2 Preventing HIV infection in young children

This Section describes how HIV infection can be transmitted to infants and young children. It also discusses strategies for preventing infection in children, in particular reducing HIV infection in women and reducing transmission through blood transfusions.

2 Mother-to-child transmission

**KEY POINTS**

- HIV can be transmitted from mother to child during pregnancy, delivery or breastfeeding.
- Recent infection or advanced HIV disease in the mother seem to increase the risk of transmission.
- The most effective way to prevent HIV infection in children is to prevent HIV infection in women.

Mother-to-child transmission is the most common way in which infants and young children are infected with HIV. It is important to remember that not all HIV-infected mothers pass the virus to their babies. Two-thirds of babies born to HIV-infected women do not become infected with the virus.

Because most HIV-infected children acquire the infection from their mother, the first priority in preventing transmission must be prevention of HIV infection in women. This means strategies which help women to protect themselves against HIV.

**How is HIV transmitted to children?**

HIV can be transmitted from an HIV-infected mother to a baby during:

- pregnancy
- delivery
- breastfeeding.

During pregnancy the baby may be infected because the virus passes through the placenta and umbilical cord or is present in the fluid in the womb (amniotic fluid).

During delivery the baby may be infected because he or she is exposed to maternal blood and secretions during labour while passing through the birth canal.

During breastfeeding the baby is exposed to the virus in breastmilk.

**When is HIV transmitted?**

The baby can become infected at any point from early pregnancy until the end of breastfeeding. It is thought that about a third of mother-to-child transmission occurs during pregnancy, and about two-thirds around the time of delivery and afterwards. Figures for the proportion of babies infected during breastfeeding vary, but on average it is thought that breastfeeding is responsible for 14 per cent of mother-to-child transmission.

**Risk factors**

The risk of HIV transmission to women is increased:

- if they have an unrecognised and untreated sexually transmitted disease (STD) (see STD box on page 10)
- by low status and inability to negotiate safer sex
- by inadequate access to information and condoms.

Based on the evidence available, the risk of HIV transmission from mother to child seems to be increased by:

- Recent infection in the mother. A woman who has recently been infected has more of the virus in her blood and body fluids,
including breastmilk. (The amount of virus she has is sometimes described as viral load.) So getting infected during pregnancy may increase the risk of transmission to the baby in the womb. Similarly, if the mother becomes infected during delivery (for example, through blood transfusion) or while she is breastfeeding she is more likely to transmit the virus to her baby through her breastmilk. Analysis of a number of studies of breastfeeding and HIV found that the transmission rate was around 14 per cent from mothers who were already HIV positive at delivery. But the rate of transmission from mothers who were infected after delivery during the breastfeeding period was 29 per cent.

- Advanced HIV disease or AIDS in the mother. A woman who has more advanced HIV disease also has a higher viral load and the risk of HIV transmission to the baby during pregnancy, birth or breastfeeding seems to be higher.
- Low birth weight and premature babies. Higher rates of infection may be because their immune systems are not fully developed and they are less able to fight off HIV.

The evidence about other factors which may increase the risk of transmission is not clear. Some studies have suggested that the risk of transmission may be greater if the mother has severe vitamin A deficiency, but more research is needed to determine whether other nutritional deficiencies may also be important.

Other factors being considered that may increase risk include length of labour after rupture of the membranes (the waters have broken), delivery method and practices. But again the evidence is not yet clear and more research is needed.

2.2 Preventing and treating HIV infection in women

This section discusses interventions for which there is evidence that they can reduce mother-to-child transmission of HIV. It also briefly describes potential interventions where more research is needed before we can be clear about their effectiveness in reducing transmission.

**Preventing infection in women**

The most effective intervention to reduce mother-to-child transmission is preventing infection in women before and during pregnancy and while they are breastfeeding. This is especially important, not only for the health of the woman but also because the risk of transmission to the baby is higher if the mother has recently been infected with HIV.

All women are at risk of acquiring HIV infection from:

- having unprotected sex – penetrative vaginal or anal sex without using a condom
- receiving an infected blood transfusion
- using unsterilised needles and syringes or cutting instruments that are likely to be contaminated with someone else’s blood.

**Factors which increase HIV risk**

Some cultural practices may increase women’s infection risk. For example, avoiding or limiting sex during pregnancy or breastfeeding may encourage men to have sex with other partners, increasing the risk that they acquire HIV infection and in turn infect the woman and the unborn child.

Sexually transmitted diseases (STDs) and reproductive tract infections (RTIs) increase the risk of HIV transmission in men and women. Studies have shown that men with untreated gonorrhoea and HIV infection have higher levels of HIV in their semen than men with HIV infection only. Treatment of the gonorrhoea reduces the levels of HIV. STDs associated with ulcers, such as chancroid, also increase the risk of HIV transmission. Better detection and treatment of STDs can reduce HIV transmission between men and women and hence reduce transmission to children.

**What can health workers do?**

The most important thing that health workers can do is to help women to protect themselves against infection with HIV.

Key aspects include:

- reproductive health services providing counselling, education and condoms, and better detection and treatment of STDs for men and women
- promoting safer sex, for men and women, and norms that support safer sex
Providing young women and girls with the information, skills and means to protect themselves and their unborn children from HIV infection is a key strategy.

- increasing women's skills in sexual negotiation, and providing women with information about HIV and STDs
- promoting women-controlled methods such as the female condom.

Health workers should advise women and men about the risks of HIV transmission associated with unprotected sex, contaminated blood transfusions and use of unsterilised equipment. They should help women in particular to take steps to avoid or reduce the risk of HIV infection before and during pregnancy and while women are breastfeeding.

Avoiding unsafe sex during pregnancy and breastfeeding is the most effective way to reduce the risk of having a child with HIV infection. This means providing young women and girls with the information, skills and means to practise safer sex to protect themselves and their unborn children from HIV infection and other STDs. It also means providing men and boys with information and skills to enable them to practise safer sex. Women cannot easily protect themselves and their unborn children unless men are also aware and concerned about HIV.

Safer sex is any sexual activity that does not involve semen (or blood or vaginal fluid) entering the body or coming into contact with broken skin, and includes:
- using a female condom for vaginal sexual intercourse
- using a male condom for vaginal or anal sexual intercourse

### How improved STD control can reduce HIV transmission

- In Kenya, programmes are combining promoting safer sex and syndromic management of STD to reduce HIV transmission.
- A study in Uganda found that HIV prevalence was higher among women with bacterial vaginosis, an STD that can be treated with metronidazole. Bacterial vaginosis (BV) is thought to be a factor in premature birth and premature rupture of membranes, both possible risk factors for mother-to-child transmission of HIV. Treating women with abnormal vaginal discharge for BV as well as gonorrhoea and chlamydia may help to reduce HIV.
- A trial in six villages in Tanzania, in Mwanza Region, showed that better detection and treatment of STD reduced HIV transmission among adults by 42 per cent. The intervention consisted of training health workers in STD syndromic management, making drugs available, and encouraging men in particular to seek treatment. The greatest reduction in HIV and STD was in women aged 15–24 years.
- Another study found that men with gonococcal urethritis had a higher concentration of HIV in their semen than men who had HIV but no gonococcal urethritis. Treating men for gonococcal urethritis (gonorrhoea) reduced the amount of HIV in their semen.
non-penetrative sex
oral sex (which still carries a little risk but is much less risky than vaginal or anal sex).

If these options are not possible, health workers can advise pregnant and breastfeeding women to reduce their risk of HIV infection by having fewer partners. STD control strategies to prevent infection and improve detection and treatment of STDs include:

- introducing syndromic management of STD
- promoting safer sex and condom use
- improving partner notification.

If a woman already has HIV infection

If a woman knows that she has HIV infection before she becomes pregnant she needs advice about pregnancy. In some places it may be appropriate for her to receive counselling to help her decide whether or not to have a child. If she decides not to have a child now then she needs advice about contraception and safer sex, and access to contraception.

However, most women in the world do not find out that they have HIV either until

What can health workers do?

Health workers should ensure that an HIV-positive woman receives advice or counselling and:

- is aware that a third of babies of women with HIV are born with the infection but that two-thirds are not
- understands that, if infected, her baby may be ill, possibly frequently, and may die at a young age, but that she also understands that her baby has a better chance of being well with good treatment, nutrition and care
- decides what she wants to do based on her individual situation and circumstances
- knows where to go for care and support for herself.

Antiretroviral therapy

Infected mothers with more virus in their blood and body fluids seem to be more likely to transmit HIV to their babies. Antiretroviral treatment has been shown to reduce HIV in the body and to reduce mother-to-child transmission.

In a study in 1994 in the USA, researchers found that giving the antiretroviral drug AZT (also called ziduvodine) to HIV-positive women from between 14 and 34 weeks of pregnancy until labour begins and during delivery, and to their newborn infants, reduced HIV transmission by two-thirds. In the control group of mothers, 25 per cent of infants were HIV positive, whereas in the...
group treated with AZT, 8 per cent of infants were HIV positive.

Although AZT was shown to reduce HIV transmission from mother to child, it is no longer recommended alone for treatment in the USA or Europe. Combination therapy – the use of more than one drug to reduce the amount of HIV in the body – has been shown to be more effective than monotherapy (treatment with one drug). Use of only one drug increases the chance that resistance will develop. Babies who have been exposed to AZT but who still acquire HIV have AZT-resistant strains of the virus making subsequent antiretroviral treatment more difficult. However, there are still unanswered questions about antiretroviral treatment during pregnancy. It is not clear:

- whether to reduce transmission, pregnant women need to take antiretrovirals throughout their pregnancy or for a short period in the later stage of pregnancy
- how effective antiretroviral therapy is in pregnant women with advanced HIV disease and AIDS
- if there are risks or longer term side effects of antiretroviral treatment during pregnancy for the woman or the infant
- whether giving antiretrovirals prevents transmission during breastfeeding, what effect they have on the amount of virus in breastmilk, or whether breastfeeding should be avoided if antiretrovirals have been used.

At the moment, in most developing countries, antiretroviral drugs are only available to wealthy women or those taking part in clinical trials. Although we know that antiretroviral therapy can reduce mother-to-child transmission of HIV, there are a number of obstacles to making this therapy available to HIV-positive pregnant women in developing countries.

- Antiretrovirals are very expensive. Treatment of a pregnant woman and an infant with AZT costs about US $1,000. Treatment with combination therapy costs more.
- Many pregnant women in developing countries do not know their HIV status. Antiretroviral treatment requires women to take an HIV test early on in pregnancy. Many pregnant women in developing countries currently do not have access to testing and counselling; some may prefer not to take an HIV test even if facilities are available.
- Women must take the antiretrovirals regularly during pregnancy and intravenously during delivery. Many women in developing countries do not visit clinics regularly during pregnancy or give birth in a health facility. Health facilities may not have the capacity to give intravenous treatment safely.

- One side effect of antiretroviral therapy is anaemia. Women in many developing countries already suffer from anaemia, because of malaria, parasites, poor diet and iron deficiency, and antiretroviral treatment may contribute to severe anaemia. Blood transfusion is the most common treatment given for anaemia. Where blood is not screened for HIV, blood transfusions would increase the risk of HIV transmission to pregnant women and hence to their infants.

- Health workers need education about prescribing and monitoring antiretroviral treatment.

- Even if antiretrovirals prevent HIV transmission during pregnancy or delivery, some infants may subsequently become infected if their mother breastfeeds.

- If antiretrovirals are made available to pregnant women, other women and men with HIV and AIDS would also wish to have access to treatment. In countries with limited resources it may not be possible to provide antiretroviral treatment to everyone who needs it, but justifying only providing it to pregnant women may be difficult.

- And finally, there is the issue of treatment of the woman herself, for the sake of her own health rather than for the purpose of preventing transmission to the baby. Will women have access to antiretroviral therapy after they have given birth?

2.3 Breastfeeding

How do we know that the virus can be transmitted through breastfeeding?

Women with HIV infection have the virus in their breastmilk as well as in their blood. Infants born to women who were HIV negative during pregnancy and at delivery but who were infected through an unsafe blood transfusion at delivery or while they were breastfeeding, have become infected with HIV. For these infants, breastfeeding by a newly HIV-positive mother was the only risk factor.

What is the risk of HIV transmission through breastfeeding?

It is estimated that the additional risk of infection is about 14 out of every 100 breastfed infants – or one in seven – of mothers who are HIV positive.
PREVENTING HIV INFECTION IN YOUNG CHILDREN

KEY POINTS

- One in seven babies born to HIV-positive women are thought to become infected with HIV by breastfeeding.
- HIV transmission risk increases if the mother becomes infected while breastfeeding or if symptoms of AIDS develop while she is breastfeeding.
- Improved access to voluntary testing and counselling is important in helping HIV-positive women make an informed choice about infant feeding.
- Once the mother has made a decision about what method of infant feeding is best for her and for her infant, she needs advice about the safest way to do this.

However, a woman who has recently been infected has more of the virus in her breastmilk, and the risk of transmission to the infant is higher if the mother is infected while she is breastfeeding. The additional risk of HIV infection to breastfed infants whose mothers are infected during breastfeeding is thought to be about 29 per cent. However the proportion of women who fall into this category is small, and it is difficult to identify them. It is thus particularly important to advise couples to prevent transmission during the breastfeeding period. Women who have AIDS may also have more virus in their milk and may be more likely to infect their babies.

Larger concentrations of the virus have been found in colostrum than in breastmilk. However, there is no evidence that giving a baby colostrum increases the risk of HIV transmission. It may just be that the virus is easier to measure in colostrum.

Some studies suggest that the risk of HIV transmission continues as long as a baby is breastfed and therefore the risk increases cumulatively the longer the breastfeeding period. Because the risk of not breastfeeding to the baby’s health decreases after the age of six months, the relative risk of HIV increases. We need to know more about HIV and colostrum and duration of breastfeeding before any clear recommendations can be made.

Preventing HIV transmission through breastfeeding

Where adequate alternatives are available and the risks associated with artificial feeding can be minimised, HIV-positive women are being advised not to breastfeed because of the risk that infants can become infected through breastfeeding.

Advising HIV-positive mothers about the best way to feed their infants in communities where it is difficult to minimise the risks of artificial feeding is much less straightforward. The current recommendation is that women should be provided with information and helped to make an informed decision about whether or not to breastfeed according to their individual circumstances.

Putting this recommendation into practice is not easy and, for health workers and mothers, there are many issues to consider.

- Breastfeeding protects babies against other infections and is the best and most hygienic form of infant feeding. In countries where malnutrition and infectious diseases are the main cause of infant deaths, not breastfeeding poses a very great risk to infants and young children. Infants who are not breastfed are much more likely to die from diseases such as diarrhoea and acute respiratory infection.
- Breastmilk substitutes – formula or animal milk – are costly to buy. For example, in Zimbabwe, the monthly cost of formula milk for a baby would be around Zimbabwe $250–300, about the same as the monthly minimum wage.
- Safe and hygienic preparation of alternatives to breastmilk require access to adequate supplies of clean water and fuel.
- In places where hygiene is poor and families lack money there may be no adequate alternatives to breastfeeding and it may not be possible to minimise the risk associated with other forms of feeding adequately. The risk to the infant of not breastfeeding in such circumstances is far greater than the risk of HIV transmission.
- In many places there is no access to voluntary testing and counselling and the...
HIV status of the mother may not be known.

- If the status of the woman is known, it is difficult to tell whether an infant of an HIV-positive mother has already been infected during pregnancy or delivery. It is also not possible to find out with an HIV antibody test — the most common form of test available — whether an infant of an HIV-positive mother is infected until after the age of 15-18 months. Before that age the baby still has its mother’s antibodies, including her HIV antibodies.

What should health workers do?

There are serious concerns that women, including those without HIV, will stop breastfeeding because of fears about transmitting HIV, putting their babies at risk of diarrhoea, respiratory infections and malnutrition. Health workers should remember that most women do not have HIV infection and that not all infants of HIV-positive women will become infected through breastfeeding. They must continue to get across the message that breastfeeding has many benefits and continue to promote it. It will be especially important to continue to promote breastfeeding for women who are HIV negative and to give accurate information at all levels because the issue of HIV transmission can easily undermine breastfeeding.

If a woman’s status is not known, she is in good general health and there is no reason to think she has been at risk of HIV, and if there are no voluntary counselling and testing facilities available, it is probably best to assume that she is not infected with HIV and to advise her to breastfeed. It is very important for health workers to explain about the increased risk of passing HIV to the baby if she becomes infected while she is breastfeeding and to advise about preventing infection.

If a woman’s status is not known and she is not in good health, it may be helpful for a health worker to assess the possibility that she is sick because of HIV. She may need help to assess whether she may be infected with HIV. This includes the possibility that she may have been infected during pregnancy or delivery. Good counselling is important to help a woman assess whether she has been at risk of HIV infection and to decide whether or not to have an HIV test if voluntary counselling and testing is available.

An important consideration in deciding about testing is whether knowing her HIV status will make a difference to her decision about breastfeeding. In many situations she may have no choice about whether or not to breastfeed. It may be helpful to find out what people usually do if they cannot breastfeed for other reasons.

However, in countries where many women have HIV infection and childhood infectious diseases are also common, health workers and mothers face a dilemma about what to do about breastfeeding. A lot will depend on local circumstances. The following steps are intended to help health workers to help mothers to decide what to do.

1. Consider the possibility that the mother may have HIV

   The possibility of HIV infection will depend on how common HIV infection is in your area and on the mother’s individual circumstances. If a mother already knows she has HIV infection, she needs counselling and support to help her consider the implications of being HIV positive and to make a decision about breastfeeding. This includes providing her with information about the benefits of breastfeeding, the risk of HIV transmission through breastfeeding, and the risks and advantages of alternative infant feeding methods.

   If a woman’s status is not known, she is in good general health and there is no reason to think she has been at risk of HIV, and if there are no voluntary counselling and testing facilities available, it is probably best to assume that she is not infected with HIV and to advise her to breastfeed. It is very important for health workers to explain about the increased risk of passing HIV to the baby if she becomes infected while she is breastfeeding and to advise about preventing infection.

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   An important consideration in deciding about testing is whether knowing her HIV status will make a difference to her decision about breastfeeding. In many situations she may have no choice about whether or not to breastfeed. It may be helpful to find out what people usually do if they cannot breastfeed for other reasons.
Counselling aims to enable a person to cope better with stress, find realistic ways to solve problems and make informed decisions. A counsellor's role is to listen and ask questions, and to provide relevant information, practical suggestions and emotional support. Counselling is not about giving advice or telling people what they should do.

Counselling is an essential part of voluntary and confidential HIV antibody testing programmes. It also plays a valuable role in HIV prevention and care on its own, without testing. Issues such as reducing the risk of infection, family planning, relationships, sexuality and sexual problems, are all important areas for discussion.

Anyone considering an HIV test for whatever reason should always have pre-test counselling, to help assess if he or she has been at risk, learn about the test and its implications, decide whether or not to be tested and think about how to prevent infection. Counselling should mean that a person's consent or refusal to be tested is an informed choice – made freely without pressure, and based on the person's own feelings about the disadvantages and advantages of knowing his or her HIV status.

Consent must be expressed, not implicit. Consent must be specific, not general. A person can give informed consent to an HIV test only after he or she has been given a proper explanation of the nature and likely consequences of taking the test. Informed consent means not only agreeing to the test itself but understanding the implications of a positive or negative test for the future.

Counselling after an HIV test is equally important, whether or not someone is infected with HIV, or if he or she does not want to know the result. One post-test counselling session is often not enough. A person may need on-going support and more sessions.

Confidentiality is an important aspect of a counselling relationship. People are better able to discuss their feelings if they know that the counsellor will not tell anyone else without their permission. Breaking confidentiality can destroy a person's confidence in their counsellor, and expose someone to discrimination at work, or to prejudice from health workers.

While it is vital not to discuss a person's situation without his or her permission, too much stress on secrecy can make it more difficult for the person to cope, and for the most appropriate support to be given. Promoting 'shared confidentiality' means encouraging someone to identify others who are trusted, especially his or her doctor, sexual partner, close friends or family members.

Health workers who may need to counsel women about HIV and AIDS need to:
- know the facts
- listen
- take time
- be concerned
- be available
- establish trust
- be consistent.

Things to avoid in counselling include:
- telling people what to do
- being judgemental
- making promises that cannot be kept
- giving false reassurances
- missing appointments
- doing all the talking
- confusing people with conflicting messages
- using complicated words.

Testing pregnant women
In some countries, pregnant women are routinely offered HIV testing. However, there may be obstacles to overcome to ensure that such testing provides benefits for the woman or the baby.

- Some women will prefer not to be tested or to know their status – they may be afraid to tell their partner if they have a positive result.
- Knowing her status may not affect either the treatment available to the mother or her baby, or her decision about the pregnancy or breastfeeding.
- Many women have little control over their lives and cannot easily make plans for the future.
- Health services may not be able to provide follow-up support and care.
- If the woman is HIV positive it probably means that her partner is too, and this raises issues such as partner notification and couple counselling.

Exercises:
1. What would you want a woman to know about HIV/AIDS if her partner was infected with HIV? How do you think she might feel? Try a role play with a colleague to practise talking about the issues.
2. Think about how women can protect themselves from becoming infected with HIV in your locality. Practise, with a colleague, describing what safer sex means.
2. Help the mother to make a decision about infant feeding

This involves talking to the mother who has HIV about breastfeeding, alternative feeding methods and her individual feelings and circumstances. Based on this, the health worker can help her to weigh up the risks to her infant if she does not breastfeed and the benefits and risks to her infant if she does breastfeed. If possible, and the mother wishes it, the father of the baby should also be involved in the decision.

Deciding whether the chances of HIV transmission are greater or lower than the risks of artificial feeding is the most difficult issue for the health worker and the mother. The following questions are intended to help them reach a decision that is best in the circumstances for the mother and her baby.

What alternatives to breastfeeding are available to the mother?
- Are locally available alternatives nutritionally adequate for infants?
- Does the mother have access to a reliable supply of formula or animal milk?
- Is the animal milk sold locally safe or is there a danger that it could be adulterated or diluted? Is it boiled or raw?
- Is wet nursing culturally acceptable? Is there an older member of the family who would be willing and able to nurse the baby?
- Does the mother have access to a breastfeeding bank? If so, can it provide milk for long periods of time?

What are her circumstances?
- Can the family afford to buy alternatives to breastmilk, not just for a day or a week but for at least six months? Can the family afford to provide adequate complementary foods from six months up to one or two years of age? Are there times of the year when the family has less money?
- Will buying formula or animal milk for the baby mean that there is less money to buy food for other members of the family?
- Does the mother have access to a reliable safe water supply? Does she have time to collect the extra water needed?
- Does she have fuel or the money to buy fuel to boil water and the baby’s feeding utensils?
- Does she have the time to prepare milk hygienically and to keep feeding utensils clean?
- Does the mother understand that it is safer to feed a baby with a cup and that bottles are much more difficult to clean?
- Does she have support from family and friends to help her feed the baby safely with alternatives?
- Is she well or does she have symptoms of AIDS?

Weighing up the risks and benefits of breastfeeding
- Would the mother’s circumstances allow her to minimise the risks associated with alternatives to breastfeeding?
- How common are childhood infectious diseases such as diarrhoea and respiratory infections?
- Is the chance of her passing HIV to her baby through breastfeeding greater or lower than the risks to the baby of alternative feeding methods?
- How does she feel about the risk?
- Does the mother have access to contraceptives to be able to practise family spacing, if she is no longer receiving this protective effect from breastfeeding?

The most important question is probably whether or not the mother’s circumstances would enable her to use alternatives.

Breastfeeding and HIV: assessing the risk

The following are examples of different scenarios that health workers may encounter in their work. It may be a useful training and support exercise for health workers to discuss together how they would deal with these different scenarios. You can make up different scenarios that are relevant to local circumstances.

- A pregnant woman who knows she is HIV positive approaches you for advice. She has heard that HIV can be passed to babies through breastmilk.
- An HIV-positive woman who chose to give formula to her baby which subsequently failed to thrive.
- A pregnant woman from a poor community who does not know her HIV status but has been told by people in her village that she looks thin and might have AIDS, asks what will happen to her and her baby.
- A pregnant woman from a poor community who does not know her HIV status but has been told by people in her village that she looks thin and might have AIDS, asks what will happen to her and her baby.
- A woman with a six-month-old son (breastfed and growing well) who recently read that the HIV virus can be spread through breastfeeding. Although she does not know her HIV status, she is worried and wondering whether she should stop breastfeeding.
questions by her family and neighbours and by other health workers about why she is not breastfeeding. As one woman in South Africa said, ‘Everyone wanted to know why I was not breastfeeding’. Not breastfeeding may signal to others that a mother has HIV and she may wish to keep her status confidential.

3. Advise the mother about how to feed the infant safely

Once the mother has made a decision about what method of infant feeding is best for her and for her infant, a health worker needs to advise her about the safest way to do this.

If a mother decides to breastfeed, she should be counselled about ways to prevent cracked nipples which may increase risk of HIV transmission. Cracked nipples should not occur if the baby is properly attached at the breast.

If the mother has decided not to breastfeed she needs to be advised about preparing and giving alternatives hygienically to minimise the risks associated with artificial feeding, and about care of the child.

Where breastfeeding is the norm, it may be difficult for a woman not to breastfeed. Adequately. If she can, then the risk of death and illness from other infections, as well as from HIV, can be minimised. If she is not able to, then the risks to her infant’s health of not breastfeeding are probably greater than the risk from the possible transmission of HIV through breastfeeding.

Having considered all these issues some women may choose not to breastfeed. However, in many communities where families do not have access to clean water and cannot pay for alternatives and where infant mortality from diarrhoea is high, the risk that a baby will die if he or she is not breastfed may be far greater than the risk of HIV transmission. In these circumstances women should continue to be encouraged to breastfeed.

Mixed feeding, that is combining breastfeeding and artificial feeding, is likely to be the worst option – placing the baby at risk both of HIV and of other infections. So, if a mother decides that breastfeeding is the best option in her circumstances, then probably she should be encouraged and supported to breastfeed exclusively. And if she breastfeeds, she should breastfeed exclusively for at least six months, as the risk of childhood infections is especially high in the first six months of life.

Where breastfeeding is the norm, it may also be very difficult for a woman not to breastfeed. She may be asked difficult

**Modified breastfeeding**

Two possible options that HIV-positive mothers could consider to reduce the risk of HIV transmission are:

- stop breastfeeding earlier than normally recommended
- breastfeed the baby but stop if she becomes ill with AIDS-related symptoms.

The first approach would mean only breastfeeding for between 6 and 12 months instead of two years, to reduce the length of time that the baby is exposed to the virus in breastmilk. But there are disadvantages of stopping breastfeeding early. The most important is the risk that the baby will not receive adequate nutrition. Preparing other foods for a baby takes time and may also be more expensive for the family. Usually, breastmilk provides about one-third of protein and energy needs for babies between the ages of six months and two years after complementary foods have been introduced. If a baby is no longer breastfed, he or she will need to be given extra complementary foods to make up for the nutrients in breastmilk. Malnutrition is a serious danger to a baby if a family is unable to provide an adequate diet based on complementary foods during this period. The other disadvantage is that the mother only benefits from the contraceptive effect of breastfeeding for a short period of time. Breastfeeding plays an important role in family spacing and if a mother stops breastfeeding earlier she may get pregnant...
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Reducing the risks associated with giving alternatives to breastmilk
To prepare and give formula or animal milk feeds, mothers need to:

- first wash their hands with soap and water
- wash the mixing and feeding vessels with boiled water or boil to sterilise them before preparing the milk and feeding the infant
- feed the infant using a cup. Cups are easier to sterilise than bottles. Bottle-feeding should be avoided because it increases the risk of diarrhoea.

Health workers should show mothers how to prepare and give alternatives and then watch them do it themselves to make sure they can do it correctly.

Complementary feeds must also be hygienically prepared and given with a clean cup, otherwise the infant is at increased risk of diarrhoea.

4. Follow up the infant’s growth and general health
Babies who are not breastfed, or who stop breastfeeding early, are more likely to develop malnutrition. Their growth should be checked carefully to make sure they are gaining weight. If an infant is not growing properly, the health worker needs to check that the mother is giving the correct amount of formula or animal milk.

Diarrhoea is also more likely, so health workers should make sure that mothers know how to treat diarrhoea and have access to oral rehydration salts (ORS) or can prepare suitable safe home fluids.
2.4 Other interventions to reduce transmission

**KEY POINTS**

- Encouraging and enabling better nutrition among pregnant women, whatever their HIV status, is important.
- Use of sterile instruments, avoidance of unnecessary procedures, and introduction of other safe delivery practices, whether at home or in health care facilities, can reduce HIV transmission during delivery.

Other interventions to reduce mother-to-child transmission are being explored but there is not enough information available yet to be sure whether these are useful. The latest information about these potential interventions is discussed briefly below.

**Improving nutrition during pregnancy**

Many women in developing countries are undernourished. The risk of transmission to the baby from a mother with HIV infection may be increased if she does not have enough to eat or does not eat enough of the right foods.

One theory being explored is that HIV-positive women who are deficient in vitamin A during pregnancy may be more likely to transmit the virus to their unborn child.

Vitamin A deficiency in pregnancy is common in developing countries. Causes include depletion of the body's stores of vitamin A because of pregnancy itself and because of infections, poor diet with insufficient foods containing vitamin A, and not absorbing enough of the vitamin from food. Women with HIV may be more deficient because they have more frequent illnesses and opportunistic infections.

A study of HIV-positive women and their infants in Malawi found that HIV transmission rates were higher from mothers with vitamin A deficiency. The risk of HIV transmission increased as vitamin A deficiency increased. Women with severe deficiency were three or four times more likely to have HIV-positive babies. Also, babies born to mothers with the most severe deficiency were more likely to die. Possible explanations for this include:

- Vitamin A helps to maintain the immune system and the internal surfaces of the body such as the birth canal. So maternal deficiency may weaken the birth canal, increasing the chance of tearing during delivery and as a result increasing an infant's exposure to maternal blood.
- Vitamin A deficiency may allow more of the virus to be present in breastmilk. A study in Kenya found higher concentrations of HIV in the breastmilk of positive women with vitamin A deficiency.

But there is no conclusive evidence as yet. In South Africa, Zimbabwe, Malawi and Tanzania researchers are looking at whether daily vitamin supplementation of different combinations of vitamins during the last six months of pregnancy reduces mother-to-child transmission of HIV.

Malnourished women and those with poor diets are often deficient in other vitamins and minerals, such as vitamins B6, B12 and E and copper and zinc, as well as in vitamin A. So, it is possible that higher risk of transmission may be because of deficiencies in a range of important vitamins and minerals rather than just a lack of vitamin A.

**What can health workers do?**

It is too early to say whether HIV-positive pregnant women should receive supplements of vitamin A or other vitamins. The most important thing that health workers can do is to promote better nutrition among all pregnant women, regardless of their HIV status. Health workers need to be aware of cultural beliefs that may restrict what pregnant women can eat.

*Health workers can promote better nutrition among all pregnant women.*
Delivery needs to be as safe as possible for the mother, the baby and the birth attendant.

If a health worker knows that a pregnant woman has HIV infection, it is important to encourage her to eat enough foods which are rich in vitamin A such as:

- animal products such as milk, liver, kidney, eggs, butter and ghee
- orange and yellow fruits and dark green leafy vegetables such as mangoes, papaya, pumpkin, carrots, maize, yellow sweet potatoes, bananas, spinach, amaranths, kale and the leaves of cassava, cowpeas, sweet potatoes and beans
- vegetable oils such as red palm oil.

Note: If the mother has too much vitamin A it can be dangerous for the unborn child. Excessive dosages (greater than 15,000 IU/day) should not be given.

Medical procedures during pregnancy and delivery

Invasive procedures during pregnancy such as amniocentesis (taking a sample of the fluid surrounding the baby in the womb), cordiocentesis (taking a sample of the umbilical cord that joins the baby to the placenta), or taking a sample from the placenta, should be avoided unless they are essential to save the life of the mother or the baby, because of the theoretical risk of increasing HIV transmission.

It is not clear how or why HIV is transmitted from mother to child during or around delivery. Theories suggested include

Safe delivery at home

Many women in developing countries give birth at home. Health workers and birth attendants can help to reduce HIV transmission during delivery at home by using sterile instruments and following good hygienic practices. Health workers or birth attendants can prepare or advise the family to prepare the following:

- several large pieces of clean cloth for wiping and wrapping the baby
- two clean ties or threads for tying the umbilical cord
- one clean new razor blade for cutting the cord
- one container of antiseptic solution such as gentian violet or iodine solution
- cotton wool or clean cloths for applying antiseptic solution to the cord stump
- gloves or plastic bags for the birth assistant and for handling the afterbirth
- one container of clean (boiled and cooled) water for cleaning the mother, the baby and the birth assistant’s arms
- soap
- pads or clean cotton cloth for the vaginal area to catch bleeding after the birth.
contact with HIV-infected blood and maternal fluids, and practices during delivery involving the use of sharp instruments.

Whatever the reasons, delivery needs to be as safe as possible for the mother, the baby and the birth attendant. Precautions to prevent transmission to health workers are discussed in Section 4.

Length of labour after rupture of the membranes may affect the risk of HIV transmission to the baby from an infected mother because the baby is exposed to maternal blood for a longer time. Different studies have shown conflicting findings. However, it is probably advisable to avoid artificial rupturing of membranes because of the increased theoretical risk.

In Malawi, washing the birth canal during labour with a solution which kills the virus, to reduce the infant's exposure to HIV, was studied. The procedure involved manual cleansing of the birth canal with a solution of 0.25 per cent chlorhexidine gluconate in sterile water. Chlorhexidine was used because it has a good safety record and can neutralise HIV. The results showed that mother-to-child transmission was reduced by about a third in women whose waters broke more than four hours before delivery, but there was no difference when delivery took place less than four hours after the waters had broken. However, there were other advantages including reduction in other infections, such as streptococcus B. More research is needed to assess the value of this procedure before it can be recommended.

Because exposure to maternal blood in the birth canal during delivery is thought to be responsible for HIV transmission in infants of HIV-positive mothers, researchers have compared rates of transmission between babies delivered vaginally and those delivered by caesarian section to see if caesarian delivery reduces the risk. Caesarian delivery is when an operation is performed to remove the baby from the mother's abdomen. Like studies on length of labour, the findings are conflicting and there is no conclusive evidence that method of delivery makes any difference to the risk of HIV transmission from mother to child. In addition, caesarian section is a very risky procedure for women.

Many women are given an episiotomy (a cut is made to the entrance to the birth canal) when they are in labour to help them deliver the baby and to prevent tearing. This practice should be avoided as there is no evidence that an episiotomy leads to an easier delivery, and it may theoretically increase risk.

2.5 Transmission through blood transfusion

**Key Points**

- If blood is not screened for HIV, blood transfusions given to either women or children carry a risk of HIV transmission.
- Reducing the use of blood transfusions and improving the safety of blood supply are key measures to reduce the risk of HIV transmission.
All women lose some blood during delivery. Although normal blood loss during delivery can be made up by the woman's body after birth if she eats a good diet, in some places blood transfusions are routinely given to women to replace blood losses. If the blood is not screened for HIV, a transfusion increases her risk of infection. And if she becomes infected, she may transmit the virus to her baby during breastfeeding.

Infection through blood transfusion now mostly happens in countries with limited resources where the blood supply is not screened for HIV, where HIV infection rates among blood donors are high and where equipment used for giving transfusions is not properly sterilised.

Blood should be screened for HIV and transfusions only be given to women who have severe life threatening haemorrhage during or after birth.

The need for transfusions can also be reduced by giving pregnant women iron supplements, ensuring that they eat iron-rich foods to prevent anaemia, and by treating malaria and parasitic diseases which also cause anaemia. Women who are not anaemic are less affected by blood loss during delivery.

In some countries, transfusions are routinely given to children as treatment for malnutrition, malaria and sickle cell anaemia. Where blood is not screened for HIV, children receiving transfusions are at risk of HIV. In some South-East Asian countries such as India and Pakistan, children may be at high risk of infection because the blood supply relies on commercial blood donors and is not screened for HIV in every health facility. For example, in Pakistan, it is estimated that 40 per cent of blood is not screened for HIV.

Preventing transmission through blood transfusion

There are two strategies for preventing transmission through blood transfusion:

- reducing the use of blood transfusions
- improving the safety of the blood supply.

Reducing use of transfusions

The use of blood transfusions can be reduced by:

- ensuring that the transfusion is really necessary; this means only giving a transfusion when it is essential to save a patient's life
- developing precise guidelines for giving transfusions to children and women, especially pregnant and lactating women, and to patients with severe blood loss
- ensuring that health workers provide clear reasons when prescribing blood transfusions on a request form
- providing training for staff and monitoring blood use
- using blood substitutes for volume replacement where possible to replace fluids after haemorrhage
- not using 'top ups' of blood as a 'tonic' when someone is weak from anaemia or after delivery
- preventing and treating illnesses in children and women that lead to anaemia such as malaria, parasitic infections and malnutrition; this includes encouraging community-based programmes to prevent and treat malaria and worms
- treating the underlying cause of anaemia
- preventing and treating anaemia in pregnant women by giving iron supplements or encouraging them to eat iron-rich foods.

Improving the safety of blood supply

Blood transfusion services can maximise the chances that the blood supply is safe by:

- setting up a donor selection process to identify and retain safe blood donors
- training staff in education and counselling skills
- ensuring that there is a regular and adequate supply of equipment for collecting, screening and storing blood
- testing (screening) all donated blood for HIV (and other infectious agents) and disposing safely of infected blood
- ensuring that there are adequate facilities for safe storage of blood (blood cold chain)
- developing and implementing quality control measures
- educating prescribers of blood and blood products about correct indications for use
- ensuring accessibility of alternatives to blood.

The most effective way to ensure safe blood supply is encouraging people at low risk of HIV infection to be voluntary unpaid blood donors and counselling them about the need to be responsible donors and about safe sex. Counselling potential donors also includes encouraging those who may have been at risk of HIV not to give blood.

Using donors who are paid increases the risk of unsafe blood donation. People who sell their blood are often those most at risk of communicable diseases including HIV.

In rural areas where blood supplies are
scarce, family members may be asked to donate blood. But this can be risky in areas where many people are infected with HIV.

**Acquired infection**

**KEY POINTS**

- Some children have been infected through surgical instruments, needles and syringes that have not been properly sterilised.
- Children can also become infected through sexual abuse involving penetrative sexual intercourse.

Transmission of HIV through medical equipment can be prevented if health workers follow standard guidelines for sterilisation of reusable equipment between patients or use disposable needles and syringes.

Dealing with the issue of possible transmission through sexual abuse is more difficult. Sexual exploitation of children is often a taboo subject and people usually do not believe that it could happen in their culture or their community. However, it is clear from cases of STD that children, even very young children, are subject to sexual abuse, by family members, neighbours and strangers, but health workers do not always pick up on the signs.

If they are able to through their work, health workers should try to raise awareness of the issue and of the risk it poses to children. They will need training to help them know when to suspect that a child is being or has been sexually abused, who to talk to and how to raise the subject, how to examine children for signs of sexual abuse, and what other agencies need to be involved.