B-R-E-A-S-T-FEED OBSERVATION FORM

Mother's name: _____ Date: _____
 Baby's name: _____ Age of baby: _____

[Signs in brackets refer only to newborn, not to older babies]

Signs that breastfeeding is going well

Signs of possible difficulty

BODY POSITION

- Mother relaxed and comfortable
- Baby's body close, facing breast
- Baby's head and body straight
- Baby's chin touching breast
- [Baby's bottom supported]

- Shoulders tense, leans over baby
- Baby's body away from mother's
- Baby's neck twisted
- Baby's chin not touching breast
- [Only shoulder or head supported]

RESPONSES

- Baby reaches for breast if hungry
- [Baby roots for breast]
- Baby explores breast with tongue
- Baby calm and alert at breast
- Baby stays attached to breast
- Signs of milk ejection, [leaking, afterpains]

- No response to breast
- [No rooting observed]
- Baby not interested in breast
- Baby restless or crying
- Baby slips off breast
- No signs of milk ejection

EMOTIONAL BONDING

- Secure, confident hold
- Face-to-face attention from mother
- Much touching by mother

- Nervous or limp hold
- No mother/baby eye contact
- Little touching or
- Shaking or poking baby

ANATOMY

- Breasts soft after feed
- Nipples stand out, protractile
- Skin appears healthy
- Breast looks round during feed

- Breasts engorged
- Nipples flat or inverted
- Fissures or redness of skin
- Breast looks stretched or pulled

SUCKLING

- Mouth wide open
- Lower lip turned outwards
- Tongue cupped around breast
- Cheeks round
- More areola above baby's mouth
- Slow deep sucks, bursts with pauses
- Can see or hear swallowing

- Mouth not wide open, points forward
- Lower lip turned in
- Baby's tongue not seen
- Cheeks tense or pulled in
- More areola below baby's mouth
- Rapid sucks only
- Can hear smacking or clicking

TIME SPENT SUCKLING

- Baby releases breast
- Baby suckled for ___ minutes

- Mother takes baby off breast

Notes:

© Adapted with permission from "B-R-E-A-S-T-Feeding Observation Form" by H C Armstrong, *Training Guide in Lactation Management*, New York, IBFAN and UNICEF 1992

Step 6

Give newborn infants no food or drink other than breast-milk, unless medically indicated.

Observe mothers and infants in the maternity wards for at least two hours. If any babies are being fed food or drink other than breast-milk, ask the mothers if they are breastfeeding at all. For any breastfeeding babies being given food or drink other than breast-milk, ask the staff to indicate why. In at least 80% of the cases there should be acceptable medical reasons.

No promotion for infant foods or drinks other than breast-milk should be displayed or distributed to mothers, staff, or the facility.

Observe staff and infants in the well-baby nurseries (if there are any) for at least one hour. If any normal babies are being fed food or drink other than breast-milk, ask the staff to indicate why. In at least 80% of the cases there should be acceptable medical reasons unless the mothers specifically refuse to breastfeed for reasons outside the control of the hospital.

Ask 15 randomly selected mothers in the maternity wards (including 5 Caesarean) if their babies have received food or drink other than breast-milk in the hospital. The senior nurse or another staff member should be able to give acceptable medical reasons for these cases where breastfeeding babies receive other food or drink (see Code of Marketing).

See in annexes: Acceptable medical reasons for supplement and Breastfeeding controversies Summary.

Step 7

Practise rooming-in – allow mothers and infants to remain together 24 hours a day.

Out of 15 randomly selected mothers with normal babies (including 5 Caesareans), at least 80% report that since they came to their room after delivery (or since they were able to respond to their babies in the case of Caesareans) their infants have stayed with them in the same room day and night, except for periods of up to an hour for hospital procedures.

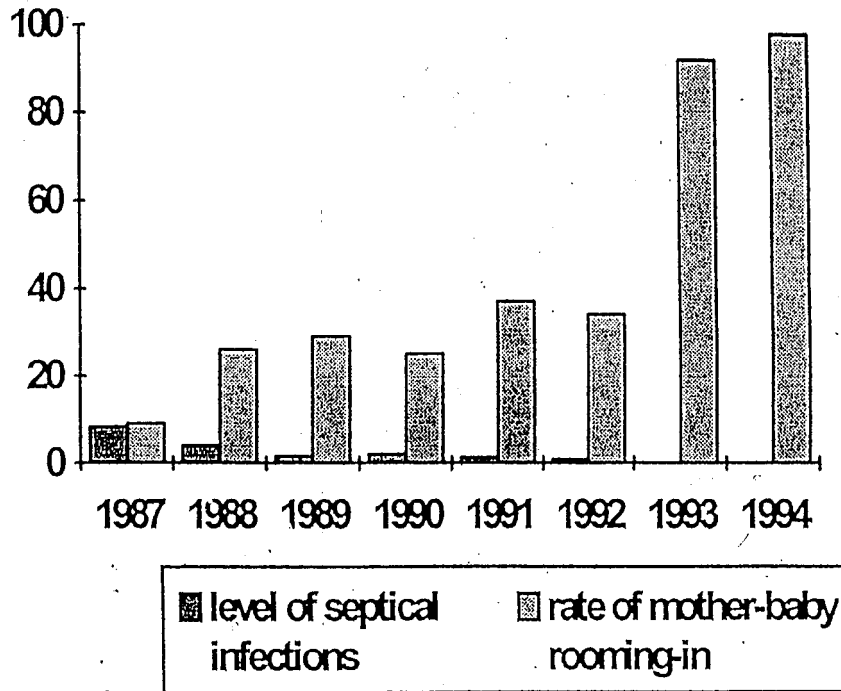
Out of 10 mothers with normal vaginal deliveries, at least 80% report their babies were separated from them for no longer than one hour before starting rooming-in.

All normal postpartum mothers in the maternity ward should be observed to have their babies with them or in cots by their bedside, unless their

babies are away for a short time for a hospital procedure or unless separation is indicated.

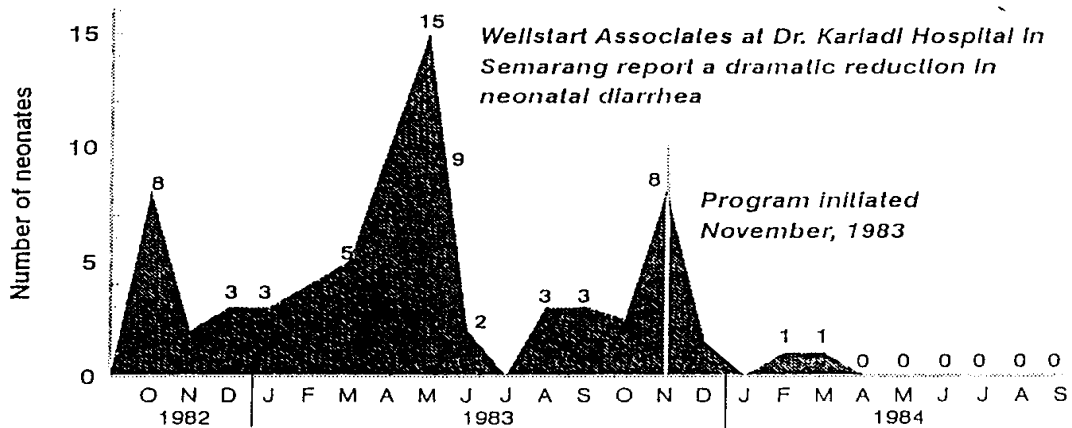
The following pictures demonstrate the advantages of rooming-in practice for reducing infection in maternity hospitals and thus reducing infant mortality and morbidity.

RATE OF MOTHER-BABY ROOMING-IN AND LEVEL OF SEPTICAL INFECTIONS



Source: Dr L. Romanchuk, Elektrostal Municipal Maternity Home and Dr N. Vartapetova, Institute for Preventive Medicine, Moscow

Decreased Morbidity & Mortality in Indonesia



Number of neonates with diarrhea before & after initiation of an intensified breastfeeding program. From "Breastfeeding & Child Survival, Wellstart's International Lactation Management Education Program," Wellstart, San Diego, 1988.

Step 8
Encourage breastfeeding on demand

Out of 15 randomly selected mothers of normal babies (including 5 Caesarean), at least 80% of those who are breastfeeding report that no restrictions have been placed on the frequency or length of their babies' breastfeeds. In addition, out of the 15 mothers, at least 80% report that they have been advised to breastfeed their babies whenever they are hungry or as often as the baby wants and that they should wake their babies for breastfeeding if the babies sleep too long or the mother's breasts are overfull.

The nursing officer in charge of the maternity ward confirms that no restrictions are placed on the frequency or length of breastfeeds.

Step 9
Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.

Out of 15 randomly selected postpartum mothers (including 5 Caesarean), at least 80% of those who are breastfeeding report that, to the best of their knowledge, their infants have not been fed using bottles with artificial teats (nipples) nor allowed to suck on pacifiers.

The nursing officer in charge of the maternity ward reports that breastfeeding infants are not given bottles with artificial teats (nipples) or pacifiers. No more than two breastfeeding infants are observed using them during two hours of observation in the maternity wards. None are observed using them during one hour in the well-baby nursery (if there is one).

Step 10

Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Out of 15 randomly selected mothers (including 5 Caesarean) 80% of those breastfeeding should confirm that their plans for infant feeding after discharge were explored. They should also be able to describe one thing that has been recommended to ensure that they will be linked to a breastfeeding support group (if adequate support is not available in their own families) or report that the hospital will provide follow-up support on breastfeeding if needed.

The nursing officer in charge of the maternity wards should be aware of any breastfeeding support groups in the local area and, if there are any, describe at least one way mothers are referred to them (e.g. through written material or counselling). Alternatively she or he should be able to describe a system of follow-up support for all breastfeeding mothers after they are discharged (early postnatal or lactation clinic check-up, home visit, telephone call.)

Follow-up help and support after discharge

Resources available in the local community

The available resources where mothers could receive ongoing support in breastfeeding in the community:

- Mother-to-mother support
- Family support
- Traditional birth attendants
- Community midwives, nutritionists, etc.
- Lactation clinics.

Referring mothers for help and support

In a mother-to-mother support group:

- Women's traditional patterns of getting advice from relatives and friends are reinforced.
- Mothers can seek help at any time, day or night.
- Discussion groups and mutual help is given by experienced mothers.
- Mothers gain the feeling of self-reliance and are reassured.
- Help is usually available in the mother's own community.

If a lactation clinic is available, it usually:

- Is based in a hospital or health centre.
- Has regular hours when mothers can be helped.
- Provides discussion groups and mutual help led by a professional.
- Provides an early follow-up appointment at one to two weeks postpartum to prevent inappropriate supplementation.

If clinic, support group, or other traditional advice is not available:

- Give mothers written or verbal advice for breastfeeding at home.
- Be sure that breastfeeding mothers receive no written materials teaching them to use bottles.
- Give mothers the name of a person to contact at the hospital/clinic or in the community.
- Contact mothers after they are home to learn how breastfeeding is going.

Developing a mother-to-mother group

Mothers are best helped where there are mother-to-mother support groups in many communities. These groups do not need to be big or have highly trained leaders. They do need warm-hearted and kind leaders, who know how to breastfeed and who can help other women. If there is not such a support group in your community, perhaps you can help to establish one and foster its growth.

- Identify experienced breastfeeding mothers and learn if they would be acceptable to other mothers as “leaders”. Young mothers can help each other well.
- Provide information and help to the leaders, but let them lead the group.
- Encourage the group to meet rather frequently, in a mother’s home or other community location. At meetings, mothers share how they feel, difficulties they have had and how they solved them. You can suggest special topics which could be discussed.
- Tell every mother about the nearest support group and assign a leader as her counsellor.
- Be available to the leaders to give accurate advice and support when asked.
- Include leaders in some training activities at the hospital or lactation clinic.

Initial Self-Appraisal Tool for Hospitals

The checklist that follows will permit a hospital or other health facility giving maternity care to make a quick initial summary of its practices in support of breastfeeding. Completion of this initial self-assessment form⁶ is the first stage of the process, but *does not in itself qualify the hospital for designation as Baby-Friendly*.

Under ideal circumstances, most of the questions will be answered “yes”. Numerous negative answers will suggest divergence from the recommendations of the WHO/UNICEF joint statement *Protecting, Promoting and Supporting Breastfeeding* and its Ten Steps to Successful Breastfeeding.

⁶ Available on request from the facilitators of the Neonatal Care and Breastfeeding workshop

If a hospital finds that many of its answers to this self assessment are “yes”, it may wish to consider taking further steps toward designation as a Baby-Friendly Hospital. Hospitals with an exclusive breastfeeding rate from birth to discharge which exceeds the national average or is at least 75% (which is larger) could usefully take such steps.

A hospital with many “no” answers or where exclusive breastfeeding from birth is not yet given to 75% of babies may want to ask for assistance with training or policy development. Changes in hospital routines may be identified which will lead toward more successful breastfeeding.

Training may be arranged in the country or could be facilitated by senior professionals who have attended an international training-of-trainers course in lactation management. In many settings, it has been found valuable to develop various cadres of specialists who can give help with breastfeeding, both in health care facilities and at the community level through village health workers and mother support groups.

Hospitals are encouraged to establish a written breastfeeding policy covering all Ten Steps to Successful Breastfeeding before seeking assessment and designation as Baby-Friendly. They also will need to prepare in advance of assessment a written copy of the curriculum for any training in lactation management given for hospital staff caring for mothers and babies, if this hasn't been done already. A third written document is an outline of the content which must be covered in antenatal health education about breastfeeding. Existence of such written document provides evidence of ongoing institutional commitment to breastfeeding and ensures against variations in practice with changes in staffing.

Consultation with the relevant local authority and the UNICEF country office can provide more information on policies and training which will contribute to increasing the Baby Friendliness of health facilities.

A global return to breastfeeding is an urgent moral, health, social and even economic imperative and any breastfeeding renaissance will have to begin in hospitals.

SESSION 17: HOW TO IMPROVE THE ORGANIZATION OF CARE

There are many fundamental aspects of good care that do not depend upon the availability of technology or upon individual skills of health professionals, but rather rely on good organization of care and collaborative team work. Newborn care requires a high degree of integration among different health professionals and therefore certainly represents an excellent example of how organizational issues are crucial. We will briefly discuss the most important of these issues and we will suggest methods and solutions that can be applied at local level by health professionals responsible for newborn care.

How to promote interprofessional collaboration

Good perinatal care is a continuum of preventive diagnostic and therapeutic actions taken at different levels of the health system, including the community. Health interventions and their standards must be coherent throughout the system, to avoid duplications as well as inconsistencies and to ensure that the best possible standard of care for every given problem is provided. This is of course particularly true within maternities, where nurses, midwives and doctors (obstetricians, paediatricians, anaesthesiologists and others) should work in close link and collaboration. However, this is not always the case and therefore a specific action must be taken to establish practices and methods that can promote and improve interprofessional collaboration.

Periodic meetings of the staff involved should be held in each maternity (if maternities are small and distances and costs affordable these meetings can involve all units within a given geographical area). These meetings have 2 main purposes:

- *to develop or review guidelines* on preventive diagnostic and therapeutic procedures that involve directly different health professionals or that have implications for both mother and baby;
- *to discuss cases of deaths and complications* to identify avoidable factors and ways to improve care.

Development and review of guidelines.

Some of the topics that involve the responsibility of various health professionals have been mentioned in Session 14 and include:

- criteria for management of pregnant women at risk of preterm delivery (particularly for cases before 33–34 weeks of gestation) including steroids for prevention of respiratory distress syndrome, antibiotics for premature rupture of membranes and referral to tertiary care centre for high risk cases;
- criteria for management of IUGR including induction of labour;
- criteria for monitoring (clinical and/or instrumental) of fetal wellbeing, with identification and management of complications;
- guidelines for use of anaesthetics and other drugs, such as anticonvulsant for eclampsia, that may affect spontaneous breathing at birth;
- guidelines for clearing airways and resuscitation at birth, including the choice of appropriate materials and responsibilities for periodic check and maintenance;

- guidelines for clean delivery, warm and friendly environment for birth.

These are just some examples of topics for which health professionals and particularly doctors with different backgrounds such as obstetricians and paediatricians-neonatologists, may not have the same views and practices. Guidelines should be discussed bearing in mind the evidences from literature, consensus conferences and textbooks and taking into account local resources and needs.

Review of cases of death and complications

The second area in which professionals can share information and viewpoints to improve care is perinatal audit. Perinatal audit, when it is carried out by the internal health professionals and not by external committees, is the peer review of perinatal deaths and other critical perinatal events such as severe complications. This analysis is aimed at identifying and discussing the causes of the adverse outcome in each case and the various factors affecting it, in particular those depending by the health system. Ultimately, the audit produces suggestions on how to improve a particular aspect of care through better organization of care or case management.

As it can be seen in the above examples, critical factors involved in perinatal deaths and morbidity can be identified along the various stages of care – prenatal care, delivery care and newborn care – and therefore it is essential that all health professionals involved are aware of their role in the chain of care and therefore in quality development.

The practice of perinatal audit has been shown to be a very effective tool for improving the quality of care in many countries. It deals, however, with very sensitive issues and for this reason it requires attitudes towards peer review that can only be developed through experience. It would be advisable, then, to start promoting attitude and interest towards interprofessional collaboration through meetings aimed at developing and reviewing guidelines, as outlined above. If this works, than it would be possible to start peer review (internal audit) of perinatal deaths and morbidity.

Establishing protocols of care

The same kind of activity described above for interprofessional collaboration can be more easily applied to those interventions that are under the responsibility of just one team, for example doctors and nurses of the neonatal ward. Guidelines for breastfeeding promotion, care of the healthy baby, case management of infections and other topics such as those outlined in this course and many others should be periodically reviewed. New guidelines can be developed for new problems that may arise. For example, an outbreak of multiresistant *Staphylococcus Aureus* dermatitis in newborns should prompt a discussion on interventions that should be made to control the outbreak, such as more accurate cleansing of hands and equipment, avoiding close contact among newborns (rooming-in mandatory!) and use of antibiotics effective in multiresistant *Staphylococcus* infections.

The principles are always: identification of critical problems, sharing of opinions and development of protocols on the basis of recent literature and of national guidelines if they exist.

It would be good practice to write the protocols that have been discussed and keep them in a sort of “ward book” so that all health professionals can obtain the relevant information when needed.

An important strategy for improving newborn care is to recognize and expand the role of nurses. They can play a very important role in newborn care and particularly in areas such as thermal control, breastfeeding and nutrition, rooming-in, monitoring clinical conditions. Therefore they

should be asked to play an active part in the process of development of guidelines and protocols by identifying critical points and by suggesting solutions.

Meetings of the staff, including doctors and nurses and other health professionals involved in care of newborns and their mothers should be held periodically – for example, once a month – to review practices and procedures with the aim of a constant improvement.

Recording and evaluating data

Good data recording is an essential component of good care.

There are two aspects of data recording that should be considered: keeping good clinical records and developing and using an indicator system based on routine collection of essential data.

For the purpose of our Newborn Indicators system activities, we will use the following definitions and indicators:

The perinatal period

The perinatal period comprises the period from 28 completed weeks of gestation to the end of the seventh completed day of life (remember that the first day is in fact day 0, so that the first week of life ends 6 days, 23 hours, 59 minutes and 59 seconds after birth).

Birth weight

The birth weight is the weight of the newborn infant obtained before significant postnatal weight loss has occurred, that is no more than 1–2 hours after birth. The definition “low birth weight” (LBW) refers to a birth weight of less than 2500 g that is up to and including 2499 g. Very low birth weight (VLBW) refers to a birth weight less than 1500 g and extremely low birth weight to less than 1000 g.

All fetuses and newborn infants should be weighed and those weighing 500 g or more – alive or dead – should be reported in a country’s statistics. WHO has recommended that mortality statistics reported for purposes of international comparison should include only those newborns weighing 1000 g or more (corresponding approximately to 28 weeks of gestation), since for some countries it would be difficult to obtain reliable data on the very small babies.

Gestational age

The duration of gestation is measured from the first day of the last normal menstrual period. Gestational age should always be expressed in completed weeks.

The preterm period

“Preterm” refers to “fewer than 37 completed weeks”. The definition of “premature” is unclear and should not therefore be used. Reference should be made either to the gestational age (preterm) or to the birth weight.

The term period

This period starts after 37 completed weeks and continues to the end of the 42nd week. It has a duration of 5 full weeks (from beginning of 38th to the end of 42nd week).

The post-term period

This period refers to a pregnancy length of more than 42 completed weeks. Sometimes other synonyms are used, e.g. “post-date” or “post-mature”. Post-term is recommended instead of these synonyms.

Live birth

A live birth has occurred when the newborn infant breathes or shows any other sign of life, such as heartbeat, pulsation in the umbilical cord or movements of the voluntary muscles.

Stillbirth

Stillbirth refers to the birth of a baby showing no sign of life. For international comparisons of perinatal mortality rates only such stillborn infants with a birth weight of 1000 g or more are included (for national perinatal statistics the Ninth Revision of the International Classification of Diseases (ICD) from 1980 recommends that the lower limit should be 500 g). Sometimes stillborn babies are not weighed. Only in this case, a gestational age of 28 completed weeks or a body length of 35 cm can be taken as equivalent to 1000 g birth weight. The stillbirth rate is defined as the number of stillborn infants per 1000 total births (stillborn infants + liveborn infants).

Early neonatal death

This refers to the death of a liveborn infant during the first 7 days of life (6 days 23 hours 59 minutes and 59 seconds after birth). The early neonatal mortality rate is defined as the number of dead infants weighing 1000 g or more occurring 0–7 days after birth, expressed per 1000 livebirths.

Late neonatal death

This refers to the death of a liveborn infant after 7 completed days, but before 28 completed days, after birth.

Perinatal death

Perinatal deaths comprise the sum of all stillbirths and early neonatal deaths. The perinatal mortality rate is the sum of all such deaths in relation to the sum of all stillborn and liveborn infants. In other words, it expresses the total fetal/neonatal loss in relation to all infants born (stillborn and liveborn).

For most of the above definitions, an international consensus has been reached. It is very important that countries utilize the same indicators to make comparisons and that the same definitions are used for indicators.

Clinical records

The principal aim of keeping a good clinical record is to provide a base for good case-management. Good care is based on accurate and complete transfer of relevant information among the various health professionals involved. This is particularly true in newborn care where intensive or semintensive clinical monitoring may be necessary. A newborn clinical record should allow the continuous recording of:

- vital signs such as general appearance (colour and tone), respiratory rate, heart rate, temperature;
- feeding patterns and quantity;

- therapeutic and diagnostic procedures;
- problem identification and plan of action. This includes the recording of signs and symptoms that may appear, the identification of the diagnostic hypothesis and the definition of a plan of action.

A sample of newborn clinical record is given below.

It is important that the format and use of records are discussed, taking into account local features and professionals available. As a general rule, it would be preferable to allow all health professionals involved, including nurses, to use the record and to make them responsible for some parts of it, for example the recording of vital signs at predetermined intervals and of feeding patterns.

An example of neonatal clinical record

Name	Sex	
Address	Birth weight	
Date of birth	Gestational age	
Mode of delivery	APGAR score	
Health professional attending	Blood group	
Alertness	Day 1	Day 2
Tone		
Colour		
Respiratory rate		
Heart rate		
Temperature		
Feedings		
Stools		
Drugs		
Lab examination		
Problem identification and plan		

Newborn Indicator System

A newborn indicator system is a fundamental component of newborn care. A newborn indicator system includes:

- the identification of the essential data to be collected and of the relevant indicators
- a system of data collection
- a system of data analysis
- the dissemination of data to the people who are in a position to make decisions.

This process, its methods and tools should be developed on a national basis. If this system is already in place, health professionals working in the different health facilities should be aware that their role is not only to collect data and send them to the central level but also to receive feedback from the centre about the data produced in their own services.

The analysis of these data allows to identify temporal trends within the same area and to make comparisons with other areas and facilities in the same country with respect to:

- perinatal and neonatal mortality and morbidity, that represent the *outcome* of the interventions;
- access to services, use of technology and other information concerning the *process* of care.

Thus producing precious indications about specific areas and interventions where improvement is needed.

The detailed description of a national newborn indicator system is not within the scope of this short course on essential newborn care. But it is very important that health professionals involved in newborn care understand that the existence of such a system is an essential component of care and therefore they should be aware of the importance of accurate collection and of local analysis of data.

They should also be aware that besides the essential data (table 1) to be recorded and the universal indicators that are part of a national newborn indicator system (table 2) they could also identify on the basis of local needs and problems, other data and indicators that can be useful to analyse newborn health or newborn care. For example, they could be interested to collect information on knowledge and practice of mothers about fertility control, or to investigate about the incidence of a particular congenital abnormality, or to know the referral rate to tertiary care or the coverage of a specific immunization.

They could also decide to collect and keep their own data so that continuous monitoring and evaluation can be carried out.

Table 1

An **essential data base** for a newborn indicator system should include the recording of:

- birth weight
- sex
- date of birth
- place of delivery (type of facility)
- mode of delivery (Caesarean, forceps or vacuum, breech presentation etc.)
- health professional attending a delivery
- spontaneous breathing/need of resuscitation
- Apgar score (or other neonatal score)
- gestational age
- plurality (twins)
- residence
- age at death
- main cause of death (*)
- main complications (asphyxia, infection, pathological jaundice, etc.)

(*) For this purpose the simple classification proposed by ICA (See Session 1) is suggested.

Table 2

Essential indicators:

- perinatal mortality rate
- early neonatal mortality rate
- late neonatal mortality rate
- (total) neonatal mortality rate
- birth weight specific mortality rate (<1500; 1500–2499, >2500)
- cause specific mortality rate
- cause specific mortality rate by birth weight
- birth weight specific mortality rate by age at death (stillbirths, early and late neonatal deaths).

A practical way of tabulating data and calculating the indicators is presented in Table 3.

The information included in table 1 should also be included in the newborn card that is given to parents at discharge. It is useful to include both in the essential data base and in the newborn record the basic information concerning the mother: maternal age, maternal education, obstetrical history with complications.

The system of collection of data, its quality and its use and the need for ad hoc investigations should be matters for discussion among the various professionals involved in newborn care within the periodic meetings that have been suggested above in this session.

Table 3. A suggested framework for tabulating data and calculating indicators

BIRTH WEIGHT	SB	END	LND	TND	TPD
< 1499					
1500 – 2499					
>2499					
TOTALS					

SB= stillbirths

END= early neonatal deaths

LND= late neonatal deaths

TND= total neonatal deaths (early plus late neonatal deaths)

TPD= total perinatal deaths (stillbirths plus early neonatal deaths)

Absolute numbers should be used so that percentages can be calculated using different denominators (total deaths by birth weight, by age at death, total neonatal deaths, etc.).

Table 4

A suggested framework for tabulating and calculating Cause-Specific Mortality Rates for Early and Late Neonatal Deaths

HOSPITAL / AREA : _____

PERIOD : _____

Total live births in the period

	< 1499 g	1500– 2499 g	≥ 2500 g	Total
Births in the period				

Early neonatal deaths (1 week of life)

Causes of neonatal deaths	< 1499 g	1500– 2499 g	≥ 2500 g	Total
Asphyxia-related conditions				
Infections				
Immaturity-related conditions				
Congenital anomalies				
Others				
Total deaths				

Late neonatal deaths (2, 3, 4 weeks of life)

Causes of neonatal deaths	< 1499 g	1500– 2499 g	≥ 2500 g	Total
Asphyxia-related conditions				
Infections				
Immaturity-related conditions				
Congenital anomalies				
Others				
Total deaths				

Total neonatal deaths (first month of life: early more late neonatal deaths)

Causes of neonatal deaths	< 1499 g	1500– 2499 g	≥ 2500 g	Total
Asphyxia-related conditions				
Infections				
Immaturity-related conditions				
Congenital anomalies				
Others				
Total deaths				

SESSION 18: AN AGENDA FOR ACTION

The main purpose of this course is to bring about some changes in the current state of care of newborn. It will not be sufficient for the participants to feel they have learnt a lot during the course. The most important outcome of the course should be the improvements implemented after the course.

The aim of this final activity is to provide a setting in which participants themselves will reach decisions, make plans and initiate changes. The plan of action is simply a statement of the changes that should be introduced in the health facilities to improve the present level of care of newborn.

The content of the action plan will vary according to local conditions and on what participants feel are the procedures that need more improvements. For this purpose, the agenda of the course can be used as a framework for the identification of problems and actions to be taken (see Table below).

Wherever possible, mixed groups of health professionals coming from the same health facility – for example obstetricians and neonatologists, nurses and midwives – should work together in this session in order to have the opportunity to discuss cooperative changes and to adopt an unified approach.

A framework for analysing problems, identifying interventions and defining responsibilities (i.e. who will be in charge of promoting the recommended intervention):			
Topics	Problems	Interventions	Responsibilities
1. Care of the healthy newborn			
2. Early mother and child contact, the first breastfeeding			
3. The “Rooming-in”			
4. The thermal protection			
5. The “Ten Steps”			
6. Care of the asphyctic newborn			

7. Care of the LBW newborn			
8. Care of the sick newborn			
9. Breastfeeding if the baby is sick			
10. Criteria for referral			
11. Discharge from hospital			
12. Breastfeeding if the Mother is sick			
13. Interprofessional collaboration			
14. Establishing protocols of care			
15. Clinical records and newborn indicator system			

Once this exercise is completed, **priorities** should be identified taking into account resources and time.

1.
2.
3.
4.
5.

Changes that health workers could make themselves; make 5–10 practical suggestions:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Changes that need administrative help; list 1–4 helpful administrative changes:

1.
2.
3.
4.

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