Guidelines for the implementation of Pretoria Pasteurisation in Health Care Institutions - a feeding method for LBW infants born to HIV infected women using their own pasteurised breast milk

Aim of the package: To provide healthcare workers institutional guidelines for safe and effective implementation of Pretoria Pasteurisation in Health Care Institutions.

1. INTRODUCTION
About 25% of pregnant women in South Africa are HIV infected. HIV infection can be transmitted from mother to child during pregnancy, during labour and delivery or through breastfeeding. Providing the mother and baby with antiretroviral treatment such as Nevirapine reduces transmission during labour. If, however an infant is breastfed by an HIV positive mother, the risk of the baby being infected via the breast milk, which may contain large amounts of the virus, is 14% - 20%. Premature infants are at increased risk of being infected with the HIV and many infected women choose to formula feed their infants, however this is not always ideal, not only because of the cost involved, but many people do not have easy access to all the facilities necessary for making up formula feeds and maintaining all the equipment. In addition, formula fed babies lose out on the protective effects of breast milk and are at increased risk of diarrhea and other diseases. Formula feeding is particularly problematic with premature infants. Not only do they need expensive premature formulae, but also high-risk low birth weight infants in neonatal units are particularly susceptible to infections as well as outbreaks of necrotising enterocolitis (NEC), which is frequently fatal. In addition, these outbreaks can be as a result of accidental contamination of formula feeds during their reconstitution in the milk kitchen. Research studies have shown that breast milk provides protection against NEC.

2. WHAT IS PRETORIA PASTEURISATION?
Pretoria Pasteurisation is a method by which an HIV infected mother can express and heat-treat her milk in order to inactivate the virus and make the breast milk safe for infant feeding while still maintaining the nutritional value and protective properties in the milk. It works on the principle of passive heat transfer from boiled hot water contained in an aluminium pot to expressed breast milk, that is contained in a glass jar.

3. HOW WAS PRETORIA PASTEURISATION DEVELOPED?

Pretoria Pasteurisation was developed with the objective of finding a way of heating milk reliably to a well-controlled temperature without using expensive equipment or a complicated procedure. The heat source used, which can be heated to a known temperature without using a thermometer, is water heated to boiling point. The boiling point of water is always at the same temperature and is easily recognised. When a glass jar containing milk is placed within a container of hot water, the heat flows from the water to the jar and the milk within the jar, thus heating the milk. The temperature to which the milk is heated depends on the type of containers used for the milk and the water and the volume of hot water (i.e., increase in water volume, increases the milk temperature). If milk is boiled or heated to a too high temperature the protective properties in the milk and some of the nutritional value, including vitamins, is destroyed. If the milk is not heated enough, there is a risk that not all the HIV viruses are inactivated.

The aim is to maintain the milk for 10-15 minutes between temperatures of 56° – 62° Celsius. At this temperature, most of the protective properties in the milk are preserved. Many different containers and volumes of water and milk were tested, and the set of apparatus giving the required temperature is a 1L Hart™ aluminium pot as the water container, a glass Black Cat™ peanut butter jar as the milk container and 750 ml boiling water. This apparatus was tested and found to reliably maintain the milk at the required temperature range. Heating is reliable for volumes of milk less than 150ml.

4. DOES PRETORIA PASTEURISATION INACTIVATE HIV IN BREAST MILK?
Pretoria Pasteurisation has been shown to inactivate (kill) HIV viruses in the milk of HIV infected lactating mothers. This was tested by asking HIV infected women to donate a sample of breast milk which was then split into two portions, one which was immediately cultured to grow HIV and the other which was pasteurised with the Pretoria Pasteurisation method and then cultured to grow HIV. HIV grew in many of the samples, which were not pasteurised, but there was no growth of the virus in the samples, which underwent Pretoria Pasteurisation. The method also kills common commensal bacteria (e.g. Staphylococcus epidermidis) and pathogenic bacteria (e.g. E Coli, Staph aureus).

5. HOW IS PRETORIA PASTEURISATION PRACTICED?

5.1 What equipment do you need?
- A 1l aluminium hart pot.
- A 410g “Black Cat” peanut butter glass jar. NB: No other jars should be used as they may not allow the same flow of heat and thus result in the milk not reaching the correct temperature. Plastic jars or any other kind must NEVER be used as they heat the milk to a wrong temperature. If the above mentioned jars are not available for whatever reason, please contact the MRC Research Unit for Maternal and Infant Healthcare Strategies for advice about alternative glass jars.
- The metal lids of the peanut butter jars should be washed with soap and water, rinsed and soaked in the Sodium hypo chloride solution for 20 minutes, removed, dried with a clean towel and stored in a dry container with a lid. The metal lids need to be replaced as soon as they begin to rust
• Electric kettle or some other means of boiling the water.
• Small plastic (atjar) containers with lids in which the pasteurised milk is poured.
• Water, dishwashing liquid and cloth or brush for washing the jars.
• Bucket and sodium hypo chloride solution for sterilising jars and lids. (Use 8 litres of tap water on 100 ml of Sodium Hypo chloride).
• Different colour stickers to identify milk belonging to different mothers, which is stored in the fridge.
• Pen for labelling stored milk with mother's name and time of expressing.
• A 2-litre ice cream plastic container with a lid to store the lids of the peanut butter jars after the lids have been washed.

5.2 How do you do the pasteurisation?
5.2.1 Procedure:
• The lactating mother washes her hands with soap and water. She then expresses her milk into a clean, dry plastic (atjar) container. Once enough milk has been expressed, she puts the lid on the container.
• The milk is poured into a clean dry peanut butter jar and placed inside the aluminium pot.
• Water is boiled. When the water is bubbling vigorously, it is immediately poured from the kettle into the aluminium pot in which the jar of milk is standing. The water must be poured into the pot immediately after it has boiled. If the kettle is left to switch itself off and then stand for a while before pouring the water, the water will have cooled down and will not heat the milk to the correct temperature).
• Fill the aluminium pot to 1cm from the top. (Draw a line around the inside of the pot, at this level, to serve as a guide for the mother.)
• The jar stands in the pot of hot water until the water is a comfortable temperature to touch (about 25-30 min).
• The jar is removed from the pot, the milk is placed in a clean plastic (atjar) container and the baby is cup fed or spoon-fed directly from it.
• If there is only a small volume of milk in the jar, when the boiling water is poured into the pot, the jar may tend to float or tilt and may not remain standing on the bottom of the pot. This must be avoided, by placing an object on the lid of the jar to hold it down. A paperweight or teacup will be adequate.
• If any milk is to be stored, the container is labelled with the mother’s own colour sticker. The name and time of expressing is recorded on the container.

6. QUESTIONS
6.1 IF THE BABY DOES NOT DRINK ALL THE PASTEURISED BREAST MILK AT ONE FEED CAN IT BE STORED FOR LATER USE?
It is important to consider if breast milk is going to be stored that bacteria can grow in the milk. These bacteria are particularly dangerous to premature infants. Milk can be stored in the fridge for up to 24-hours or 8-hours at room temperature if certain principles are strictly applied.

• The mother must wash her hands thoroughly with soap and water before hand expressing her milk. This reduces the number and type of bacteria, which may contaminate the milk.
• Pasteurising equipment must be kept clean. Jars must be carefully washed with soap and water, making sure to remove all fatty residues from the glass before soaking it in sodium hypo chloride solution.
• Pretoria Pasteurisation effectively inactivates bacteria present in the milk after hand expression. Handling of milk and transfer from one container to another after pasteurisation provides an opportunity for pathogenic bacteria to enter the milk. These bacteria will grow rapidly if introduced into pasteurised milk. Therefore, if a mother expresses more milk than she thinks the baby will drink at one feed, she should place the milk into two jars before pasteurising and pasteurise the two jars of milk separately. The milk which is to be stored must be stored in a clean jar with a lid on. If the baby still requires more after drinking the first jar of milk, the second is then used. Once a jar of pasteurised milk has been opened, the milk must be used at that feed or discarded and may not be placed back in the fridge.
• Any milk, which is stored, should preferably be refrigerated.
• If milk is to be stored, the time when it was expressed must be recorded on the jar. Any refrigerated milk older than 24 hours must be discarded. Milk at room temperature should be discarded after 8 hours.

6.2 WHAT ABOUT THE USE OF BREAST PUMPS?
Most women are able to adequately express their breast milk by hand. If there is a problem with not producing enough milk, lactation can be improved by good hydration, and if necessary, prescribing Eglonyl. Breast pumps are not recommended because the small parts of the apparatus are an ideal place for the accumulation of bacteria and are difficult to keep clean in a hospital set up.

6.3 CAN ONE USE OTHER POTS OR OTHER GLASS JARS?
No. The method has been carefully worked out and tested with the equipment described. As explained above, the temperature to which the milk is heated depends on the types of containers for the milk and the water and on the volume of water. If one of these is changed, it can have a large effect on the temperature of the milk, resulting either in it getting too hot and destroying the protective factors and nutritional value, or if it does not get hot enough, some of the HIV may remain in the milk, thus putting the infant at risk of infection. Even different glass jars produce surprisingly different temperatures. Thus the equipment used must be as described. If any of the equipment is not available (manufacturers sometimes change their containers), please contact the MRC Unit for Maternal and Infant Healthcare Strategies for advice about alternatives.

6.4 WHAT IF THE LIDS OF THE PEANUT BUTTER JARS RUST?
The peanut butter jar lids rust if they are placed in the sodium hypo chloride solution for a period of 24 hours. The solution to this problem is to wash the lids with soap and water, rinse them and soak them only for 20 minutes in the hypo chloride solution. The lids should then be placed in a container to dry. This container should only be used for storing the lids. A two-litre ice cream container is ideal for this purpose because it has a lid and it is easy and cheap to obtain. The lids last much longer and do not rust so quickly. If they do start rusting it is necessary to replace them.

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