



# Guidelines for making up special feeds for infants and children in hospital



# Foreword

The handling, preparation and storage of large volumes of Expressed Breast Milk (EBM) and formula feeds in a hospital environment presents potential health risks specifically to vulnerable sick infants and children. This document identifies the areas of concern and provides guidelines to minimise such risk.

Current concerns on the presence of pathogens in powdered infant formulae have necessitated a change in feed preparation instructions. The World Health Organisation (WHO) have developed new guidelines on the safe preparation of infant feeds<sup>1</sup>.

This document has been written to support best practice when making up powdered and modular feeds within a hospital setting. Currently, there is little evidence based literature to support the guidance given within this document, therefore best practice can only be cited until further research is undertaken to underpin practice.

This document will need to be reviewed on a 3 yearly basis or as new evidence emerges.



Lisa Cooke MA BSc RD  
Head of Paediatric Dietetics  
Bristol Royal Hospital for Children  
February 2007  
Review date: February 2010

<sup>1</sup> WHO (in collaboration with the FAO) <sup>1</sup> Guidelines for the safe preparation, storage and handling of powdered infant formula.  
<http://www.who.int/foodsafety/publications/micro/pif2007/en/index.html>

# Acknowledgements

This document could only have been written with the support of the following:

- Annette Anderton, University of Strathclyde
- Elaine Buchanan, Yorkhill Children's Hospital, Glasgow
- Alison Coates, Edinburgh Sick Children's Hospital
- Moria Dixon, Manchester Children's University Hospital
- Joanne Eardley, Evelina Children's Hospital, London
- Viv Jones, Derriford Hospital, Plymouth
- Sharan Lowry, Sheffield Children's Hospital
- Anne Maclean, Yorkhill Children's Hospital, Glasgow
- Carolyn Patchell, The Birmingham Children's Hospital NHS Trust
- Julie Royle, Manchester Children's University Hospital
- Ita Saul, Our Lady's Hospital for Sick Children, Crumlin, Dublin
- Vanessa Shaw, Great Ormond Street Hospital for Children NHS Trust
- Kirsten Tremlett, St James Hospital, Leeds
- Lisa Waddell, Nottingham
- Ruth Watling, Royal Liverpool Children's NHS Trust

and thanks to their colleagues who commented on earlier drafts of this document.

Supported by an educational grant from the Paediatric Group of the British Dietetic Association – printing sponsored by the Food Standards Agency 2007.

# Contents

	Page No
Foreword	i
Acknowledgements	ii
Contents	iii
Abbreviations	iv
<b>● Section One</b>	<b>1</b>
Introduction	1
<b>● Section Two</b>	<b>2-3</b>
The special feed unit	
2.1 Storage area	2
2.2 The ante room/office	2
2.3 The clean preparation area	2
2.4 Wash-up area	3
2.5 For hospitals or units where there is no SFU facility	3
<b>● Section Three</b>	<b>4</b>
Equipment And Supplies	
3.1 Equipment	4
3.2 Supplies	4
<b>● Section Four</b>	<b>5-7</b>
Feed handling and preparation	
4.1 General information	5
4.2 Practical aspects	5-6
4.3 Ready to feed formula	7
4.4 Labelling	7
4.5 Chilling and storage of feeds in SFU	7
4.6 Transportation	7
4.7 Storage on wards	7
<b>● Section Five</b>	<b>8</b>
Personnel	8
<b>● Section Six</b>	<b>9</b>
Expressed breast milk	9
<b>● Section Seven</b>	<b>10</b>
Delivery of feeds	10
<b>● Section Eight</b>	<b>11-12</b>
Ward or unit based management of infant feeding	
8.1 Feeding the child	11
8.2 Administering the feed	11
8.3 Plans for discharge	12
<b>● Section Nine</b>	<b>13</b>
Infection control	
<b>● Section Ten</b>	<b>14-15</b>
Discussions and recommendations	
10.1 Discussions	14
10.2 Recommendations	15
<b>● References and appendices</b>	<b>16</b>

# Abbreviations

**CSSD** – Central Sterile Services Department

**EBM** – Expressed Breast Milk

**FBCC** – Foreign Body Cross Contamination

**MD** – Multidisciplinary

**NICU** – Neonatal Intensive Care Unit

**PIF** – Powdered Infant Formula

**RTF** – Ready to Feed

**RTH** – Ready to Hang

**SCBU** – Special Care Baby Unit

**SFU** – Special Feed Unit

**WA** – Working Appendices

**WHO** – World Health Organisation

When possible sterile ready to feed (RTF) products should be used as no preparation is necessary. This considerably reduces the risk of cross-contamination, particularly if these products are not decanted into other bottles or reservoirs.

Infant formulae and modular feeds are a food source and therefore an excellent medium for bacterial and microbial proliferation. Powdered infant formula (PIF) is a non sterile product. This means there is an inherent risk of infection with pathogenic bacteria such as *Salmonella* and *Enterobacter sakazakii* with neonates, preterm, low birthweight and immuno compromised infants who are most at risk<sup>1</sup>. Inappropriate preparation, storage and transportation of PIF can lead to an ideal environment for the multiplication of pathogens. *E. sakazakii* can survive for at least one year in dry PIF. Vigilance is therefore required when preparing large batches of reconstituted PIF. There is currently no written guidance on what constitutes a safe environment for the preparation of these products within the hospital setting.

These guidelines have been devised to provide guidance on best practice based on the limited evidence available and current practice within the UK and Ireland's tertiary and secondary care paediatric hospitals, centres and units.

They can be used as a useful tool in assisting with the improvement and quality assurance of any existing unit or facility or in the design of any new facility.

Funding is required to further research this essential children's hospital service, to validate evidence based practice, and to produce recommendations.

All Working Appendices (WA) are suitable for copying or adapting to use within local areas.

# The special feed unit

The 'Special Feed Unit' (SFU) should be physically isolated from direct patient care and include a separate storage area and ante room. The SFU should be an aseptic area and used only for the purpose of making up infant formula and modular feeds. Security is essential with restricted access enforced due to the risk of cross-infection, adulteration of feeds and theft.

## 2.1 Storage area

This room should be shelved and all feed products should be stored on shelving and not in direct contact with the floor. The temperature should be ambient and should not experience large shifts in temperature. Daily records of the temperature of this room should be monitored (Appendix 1 WA Temperature Recording Form for Ante Room / Office). Products should be stored in a manner, which allows adequate air flow. In order to avoid using out of date products, stock use by dates should be checked and rotated when storing, and product dates re-checked before using.

In hospitals where the storage area is integral within the clean preparation area the above instructions should still be followed. Part of the area should be designated as storage for feeds with a separate storage area for cleaning equipment.

This area should be cleaned weekly.

## 2.2 The ante room/office

This should provide sufficient space to support the function of the SFU. Facilities should include;

- 1 An area for receiving orders, for record keeping and label preparation.
- 2 In larger units there should be space for a telephone/fax machine, computer terminal, printer and space for stationery.
- 3 A sink with hands free taps and drying facilities should be available, in order that the SFU Technician or any other authorised personnel can wash and dry their hands prior to entering the unit.
- 4 Disposable aprons and hats should be kept adjacent to the entry door of the SFU. All entrants should wash and dry their hands and wear both an apron and a hat before entering (see footnote\*).

## 2.3 The clean preparation area

- 5 A clean air supply with pressure gradient is necessary for the preparation unit.
- 6 Floors, walls and ceilings should be of a material which can be maintained in a clean condition.
- 7 The unit should be cleaned daily and deep cleaned on a weekly basis. (Appendix 2 WA. Special Feed Unit Cleaning Rota).
- 8 The unit lights should be enclosed but adequate to allow accurate preparation of the feeds.

\* The Food Hygiene legislation requires protective clothing to be worn where appropriate. Although there is nothing specific in the legislation which states that staff must wear hats or hair nets, it would generally be considered good practice for persons handling open feed to have clean hair tied back and covered. If hair is not tied back or covered, it is more likely to fall into feed and staff are more likely to touch their hair. The responsibility lies with the proprietor of a food business to identify any step in the activities of their operation where food hazards (including cross contamination) may occur and ensure adequate safety procedures to control such hazards are in place. In this context, the decision for staff to wear hats/hairnets, gloves etc. is at the discretion of the proprietor.

- 9 There should be a dedicated sink for hand washing within the unit with hands free taps, anti-bacterial hand wash and drying facilities available.
- 10 A separate sink should also be available for washing equipment.
- 11 The unit must be of adequate size to allow a comfortable work flow for the SFU preparation technicians.

## 2.4 Wash-up area

In larger units a separate wash-up area should be made available to enable recycling of glass and plastics.

## 2.5 For hospitals or units where there is no SFU facility

Where it is impractical and not cost effective to have a separate SFU facility, it is imperative that a separate feed preparation area is designated. This must comply with a facility which supports an aseptic technique for the preparation of formula and modular feeds as described previously (Appendix 3 WA Special Feed Unit Aseptic Procedures). Safe preparation and practice should be maintained in the production of PIF and other feeds within the hospital /unit setting.<sup>2</sup>

# Equipment and supplies

### 3.1 Equipment

- 1 It is important that all equipment and utensils used in the preparation of the feeds are made of a material which can be sterilised by the Central Sterile Services Department (CSSD), can withstand commercial disinfectant temperatures with a commercial dishwasher, or are designed for single use only.
- 2 Written guidelines should be produced to highlight regular scheduled checking and monitoring of maintenance for any equipment used during the preparation and storage of feeds produced in the SFU.
- 3 Refrigerators must be able to chill prepared feeds to 4°C within 1 hour of preparation. The most efficient way of doing this is by using a blast chiller. This is an essential recommendation for larger units. If this is neither cost effective or where there is a lack of space, then the following techniques can be used:
  - a) Holding bottles under a cold tap – ensure water is below the lid of the vessel. The outside of the bottle should be dried and the child's details attached with the appropriate label and then stored in the fridge.
  - b) Cool the bottles in a container of cold water/ice, ensuring the water level is below the lid. Waterproof labels would be a better option to use with these techniques.

Note: In units producing large numbers of feeds points a) & b) are impractical and therefore a blast chiller or equivalent equipment should be used to adequately chill the feeds to between 2°C - 4°C as above.
- 4 Storage of expressed breast milk should be held at -20°C in a freezer for up to 3 months or in a fridge for feeds to be used within 48 hours – see section 6.
- 5 All utensils and supplies used for the preparation of feeds must be of a nature that the implementation of the aseptic technique (Appendix 3 WA Special Fed Unit Aseptic Procedures) can be followed e.g. teats, feeding bottles, containers for storing decanted feeds, protective clothing for technicians, bowls, whisks etc.
- 6 Bottles and teats should be for single use only unless the container can be sterilised or disinfected adequately.
- 7 Cleaning supplies should be stored separately from feed ingredients.
- 8 Only sterile water or freshly boiled water cooled to 70°C - 80°C should be used for feed preparation.
- 9 Transportation equipment which ensures the feeds remain chilled to 4°C should be used to allow safe transportation to the wards and units.
- 10 All waste bins within the SFU should be foot operated and emptied daily.

### 3.2 Supplies

Any damaged tins or packets of product along with out of date stock must be disposed of.

# Feed handling and preparation

## 4.1 General information

- 1 Fridge and freezer temperatures should be checked and recorded daily (x2) (Appendix 4 WA Special Feed Unit Refrigeration Temperature Record) to avoid fluctuations in temperature. Feeds should be disposed of if temperatures are not within the recommended range. Fridge 2°C - 4°C, Freezer <-20°C.
- 2 All products should be checked for visual comparability and if there are any discrepancies from the norm the product should not be used and the manufacturer informed stating the product identification number.
- 3 During feed preparation no other activities should take place and all doors should be closed. Only authorised personnel should have access to the SFU.
- 4 Aseptic technique should be practised for all feed preparation. Each hospital or unit should have written guidelines for aseptic technique used within the SFU or facility – (Appendix 3 WA Special Feed Unit Aseptic Procedures).
- 5 Preparation should be appropriate to the facilities available to the hospital or unit.
- 6 All feed recipes should be produced and checked by a registered and appropriately trained Paediatric Dietitian.
- 7 A Clinical Incident Form must be submitted if any of the steps within the storage, production, handling, storage and dispensing of feeds produced in the SFU or other facility, breakdown.
- 8 Clinical risk assessment should take place for each SFU or specified feed production area and stored within the units procedure/guidelines folder. (See Appendix 5 WA Risk Assessment Form). A Risk Assessment Form should be produced to highlight potential hazards. (See Appendix 6 WA Risk Assessment for Microbial Contamination of Feeds).

## 4.2 Practical aspects

- 1 Powdered or decanted liquid feeds should only be used when there is no suitable alternative sterile feed available.
- 2 Only boiled water cooled to 70°C - 80°C should be used to make up feeds, unless otherwise specified by the manufacturers instructions. Distilled, deionised or other bottled waters are not suitable alternatives. Commercially sterilised water can be used but must be heated to within 70°C - 80°C.
- 3 Each Special Feed Unit should test the procedure they use for allowing boiled water to cool in a covered container so that an appropriate time is established for water to reach 70°C - 80°C.
- 4 New, sterilised or disinfected mixing equipment should be used to prepare each type of feed to prevent exposure to potential pathogens.

## Section Four

### Feed handling and preparation (continued)

- 5 Where facilities are available, powdered formula should be measured by weight using a scientific scale accurate to 2 decimal places. The scoops found in the manufacturers feed containers should be removed aseptically and discarded. Where there are no accurate weighing facilities the manufacturers scoop should be used in the preparation of PIF. The dietitian should provide a recipe using scoops with known and accurate weight content where additives are used.
- 6 All opened containers of ingredients should be covered, labelled with an expiry date and stored in a clean secure location. Dry ingredients once opened should be used within 4 weeks of opening or as determined by the manufacturers' instructions if sooner.
- 7 Electrolytes should be added at ward level and administered by nursing staff, along with any other medication or as local policy dictates. (Appendix 7 WA Procedure for Adding Sodium and Potassium to Feeds at Ward Level).
- 8 Prepared feeds should not be frozen.<sup>3</sup>
- 9 Feeds should not be pasteurised routinely. This is due to the potential for altering physical and nutritive properties of the feed.<sup>3</sup>

Feeds containing peptides or amino acids will be compromised nutritionally by pasteurisation.<sup>3</sup>

Note. Due to the distinct lack of evidence for terminal heating of formulae and modified enteral feeds, some of the larger children's' centres have adopted pasteurisation for the following groups:

'Immunocompromised patients, pre-term infants, powdered jejunal feeds, multi-component feeds, Donor Expressed Breast Milk (EBM).'

Evaluation of the literature suggests only the following should be pasteurised:

#### Donor EBM

- 10 Prepared feeds should be used within 24 hours of production.
- 11 For feeds made up in several bottles at a time – the ESPGHAN committee<sup>4</sup> guidelines recommend that;

#### Each bottle feed should be made up individually prior to feeding the baby.

For modified feeds with multiple ingredients a judgement needs to be made: it would be less accurate, time consuming, liable to error and impractical to split the ingredients down to the correct quantities to fill the small volumes that each individual feed requires. Then the feed should be made up in a bulk quantity and decanted into several bottles using aseptic technique. SFU's are not open for 24 hours; hence it would not be cost effective to produce feeds prior to feeding.

For the majority of infants on a standard feed, then sterile 'Ready to Feed' preparations should be used and this fits in with the above guidelines.

- 12 Tamper proof lids should be used for all prepared feeds.

### 4.3 Ready to feed formula

Before using any Ready to Feed Formula check the 'use by date' is in date, otherwise dispose of the feed. Check that the seal on the lid is intact and not broken. Treat the feeding time once the bottle has been open as for prepared formula. (See section 8.2 page 11-12).

### 4.4 Labelling

- 1 Patient feeds should be ordered and when prepared, labelled with,
  - (1) Patient name
  - (2) Hospital number
  - (3) Ward and location
  - (4) Formula name including additives
  - (5) Volume
  - (6) Use by date and time
  - (7) 'For enteral use only'
  - (8) Refrigerate until used
- 2 Feed labels should be generated within the ante-room, prior to feed preparation.

### 4.5 Chilling and storage of feeds in SFU

- 3 Dedicated fridges for feeds maintained at 4°C should be provided for the SFU and for storage at ward or unit level.

### 4.6 Transportation

- 1 Local guidelines should be produced for the safe transportation of feeds from the SFU to the wards or units. A cool box or chilled trolley with ice-packs would be suitable transportation.

### 4.7 Storage on wards

- 1 Local guidelines should be produced around the safe handling and storage of feed products at ward level.
- 2 Before dispensing any feeds, labels should be checked against the patients feed plan and verified by the nurse or carer before being given to the patient.

## Section Five

# Personnel

- 1 Responsibility for the operational management of the Special Feed Unit, or preparation area should be assigned to a professional e.g. a Registered Dietitian or Senior Registered Nurse.
- 2 The SFU should be assigned a supervisor experienced with the SFU techniques and operations.
- 3 SFU personnel should have the minimum qualifications, of an ability to read, write and have mathematical skills to enable calculations of feed volumes.
- 4 SFU personnel should wear suitable aseptic clothing. Theatre blues, theatre clogs, disposable plastic aprons, hats and sterile gloves are an example of suitable clothing. (See footnote on page 2).
- 5 A written training policy should be developed and implemented, (Appendix 8 WA Training Programme for Special Feed Unit Staff).
- 6 A sufficient number of trained staff should be available to provide seven days cover for the SFU, allowing for annual leave, sickness and study leave etc.
- 7 Staff working within the SFU or preparation area must be in good health as defined by local occupational health policies.
- 8 Staff working within the SFU or feed preparation area must be qualified food handlers and should hold at least a basic Food Hygiene Certificate or as designated by local policies. This must be updated on the required statutory basis.

## Section Six

# Expressed breast milk – mothers own

- 1 Breast feeding pumps should be readily available for use.
- 2 All expressing equipment should be sterilised or for single use only.
- 3 All mechanical equipment should be cleaned regularly (as determined by local risk assessment) and maintained annually.
- 4 A dedicated breast feeding facility should be made available within the hospital.
- 5 Breast feeding mothers should be supported, advised verbally and given written instructions (where appropriate) on how to:
  - i) use the breastfeeding pump and equipment,
  - ii) label and store the milk (Appendix 9 WA Breast Feeding and Expressing Milk)
- 6 Expressed Breast Milk (EBM) should be transported at a temperature maintained between 2°C - 4°C.
- 7 Dedicated fridges or freezers or where this is not practical, dedicated storage boxes for use in the fridges or freezers should be available for storing EBM at 2°C- 4°C and -20°C, respectively<sup>5</sup>.
- 8 Freezers should have an adequate alarm fitted to alert any temperature rise that may induce thawing of the EBM.
- 9 EBM should only be stored within a suitable fridge for up to 48 hours and, if not used, discarded. If there is any reason why it may not be used within that time it should be frozen directly after expressing.<sup>5</sup>
- 10 If EBM has been fortified the same criteria applies as for the feeds produced within the SFU, it can only be stored in a suitable fridge for 24 hours.
- 11 Frozen EBM can be stored in a suitable freezer at -20°C for up to 3 months.
- 12 Where possible infants should receive fresh EBM to maintain the breastmilk quality.
- 13 Frozen EBM should be used in date order, i.e. oldest date first.
- 14 When defrosting EBM, it should be placed in the fridge to thaw gradually, labelled, with the use by date and used within 24 hours from the start of the defrosting process.  
Note: See Appendix 10 WA Guidelines for Handling, Storage and Administration of Expressed Milk.
- 15 Microwave ovens should never be used to thaw or warm EBM.
- 16 Fortifiers should be added to EBM aseptically before administering the feed.
- 17 EBM fed via a tube should hang for a maximum of 4 hours and the container used to administer the feed should be changed every 4 hours.
- 18 Donor EBM must be pasteurised before a feed and can be stored within a fridge for 48 hours. Otherwise, if frozen follow the above guidance.

## Delivery of feeds

- 1 All feeds should be removed from the SFU or preparation area's fridge and placed into a delivery vessel, which can store the feeds at 4°C for the duration of the delivery.
- 2 On arrival at ward or unit level, feeds should be placed immediately into the designated fridge, and any out of date feeds or those remaining from the day before, should be disposed of.
- 3 The designated fridge should only be used to store milk feeds or EBM. No other food should be stored there.
- 4 These fridges should be deep cleaned every three months.
- 5 The temperature of these fridges should be monitored and recorded daily (Appendix 11 WA Ward Fridge Temperatures). Any problems should be reported immediately to Hotel Services or the department responsible for their maintenance and remedial action taken as appropriate.

- 1 Where it is impractical to have a separate dedicated storage fridge or freezer for feeds/EBM, then they should be placed in a sealed vessel/bag and stored within the main body of the fridge or freezer, preferably towards the back.
- 2 Feeds/EBM should be stored in the main body of the fridge (2°C - 4°C). They must not be stored in a fridge or freezer door as temperatures fluctuate and it may be warmer there.
- 3 Feeds taken from the ward/unit fridge to the ward area and not used must not be returned and must not be given to another patient.
- 4 Bottles, teats, syringes or feeds should be for single use, except the BAXA (purple) enteral feeding syringes which can be re-used. Care should be taken at ward level when re-using syringes and manufacturers guidance must be followed (Appendix 12 WA BAXA Oral/Enteral Dispenses).  
Note: Single use syringes should always be used for infants < 12 months or who are immunocompromised.
- 5 All unused feeds must be discarded after 24 hours in accordance with the 'use by date' and time indicated on the feed label.

## 8.1 Feeding the child

### 8.1.1 Warming the feeds

- Feeds to be fed continuously via enteral tubes should not be warmed.
- Bolus feeds should be warmed for a maximum of 15 minutes.
- Electric warming devices, warm running water or submersion of the bottle into water (do not allow the water to reach the level of the teat base or submerge the lid on a RTH) can be used.
- Microwave ovens must never be used to warm feeds.

## 8.2 Administering the feed

- The named nurse or carer must verify the feed label before feeding the child.
- Bottle fed infants – any feed left in the bottle after an hour of starting the feed must be discarded.
- Tube-fed infants – modular feeds should be hung for not more than 4 hours. The giving set should be changed on a 24 hourly basis, except in high risk infants where the giving set should also be changed 4 hourly<sup>6</sup>.
- Any additions, e.g. electrolytes added at ward level before the feed is administered, must be added by trained staff and checked off using the local medicines policy.

## Section Eight

### Ward or unit based infant feeding (continued)

- Local tube feeding guidelines should be followed for the following issues:
  - i. Using giving sets
  - ii. Maintaining enteral tubes to be clean and patent.
  - iii. Feed hanging times.
  - iv. Care, use and maintenance of enteral feeding pumps.

### 8.3 Plans for discharge

- Parents/carers require education on feed preparation prior to discharge.

Note: Reference<sup>7</sup>

- 1 Infection control procedures from procurement through to ward feeding should be in place to support the feeding and feed preparation process (Appendix 13 WA Flow Diagram for the Preparation of Milk Feeds).
- 2 A multidisciplinary (MD) Committee should be in place in each hospital or unit setting to appropriately monitor the quality of the feeding preparation process.
- 3 There should be a documented Risk Assessment on the feed preparation process to ensure
  - a) Prevention of contamination of feed products during: receipt, storage before and after preparation, storage once prepared and administration.
  - b) Prevention of microbial proliferation during any stage of the above.
  - c) Exposure to any likely toxin that may be present in the feeds or contaminate them during the above process.
- 4 All previous guidance to avoid risk of administering unsafe feeds for consumption should be adhered to.
- 5 Any outbreak from an individual or number of children on the wards with symptoms of food borne illness receiving potentially contaminated feeds should be surveyed as part of the diagnostic process.
- 6 An Environmental Health Officer should inspect the premises annually or as deemed appropriate and be approached for advice and support.
- 7 Bacteriological monitoring of feeds should take place using local Public Health/Bacteriology departments<sup>9</sup>.

## 10.1 Discussion

### 1 Temperature of water used to make up PIF and modular feed

Freshly boiled water is unsuitable to use for making up PIF as it may destroy or significantly reduce the Vitamin C content. Evidence has supported safe practice to reduce the risk of *E. sakazakii* proliferation by making up PIF with boiled water cooled to between 70°C - 80°C, then by cooling the prepared feed quickly to 4°C and storing at between 2°C - 4°C, unless the feed is being given within 2 hours post preparation.

### 2 Terminal heating/pasteurisation

#### Expressed breast milk

Best practice suggests that providing all the steps are taken to follow the guidance in this document, pasteurisation is only necessary for donor EBM.

#### Formula

*E. sakazakii* is fairly resistant to heat and formula would need to be heated to over 90°C. This can affect the nutritional composition of feeds<sup>3</sup>. Therefore, the important practice point is that feeds after preparation are chilled rapidly to 4°C within 1 hour of preparation and then stored at 2°C - 4°C. *Salmonella* and *E. sakazakii*, can grow in the reconstituted product if stored above 5°C for a sufficient length of time and can multiply rapidly at room temperature<sup>4</sup>.

#### Enteral feeds

Good practice, outside the SFU is imperative to prevent proliferation of these organisms, which can lead to increased mortality and morbidity in vulnerable children in hospitals and units. Thought needs to go into enteral feeding practice including the hygienic handling of the feeds at ward level during the administration process.

#### Variations between hospitals trusts

There are variations to this policy due to the cost constraints within some hospitals. The advice on hanging times of feeds, in units where suitable human milk pasteurisation facilities are available is to pasteurise the products intended for vulnerable at risk groups as an added precaution. Prior risk analysis conducted weighed in favour of the potential nutrient loss compared to the increased risks of feed contamination through not pasteurising.

### 3 Temperature of prepared feed storage

Evidence, although limited, suggests there must be adequate facility to immediately chill prepared formula, store and hold at 2°C - 4°C until administration and then feed the infant or child immediately after warming.

## 10.2 Recommendations

In conclusion, practice which follows these guidelines – should be used to implement and audit local policy guidelines. This will enable appropriate storage, production, followed by storage and administration of non-sterile feeds for infants and children in all hospitals and units.

# References and appendices

- 1 Bowen, Anna, B, Braden, Christopher R, 2006, Invasive *Enterobacter sakazakii* disease in infants, Emerging Infectious Diseases 12, (8)
- 2 Renfrew, DMJ, Ansell, P, Macloed, KJ, 2003, Formula Feed Preparation: helping reduce the risks; a systematic review. Archives of Disease in Childhood, 88:855-858.
- 3 Paediatric Nutrition Practice Group of the American Dietetic Association, 2003, Infant Feedings: Guidelines for the preparation of Formula and breastfeeding in health care facilities.
- 4 ESPGHAN Committee on Nutrition, Preparation and Handling of powdered infant formula, 2004. A commentary by the ESPGHAN Committee on nutrition, Journal of Paediatric Gastroenterology and Nutrition, 39:320-322
- 5 Baumer J, Harry 2004, Guidelines for the establishment and operation of human milk banks in the UK, Archives of Disease in Childhood, Educational Practice Edition 89, ep 27- ep 28.
- 6 Patchell, CJ, Anderton, A, Holden, C, MacDonald, A, George, RH, Booth, IW. 1998, Reducing bacterial contamination of enteral feeds, Archives of Disease in Childhood, 78:166-168
- 7 NICE, June 2003, Clinical guideline 2, Infection Control No 3 Care during Enteral Feeding, NHS.
- 8 Commission Regulation (EC) No 2073/2005 of 15 Nov 2005 on microbiological criteria for foodstuff Official Journal of the European Union L338/1 – L338/26.

**[www.efsa.europa.eu](http://www.efsa.europa.eu)** – useful website for up to date information

WHO (in collaboration with FAO) 'Guidelines for the safe preparation, storage and handling of powdered infant formula' are available on the WHO web site:

**[www.who.int/foodsafety/publications/micro/pif2007/en/index.html](http://www.who.int/foodsafety/publications/micro/pif2007/en/index.html)**

---

Note: All Working Appendices (WA) are in use in various departments around the UK and Ireland. They can be freely adapted within the recommendations of this document to be used locally within your own unit or facility.



Appendix 2 WA

# Special feed unit cleaning rota



# Special feed unit aseptic procedures

**The Special Feed Unit is a clean unit and the following procedures must be followed to ensure safe practice**

- 1 Collect recipe sheets from relevant ward trays written by the dietitians.
- 2 Print off feed labels.
- 3 Collect feeds required from the storage room, checking that they are not out of date or damaged.
- 4 Change into theatre blues. Always put on a plastic apron and hat when entering the Special Feed Unit.
- 5 Wash hands with appropriate steriliser.
- 6 Unpack CSSD equipment.
- 7 Always use the sterile equipment available.
- 8 Decant water from boiler into cleaned and sterilised stainless steel jugs, cover and leave to cool to between 70°C-80°C (for no longer than 30 minutes).
- 9 Always wear sterile gloves when making up feeds, dispose in a foot operated bin changing between each type of feed made.
- 10 Prepare all feeds carefully following recipe sheets found in relevant ward trays in the Special Feed Unit ante room, written by the dietitian. Procedures for standard additives should be followed.
- 11 Ensure all feeds are labelled correctly.
- 12 Chill all feeds for 'at risk' patients' in a 'Bain Marie' filled with ice – (at risk include any premature infant or baby under 2 months or those who are neutropenic).
- 13 Place all feeds in fridge in Special Feed Unit if not delivered to wards within ½ hour of making.
- 14 Record temperature of the fridge(s) in Special Feed Unit 3 times a day and chart using the sheet on the wall. Record feed numbers daily.
- 15 Wipe down work surfaces after use with an antibacterial liquid.

Note: For point 13 – Best practice guidelines are to blast chill feeds. This should take place in all larger units.

Appendix 4 WA  
Special feed unit

Refridgeration temperature record

**Week commencing** \_\_\_\_\_

DAY	TIME			
	TEMP	SIGNATURE	ACTION TAKEN	SIGNATURE
MON				
TUES				
WED				
THUR				
FRI				
SAT				
SUN				

Appendix 4 WA  
Special feed unit

Refridgeration temperature record

**Week commencing** \_\_\_\_\_

DAY	TIME			
	TEMP	SIGNATURE	ACTION TAKEN	SIGNATURE
MON				
TUES				
WED				
THUR				
FRI				
SAT				
SUN				

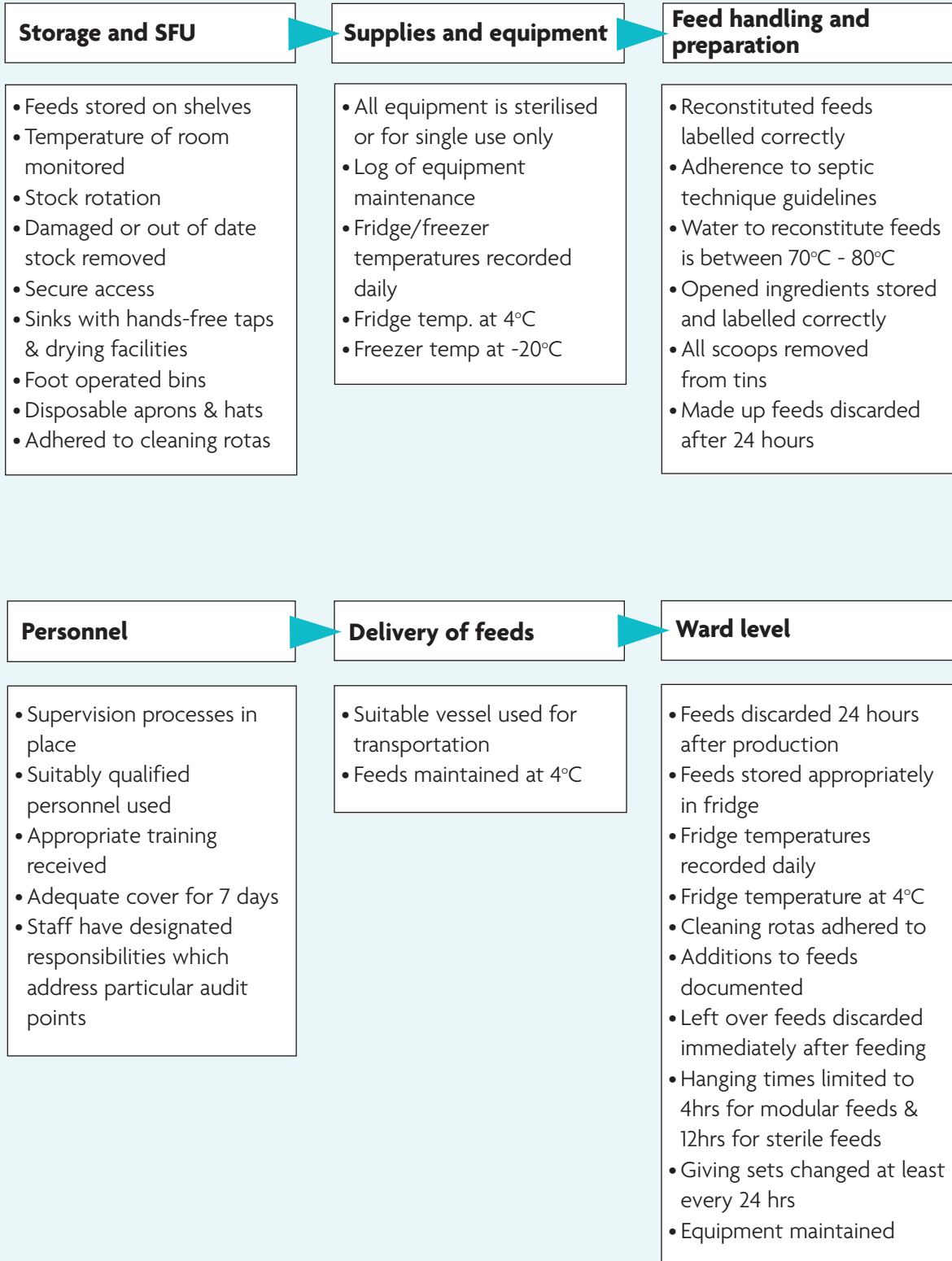
**Microbial contamination of feeds**

HAZARD	LIST POSSIBLE OUTCOME	RISK CATEGORY	WHO MAY BE AFFECTED/HARMED
Microbial contamination of feeds in the SFU	Vomiting and diarrhoea	High	Patients receiving feed from Special Feed Unit
Contamination during transport of feeds to wards	Vomiting and diarrhoea	High	Patients receiving feed from Special Feed Unit
Contamination of feeds on the ward	Vomiting and diarrhoea	High	Patients receiving feed from Special Feed Unit
Contamination of feeds given via tube feeding systems	Diarrhoea and vomiting	High	Patients receiving feeds via tube

IS THE RISK ADEQUATELY CONTROLLED	WHAT FURTHER ACTION IS NECESSARY TO CONTROL THE RISK
Yes. If guidelines in Special Feed Unit and or notices to wash hands, wear hat and apron on entry are adhered to. Also when ward staff have to make up feeds occasionally that they are supervised.	<ul style="list-style-type: none"> <li>● All to report people going into SFU without hat, apron/hand washing</li> <li>● Notice on door</li> <li>● Check on Dietetic Assistant's adherence to guidelines re date checks for feeds</li> <li>● Check deep cleaning guidelines adhered to</li> <li>● Check fridge temp checked daily and where recorded</li> <li>● Investigate funding for a blast chiller and in meantime follow SFU guidelines re minimising time feeds out of fridge</li> <li>● SFU staff to check volume/bolus feed needed and send sufficient bottles for every feed</li> </ul>
Yes. If all feeds are covered for transport in plastic bags, are taken directly to ward with no delay and then the feeds are placed immediately into the fridge. Remove all feeds over 24 hours old. (Note: Cool boxes should be used as best practice for delivering feeds to wards).	<ul style="list-style-type: none"> <li>● Dietetic Assistant to audit Porters practice re delivery times to NICU (check maximum of 15 minutes to deliver feeds).</li> <li>● Investigate use of cool boxes for NICU transportation</li> <li>● Audit practice on ward – are feeds immediately put in fridge? Dietetic Assistant to audit</li> <li>● Dietetic Assistant to check all old feeds are discarded and investigate practice on NICU</li> </ul>
No	<ul style="list-style-type: none"> <li>● Notice re hand washing before handling feeds on all fridges</li> <li>● Minimise additions to feeds at ward level</li> <li>● Investigate checking of fridge temperatures at ward level</li> <li>● Dietetic Assistants to audit hanging times for made up feeds</li> <li>● Investigate best practice for changing of giving sets for made up feeds. In meantime vulnerable patients and those &lt;1 year to have giving set changed with feed reservoir</li> <li>● Monitor practice re warming feeds at ward level and log time feed from fridge to patient</li> <li>● Agree handling practice with infection control e.g. use of gloves vs hand washing and produce laminated sheet for ward detailing practice</li> <li>● Agreed practice to be documented in enteral feeding guidelines in discussion with nursing staff</li> </ul>
No not fully. RTH feeds to be used where possible. All made up feeds to be sent in volumes to feed for 4 hours only. Giving sets to be changed at agreed intervals. Thorough hand washing should be done if the line needs to be broken.	<ul style="list-style-type: none"> <li>● Guidelines to be produced as part of enteral feeding guidelines regarding procedure for giving made up feeds. In meantime very vulnerable patients under 1 year/immuno-compromised to have giving sets changed with feed container. Department consensus needed.</li> </ul>

# Risk assessment for microbial contamination of feeds

Risk assessment audits can be undertaken for each item listed under the following flow diagram headings. Liaison with the infection control nurse should occur to address any ongoing identified risks.



# Adding sodium and potassium to feeds

**For use with specialised feeds that require addition of electrolytes.**

- 1 The doctor, following discussion with the dietitian, decides how much electrolyte solution (sodium or potassium) is required in addition to that provided by the feed. The amount of electrolyte is based on a requirement in mmol, per kg per day.
- 2 Medical and nursing staff will decide the frequency with which the additional electrolytes will be given.
- 3 The doctor prescribes the amount of electrolyte solution that is required on the drug chart with the dose and frequency clearly stated.
- 4 If the patient is taking the feed via a feeding tube the electrolyte solution may be given separate from the feed.
- 5 If the patient is taking the feed orally it is recommended that the additional electrolytes be added in split doses to each feed bottle as prescribed on the drug chart.
- 6 For each feed the nursing staff on the ward will draw up the prescribed amount of electrolyte solution and sign it off on the drug chart.
- 7 The member of nursing staff will then administer the prescribed amount of electrolyte.

# Training Check List

# Training check list

	Told Date	Checked Date
• Always change into theatre blues and put on hat and apron before entering Special Feed Unit	<input type="text"/>	<input type="text"/>
• Always wash hands with Hydrex before entering Special Feed Unit	<input type="text"/>	<input type="text"/>
• Turn on computer and print labels correctly	<input type="text"/>	<input type="text"/>
• Always wear sterile gloves when making up feeds. Change gloves in between each feed type	<input type="text"/>	<input type="text"/>
• Make up 600mls Dioralyte daily and place in special feed unit fridge	<input type="text"/>	<input type="text"/>
• Make up all feeds carefully, following the recipe sheets	<input type="text"/>	<input type="text"/>
• During the week when the dietitians are available, bleep the dietitian if any changes or new requests are made from wards	<input type="text"/>	<input type="text"/>
• At weekends and bank holidays, please ring the ward for any changes	<input type="text"/>	<input type="text"/>
• Use the standard dietitian sheet and produce for increasing volume and strength of feeds	<input type="text"/>	<input type="text"/>
• Check feeds are correctly labelled for type of feed including additives + strength. Ensure amount of calorie supplement is correct e.g 1% 2% etc	<input type="text"/>	<input type="text"/>
• Put feeds in Feed Unit fridge after making up if not delivered within ½ hour	<input type="text"/>	<input type="text"/>
• Read fridge temperature and record on sheet in feed unit	<input type="text"/>	<input type="text"/>
• When delivering feeds to wards, please discard any unused feed from previous day.	<input type="text"/>	<input type="text"/>

**NICU Feeds:**

	<b>Told Date</b>	<b>Checked Date</b>
• Ring Daily for any changes, otherwise liase with the ward dietitian	<input type="text"/>	<input type="text"/>
• Do not accept new feed requests over the phone. All new feed requests must be faxed using feed request sheet	<input type="text"/>	<input type="text"/>
• Feeds for SCBU will be collected by a porter at 10.30am. Please bleep porter on <input type="text"/> if there are no feeds	<input type="text"/>	<input type="text"/>
• Wipe down surfaces after use with antibacterial liquid	<input type="text"/>	<input type="text"/>
• Wash used equipment and place in CSSD box. Put bag in sluice with any empty bottles	<input type="text"/>	<input type="text"/>
• Where is everything kept in kitchen	<input type="text"/>	<input type="text"/>
• Where are the fridges on the wards	<input type="text"/>	<input type="text"/>
• Where to collect theatre blues	<input type="text"/>	<input type="text"/>
• Washing up of equipment	<input type="text"/>	<input type="text"/>
• What to do if off sick	<input type="text"/>	<input type="text"/>
• How to teach parents for home	<input type="text"/>	<input type="text"/>
• Show where procedure and order forms etc are kept	<input type="text"/>	<input type="text"/>
• If the kitchen is unclean when you enter it in the morning, report it to Hotel Services Manager	<input type="text"/>	<input type="text"/>
• How to order and who does ordering	<input type="text"/>	<input type="text"/>

**Weekend jobs**

• Tidy/clean store cupboards	<input type="text"/>	<input type="text"/>
• Clean cupboards in kitchen	<input type="text"/>	<input type="text"/>
• Check wards for stock and throw away any out of date feeds	<input type="text"/>	<input type="text"/>

### 2.1 Training programme for SFU staff

① 3 day training course

② Day 1 – Shadow and watch Special Feed Unit Supervisor – Go through check list.

Day 2 – Make up feeds with Special Feed Unit supervisor and show how carer is taught to make up a feed.

Day 3 – Do all of feeds unsupervised but with Special Feed Unit supervisor on hand – Repeat check list.

Note: Continue supervising the above and monitor competence by signing off checklist when happy new member of staff is able to work alone.

## Information for parents from Great Ormond Street Hospital For Children NHS Trust

During your baby's stay in hospital, it may not always be possible for you to breast feed. Expressing your milk (taking it from the breast using special equipment and storing it for later use) allows your baby to continue to have all the nutritional benefits of breast feeding at a time when it is most needed. Hospital dietitians are available every day to offer advice about your baby's nutritional needs. This is designed to be a practical guide to expressing milk at Great Ormond Street Hospital.



### **Q: Will I be able to begin breast feeding at the hospital or re-start if I have to stop temporarily?**

**A:** Yes, but it can take some time for your baby to learn or re-learn to breast feed. Talk to your nurse or the neonatal nurse for advice on bleep 697 if you are worried about breast feeding or expressing breast milk. We are here to help you and your baby to breast feed successfully.

### **Q: Where can I express breast milk?**

**A:** There are expressing rooms and/or breast pumps for mothers in the following places throughout the hospital:

- DJW ward (level 4 Cardiac Wing)
- NICU (level 4 Variety Club Building)
- Woodland Ward (level 5 Variety Club Building)
- Louise Ward (level 8 Southwood Building AB side)
- Feeding Room (level 2 Outpatients)

We can also arrange for you to use a portable breast pump on your ward.

If you are staying in hospital accommodation, it may be possible for you to have a breast pump in your room.

Electric breast pumps for use at home are available from various organisations but unfortunately GOS is unable to supply them.

For information about all of these options, speak to your nurse or the neonatal nurse advisor.

Sterile breast pump packs are available for use with pumps in all areas of the hospital. If you use the portable pump on your ward, please ask your nurse how to dispose of the equipment when you have finished expressing.

### **Q: For how long can I use my breast milk after it has been expressed?**

**A:** If your baby is having your breast milk, within 24 hours of you expressing it, you can store it in the milk feed refrigerator on the ward. Otherwise, it needs to be taken to the Milk Storage Room to be frozen.

When you have expressed your milk, you should label each bottle with the stickers provided on the ward (see below). You can also add your baby's name sticker to the bottle.

**EXPRESSED BREAST MILK  
(KEEP REFRIGERATED)**

Mother's Name \_\_\_\_\_  
Infant's Name \_\_\_\_\_  
Ward \_\_\_\_\_ Date \_\_\_\_\_  
Time Expressed \_\_\_\_\_  
Mother on Medication? Y/N

Please put milk on the shelves in the refrigerator, not in the door.

**Q: What do I do if the milk will not be used within 24 hours?**

Place it in the refrigerator in the Milk Storage Room on level 2 of Southwood Building (AB side). The door code is C69 XYZ. The expressed breast milk will be frozen by milk room staff for later use. Breast milk can be safely stored frozen for up to three months. However, fresh breast milk is always the first choice for your baby so do not freeze it unless this is necessary.

**Q: What happens if my baby needs the frozen milk?**

Your nurse will collect it from the Milk room and defrost it on the ward. Breast milk should be used within 24 hours of defrosting and must not be refrozen.

**When you go home**

Please remember to take any excess breast milk home with you. If you do not have a cool bag and freezer packs, please ask the neonatal nurse advisor to assist you.

To defrost the milk at home, stand the bottle in a jug of cold water. **Please do not defrost in the microwave.** Breast milk should be used within 24 hours of defrosting and must not be refrozen.

**Looking after yourself**

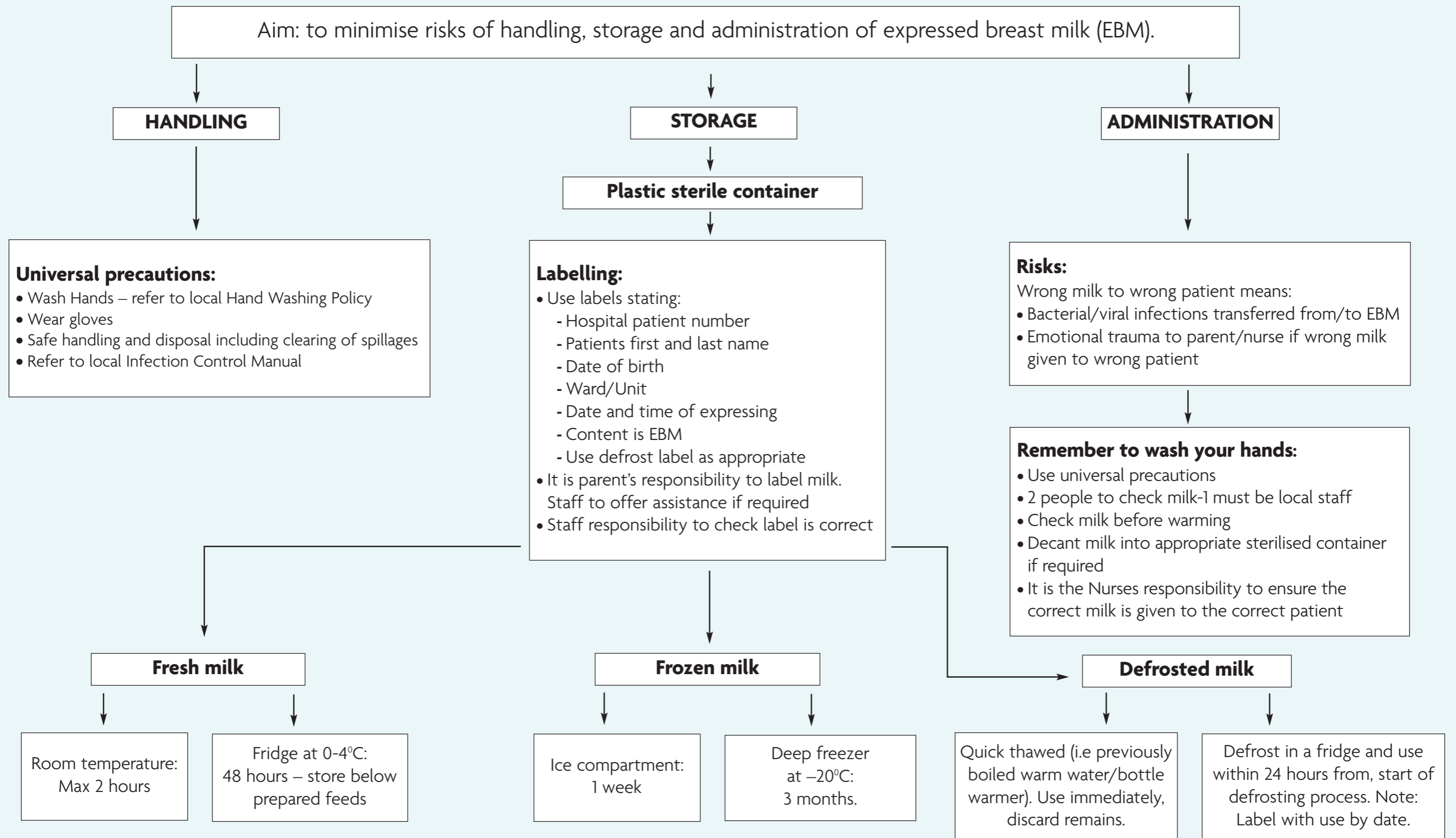
Producing breast milk takes up a lot of energy and nutrients. It is easy to forget yourself when your baby is ill. The following tips will help you stay healthy and produce enough milk for your baby:

- Remember to eat well. You may find it easier to eat little and often rather than having large meals. Eating a varied diet will also help you to keep well.
- Remember to drink plenty. You will need to drink about eight to ten glasses of fluid a day.
- Try to get as much rest and sleep as possible.
- If your baby is under four months old you are entitled to food vouchers to use in the Peter Pan Cafeteria.

The neonatal nurse advisor is available on most weekdays if you need help or advice. Ask your nurse to contact her on bleep number 697.

# Training Check List

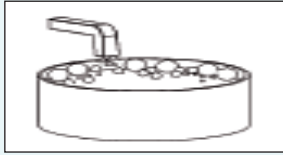
## Guidelines for handling, storage and administration of expressed milk





# Internal dispenser cleaning guidelines

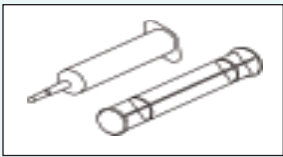
Clean the dispenser immediately after use, completing steps 1 to 4



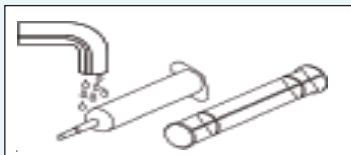
**Step 1:** Fill a clean bowl with hot, soapy water (domestic washing up liquid).



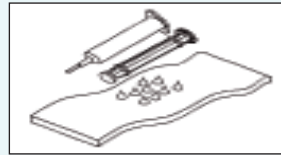
**Step 2:** Place the dispenser tip in the water and draw the plunger in and out several times until all traces of feed or medicine are removed.



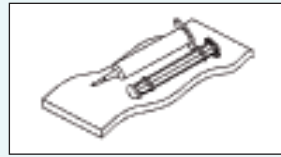
**Step 3:** Separate the two parts of the dispenser and wash in soapy water.



**Step 4:** Rinse both parts under cold running water.



**Step 5:** Shake off any excess water and gently tap the end of the dispenser on a clean paper towel to dislodge any water in the tip of the dispenser.



**Step 6:** Dry with a clean paper towel.



**Step 7:** Once dry, store the dispenser still separated, in a clean, dry container.



**Step 8:** Re-assemble the dispenser prior to use.

**If required, after step 4, the dispensers may also be processed in a steam steriliser; a dishwasher (barrel on a spike with tip uppermost); by immersion in cold sterilising solution.**

**Please note, Baxa Enteral Dispensers are reusable but should be replaced if:**

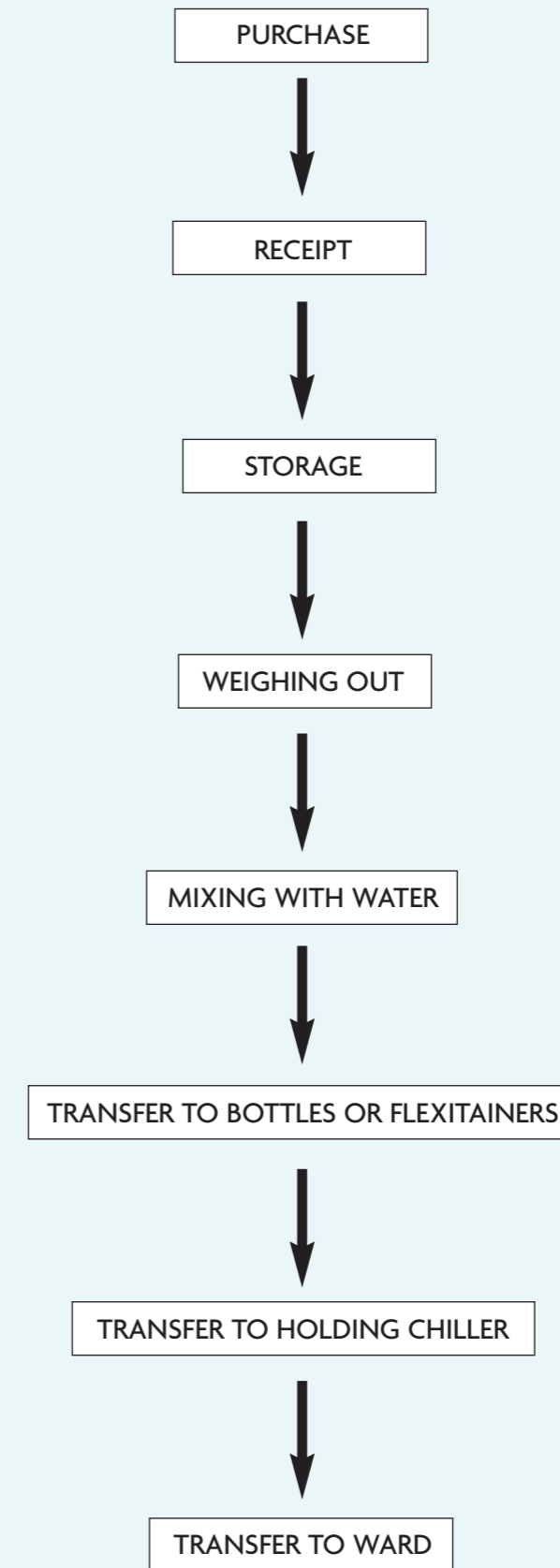
- There is any visible damage to the barrel or tip
- The dose markings are no longer clear
- The plunger seal is damaged
- It becomes difficult to operate

**If you are in any doubt, contact your Healthcare provider.**

# Flow diagram for the preparation of milk feeds

## Hazard Sheet

STEP	HAZARD	ACTION
<i>Purchase</i>	Foreign Body Cross Contamination (FBCC)	<ul style="list-style-type: none"> <li>• Container integrity</li> </ul>
<i>Receipt</i>	FBCC	<ul style="list-style-type: none"> <li>• Container integrity</li> </ul>
<i>Storage</i>	FBCC	<ul style="list-style-type: none"> <li>• Container integrity</li> </ul>
<i>Proprietary Feeds/Supplements</i>	FBCC	<ul style="list-style-type: none"> <li>• Container integrity</li> <li>• Cleanliness before opening</li> </ul>
<i>Weighing out</i>	FBCC	<ul style="list-style-type: none"> <li>• Cleanliness of environment and operative</li> <li>• Hygienic procedures</li> </ul>
<i>Mixing with water</i>	FBCC	<ul style="list-style-type: none"> <li>• Cleanliness of environment and operative</li> <li>• Hygienic procedures</li> <li>• Integrity of water source</li> </ul>
<i>Transfer to bottles or flexitainers</i>	FBCC	<ul style="list-style-type: none"> <li>• Cleanliness of environment and operative</li> <li>• Hygienic procedures</li> </ul>
<i>Transfer to holding chiller</i>	Temperature Control	<ul style="list-style-type: none"> <li>• Maintenance and monitoring of temperature</li> <li>• Recording</li> </ul>
<i>Transfer to ward</i>	Temperature Control	<ul style="list-style-type: none"> <li>• Temperature control using eutectic bags e.g. cool boxes or insulated bags</li> </ul>



Produced by The Special Feed Working Group of the  
Paediatric Group of the British Dietetic Association 2007

Published by the Food Standards Agency August 2007  
Crown Copyright 2007

Designed by SPY Design & Publishing. Print by Oakfield Press

Printed in the UK 1k FSA/1195/0807

Printed comprising a minimum 75% recycled fibre

