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# RELACTATION

## Review of experience and recommendations for practice



DEPARTMENT OF CHILD  
AND ADOLESCENT HEALTH  
AND DEVELOPMENT

**WORLD HEALTH ORGANIZATION**



# RELACTATION

## A review of experience and recommendations for practice

DEPARTMENT OF CHILD AND ADOLESCENT  
HEALTH AND DEVELOPMENT



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## RELACTATION

### A review of experience and recommendations for practice

#### 1. Introduction

WHO recommends exclusive breastfeeding for at least the first 4 and if possible the first 6 months of an infant's life, and continued breastfeeding with adequate complementary food for up to two years of age or more. Yet many infants stop breastfeeding in the first few weeks or months and, as a result, are at increased risk of illness, malnutrition and death.

Breastfeeding can however be re-established. A woman who has stopped breastfeeding her child, recently or in the past, can resume the production of breastmilk for her own or an adopted infant, even without a further pregnancy. This potentially life-saving measure is called *relactation*. Many women who relactate can produce enough milk to breastfeed an infant exclusively. A woman who has never been pregnant can also establish lactation, although the amount of milk produced is less often adequate for exclusive breastfeeding. This is called *induced lactation*<sup>1</sup>(1).

In the past relactation and induced lactation were considered exceptional experiences and were not well researched. However, there are now sufficient reports to show that most women can relactate if they are motivated and have adequate information and support. Effective techniques have been learned empirically and enough is known to provide practical guidelines to enable mothers to relactate. It is the purpose of this review to make relevant information available to health workers caring for women and children who may be in need of such help.

#### 2. Prevention of the need for relactation

When mothers receive good support from health services and from the community to enable them to breastfeed optimally from the time of birth, relactation should rarely be necessary. If the need arises frequently, it indicates that routine support for breastfeeding should be improved. The first priority is to ensure that maternity and child care services in health facilities and in the community provide mothers with the help that they need to initiate, establish, and sustain breastfeeding.

#### Footnote

<sup>1</sup>The terms *relactation* and *induced lactation* are not used consistently in the literature. Some authors call lactation "induced" when a woman who previously breastfed her own infant, breastfeeds an adopted infant or grandchild. However, in this review the term relactation is used if the woman has at any time given birth to a child, whether or not she has borne the child whom she is breastfeeding, and whatever the interval since her last pregnancy.

WHO and UNICEF promote supportive practices through the Baby Friendly Hospital Initiative, which introduces the Ten Steps to Successful Breastfeeding in maternities (86); through training of health workers in Breastfeeding Counselling (11); and through the Integrated Management of Childhood Illness initiative (87). Every encounter of a mother and infant with a health worker throughout at least the first year, whether for immunisation, growth monitoring, treatment of illness, or family planning, should include a basic assessment of breastfeeding. If breastfeeding is going well, positive encouragement should be given, but if practices differ widely from WHO recommendations, if the infant is not thriving, or if there is any other difficulty, help should be offered. This relatively simple routine could prevent many difficulties, and the need for more time-consuming procedures such as the intensive and continuing support necessary to re-establish breastfeeding after it has stopped.

### 3. Indications for relactation

There will continue to be occasions when routine care has not proved effective, and breastfeeding has been interrupted or mismanaged; or when a woman is unable to breastfeed her infant because she is ill or not available, and her child's health is at risk from inadequate artificial feeding. In these situations, relactation and induced lactation are important options. In addition to knowing how to support breastfeeding, health workers who care for mothers and children should also be familiar with techniques for helping mothers to relactate, so that these can be practised when the need arises.

The need to consider the possibility of relactation or induced lactation may arise in a variety of circumstances:

- *for case management of sick infants*, such as those under 6 months of age with acute or persistent diarrhoea, those who stopped breastfeeding before or during an illness, and those who have been artificially fed but cannot tolerate artificial milks.
- *for infants who were low birth weight*, and who were unable to suckle effectively in the first weeks of life, and who required gavage or cup feeding.
- *for infants with feeding problems*, particularly those under 6 months of age, whose mothers had difficulty establishing lactation or whose breastmilk production has decreased significantly as a result of poor technique or mismanagement.
- *for infants who have been separated from their mothers*, for example because they or their mothers required hospitalisation.
- *in emergency situations*, for infants who are unaccompanied; those who were artificially fed before the emergency; and those for whom breastfeeding has been interrupted. As many infants as possible should be enabled to resume or continue

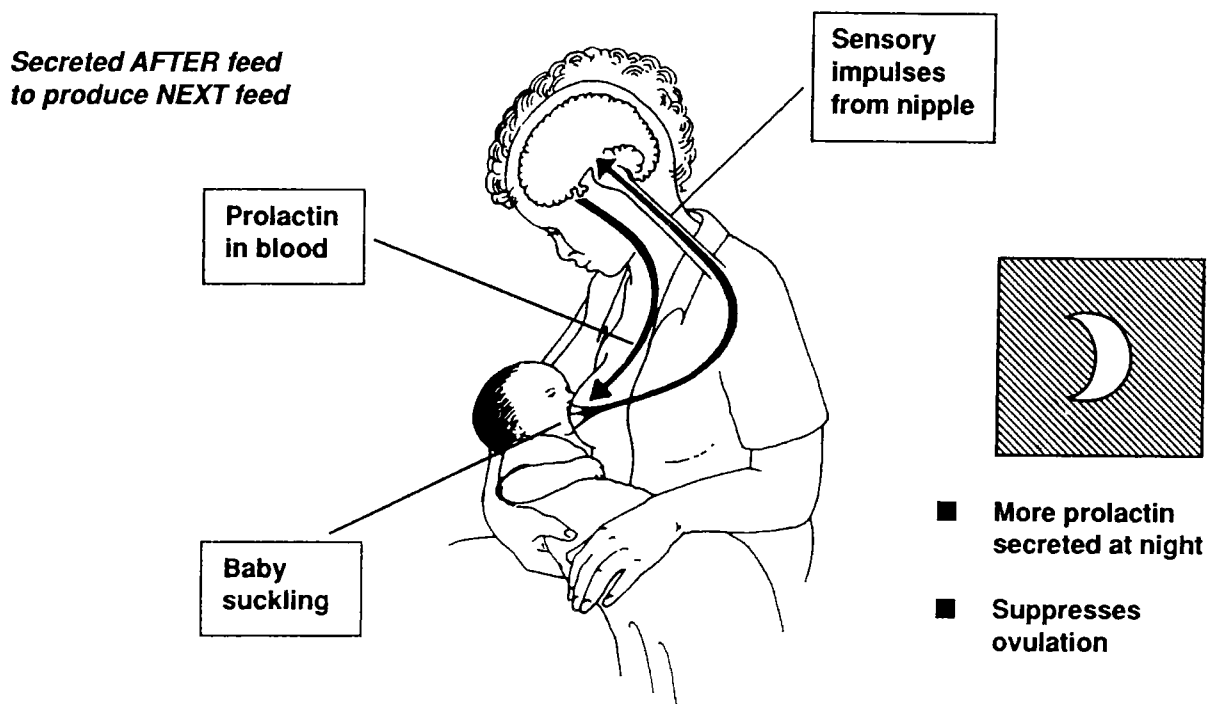


breastfeeding to help prevent diarrhoea, infection and malnutrition. A woman can relactate to feed one or more unaccompanied infants.

- *individual situations*, for example when a mother who chose to feed her infant artificially changes her mind or, in the case of adoption, to enhance mother-infant bonding as well as providing other advantages of breastfeeding.
- *when a woman is unable to breastfeed her infant*, for example because she is severely ill or has died or because she is HIV positive and chooses, after counselling, not to breastfeed her infant (85). One option in these situations is for someone in the same community, such as a grandmother, to relactate to feed the child.

Figure 1. The prolactin response

## PROLACTIN



#### 4. Physiological basis of lactation on which relactation depends

Little research has been conducted specifically into the physiology of relactation in humans. However, the empirical methods that have been found to be effective are in accord with well established physiological principles of lactation (2,3,4,5,6,7, 55, 56).

The production of breastmilk sufficient to feed an infant requires:

- growth of secretory alveoli in the glandular tissue of the breast
- secretion of milk by the cells of the secretory alveoli
- removal of milk by the infant or by expression

Hormones play a major role in all these processes.

The hormone *prolactin*, which is produced by the anterior pituitary gland at the base of the brain, is the most important hormone for both development of secretory alveoli and for the secretion of milk by the alveolar cells. Prolactin usually works together with oestrogen, progesterone, and other hormones, which may be made in the placenta or in the ovary. However, it has been demonstrated in animals that prolactin can stimulate the growth of secretory alveoli even in the absence of these other hormones (2,3,4).

Prolactin is produced in response to nipple stimulation, as shown in Figure 1 (5, 11). Sensory nerve impulses from the nipple pass to the base of the brain and cause the anterior pituitary to secrete prolactin. In the non-lactating breast, prolactin stimulates growth of secretory alveoli. As the alveoli develop, prolactin also stimulates the cells to produce milk proteins and lactose and to secrete milk.

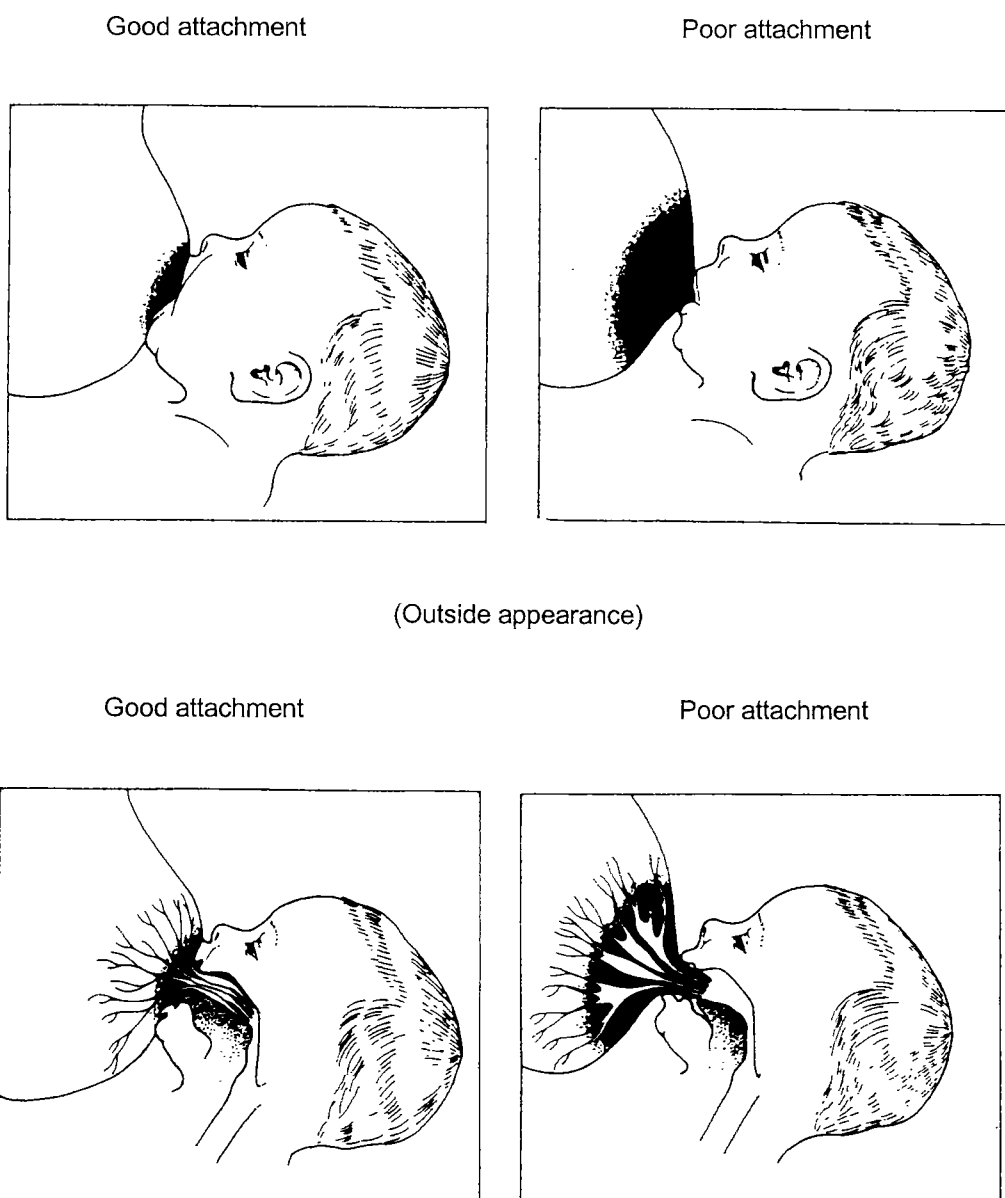
The prolactin response can be induced by different kinds of nipple stimulation. The most satisfactory is the suckling of an infant, and the response is greater during the night than during the day (8). However, both manual and mechanical expression of the breasts are also effective (9).

Removal of any milk which is secreted also helps to increase and maintain production (3,10). "Saving" milk in the breast until the mother is aware of pressure and fullness inhibits further production (3,10). Milk can be removed by an infant suckling or by manual or mechanical expression. So suckling and milk expression, which both increase prolactin levels and remove milk, are the key to the stimulation of milk production for both relactation and induced lactation.

Removal of milk from the breast requires the action of another hormone, *oxytocin*, which is produced by the posterior part of the pituitary gland in response to suckling. Oxytocin causes small muscle cells which surround the secretory alveoli to contract and press out the milk. Oxytocin does not help when there is no milk present in the breast, but it assists removal when milk is present, so it may indirectly help milk production after the gland cells have developed. Because oxytocin production can be affected by the mother's psychological state, support and confidence-building are important ways to help the process of milk removal (5).

The best way to stimulate the nipple and to remove milk is for a child to suckle. The more frequently and the longer a child suckles, the more milk is produced. To remove milk effectively, an infant needs to be well attached to the breast (6). The part of the breast beneath the areola, where the milk collects in lactiferous sinuses, must be inside the infant's mouth (Figure 2). It is important for health workers to be able to assess breastfeeding to decide if a mother needs help, and if necessary to help a mother to ensure that her infant is well attached and suckling effectively. Infants who have never suckled from a breast or who have become used to suckling from a bottle or pacifier often need extra help to learn to take the breast into their mouths and to suckle effectively (15,16). Practical details are described in several manuals (12, 13, 14) and WHO/UNICEF training materials (11, 87) and are summarised in Box 1.

**Figure 2. Diagrams of infant's mouth showing good and poor attachment to the breast.**



### **Box 1. SIMPLE ROUTINE ASSESSMENT AND HELP WITH BREASTFEEDING**

[adapted abstract from Integrated Management of Childhood Illness (87)]

**1. Ask the mother:**

- Is there any difficulty feeding?
- Is the infant breastfed? If yes, how many times in 24 hours
- Does the infant usually receive any other foods or drinks? If yes, how often?
- What do you use to feed the infant?

**2. Weigh the infant, and determine weight for age.**

**3. If an infant:**

- Has any difficulty feeding
- Is breastfeeding less than 8 times in 24 hours
- Is taking any other foods or drinks or
- Is low weight for age

Assess a breastfeed for 4 minutes (if necessary, wait until the infant is ready to feed).  
Look for signs of good attachment and effective suckling.

**4. Signs of good attachment:**

- Chin touching breast
- Mouth wide open
- Lower lip turned out
- More areola visible above than below mouth

**5. Signs of effective suckling:**

Slow deep sucks, sometimes pausing

**6. If any signs of good attachment are not present, teach correct positioning and attachment**

- Show the mother how to hold her infant:
  - With the infant's head and body straight
  - Facing her breast, with the infant's nose opposite her nipple
  - With the infant's body close to her body
  - Supporting infant's whole body, not just head and neck
- Show her how to help the infant to attach. She should:
  - touch her infant's lips with her nipple
  - wait until her infant's mouth is wide open
  - move her infant quickly onto her breast, aiming the infant's lower lip well below the nipple.
- Look for signs of good attachment and effective suckling.
- If the attachment is not good, try again.

**7. When the attachment is good:**

advise the mother to breastfeed as often and for as long as the infant wants, day and night, at least 8 times a day.

**8. If an infant less than about 6 months old is receiving other foods or drinks:**

counsel the mother about breastfeeding more, reducing other foods or drinks, and using a cup for the other food and drinks until they can be stopped.

**9. If the infant is not breastfeeding at all, refer for breastfeeding counselling and possible relactation.**

## 5. Reported experience of relactation and induced lactation

In animals, it has been recognised for many years that frequent stimulation of the teats can result in lactation, even without the mammary gland development brought about by pregnancy, (3,17). In 1967, research with goats confirmed that "prolonged application of the milking stimulus can induce both mammary growth and milk secretion" (18).

In humans, the principal source of information is women who have themselves relactated or induced lactation for their infants. These personal experiences have most often been reported in the popular press, or in the publications of breastfeeding support organizations, which are mainly targeted at parents, (19,20,21).

Earlier references in the medical literature implied that, despite frequent anecdotal reports, relactation was an exotic and abnormal event (23). Slome in a classic paper in 1956 (26) reported the experience of 10 grandmothers in Natal who relactated for their grandchildren. A number of individual experiences are quoted by Newton in 1967 (32), and by Cohen in 1971 (33) as well as in a review by Marieskind in 1973 (22). Only relatively recently have health professionals become aware of the importance and usefulness of the phenomenon (1,24,25), and of the need to learn from women who have had the experience.

In the 1970s, Jelliffe (29,30) described a regime for re-establishing lactation among mothers in Uganda who were bottle-feeding their infants. Brown in 1977 (27) and 1978 (28) reviewed experiences in India and Vietnam pointing out the value of relactation in developing countries and in emergency situations, particularly for low birth weight infants. In 1981 Bose et al (31) reported successful relactation by mothers of sick and premature infants in the USA, and more recently Thullen (34) and Thompson (35) described relactation as a part of formal medical treatment. In 1998, Marquis et al (88) reported relactation as a common occurrence in a community in Peru. Mothers were observed to reverse a decision to stop breastfeeding their child, usually because of the child's resistance. Breastfeeding was started again after a few days or weeks, and some women relactated more than once for the same child.

The largest study to date is a series of retrospective reports by Auerbach and Avery (36,37) and Auerbach (38) in the USA. They used the recall method to study four groups of mothers:

1. 174 women who had stopped breastfeeding prematurely;
2. 117 women who relactated for a low birth weight infant;
3. 75 who resumed breastfeeding after they or their babies had been hospitalised;
4. 240 women who breastfed an adopted infant: 83 of whom had never been pregnant; 55 of whom had been pregnant but had never breastfed; 102 of whom had breastfed a previous infant.

There are also a number of reports from developing countries: Papua New Guinea (39), Nigeria (40), and India (41-46) which, though smaller than those of Auerbach and

Avery, have the advantage of being prospective. In the largest of these (43), Seema et al studied 50 mothers of hospitalised infants less than 4 months old, 86% with complete cessation of lactation, and 14% who were still breastfeeding partially. Relactation was successful for all except one of the mothers.

## 6. Composition of milk in relactation

No significant differences have been identified between breastmilk produced during relactation or induced lactation and that produced puerperally, though few studies have been reported (47,48). Kleinman et al (47) observed that mothers who had never been pregnant did not produce colostrum. In the first five days of lactation their milk was similar in its total protein, alpha-lactalbumin, and IgA content to transitional and mature milk.

## 7. Factors which affect the success of relactation

Marieskind (22) commented that there are two paramount requirements for relactation: a strong desire by the mother or foster mother to feed the infant, and stimulation of the nipple. Brown (27,28) and Jelliffe (30) add a third requirement, of particular importance when relactation is promoted as part of health care: a support system, to build and maintain the woman's confidence. However, there are additional factors related to both the infant and the woman which need to be recognised and understood.

### 7.1 *Factors related to the infant.*

The main requirement for relactation or induced lactation is that the infant should suckle. This is affected by:

- the infant's willingness to suckle
- the infant's age
- the infant's breastfeeding gap (ie the time since the infant stopped breastfeeding)
- the infant's feeding experience during the gap
- infant-related reasons for interrupting breastfeeding

Other factors of potential but unknown significance include:

- gestational age (for low birth weight babies)
- intake of complementary food (for older infants)

### 7.2 *Factors related to the mother or foster mother:*

The most important are:

- the woman's motivation
- her lactation gap (the time since she stopped breastfeeding an infant)
- the condition of her breasts
- her ability to interact responsively with her child
- support from her family, community and health workers

Other factors of less clear significance:

- her previous experience of lactation
- her general health and nutrition (see section 14).

Each of these factors are discussed in more detail in the following sections.

## **8. Factors related to the infant**

### *8.1 The infant's willingness to suckle*

Relactation is most likely to succeed if the infant starts suckling soon after he or she is introduced to the breast. With infants who are willing to suckle the first time they are put to the breast the process is relatively easy.

Auerbach and Avery (36) report that about 39% of the infants who stopped breastfeeding early, 63% of adopted infants and 61% of infants of mothers relactating after hospitalisation suckled well the first time they were put to the breast. An older child sometimes takes the initiative and persists. In this situation relactation can occur in unfavourable circumstances (26,49) and other factors, even including the mother's motivation, are less important.

However, many infants need to be helped to take the breast. Seema et al (43) found that if breastfeeding had been completely discontinued, 74% of babies refused to suckle initially, mostly because of difficulties attaching to the breast. All but one was enabled to start and to continue suckling, but the help of a skilled health worker was required.

### *8.2 The infant's age*

In general, infants are more willing to take the breast when they are younger. Older infants tend to be less willing, especially if they have become used to feeding from bottles with teats.

Auerbach and Avery (36,37) reported that babies less than three months old were more willing to accept the breast than those who were more than three months old. With adopted infants, a dividing line was observed at eight weeks. Ninety percent of infants less than one week old, 75% of those aged 1 to 8 weeks, but only 51% of those aged more than 8 weeks, suckled well the first time they were put to the breast. Infants may not be willing to suckle from a breast which is producing little milk, except in the first 2-3 weeks of life (50).

Banapurmath et al (41) observed that 4 of the 5 adoptive mothers who were successful at relactation started when their infants were less than 3 weeks of age while 4 of the 5 mothers classified as unsuccessful had not started until their infants were more than 3 weeks old.

However, relactation is possible with older children, particularly if the child wants to suckle and takes the initiative (49,51). In Peru (88), mothers relactated for children who were over 12 months old. No mother should be discouraged from making an

attempt to relactate or induce lactation solely on the basis of her infant's age. If there are important reasons for relactating for an older child, but the child is not willing to suckle, special techniques which are beyond the scope of this review may be necessary (52). Support from a breastfeeding counsellor with considerable experience in relactation is essential, as unskilled attempts may cause frustration and can interfere with the relationship between the mother and child.

### 8.3 *The infant's breastfeeding gap*

The infant's breastfeeding gap is the time since the infant last suckled. Reports of individual cases suggest that in general relactation is more likely to occur with a shorter gap, but this may partly depend on the child's age. Children who stopped breastfeeding when they are older may be willing to resume breastfeeding after a longer gap (36,37,38,49,51).

### 8.4 *The infant's feeding experience during the gap*

Infants who are bottle-fed may develop a preference for an artificial teat over the breast. Banapurmath et al (41,42) and Seema et al (43) comment that it is more difficult to teach an infant to suckle from the breast if he is accustomed to feed from a bottle, even if the breasts are producing milk. These authors emphasise that it is necessary to stop using bottles and pacifiers to overcome infants' unwillingness to suckle. This is also the experience of many other lactation experts (7,15,46,53). Some mothers relactating for infants aged 1-6 months, report that their infants are used to bottle feeding and seem at first not to know what to do at the breast. A recent study by Lang (54) suggests that low birth weight infants who are cup fed during the transitional phase between gavage and breastfeeding may breastfeed more easily than those who have been bottle fed. However, even infants who have used artificial teats can usually learn to suckle at the breast, if their mothers are given sufficiently skilled help (16). This requires a level of experience, time and patience which many health workers do not have. It is much better to prevent the problem by using cups when necessary and avoiding the use of artificial teats.

### 8.5 *Infant-related reasons for interrupting breastfeeding*

Sometimes the reason for discontinuing breastfeeding early is related to the infant. This may involve an anatomical problem, or it may be because of the infant's behaviour.

Examples are:

- tongue tie, cleft palate
- difficulty attaching to the breast, including awkward use of the tongue
- breast refusal
- excessive crying (e.g., associated with colic or gastro-oesophageal reflux)

Any such specific infant-related reasons need to be identified and require appropriate management if relactation is to be effective.

### 8.6 *Gestational age*

Few studies have examined the effect of the infant's gestational age or weight at the beginning of relactation or induced lactation on the outcome. These factors are difficult to evaluate, partly because of the interrelationship between weight and age and partly



because of confounding factors in the overall management of low birth weight and premature infants. In the past, their care has generally included bottle feeding and a minimum of parental contact. With current methods of care that use more parental contact, including kangaroo care, low birth weight babies can breastfeed fully or partially sometimes as early as 32 weeks gestational age and with weights as low as 1,300 g (13,57, 58, 59).

### 8.7 *Intake of complementary food*

Complementary (solid or semi-solid) food introduced before about 6 months may replace breastmilk. In Auerbach and Avery's study (36,37), 46% of mothers noticed that adding complementary food enabled them to reduce or eliminate formula supplements, while 50% continued to give the same amount of formula supplement but breastmilk production apparently decreased. It is preferable to avoid introducing complementary feeds before about six months. They should only be considered at 4 or 5 months of age if an infant is not gaining weight satisfactorily (Section 15) or shows clear signs of hunger, despite maximum stimulation of the breasts.

## 9. **Factors related to the mother or foster mother**

### 9.1 *The woman's motivation*

A woman is unlikely to relactate or induce lactation unless she is well motivated. The reasons for which women are most often willing to relactate are:

- because it is beneficial for the child's health and nutrition
- to enhance the mother-child relationship

Sometimes mothers or foster mothers are self-motivated. This may be the case in communities in which it is common to reverse a decision to stop breastfeeding an infant (88); in which informal adoption and breastfeeding of motherless infants by other relatives is an accepted practice; and in industrialised countries with some mothers who adopt infants because they are unable to conceive or want to add to their families in this way.

More often, mothers or prospective foster mothers need to be counselled, informed, encouraged and supported by health care providers before they are sufficiently motivated to relactate for an infant. This requires time, skill and patience from the counsellor.

Abejide et al in Nigeria (40), and Banapurmath (41) and Seema (43) in India, identified the child's health as the principle motivating factor for mothers and foster mothers. The infants were already ill when relactation was suggested by a health care provider. In Papua New Guinea (39), foster mothers who requested prescriptions for a feeding bottle were motivated to relactate when the hazards of bottle feeding were explained to them. In these situations, the amount of milk produced and the extent of relactation were important outcomes.

In studies from industrialized countries, the mother-child relationship was a major motivating factor both for adoptive mothers (37) and mothers of premature babies (31). In such situations, the experience may be of great importance regardless of the quantity of milk produced. The mother-child relationship is not often mentioned in reports from developing countries, but this does not necessarily mean that it is unimportant. Possibly, where there is still a predominantly breastfeeding culture, an intimate mother-child relationship is accepted as so natural that it does not seem necessary to comment on it.

Breastmilk can be produced when a woman is not specifically motivated, if the infant's desire to suckle is strong, (21,49). Grandmothers in Africa (26) produced milk when they put infants to their breasts to soothe them in the absence of their mothers, without any intention to relactate.

### 9.2 *The woman's lactation gap*

The time since a mother last breastfed a child is the *woman's lactation gap*. It is often assumed that the shorter the interval since a woman last breastfed a child, the more likely she is to relactate. Reports from industrialized countries tend to support this, but several from developing countries indicate that relactation sometimes occurs 15 or 20 years after a woman breastfed her last child, (22,26,39,40,41), including after the menopause.

### 9.3 *The condition of her breasts*

Sometimes the form or condition of a mother's breasts contributes to the interruption of breastfeeding; for example, her nipples may be inverted or fissured, or she may have a breast infection, or scars from breast surgery. The same condition may make it difficult for the infant to attach to the breast and suckle effectively for relactation. These were important factors in 12% of mothers in Seema et al's study (43), but the authors found that with motivation, support of the mothers, and skilled help to position the infant at the breast, most difficulties were eventually overcome.

### 9.4 *Her ability to interact responsively with her child*

To relactate, a woman needs to be able to respond freely and breastfeed whenever the child shows interest and is willing. She should care for the child completely herself and have frequent skin-to-skin contact with him. To be able to respond fully, she needs freedom from other duties for a few weeks and, if possible, time off from paid employment. If this is not possible, relactation is less likely to succeed.

### 9.5 *Support from family, community and health workers*

Women commonly report that it is essential to have emotional support and that they receive this most often from their family, friends, or breastfeeding counsellors and much less often from doctors or other health workers. In the USA (36,37), husbands were often key support persons, particularly when the infant was adopted and when other relatives and friends were hostile to the idea of inducing lactation or relactation. Physicians were the least supportive people and were also sometimes openly hostile.

In countries where breastfeeding is the norm, women usually receive more support from their families and friends, making relactation easier. Health workers, too, may be more supportive in these settings, and may both suggest the procedure and help her to carry it out (39,40,41,43,46).

#### 9.6 *Her previous experience of lactation*

A woman's previous experience of lactation may have only a marginal effect on her ability to relactate. Auerbach and Avery (35) found that women who had never been pregnant or those with prior pregnancies who had never breastfed were somewhat less likely to relactate fully than were women who had previously breastfed, but the difference was not statistically significant. The same women were also less likely to produce breastmilk using mechanical stimulation before their adoptive infants suckled. If an adoptive mother had breastfed previously, the adopted infant was more likely to start suckling in the first ten days.

Nemba (39) found that 11 out of 12 women who had not lactated previously achieved adequate lactation 5-13 days after starting a protocol to induce lactation. Seema et al (43), who reported that 46 out of 50 mothers succeeded in relactating puerperally for their own infants, found no difference between primiparous and multiparous mothers.

### **10. Time for breastmilk to be produced**

The time required for breastmilk production to start varies from a few days to a few weeks, and is difficult to predict. Some women never produce enough milk to establish or re-establish exclusive breastfeeding, but others achieve a full supply in a few days (39,40,41,42). Some authors report that relactation occurs earlier in mothers who stopped recently or still breastfeed sometimes, but this is not always the case. Women who have not breastfed for a longer time sometimes take up to 4 to 6 weeks to produce significant amounts, though with them also milk sometimes appears in a few days (40).

Seema et al (43) observed that the first breastmilk appeared between 2 and 6 days; partial relactation was achieved in from 4 to 28 days, and complete relactation in 7 to 60 days. Abejide et al (40) studying 6 cases of adoptive lactation, found that breastmilk appeared on day 4 to 7, partial lactation was achieved in between 11 and 18 days and exclusive breastfeeding was possible in 21 to 25 days. Mothers should be encouraged to be patient and not to have precise expectations about when certain amounts of milk will be produced.

**Box 2. HOW TO FEED AN INFANT BY CUP**

- Hold the infant sitting upright or semi-upright on your lap.
- Hold a small cup of milk to the infant's lips.  
The cup rests lightly on the infant's lower lip and the edges of the cup touch the outer part of the infant's upper lip.
- Tip the cup so that the milk just reaches the infant's lips.  
The infant becomes alert and opens his or her mouth and eyes.
  - A LBW infant starts to take the milk into his or her mouth with the tongue.
  - A full term or older infant sucks the milk and may spill some of it.
- **DO NOT POUR** the milk into the infant's mouth. Just hold the cup to his or her lips and let him take it himself.
- When the infant has had enough, he closes his mouth and will not take any more. If he has not taken the calculated amount, he may take more at the next feed or you may need to feed him more often.
- Measure intake over 24 hours – not just at each feed.

**Figure 3. Feeding an infant with a cup**

## 11. Practical recommendations for relactation

Practical information on how to relactate or induce lactation is based on the experiences of mothers and breastfeeding support groups and counsellors (19,60) and on the clinical experience of health professionals recorded in the studies described above.

### 11.1 *Identifying mothers and infants who need help with relactation*

Health and community services which provide care for mothers and infants need to adopt a routine assessment of breastfeeding procedure, as described in Sections 3 and 4. Health and community workers should know how to help mothers with common difficulties and where to refer those with more specialised needs. Such a procedure would enable mothers and infants who need help with breastfeeding to be identified and appropriately counselled. The need for relactation would be reduced, while the remaining few who would benefit from relactation would be more likely to receive appropriate help.

If a woman is ill or severely malnourished, appropriate treatment should be given and relactation started only when her condition improves sufficiently. If an infant is low birth weight or premature, every effort should be made to establish and maintain lactation beginning from the day of delivery. For infants who are ill or unable to suckle, mothers should be taught effective hand expression, to enable them to provide breastmilk as soon as oral feeding is possible. If a mother starts expressing on the first day, and continues to do so frequently (at least 8 times in 24 hours), it will be easier for her both to initiate lactation and to provide adequate amounts of breastmilk to meet her infant's growing needs. However, if a mother for any reason did not receive help to initiate lactation soon after birth, she will need help to relactate subsequently.

### 11.2 *Principal recommendations*

#### A. Essential measures

- Counselling for the mother or foster mother to
  - assess the reason for the difficulty
  - give information to her and members of her family
  - motivate her
  - remove factors which might reduce suckling or breastmilk production
  - provide continuing support
- Stimulation of the nipple and breast by
  - the infant's suckling
  - mechanical or hand expression
  - skin-to-skin contact
- Provision of a temporary milk supplement for the infant without using a bottle
  - to provide nourishment
  - to encourage suckling at the breast

## B. Other measures

- lactogogues if indicated
- food, fluids, and rest

These measures are explained in more detail in the sections which follow.

## 12. Essential measures

### 12.1 *Counselling the mother or foster mother*

The breastfeeding counsellor may be a health professional trained in breastfeeding or a community breastfeeding counsellor.

She will need to spend a considerable amount of time with the mother or foster mother. She needs listening skills to be able to understand how a mother feels – perhaps that she has failed her child or that her body has failed her. The breastfeeding counsellor must not be critical or commanding. She needs to build the woman's confidence that relactation is possible for her. More details about counselling skills can be found in *Breastfeeding Counselling: A Training Course* (11).

The breastfeeding counsellor will need to talk to the woman, ideally several times, before relactation starts to ensure that the woman is adequately motivated; and then she should provide regular support throughout the process. This intensive day-to-day support may be most readily provided by community health workers, mother support groups, or traditional birth attendants. However, it is essential for health professionals to have a supportive attitude and to be available as resources when required.

#### • *BEFORE RELACTATION STARTS*

The breastfeeding counsellor should talk to the mother or the possible foster mother and identify the reasons why breastfeeding was interrupted or relactation is being considered. She should enquire about any factors that can reduce either breastmilk production, (such as the use of oestrogen-containing contraceptives, thiazide diuretics, or nicotine), or suckling (such as bottles and pacifiers, or periods of separation from the infant).

If a specific infant-related reason why breastfeeding was interrupted is identified (such as the examples listed in Section 8.5), appropriate management is needed for relactation to be effective. Feeding and behavioural techniques are described in Section 12, and further details about specific difficulties can be found in WHO/UNICEF training materials (11), and appropriate manuals (12,13). In cases for which medical treatment may be necessary, for example for cleft palate and gastro-oesophageal reflux, specialised advice should be sought or reference made to standard textbooks (19,55,56).

If a factor which reduces breastmilk production or suckling has been identified, it will be necessary to make every effort to discontinue it (such as with pacifiers, or nicotine),

or to change to an alternative (for example, an alternative form of contraception), or to find ways to reduce periods of separation.

The breastfeeding counsellor should:

1. Ensure that the mother or foster mother is fully informed about:
  - the benefits of breastfeeding for both the child's health and nutrition and the mother-infant relationship and the reasons she might want to consider relactation.
  - how relactation works, how long it may take and the commitment, patience and persistence that she needs.
  - practical details of how to relactate.
  - how particular difficulties can be overcome, and any special help or treatment required.
  - the need to stop or change any factor which can reduce suckling or breastmilk production.
2. Ensure that the mother or foster mother is adequately motivated.  
The breastfeeding counsellor should give the woman relevant information and encouragement and try to build her confidence, but should not put pressure on her to relactate if she is unwilling. It may be helpful to introduce her to other women who have relactated, and who can talk to her about their experience.
3. Enquire about the support that the woman is likely to receive from home.  
If possible, the breastfeeding counsellor should explain the importance and the process of relactation to other family members and counteract any misinformation. She needs to discuss the woman's need for their continuing support and what they might do to ensure that she has enough rest and relief from other jobs while she re-establishes a breastmilk supply. Contact with other mothers who have relactated may also be helpful.

- *AFTER RELACTATION IS STARTED*

The breastfeeding counsellor should follow up the mother or foster mother regularly and give continued support and encouragement. This is important if the mother is to continue breastfeeding after the first few weeks. At first, follow-up should be daily if possible.

### 12.2 *Stimulation of the nipple and breast.*

The breastfeeding counsellor needs to help the mother or foster mother to ensure maximum stimulation of her breasts and nipples.

*If the infant is willing to suckle:*

Encourage the woman to:

- put the infant to the breast frequently, as often as he or she is willing. This should be every 1-2 hours if possible and at least 8-12 times every 24 hours.
- sleep with the infant to breastfeed at night, to allow the infant easy access to the

breast while minimising disruption of the mother's rest. Night breastfeeds increase the production of prolactin and the extra contact may increase the infant's willingness to suckle.

- let the infant suckle on both breasts, and for as long as possible at each feed - at least 10-15 minutes on each breast. The mother can offer each breast more than once if the infant is willing to continue suckling.
- ensure that the infant is well attached to the breast, to prevent nipple trauma, and to remove effectively any breastmilk that is produced (6).
- avoid using a pacifier or bottle and teat as this reduces nipple stimulation and is likely to make the infant less willing to suckle from the breast (7).
- feed the infant supplements separately, using a cup (Section 12.6, Box 2, Fig. 3).

*If the infant is unwilling or unable to suckle:*

- Ensure that the infant is not ill, and does not have an anatomical problem which needs specialised help.
- Suggest that the mother give plenty of skin-to-skin contact and continue to offer the breast at any time that the infant shows any interest.
- The infant can be encouraged to suckle again by using a breastfeeding supplementer (11,13) (Figure 4) or the "drop and drip" method (61) (Figure 5).
- Stimulate the breast by hand or mechanical expression
- Avoid using bottles or pacifiers, and if necessary feed the infant by cup.

These techniques are described more completely below.

### 12.3 Breastfeeding supplementers

Breastfeeding supplementers are designed to provide the infant with a steady flow of a supplementary feed while he or she suckles and stimulates the breast and nipple. They are particularly useful when a breast is not producing much milk. They help to keep the infant at the breast for a longer time with a good pattern of suckling.

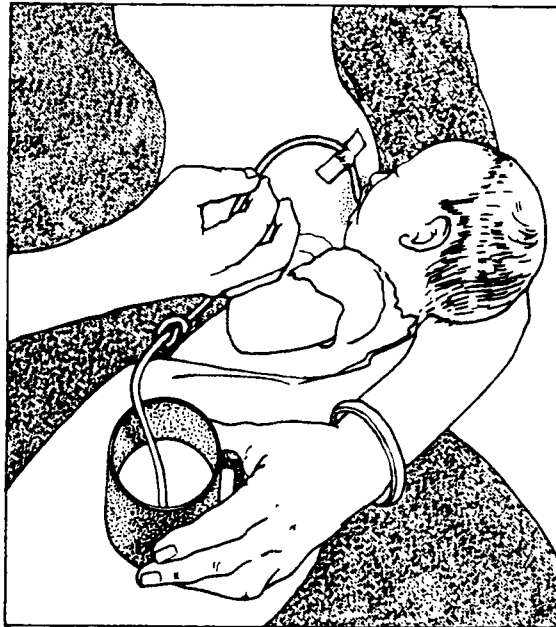
A supplementer consists of a bag, bottle or cup of the milk feed with a fine tube, through which the feed can pass, leading along the nipple to the infant's mouth. There are a number of useful proprietary devices which are suitable in settings where they are available and affordable (13) and where they can be adequately cleaned and maintained. A simpler form of breastfeeding supplementer, made from a cup and a length of fine plastic tube, has been used with success in situations where proprietary devices are unavailable or cannot be maintained (11,12,46) (Figure 4, Box 3).

The flow of milk must be regulated so that the breast receives enough stimulation before the infant's hunger and thirst are satisfied.

Fine plastic tubing is difficult to clean. It needs to be thoroughly rinsed with hot water and soap immediately after use. This can be done by drawing the water through with a syringe or by sucking as on a straw. It should then be sterilised with household bleach and rinsed again immediately before use with clean water. The tubing needs to be replaced every few days.



**Figure 4. Using a breastfeeding supplementer**

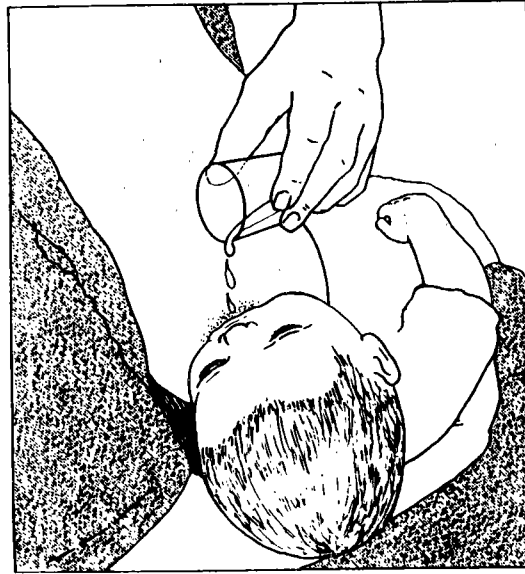


**Box 3. HOW TO HELP A MOTHER TO USE A BREASTFEEDING SUPPLEMENTER**

Show the mother how to:

- Use a fine nasogastric tube or other fine plastic tubing and a cup to hold the milk. If there is no very fine tube, use the best available.
- Cut a small hole in the side of the tube, near the end of the part that goes into the infant's mouth (this is in addition to the hole at the end). This helps the flow of milk.
- Prepare a cup of milk (expressed breastmilk or artificial milk) containing the amount of milk that her infant needs for one feed.
- Put one end of the tube along her nipple, so that her infant suckles the breast and the tube at the same time. Tape the tube in place on her breast.
- Put the other end of the tube into the cup of milk.
- Tie a knot in the tube if it is wide or put a paper-clip on it, or pinch it. This controls the flow of milk, so that the infant does not finish the feed too fast.
- Control the flow of milk so that the infant suckles for about 30 minutes at each feed if possible. (Raising the cup makes the milk flow faster, lowering the cup makes the milk flow more slowly).
- Let the infant suckle at any time that he is willing – not just when she is using the supplementer.
- Clean and sterilise the tube of the supplementer and the cup or bottle, each time she uses them.

**Figure 5. Drop and Drip Technique**



#### 12.4 *The "drop and drip" technique*

In the "drop and drip" technique (Figure 5), milk is dripped from a dropper or a cup directly onto the breast while the infant is suckling (61). This technique can be used to entice a reluctant infant to start suckling at the breast. It is less satisfactory when the infant is well attached to the breast, because the milk does not go into the infant's mouth so easily. Because the technique is easier with three hands, it can be difficult for a mother who has no-one to help her.

Seema et al (43) describe how they persuaded infants to start suckling by use of the drop and drip method and then continued with the breastfeeding supplementer.

#### 12.5 *Mechanical and hand expression*

If an infant is not willing or able to suckle at all for a time, the mother needs to stimulate her breasts in some other way. This is usually done by expressing breastmilk either manually (Figure 6, Box 4), or mechanically, using a hand-operated or electric breast pump (13).

Expressing breastmilk is particularly important for mothers of sick, low birth weight or premature infants for whom it is helpful to start milk production before the infant is able to suckle. Adoptive mothers and sometimes mothers who are relactating for their biological infants, also find it helpful to massage their breasts lightly, or to stroke them with a comb, before their infants start to suckle. Milk should be expressed 8-12 times daily, to approximate the range of feed frequency expected in the early days of lactation. Failure of the technique in the past may have been partly due to the recommendation of less frequent breast stimulation. With expression alone, breastmilk

starts to appear in between one to six weeks. Clinical experience suggest that more frequent stimulation results in earlier appearance of milk. Physiologically this would be expected, but it has not been studied scientifically.

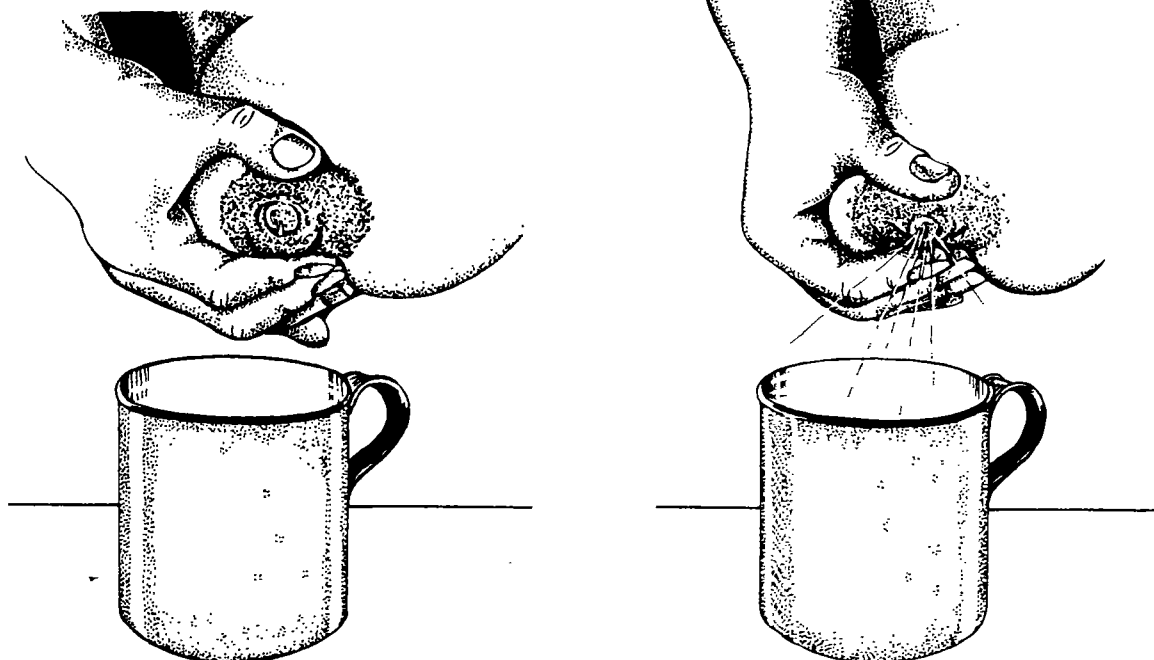
Mothers vary in their preference for mechanical or manual expression (38). In situations where breast pumps are unavailable or difficult to maintain, mothers commonly use hand expression successfully and there may be no need to recommend the use of pumps. In any case, neither of these methods should take the place of suckling by the infant when that is possible.

Some authors recommend continued manual or mechanical breast stimulation even after the infant has begun suckling. However mothers who are relactating find suckling alone very time-consuming and few find it practical to continue any additional breast stimulation.

### Figure 6. Expressing milk by hand

a. Place finger and thumb each side of the areola and press inwards towards the chest wall.

b. Press behind the nipple and areola between your finger and thumb.



#### Box 4. HAND EXPRESSION OF MILK

The technique is similar if a woman is expressing her breasts to stimulate milk production before she relactates, or if she is expressing milk to feed an infant or to keep up her milk production.

*Teach a mother to express herself. Do not do it for her. Touch her only to show her what to do. Be gentle. Teach her to:*

- wash her hands thoroughly.
- sit or stand comfortably, and, if milk is being produced, hold a clean container for it near her breast.
- put her first finger and thumb either side of the areola, behind the nipple (Fig 6a).
- press her first finger and thumb slightly inwards towards the chest wall.
- compress and release the breast between her finger and thumb (Fig 6b).
- continue pressing and releasing all round the breast, to make sure that all parts are stimulated.
- avoid rubbing or sliding the fingers over the skin, and squeezing the nipple.
  - this can make the breast and nipple sore.
- continue expressing the breast for at least 4 minutes, and then express the other side.
- repeat the procedure several times, continuing for at least 20-30 minutes.
- repeat several times a day, building up to at least 8 times in 24 hours, even if no milk seems to come for many days.

Using this technique, breastmilk may start to appear after a week, but sometimes takes longer.

#### 12.6 Skin-to-skin contact

The breastfeeding counsellor should explain that it is important for the mother to hold the infant close to her, to sleep with the infant, and to give skin-to-skin contact as often as possible. Skin-to-skin contact is reported as useful by mother-to-mother support groups for a wide range of breastfeeding problems and may increase milk production (59). Infants who have never breastfed or who have refused to breastfeed often start breastfeeding again spontaneously if they are given skin-to-skin contact without urging them to take the breast. Other forms of close contact between mother and infant, such as co-bathing (65) and moving, rocking and walking while offering the breast have been reported to be effective. Some mothers find it helpful to support the infant in a sling.

Skin-to-skin contact soon after birth helps newborn infants to find the breast and to start suckling spontaneously (62). This may be because the sense of smell is important for locating the nipple (63). Touching the nipple may affect the mother's behaviour and neuro-endocrine response (64) and increase prolactin secretion. When low birth weight babies have skin-to-skin contact with their mothers, breastmilk production increases (59), and they continue to breastfeed for longer (58).

### 12.7 *Supplementing the infant*

While the mother's breastmilk supply is becoming established, it is essential to ensure that the infant receives adequate nourishment. If expressed breastmilk is available, this is usually the best alternative. If it is necessary to use a breastmilk substitute, this must be nutritionally adequate, for example, a commercial formula, or home-prepared formula made from fresh or processed animal milk. It must be prepared hygienically, at the correct strength, and given in adequate amounts. Commercial formula should be made according to the instructions on the tin. If cow's milk is used, add 50 ml water and one teaspoon (5g) sugar to 100 ml of milk to make 150 ml of the feed. Water-based drinks, such as juice and tea, and dilute cereal preparations are not appropriate.

If an infant is not willing to suckle at a non-productive breast, the supplement can be given through a breastfeeding supplementer (Section 12.3). If the infant is willing to suckle at a non-productive breast, the supplement can be given separately. Cup feeding (54) is becoming the preferred way to give supplements (see Figure 3 and Box 2), provided it is done correctly. Cup feeding is practical for low birth weight as well as larger infants. Spoon-feeding is an alternative if the mother prefers the method, provided she persists in giving adequate quantities of the feed using this technique. Feeding bottles and pacifiers should be avoided (7), and the breast should be offered when the baby shows interest in sucking anything. Initially the amount of supplement given should be the full amount according to the infant's weight, normally 150 ml per kg of the infant's body weight per day, divided into 8 or more feeds. As breastmilk production increases, the amount of supplement consumed will be reduced (Section 16). The infant's weight should be monitored regularly to ensure adequate nutrition and growth (Section 15).

### 12.8 *Summary of essential measures for management of breastfeeding for relactation*

Based on practical experience of both health care professionals and lay breastfeeding support groups, and supported by physiological understanding, the following management is currently recommended:

- Counsel the mother: assess the situation, inform, motivate, give continuing support
- Discuss with the mother's family and friends how they can support her
- Help with underlying physical difficulties in the mother or infant (treat illness, give skilled help with anatomical difficulties)
- Help her to stop or change any factors which could reduce breastmilk production or suckling
- Encourage close contact, including plenty of skin-to-skin contact, between mother and infant
- Ensure adequate breast and nipple stimulation
- Ensure that the infant is well attached to the breast for effective suckling and to avoid nipple trauma
- Help the infant to suckle frequently, day and night, from both breasts: 1-2 hourly if possible, at least 8-12 times in 24 hours, at least 15 minutes on each breast.
- For the infant who is unwilling to suckle, using the drop-and-drip method and/or a breastfeeding supplementer to entice him or her to try

- Stimulate the breasts by manual or mechanical expression until the infant is willing and able to suckle
- Supplement the infant from a cup, and avoid using bottles and pacifiers
- Monitor the infant's weight

In many cases these techniques are sufficient by themselves to start the production of breastmilk.

### 13. Pharmacological measures

#### 13.1 *Lactogogues*

If the physiologically based methods described above are not effective alone and no milk appears, or if the infant does not gain weight, pharmacological methods can be considered. Drugs which cause milk secretion are called *lactogogues* (or *galactogogues*). The term lactagogue is also sometimes used for herbal preparations which are believed to increase the production of milk, whether or not a pharmacological effect has been demonstrated. It is important to recognise that although certain drugs may enhance the effect of stimulation of the breast, they are not fully effective alone. Thus even if drugs are used, full stimulation of the breasts is necessary.

The drugs that are used are:

- *Hormonal preparations* to simulate pregnancy to help induce lactation.
- *Drugs which increase prolactin release:*
  - chlorpromazine
  - metoclopramide

Other drugs are described in some publications, but are not further described here:

- *Sulpiride*, a drug related to metoclopramide, is used in some countries but is not available or recommended in others. Significant amounts of the drug are secreted in the milk, with possible adverse effects on the infant.
- *Thyroid-releasing hormone* has also been shown to increase prolactin release, and has been used in some hospital based studies (66), and as a test of the prolactin response (31), but is probably not appropriate for routine use.
- *Oxytocin given by nasal spray* was sometimes used in the past to increase breastmilk production, but it is no longer widely available. In one study, oxytocin given before mechanical expression resulted in the volume of milk removed by 4 mothers of premature infants being 3 to 5 times greater than that removed by 4 placebo users (79). The expected effect of oxytocin would be to facilitate milk removal, not milk secretion. It is possible that more effective removal of milk could contribute indirectly to an increase when some milk is already being secreted, but it would be unlikely to help initiate or re-establish milk production.

#### 13.2 *Hormonal preparations*

Preparations of oestrogen, progesterone or hormonal contraceptives, both oral and injectable, are sometimes given, most commonly to induce lactation in adoptive mothers who have never been pregnant (39,67,68). The aim is to mimic the hormonal changes

of pregnancy, and to stimulate breast development and growth of secretory alveoli. Milk production is expected to begin a few days after the hormones are discontinued, which is timed to coincide with the arrival of the adopted infant. No controlled studies have been identified, and it is not possible at this time to recommend any specific method.

Hormonal treatment is sometimes given in combination with prolactin stimulating drugs. The hormonal preparations are given before suckling is started, followed by withdrawal of the hormone and mechanical breast stimulation shortly before the child is adopted. Chlorpromazine or metoclopramide are given after suckling begins. In one study, adequate lactation was achieved after 5-13 days in 11 of 12 mothers who had never lactated before (39). There are no reported studies using controls.

### 13.3 *Chlorpromazine*

Galactorrhoea (spontaneous secretion of breastmilk) is a recognised side effect of the use of large doses of chlorpromazine (1,000 mg or more daily) for the treatment of psychiatric patients (27). Jelliffe used moderate doses of chlorpromazine (50 mg 3 times a day for 7 days), in addition to suckling, in relactation clinics in Uganda (30). Brown (27,28) in the early 1970's used chlorpromazine in addition to suckling to help induce lactation in women feeding orphans in refugee camps in India and Vietnam. He gave 25 to 100 mg of chlorpromazine 3 times daily for 7-10 days to help initiate milk production in non-lactating women who were suckling one or more infants. In Papua New Guinea, chlorpromazine was used in doses of 25 mg 4 times a day to help both puerperal and non-puerperal women to lactate for adopted or fostered infants (39). These studies were not controlled, and the results are variable. However, in most cases some breastmilk was produced within 5-10 days, with more than half of the women establishing full lactation.

### 13.4 *Metoclopramide*

Metoclopramide is used to treat nausea in adults, and gastro-oesophageal reflux in infants. It has been shown to increase prolactin secretion (69,78), and was reported in 1975 to increase breastmilk secretion (70,71). Small amounts are secreted in milk, but they are well below the dose used for treatment of infants with gastro-oesophageal reflux. No side effects have been observed in infants whose mothers are treated with metoclopramide at the recommended dose, (10 mg three times daily for 7-14 days) so it is considered safe in this respect.

Three controlled studies have been identified of the use of metoclopramide to increase breastmilk production. Kauppila et al in 1981 (72) studied 37 women with insufficient breastmilk 13 to 110 days postpartum in a placebo-controlled, cross-over study. Giving 30-45 mg of metoclopramide per day increased the women's breastmilk production by about 200-300 ml daily. A smaller dose of 5 mg three times daily had no effect. However, Lewis et al in 1980 (75) treated 10 of 20 women, who had delivered by Caesarean section, for 7 days, and found no difference between the two groups. Relactation in both may have depended more on appropriate breastfeeding management and support. More recently, in 1991, Ertl et al (74) compared eleven women given metoclopramide 10 mg three times daily from immediately after delivery with eleven

untreated controls. On day 5, the breastmilk production was significantly higher in the treated than in the placebo group.

There are a number of other reports of increased breastmilk production following the use of metoclopramide (45,46), but the studies were uncontrolled, and mothers also received help with breastfeeding. Gupta and Gupta in 1985 (44) found that 28 of 32 women with insufficient milk responded to treatment in 2-5 days. Ehrenkranz and Ackerman in 1986 (73) observed an increase after 7 days in the volume of milk expressed by 23 mothers of premature babies whose milk production was previously decreasing. Budd et al in 1993 (76) reported a case of an infant who failed to thrive while breastfeeding. Following treatment with metoclopramide, the mother's serum prolactin and breastmilk production increased, and the infant gained weight and returned to exclusive breastfeeding.

Metoclopramide has also been used for relactation and induced lactation (27,39,44,45,46). However, it does not necessarily ensure success. Banapurmath (41) gave 10 mg three times a day for 10-15 days to 10 adoptive mothers, all of whom had breastfed previously and only 5 succeeded in producing breastmilk. In another study by the same authors (42), 15 mothers (13 biological and 2 adoptive) all succeeded in producing breastmilk using physiological methods only, with no drug treatment. Abejide et al achieved relactation in 6 mothers without using any drugs. Seema et al (43) randomly assigned 25 of 50 relactating mothers to receive metoclopramide 10 mg three times daily for 10 days. All 50 mothers received support, motivation and skilled help to ensure adequate suckling. All 50 mothers relactated, and there was no significant difference in performance between the two groups. Seema et al conclude that with adequate help from a health worker, a lactagogue should not be needed.

In conclusion, it appears that metoclopramide and other drugs may help to increase a diminishing breastmilk supply, but it is uncertain how much they help when breastfeeding has stopped altogether. With skilled support from a health worker, pharmacological preparations are probably not necessary for relactation. Their use is not recommended as a routine (77,78) for the following reasons:

- Their effectiveness has not been sufficiently established by placebo-controlled trials, or compared to good physiological techniques.
- They can cause side effects in the mother, such as gastrointestinal and neurological symptoms.
- Mothers and health workers may become dependent on them and believe that it is not possible to lactate without using a drug.
- Less attention may be paid to breastfeeding counselling and support for the mother.
- On discontinuation of the drug, if the mother does not receive adequate support, the supply of milk may decrease.

Use of a drug should only be considered if adequate physiological methods have been tried for at least 2 weeks, and relactation has not yet occurred. Metoclopramide 10 mg three times daily for one to two weeks, is the drug of choice when medication is indicated (77,78). The drug should be discontinued after a maximum of 2 weeks or



earlier if a breastmilk supply has been established. Continued good management of breastfeeding should be ensured to sustain breastmilk production.

### 13.5 *Natural lactogogues*

A variety of natural lactogogues, including Brewer's Yeast, herbal teas, and warm cereal drinks, have been used by relactating mothers. Some are white, milky looking preparations. There are anecdotal reports of their effectiveness, but few have been evaluated scientifically. If a woman or her family have a strong belief in the effectiveness of a traditional drink, it may help her psychologically to take it.

Alcohol, particularly beer, is sometimes recommended for increasing breastmilk production. However, a recent controlled study (80) showed that consumption of alcohol reduced the infant's intake of breastmilk at the following feed. Beer has been shown to increase prolactin levels, but it seems that substances other than alcohol in beer are responsible (81). Garlic is also sometimes recommended. The ingestion by the mother of a garlic capsule was found (82) to increase the length of time that the infant stayed at the breast during feeds, compared to ingestion of a placebo. However, if the mother repeatedly consumed garlic, the test capsule made no difference.

## 14. Care for the mother or foster mother

### 14.1 *Food*

Good nutrition is often considered necessary to enable a woman to lactate adequately. However, research has not demonstrated that increasing the food intake of adequately nourished women affects their milk output, though it may do so in malnourished women (83,89). Nevertheless, an adequate diet is recommended both by health care professionals (28,40,46) and by women who have themselves relactated or induced lactation. This may be of particular importance for adoptive mothers who have not usually laid down the fat deposits associated with pregnancy in adequately nourished women (28).

Women who are undernourished should receive nutritional support for the sake of their own health, as well as for lactation. Nutritious snacks and drinks may have both dietary and psychological benefits and increase a woman's energy, which can help her to breastfeed and to care for her child in other ways. However it is important not to create assumptions that a special kind of diet is necessary for relactation any more than it is for ordinary lactation. For women who are receiving food supplements, an extra 500 kcal of food per day is recommended during lactation.

### 14.2 *Fluids*

An increased fluid intake was recommended in the past to increase milk production, but there is no evidence that drinking more than is dictated by natural thirst has any effect. Excessive fluid intake, well above what is required to satisfy thirst, may even be associated with a reduced milk production (84). It is recognised that lactating women have increased thirst and provided that they can respond to this, they will drink enough to replace what they secrete in breastmilk. Auerbach and Avery reported that women

varied in the amount that they drank while relactating, but there was no association between fluid intake and milk production.

#### 14.3 *Rest*

Rest is often recommended for increasing breastmilk production (30,46). There is little evidence of a specific effect, though the prolactin response to suckling is increased at night. The main benefit of rest is probably to enable a mother to respond freely to her infant and to breastfeed frequently. It may be worth including the recommendation for this reason, though it should not be considered that complete bed rest is essential for relactation. It may be helpful to explain to a woman's family and friends that she needs rest, to encourage them to give her practical help and to relieve her from her other duties, in order that she can breastfeed her infant as often as possible. They need to understand that she is not being lazy.

#### 14.4 *Time off work*

Women who are employed outside the home are at particular risk of decreased milk production, if they cannot breastfeed as often as necessary. Sometimes their infants become sick as a result of artificial feeding, or refuse to breastfeed even when their mother is at home. These women may also have particular difficulty in responding often enough to their infants to relactate.

If possible, they should ask for sick leave for 1-2 weeks in order to re-establish their milk supply. If this is not possible, they can try the techniques described above intensively over a weekend, and at night during the week. The infant should be cup fed while the mother is away from home, and she should express her breasts as often as possible while at work to further stimulate milk production.

#### 14.5 *Protection from violence*

Women at risk of violence may need protection in order to be able to respond adequately to their infants. In emergency situations, if women are being encouraged to relactate for their own or adopted infants, it may be necessary to provide a sheltered space where breastfeeding women can stay together to help and support each other.

### **15. Monitoring the infant's intake**

#### 15.1 *Checking the infant's weight gain*

Regular weighing is the most reliable way of deciding if an infant's intake is sufficient. It is important to ensure that an infant is gaining enough weight over the course of a week or more. Some infants are "happy to starve" and may appear content without gaining weight.

Weighing once a week is usually the most satisfactory frequency. "Test weighing" before and after breastfeeding or weighing more than once a week is not useful for full term infants and often increases a mother's anxiety. However weighing low birth weight babies more frequently has been found in some situations to reassure mothers and build their confidence.

Weighing should confirm that an infant under 9 months of age gains at least 125 grams a week or 500 grams a month after the first 10 days after birth. When an infant is exclusively breastfed, these signs are sufficient to indicate that a mother is producing enough milk.

Observant parents may notice that their infant in “filling out” or outgrowing clothes, which is also a sign of weight gain.

### 15.2 *Changes noticed as breastmilk is produced*

Mothers may become aware of changes in their breasts, which may feel fuller or firmer, or they may leak milk or be able to express milk. The most important sign of increased breastmilk production is the infant consuming less supplement, but continuing to gain weight. If the mother uses a supplementary feeding device while breastfeeding or if she breastfeeds first and then gives a supplement, it is easy to observe how much has been consumed. This is not completely reliable over a short time, as the amount of supplement an infant takes can vary from day to day. For example, during a sudden growth spurt, an infant may require additional supplements for a few days. However, over a longer time, a clear trend can usually be observed.

### 15.3 *Urine and stools*

These can be a helpful day to day indication of adequate intake. Frequent urination (6 or more wet diapers daily, with pale, dilute urine) is indicative of adequate fluid intake. In the first four weeks or so, most breastfed infants pass loose, yellow-brown stools several times daily (56). After the first month the frequency may be reduced to once a day, or as infrequently as once in 7-10 days. The stools will be correspondingly larger in quantity. The consistency and colour begin to change only when other foods are added to the infant's diet, around the middle of the first year. Infants fed artificial supplements have firmer, more bulky stools. As breastmilk production increases, a mother may notice changes in her infant's stools, which become softer, more like the stools of a breastfed infant.

### 15.4 *Activity*

An infant's activity level can also be a sign that his intake is sufficient. An infant who wakes spontaneously every 2-3 hours demanding a feed, who feeds vigorously and has some energy to spare for social interaction appropriate to his age is probably getting enough. An infant who is not getting enough may seem very quiet and undemanding because he lacks the energy to insist on being fed.

### 15.5 *Assessing breastmilk production*

Once breastmilk production starts, it is necessary to decide how much of an infant's intake is from the breastmilk. A useful way to decide approximately is by subtraction, as follows:

1. Estimate the infant's total needs according to his or her weight
2. Subtract the amount of supplement that he is taking.

The difference is approximately the amount of breastmilk that he is taking, and therefore that the mother is producing.

## 16. Decreasing the supplement

### 16.1 *The amount of supplement required*

The first priority for all infants is adequate intake of the nutrients needed for brain and body growth. For mothers who are relactating or inducing lactation, it is essential to see that their infants are continuing to develop well as they establish breastfeeding. To continue supplements in larger quantities or for a longer time than is absolutely necessary is preferable to reducing them too much or too quickly.

Initially, an infant should be given the full amount of supplement recommended according to his weight (150 ml full strength breastmilk substitute per kg body weight per day) either through a breastfeeding supplementer or with a cup or spoon. As breastmilk production increases, the supplement can be reduced, usually by about 50 ml per day every few days.

### 16.2 *How to reduce the supplement*

In some cases an infant shows that he needs less by refusing to take the supplement or to suckle from the second breast. This can be quite easy to see when a breastfeeding supplementer is used.

In some cases the mother must try to reduce the supplement. She needs to reduce the supplement enough to encourage more enthusiastic and/or longer and more frequent breastfeeds, but she must not reduce it so much that her infant becomes too hungry or too inactive to feed properly.

One useful way to reduce supplements is as follows:

- Reduce the total amount of supplement given in 24 hours by 50 ml.
- This amount can be divided between several feeds: for example, reduce 5 supplementary feeds by 10 ml each; or reduce two feeds by 25 ml each.
- Continue with the reduced amount of the supplement for the next few days.
- If the infant shows by his behaviour that he is getting enough and if, after a week, he has gained 125 g or more of weight, reduce the supplement again by the same amount.
- If the infant shows signs of hunger or if he has not gained weight at the end of a week, do not reduce the supplement - continue with the same amount for one more week.
- If the infant continues to show signs of hunger or he still has not gained weight after another week, increase the supplement again to what it was before the reduction.

There are several routines which can be used for giving the supplement and mothers should be encouraged to use the one which is most convenient for them. Many prefer to supplement at some feeds and not at others. A common pattern is to breastfeed without supplements early in the day or at night when the breasts feel fullest and to give a supplement later in the day. Another common pattern is to supplement at alternate feeds. Sometimes supplements continue to be needed until complementary feeds start.

## 17. Conclusion

Studies of relactation vary in their size, methods and cultural context. The main emphasis of investigators has been on the short term outcome and on the determinants of success of the procedure. Where infants have been followed up after relactation, it appears that their growth has been normal. However, follow up has not usually continued for much more than about 4 months. Soon after this time, it would be expected that infants start to receive complementary foods in addition to breastmilk. However, sustained breastfeeding as recommended is particularly important for these infants, many of whom will have suffered a period of illness and poor growth when breastfeeding was interrupted.

Some clear and important conclusions can be drawn:

- Relactation is possible and practical for almost any woman if she is adequately motivated and supported. Age, parity, previous breastfeeding experience, and lactation gap, are less important factors.
- In widely varying studies, the majority of mothers produce breastmilk, usually starting within about 1 week. Roughly half of all mothers who relactate are able to breastfeed their infants exclusively within one month. Mothers relactating for infants to whom they gave birth breastfeed exclusively more often than adoptive mothers.

The main requirements to achieve relactation are:

- Adequate motivation, education and support of the mother or foster mother. She may be motivated because of the health and nutritional advantages for the infant, or because of the benefits to her relationship with the infant.
- Frequent suckling by the infant, day and night. Many infants are willing to suckle the first time they are put to the breast. Other infants need to be helped to attach to the breast and start suckling.
- Skilled help for the mother, particularly if the infant is unwilling and needs help to suckle. Selected health workers should be trained to provide the necessary skilled help.
- Continued support and encouragement for the mother or foster mother from health workers, using appropriate counselling skills to build and sustain confidence. This may be one of their most important roles in helping these women.
- Support from friends and family. The infant's father or foster father may play a key role.
- Drugs (lactogogues) should be considered only if milk production has not started after at least 2 weeks of using adequate physiological methods. The effectiveness of drugs has not been proved, and they are not routinely necessary. They should not replace physiological techniques and continued emotional support.

The priority in breastfeeding promotion programmes should be to ensure that mothers receive adequate help and support throughout pregnancy and the post partum period to enable them to breastfeed optimally from the time of delivery. However, there will always be a proportion of mothers who for reasons such as illness, premature delivery,

early introduction of supplements, or mismanagement, experience difficulties with breastfeeding, and need help to relactate. When an infant is adopted, in normal or emergency situations, relactation or induced lactation can be the best choice of feeding method. The procedure should become a standard health intervention. Selected health workers should be identified and trained as breastfeeding counsellors, and supported in the implementation of the relevant skills to help mothers relactate.

#### Box 5. HOW TO HELP A WOMAN TO RELACTATE

- Explain why it would help her infant to breastfeed exclusively, and what she needs to do to increase her breastmilk supply. Explain that it takes patience and perseverance.
- Build her confidence. Help her to feel that she can produce enough breastmilk for her child. Try to see her and talk to her often – every day if possible
- Make sure that she has enough to eat and drink.
- Encourage her to rest more, and to try to relax when she breastfeeds.
- Explain that she should keep her child near her, give him plenty of skin-to-skin contact, and do as much as possible for him herself. Grandmothers and other family members can help if they take over other responsibilities, but they should not care for the child at this time. Later they can do so again.
- Explain that the most important thing is to let her infant suckle more – at least 8-10 times in 24 hours, more if he is willing. Sometimes it is easiest to get an infant to suckle when he is sleepy.
  - She can offer her breast every two hours.
  - She should let him suckle whenever he seems interested.
  - She should let him suckle longer than before at each breast.
  - She should keep him with her and breastfeed at night.
- Discuss how to give other milk feeds, while she waits for her breastmilk to flow, and how to reduce the other milk as her milk increases.
- Show her how to give the other feeds from a cup, not from a bottle. She should not use a pacifier.
- If her infant refuses to suckle on a breast which does not provide much milk, help her to find a way to give the child milk while he is suckling. For example, with a supplementer, a dropper or a syringe.
- For the first few days, she should give the full amount of artificial feed for a child of his weight (150 ml per kg per day) or the same amount that he has been having before. As soon as her breastmilk begins to flow, she can start to reduce the daily total by about 50 ml every few days.
- Check the child's weight gain and urine output, to make sure that he is getting enough milk.
  - If he or she is not getting enough, do not reduce the artificial feed for a few days.
  - If necessary, increase the amount of artificial milk for a day or two.

If a child still breastfeeding sometimes, the breastmilk supply increases in a few days. If a child has stopped breastfeeding, it may take 1-2 weeks or more before much breastmilk comes.

## REFERENCES

1. Waletsky LR, Herman EC. Relactation. *Am Fam Phys* 1976; **14**: 69-74.
2. Mepham TB. *Physiology of Lactation* 1987; Open University Press.
3. Mepham TB. Suckling-induced stimulation of breastmilk. *New Generation* September 1991, 31/32 (National Childbirth Trust, Alexandra House, Oldham Terrace, Acton, London W3 6NH, UK)
4. Hartmann PE. The breast and breastfeeding, Chapter 33 of *Scientific Foundations of Obstetrics and Gynaecology*, 4<sup>th</sup> Edition. Philip E, Setchell M, Ginsburg J, Butterworth&Heineman 1991.
5. Howie PW. Breast Feeding – a New Understanding. *Midwives Chronicle and Nursing Notes* July 1985; 1-12.
6. Woolridge MW. a) The ‘anatomy’ of infant suckling. *Midwifery* 1986; **2**: 164-171. b) Aetiology of sore nipples. *Midwifery* 1986; **2**: 172-176.
7. Woolridge MW. Problems of establishing lactation. *Food and Nutrition Bulletin* 1996; **17**(4): 316-323.
8. Glasier AS, McNeilly AS, Howie PW. The prolactin response to suckling. *Clinical Endocrinology* 1984; **21**:109-116.
9. Zinaman MJ, Hughes V, Queenan JT, Labbok MH, Albertson B. Acute Prolactin and oxytocin responses and milk yield to infant suckling and artificial methods of expressing in lactating women. *Paediatrics* 1992; **89**:437-440.
10. Wilde CJ, Prentice A, Peaker M. Breast-feeding: Matching supply with demand in human lactation. *Proc Nut Soc* 1995; **54**: 401-6.
11. WHO and UNICEF. *Breastfeeding Counselling: A Training Course*. WHO/CDR/93.3-6, UNICEF/NUT/93.1-4.
12. Savage King F. *Helping Mothers to Breastfeed* 2<sup>nd</sup> Edition, 1992, African Medical and Research Foundation, Box 30125, Nairobi, Kenya.
13. Lang S. *Breastfeeding Special Care Babies*. Bailliere Tindall 1997.
14. Royal College of Midwives: *Successful Breastfeeding* 1991, 2<sup>nd</sup> Edition, Churchill Livingstone
15. Neifert M, Lawrence R, Seacat J. Nipple confusion: Towards a formal definition. *J Pediatr* 1995; **126** S125-9.
16. Fisher C, Inch S. Nipple confusion – who is confused? *J Pediatr* 1996; **127**: 174.
17. Field LE. Lactation in a Virgin Heifer, *The Cornell Veterinarian* 1958; Vol. **XLVII**, No. 4.

18. Cowie AT. The Milking Stimulus and Mammary Growth in the Goat. *J. Endocr.* 1968; **40**: 243-252.
19. La Leche League International. *The Womanly Art of Breastfeeding*. 6<sup>th</sup> Edition, 1998. La Leche League International (LLLI), P.O. Box 4079, Schaumburg, IL 60168-4079 USA.
20. Hernandez MS. Breastfeeding my adopted baby. *Association of Breastfeeding Mothers newsletter* 1992; **13**(9): 7-8, reprinted in *MIDIRS Midwifery Digest* 1993; **3**(1):75.
21. Phillips V. (Thorley Phillips V) Non-Puerperal Lactation Among Australian Aboriginal Women, Part 1. *Nursing Mothers Association of Australia (NMA) Newsletter* 1969; **5**(4), Reproduced as *NMA Research Bulletin No 1* 1969, Part II *NMA Newsletter* 1969; **5**(6) Reproduced as *NMA Research Bulletin No 2* 1969.
22. Marieskind H. Abnormal lactation. *J Trop Paediatr* 1973; **19**(2): 123-8.
23. Foss GL, and Short D. Abnormal Lactation. *J Obst Gynaec Brit Empire* 1951; **58**: 35.”
24. Ryba KA and Ryba AE. Induced lactation in nulliparous adoptive mothers. *New Zealand Medical Journal* 1984; (28 Nov. 1984)
25. Thearle MJ and Weissenberger R. Induced Lactation in Adoptive Mothers. *Aust NZ J Obstet Gynaec* 1984; **24**: 283.
26. Slome C. Non-puerperal lactation in grandmothers. *Journal of Pediatrics* 1956; **9**: 550-552.
27. Brown RE. Relactation with Reference to Application in Developing Countries. *Clinical Pediatrics* 1978; **17**(4): 333-336.
28. Brown Roy E. Relactation: An Overview. *Pediatrics* 1977; **60**(1): 116-120.
29. Jelliffe DB, and Jelliffe EFP. Nonpuerperal induced lactation (letter). *Pediatrics* 1972; **50**: 170-171.
30. Jelliffe DB and Jelliffe EFP. *Human Milk in the Modern World*. 1978 Oxford University Press.
31. Bose CL, D’Ercole AJ, Lester AG, Hunter RS, Barrett JR. Relactation by mothers of sick and premature infants. *Pediatrics* 1981; **67**: 565-569.
32. Newton M. Breastfeeding by an adoptive mother. *JAMA* 1970; **212**(11): 1967.
33. Cohen R. Breastfeeding Without Pregnancy. (Letter), *Pediatrics* 1971; **48**: 996-997.
34. Thullen JD. Management of hypernatremic dehydration due to insufficient lactation. *Clinical Pediatrics* 1988; **27**(8):370-372.



35. Thompson NM. Relactation in a newborn intensive care setting. *J Human Lactation* 1996; **12**(3): 233-235.
36. Auerbach KG and Avery JL. Relactation: A study of 366 cases. *Pediatrics* 1980 **65**(2): 236-242
37. Auerbach KG. and Avery JL. Induced Lactation: A Study of Adoptive Nursing by 240 Women. *Am. J. Dis Child* 1981; **135**: .
38. Auerbach KG. Extraordinary Breastfeeding: Relactation/Induced Lactation. *J.Trop Paed* 1981; **27**: 52-55.
39. Nemba K. Induced Lactation: A Study of 37 Non-puerperal Mothers. *J. Trop Paediatr* 1994; **40**: 240-242.
40. Abejide OR, Tadese MA, Babajide DE, Torimiro SEA, Davies-Adetugbo AA, Makanjuola ROA. Non-puerperal induced lactation in a Nigerian community: case reports. *Annals of Tropical Paediatrics* 1997; **17**: 109-114
41. Banapurmath CR, Banapurmath S, and Kesaree N. Successful Induced Non-puerperal Lactation in Surrogate Mothers. *Indian J. Pediatr.* 1993; **60**: 639-643.
42. Banapurmath CR, Banapurmath S, and Kesaree N. Initiation of Relactation. *Indian Pediatrics* 1993; **30**: 1329-1332.
43. Seema AK, Patwari L, Satyanarayana. Relactation: An effective Intervention to Promote Exclusive Breastfeeding. *J Trop Paediatr* 1997; **43**: 213-216.
44. Gupta AP, Gupta PK. Metoclopramide as a lactagogue. *Clin Ped* 1985; **24**(5): 269-272.
45. Rath KB, Ghai OP, Bhan MK, Arora NK, Dhar V, Thakkar D, Dhamija NK. Metoclopramide in lactational failure. *Indian Pediatr* 1983;**20**:341-344
46. Mathur GP et al. Lactation Failure. *Indian Pediatrics* 1992; **29**: 1541-4.
47. Kleinman R., Jacobson L, Hormann E. and Walker WA. Protein values of milk samples from mothers without biologic pregnancies. *J.Pediatrics* 1980; 612-615.
48. Kulski JK, Hartmann PE, Saint WJ, Giles PF, and Gutteridge DH. Changes in the milk composition of non-puerperal women. *Am. J. Obstet. Gynecol.* 1981; **139**: 597.
49. Thorley Phillips V. Relactation in Mothers of Children Over 12 Months. *J. Trop. Pediatrics* 1993; **39**: 45-46.
50. Miller-House S. Adoptive Nursing. *New Beginnings LLLI*, 1400 N. Meacham Road, P.O. Box 4079, Schaumburg, IL 60168-4079 USA; **8**(3) 1991.
51. Chaturvedi P and Dubey AP. Induced Non-Puerperal Lactation. *Indian J. Pediatr* 1985; **52**: 319-320.

52. Guóth-Gumberger M. Umgewöhnung von der Flasche zur Brust. *Stillnachrichten* 1994; 5-14.
53. Newman J. Breastfeeding Problems Associated with the Early Introduction of Bottles and Pacifiers. *J. Human Lact* 1990; 6(2): 59-63.
54. Lang S, Lawrence CJ, L'E Orme R. Cup feeding: an alternative method of infant feeding. *Arch Dis Chld* 1994; 71: 365-369
55. Riordan J. and Auerbach KG. *Breastfeeding and Human Lactation*, Boston: Jones and Bartlett, 1993.
56. Lawrence RA. *Breastfeeding: A Guide for the Medical Profession*. St.Louis: Mosby, 4<sup>th</sup> ed., 1994, 555-574.
57. Meier P. Breastfeeding the Premature Baby: A research review, *News Brief, Parent Care, Inc.* Vol 9, Israel 1994 (see also reference (55): Meier, P and Mangurtan, H. Breastfeeding the preterm infant, in Riordan, J and Auerbach, KG. *Breastfeeding in Human Lactation*, pp. 253-278; Boston: Jones and Bartlett 1993.)
58. Whitelaw A, Heisterkamp G, Sleath K, Acolet D and Richards M. Skin-to-skin contact for very low birthweight infants and their mothers. *Arch Dis Chld* 1988; 63:1377-1381.
59. Hurst NM, Valentine CJ, Renfro L et al. Skin-to-skin holding in the neonatal intensive care unit influences maternal milk volume. *J. Perinatol* 1997; 17: 213-17.
60. Sutherland A and Auerbach K. *Relactation and Induced Lactation*, Lactation Consultant Series 1985. La Leche League International, Box 4079, Schaumburg, IL 60168-4079 USA.
61. Kesaree N. Drop and drip method. *Indian Pediatrics* 1993; 30: 277-278.
62. Righard L. and Alade MO. Effect of delivery room routines on success of first breast-feed. *Lancet* 1990; 336: 1105-07.
63. Winberg J and Porter RH. Olfaction and human neonatal behaviour:clinical implications. *Acta Paediatr* 1998; 87:6-10
64. Widstrom AM, Wahlberg V, Matthiesen AS, Eneroth P, Uvnas-Moberg K, Werner S, Winberg J. Short term effects of early suckling and touch of the nipple on maternal behaviour. *Early Human Development* 1990; 31:153-163.
65. Harris H. Remedial Co-Bathing for Breastfeeding Difficulties. *Breastfeeding Review* 1994; 11(10): 465-8.
66. Peters F, Schulze-Tollert J, Schuth W. Thyrotropin-releasing hormone: A lactation promoting agent? *Br. J. Obst. Gynaecol* 1991; 98: 880-85
67. Randall Craig H. Presentation at the 1993 Conference of the International Lactation Consultants Association. (ILCA, 4101 Lake Boone Trail, Suite 201 Raleigh NC 27607, USA.)

68. Peters F. Laktation und Stillen: Physiologie, Klinik und Pathophysiologie der Brustdrüsenfunktion, Mastitis. Bücheri de Frauenarztes, Band 26. (Lactation and Breastfeeding: Physiology, clinical aspects and pathophysiology of breast glandular function, mastitis. The Gynaecologist's Library, Vol 26). Ferdinand Enke Verlag Stuttgart, Germany, 1987. From Chapter 8 "Milchbildung und Stillen unter besonderen Bedingungen" ("Milk Production and Breastfeeding under special conditions"), p.74
69. McNeilly AS, Thorner MG, Volans G, Besser GM; Metoclopramide and prolactin (letter). *Br Med J* 1974; 1(5921): 729
70. Sousa PLR. Metoclopramide and breastfeeding. *British Medical Journal* 1975; 512.
71. Sousa PLR, Barros FC, Pinheiro GN, Gazalle RV. Reestablishment of lactation with metoclopramide. *J Trop Paediatr* 1975; 21: 214
72. Kauppila A, Kivinen S, Ylikorkala O. A dose response relation between improved lactation and metoclopramide. *Lancet* 1981; 1: 1175-1177.
73. Ehrenkranz RA, Acherman BA. Metoclopramide effect on faltering milk production by mothers of premature infants. *Pediatrics* 1986; 78: 614-620.
74. Ertl T, Sulyok E, Ezer E, Sarkany I, Thurzo V, Csaba IF. The influence of metoclopramide on the composition of human breastmilk. *Act Paediatr Hung* 1991; 31: 5-422.
75. Lewis PJ, Devenish C, Kahn C. Controlled trial of metoclopramide in the initiation of breastfeeding (letter). *Br J Clin Pharmac* 1980; 9: 217-219.
76. Budd SC, Erdman SH, Long DM, Trombley SK, Udall JN: Improved lactation with metoclopramide. *Clin. Pediatr* 1993; 32:53-57
77. Emery ME, Galactogogues: Drugs to induce lactation. *J Hum Lact* 1996; 12(1) 55-57.
78. Hale TW, Medications and Mother's Milk. 1998 Edition, Pharmasoft Medical Publishing, 21 Tascocita Circle, Amarillo, Tx 79124-7301 USA
79. Ruis H, Rollen R, Doesburg W, Broeders G, Corbey R. Oxytocin enhances onset of lactation among mothers delivering prematurely. *Brit Med J* 1981; 283(6287): 340-42.
80. Menella JA, Beauchamp GK. The transfer of alcohol to human milk. *New England Journal of Medicine* 1991, 325: 981-5
81. Menella JA, Beauchamp, GK. Beer, breast feeding and folklore. *Developmental Psychobiology* 1993; 26(8):459-466.
82. Menella JA, and Beauchamp GK. The effects of repeated exposure to Garlic-flavoured milk on the nursling's behaviour. *Pediatr Res* 1993; 34: 805-808.
83. Prentice AM, Goldberg GR, and Prentice A. Body mass index and lactation performance. *European Journal of Clinical Nutrition* 1994; 48 Suppl 3, 578-589.

85. HIV and Infant Feeding: A guide for health care managers and supervisors. WHO/FRH/NUT/CHD/98.2; UNAIDS/98.4; UNICEF/PD/NUT/(J)98-2.
86. Protecting, promoting and supporting breastfeeding. The special role of maternity services. A Joint WHO/UNICEF Statement 1989.
87. Integrated Management of Childhood Illness:
  - Management of the Sick Young Infant WHO/CHD/97.3F
  - Counsel the mother WHO/CHD/97.3E
  - Chart booklet(course materials, Department of Child and Adolescent Health and Development, WHO, Geneva)
88. Marquis GS, Diaz J, Bartolini R, De Kanashiro HC, Rasmussen KM, Recognising the reversible nature of child feeding decisions: breastfeeding, weaning, and relactation patterns in a shanty town community of Lima, Peru. Soc Sci Med 1998; **47(5)**: 645-656
89. Gonzales-Cassion T, Habicht J-P, Rasmussen KM, Delgado H, Impact of food supplementation during lactation on infant breast-milk intake and on the proportion of infants exclusively breastfed. J Nutr 1998; **128 (10)**: 1692-1702.









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