

**NUTRITIONAL GUIDELINES FOR THE UNDER FIVES
IN OXFORDSHIRE**

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**Approved by Community Health Oxfordshire Board Community Health and
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Introduction and Purpose

Aims

These guidelines are designed to assist all health professionals advising on feeding children under five years of age across Oxfordshire.

The aim is that all parents or carers will receive clear, practical, and consistent advice which is evidence based and considered good practice.

Children develop at an individual pace and their requirements will vary; the need for flexibility of professional advice in individual cases is recognized.

These guidelines focus on healthy infants and children. Whilst some nutritionally related problems are covered, the nutritional needs of sick children are beyond the scope of these guidelines.

Definitions

Infants: Refers to babies from birth to twelve months of age

Children: Refers to one to five year olds

Accountability and Responsibility

Oxfordshire PCT Board has ultimate responsibility for documents approved for use by PCT staff.

Directors and Heads of service are responsible for ensuring that line managers are aware of these guidelines and support them in implementing them.

Line managers are accountable for ensuring that all of their staff are aware of these guidelines.

Each member of staff involved in advising on feeding children under five is individually responsible for maintaining an up to date knowledge of the content of these guidelines as well as the standards set out by their own professional body.

1. Breastfeeding

1.1. Introduction

All pregnant women should be encouraged to breastfeed.

Promoting and supporting optimal maternal and infant nutrition is important, particularly among population groups where breastfeeding rates are low.

Breastmilk is the optimal diet for infants, and research continues to strengthen this position, notably in relation to the health risks attributable to not breastfeeding. (SACN 2008)

Current UK policy is to promote exclusive breastfeeding (feeding only breast milk) for the first 6 months. Thereafter, it recommends that breastfeeding should continue for as long as the mother and baby wish, while gradually introducing a more varied diet (DH 2003).

1.2. Antenatal information

During individual antenatal consultations, pregnant women should be encouraged to breastfeed, particularly: those with a family history of allergy, young women, those who have low educational achievement and those from disadvantaged groups (NICE 2008a)

- At the booking appointment (ideally by 10 weeks) all pregnant women should be given specific information on:
 - The importance of breastfeeding, including how to access breastfeeding workshops
 - and participant-led antenatal classes, which would include breastfeeding.
- At or before 36 weeks) they should also receive specific information on:
 - breastfeeding: technique and good management practices, such as detailed in the UNICEF Baby Friendly Initiative and the ORH breastfeeding Policy (4th Ed. 2006)

1.3. The importance of breastfeeding

- Breastfeeding contributes to the health of both mother and child, in the short and long term. For example:
- Babies who are not breastfed are many times more likely to acquire infections such as gastroenteritis in their first year (Ip et al. 2007; Horta et al. 2007).
- It is estimated that if all UK infants were exclusively breastfed, the number hospitalised each month with diarrhoea would be halved, and the number hospitalised with a respiratory infection would be cut by a quarter (Quigley et al. 2007).
- Exclusive breastfeeding in the early months may reduce the risk of atopic dermatitis (DH 2004a).
- In addition, there is some evidence that babies who are not breastfed are more likely to become obese in later childhood (DH 2004a; Li et al. 2003; Michels et al. 2007).
- Mothers who do not breastfeed have an increased risk of breast and ovarian cancers and may find it more difficult to return to their pre-pregnancy weight (World Cancer Research Fund 2007; DH 2004a).

1.4. The composition of breast milk

The composition of human breast milk differs markedly from infant formula in many respects:

- amount and type of protein
- presence of long chain polyunsaturated fats and cholesterol
- ratios of essential amino acids
- ratios of minerals present and their bioavailability
- presence of lipase
- anti-infective factors
- presence of hormones and growth factors
- presence of nucleotides

Unlike formula milk, breast milk does not have a uniform composition. The volume:fat gradient changes over the course of the feed with the result that the milk available to the baby at the end of the feed is higher in fat than the milk at the beginning of the feed. In addition to this the composition of human milk changes as the baby matures (Inch 2006).

1.5. Breastfeeding Policy within the Oxford Radcliffe NHS Trust

The Women's Centre, Oxford Radcliffe Hospital NHS Trust, implement their own breast feeding policy (see Appendix 1). All health professionals advising mothers on breast feeding should give advice that is consistent with this policy.

It is crucial that breastfeeding mothers know how to position and attach their baby and can identify signs that the baby is feeding well, before they leave hospital or before the midwife leaves the mother after a home birth. (NICE 2008a).

1.6. Management of breastfeeding

The baby should be allowed to come off the first breast spontaneously before being offered the second side.

Mothers should be reassured that it does not matter if her baby wants to feed only from one breast at an individual feed. She should be similarly re-assured if he wants both breasts at a feed, and if he shifts from one pattern of feeding to another. (RCM 2002)

Babies should be fed according to need (on demand)

Babies vary tremendously in the rate at which they feed and hence the amount of time needed at each feed. They also vary in the frequency with which they require feeding.

However, the feeding technique should be investigated if:

- feeds are regularly taking over 30 minutes per breast
- or, once breast feeding is established, the baby needs to be fed more than 10 times in 24 hours. (RCM 2002)

There is no need to give extra fluids to a breast fed baby during the first six months, even during hot weather. The low electrolyte concentrations in breast milk mean that only a small amount of fluid is required to excrete the waste products. (RCM 2002)

Expressing milk

Mothers may:

(1) need to express milk to establish lactation and feed a baby who is unable to go to the breast at all (e.g. pre-term, sick, cleft palate). In these circumstances expression should start as soon after the birth as possible. Hand expressing is likely to be more effective than using an electric pump at removing colostrum, but the mother should experiment, with help. When and if an electric pump becomes more effective than hand expressing, the mother should be shown how to “double pump” i.e. express both breasts simultaneously, as this has been shown to be much more effective (more milk in less time). (RCM 2002)

(2) need to express for therapeutic reasons, (e.g. provide milk for their baby and sustain lactation if they are having difficulty getting the baby to attach well to the breast; to increase the supply of their own milk to their baby who is not growing well while they improve their breastfeeding technique; to “rest” damaged nipples before they get the help they need to improve their breastfeeding technique; to relieve engorgement or to augment milk removal in the event of mastitis, until their breastfeeding technique improves). An electric pump will probably be more effective than hand expressing in these circumstances, but the mother should be shown both methods.

(3) want to express milk so that they can leave their baby with someone else, if they need to be away from their baby either occasionally (an evening out) or regularly (working). If the mother can wait until breastfeeding is established (4-6 weeks after birth) before starting to express, she may find life easier, but expression can begin at any time.

There are various hand, battery and electric pumps available on the market. Ideally, mothers should try these before they buy them as not all pumps suit all mothers. Some can be tried out at the breastfeeding clinic at the John Radcliffe or may be available from some Children’s Centres.

Hand expressing is a useful skill and mothers should be shown how to do this and/or be aware that a description of the technique is contained in the ORH orange booklet “Successful Breastfeeding”, which should be given to all breastfeeding women.

Storing expressed breast milk

Expressed breast milk must be collected in a sterile container. This must be stored as follows:

- at room temperature for up to six hours
- up to 5 days in the main part of the fridge at 4°C or lower (this preserves its properties better than freezing)
- up to 2 weeks in the freezer compartment of a fridge
- up to 6 months in a domestic freezer at –18°C or lower. (NICE 2008a)

Thawing expressed milk should be done overnight in the fridge or more quickly in a jug of warm water. Microwave ovens should not be used for thawing or heating milk. Once thawed, the milk should be stored in the fridge and used within 12 hours.

1.7. Maternal diet

Breastfeeding mothers should be advised that a healthy diet is important but that they do not need to modify their diet to breastfeed. Hunger and thirst will usually effectively regulate the intake of a lactating woman. There is no need to advise a lactating mother to eat and drink beyond her appetite. (RCM 2002)

Most women will lose weight naturally while breast feeding. Once breast feeding is established, obese women may try to lose weight, but no more than 2kg should be lost per month. (Dewey et al. 1994) Those seeking to lose weight should be referred to a dietitian for advice.

Vitamin D supplements providing 10 micrograms of vitamin D each day are recommended for breastfeeding mothers. Healthy start vitamins for women contain vitamin C, vitamin D and folic acid and are available free to those families eligible for Healthy Start vouchers.

For further information see the Healthy Start leaflet A Healthy Start for Pregnant Women and Young Children. Leaflets are available by calling 08701 555 455.

Information on Healthy Start is also available at www.healthystart.nhs.uk

1.8. Colic

The likeliest cause of colic in a well breastfed baby is poor attachment at the breast; with repeated high volume/low fat feeds often leading to an excess of lactose in the gut. (Woolridge et al., 1988; Evans et al., 1995)

There is limited evidence of a link between certain foods in the maternal diet and symptoms of colic in the infant (Lust et al., 1996).

1.9. Vegan mothers

There is evidence to suggest that vitamin B12 deficiency may occur in breast fed infants of vegan mothers if the maternal intake is not adequate (Specker et al., 1990). A good intake of vitamin B12 fortified foods e.g. yeast extracts; fortified soya milk, fortified cereals, or B12 supplements should be taken.

1.10. Peanuts

Allergen avoidance during pregnancy or lactation is **not** recommended for the prevention of allergy – the exception to this has been the avoidance of peanuts if there was a history of atopy in the family (Hourihane 1997, DH, 1998). However the advice on peanut consumption during early life and allergy risk has now been updated by the Department of Health (DH, 2009) as a result of a major review of the scientific evidence now available carried out in 2008 by the independent expert Committee on Toxicity (COT). This review has shown there is no clear evidence that eating or not eating peanuts (or foods containing peanuts) during early life stages influences the chances of a child developing a peanut allergy. COT concluded that the previous precautionary dietary recommendations are no longer appropriate.

The revised advice is as follows:

- **During pregnancy and breastfeeding:** The revised advice states that if mothers would like to eat peanuts or foods containing peanuts during pregnancy or

breastfeeding, then they can choose to do so as part of a healthy balanced diet, irrespective of whether their child has a family history of allergies.

- The revised advice additionally advises that where a child already has another kind of allergy (e.g. diagnosed eczema or a diagnosed allergy to foods other than peanut), or if there is a history of allergy in the child's immediate family (parents, siblings) then mothers should talk to their GP, Health visitor or medical allergy specialist before giving peanuts to the child for the first time, because these children are at higher risk of developing peanut allergy.

1.11. Breastfeeding and HIV

The rate of transmission of the HIV virus from mother to baby is higher in mothers choosing to breast feed. In the UK, where the risks to the baby of not breastfeeding are outweighed by the risk of infecting the infant, mothers who are HIV positive are advised not to breast feed (Townsend et al 2008).

1.12. Common problems in breast feeding

Breastfeeding is a learnt rather than instinctive process. In the UK, where breastfeeding has yet to become the cultural "norm", many mothers experience problems until a good technique is established and the mother's milk supply begins to match the demand of the baby. Mothers should be encouraged to seek help early if they experience problems in breast feeding.

Frequent feeding during the first week

New mothers should receive information about their baby's probable feeding patterns in the early days. It is normal that the baby may not feed very often during the first two days but may then feed very frequently for the rest of the first week. After the first week, if the baby is having fewer than six or more than ten feeds in twenty four hours it may be a sign that the baby is hungry and not getting enough milk; attachment should be checked.

Tender, full breasts

Mothers should be reassured that though painful, this is a common problem during the first week after birth as the milk comes in. They should also be reassured that it will resolve with good attachment and positioning and this should be checked. A little milk can be expressed, possibly with the help of hot flannels, to soften the breast and to enable the baby to latch on. The mother should be encouraged to continue feeding.

Sore, cracked or damaged nipples

These are usually caused by incorrect attachment in the early days. Later onset of sore nipples, after a period of pain free feeding, may be due to thrush. The mother should seek skilled help.

Mastitis

This is more common in the first weeks of lactation than later on, and is much more likely to be due to inefficient milk removal (milk stasis) than to infection. The mother should seek skilled help. Breastfeeding should continue, the attachment of the baby at the breast should be improved, and the mother shown how to express milk after feeds, if

appropriate. Symptomatic treatment (e.g. anti-inflammatory analgesics, bed rest, warm flannels) and reassurance should be given. Antibiotics may be necessary if there has been a delay in seeking help or symptoms do not start to resolve within 24 hours. Mastitis that occurs after breastfeeding is trouble free and well established is likely to be due to missed feeds (baby suddenly sleeps through the night) or weaning too quickly (milk stasis occurs if milk removal does not keep pace with milk production) (RCM. 2002, WHO. 2000).

1.13. Complementary feeds and supplementary feeds

Supplementary feeds are feeds given *in place* of a breastfeed. These should only be used in circumstances such as severe illness because unless the mother is able to express, each breast feed missed by the baby will interfere with the establishment of lactation and /or increase the likelihood of engorgement/mastitis.

Complementary feeds (or 'top-ups') are feeds given after a breastfeed, and in a term baby are usually an indication that breastfeeding needs attention. Complementary feeds of breast milk substitutes (formula milk) should be given as a last resort, not as a quick fix. (Currently 33% of babies born in UK hospitals receive breast milk substitutes whilst in hospital (Bolling et al 2007). The only demonstrable effect of giving complementary feeds in hospitals is to reduce the overall duration of breastfeeding. The mothers of these babies are three times more likely to have given up breastfeeding by the time their baby is two weeks old, in comparison to mothers whose babies have received only breast milk (White et al 1992).

1.14. Banked human milk

The primary purpose of the human milk bank is to provide human milk (as an alternative to formula/dextrose) for sick and/ or preterm infants, until their mothers are able to provide all they need themselves. It is occasionally used for babies on the post-natal wards if they (temporarily) need more milk than their mothers can supply.

1.15. Returning to work before one year

Mothers should be encouraged to combine working and breastfeeding if they wish to. This may involve using expressed breast milk or a combination of breast feeds and formula milk.

If the mother chooses to use expressed breast milk the supply needs to be built up for several days before returning to work. The mother will need to express whilst at work.

She will need to inform her employer ahead of time that she will need to express and store breast milk when she returns to work.

If the mother chooses to use formula milk or a combination, she will need to start dropping work time breast feeds and substituting with formula for a time before returning to work so that milk production is reduced.

After one year

If the mother returns to work after the child is aged one year, she may wish to continue to breastfeeding either end of the work time and will need to start dropping work time

feeds and offer cows' milk along with three meals, for a time before returning to work so that milk production is reduced.

1.16. Health professionals should aim to give consistent advice

Those who advise on infant feeding should be conversant with recent advances in the management of breast feeding.

The theoretical basis for breast feeding in the Oxford Radcliffe Trust is 'Successful Breast Feeding' written and produced by the Royal College of Midwives (RCM 2002). This should also form the basis of advice given across Oxfordshire.

1.17. Summary points

- All mothers should be encouraged to breast feed and offered support when breastfeeding.
- Exclusive breastfeeding for six months or longer is especially recommended in atopic families
- Particular attention should be paid to the attachment of the baby to the breast, as poor attachment is the cause of most of the problems breast feeding mothers encounter.
- Babies should be fed on demand, and allowed to finish the first breast first, before being offered the second, according to appetite
- Breast fed babies do not need additional fluids.
- During the first six months complementary (top- up) feeds should be discouraged.
- Mothers who are HIV positive should be advised not to breast feed.

1.18. Further Resources

- Successful Breast feeding (orange booklet), Royal College of Midwives, May 2008 – available to download from www.oxfordradcliffe.nhs.uk/forpatients/departments look under women's health services, maternity services and JR breastfeeding clinic

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Appendix 1 – Breast feeding policy for the Women’s centre, Oxford Radcliffe Hospitals NHS Trust

The Oxford Radcliffe Hospital’s Women’s Centre promotes, supports and protects breastfeeding because it is the healthiest way a mother can feed her baby.

The ten steps set out by the Baby Friendly Hospital Initiative are as follows:

1. Have a written policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement the policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers to initiate breastfeeding within half an hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants.
6. Give new-born infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming-in, allowing mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital.

The breastfeeding policy (2006) expands these points. Full copies may be obtained from the Women’s Centre, John Radcliffe Hospital or downloaded from www.oxfordradcliffe.nhs.uk/forpatients/departments - look under women’s health services, maternity and JR breastfeeding clinic.

2. Infant Formula

2.1. Introduction

Breastfeeding should be encouraged but where it is not possible or where parents choose not to, an infant formula should be used. Parents should be supported and receive advice on safe preparation of feeds.

All milks in the U.K. are required by law to follow the 'Infant Formula and Follow-on Formula Regulations 2007'. The regulations are concerned with the composition, labelling and marketing of infant formula and follow-on formula. The current U.K. regulations (2007) can be accessed on the Infant and Dietetic Foods Association website: www.idfa.org.uk

The nutritional composition of infant formula is designed to be as close to the composition of breast milk as possible. However they do not have all the immunological benefits of breast milk.

Breast milk or formula should be the main milk drink for infants during the first year of life. Both provide the infant with significantly larger amounts of iron and vitamin D than cows' milk.

2.2. Infant formula based on cows' milk

Standard formula

Standard infant formula is based on cow's milk which is then highly modified to produce formula. Some manufacturers produce two types of formula that are suitable from birth. 'First stage' and 'Second stage'. First stage formula are whey dominant and second stage are casein dominant.

Whey dominant formula have a protein composition more similar to breast milk. They have a 40 to 60 ratio of casein to whey protein. Casein dominant formula are less modified and have an 80:20 ratio of casein to whey protein. There are also 100 % whey formula where all the protein is whey protein.

Casein dominant formula are often marketed as suitable 'for the hungrier baby'. In theory casein stays longer in the stomach thus giving a greater feeling of satiety. There is however no conclusive scientific evidence that casein dominant formula is more satisfying than whey dominant formula (Taitz, 1989).

As whey dominant formula more closely resemble breast milk than casein based formula it would seem appropriate to recommend their use over casein dominant formula.

If a parent feels their infant is hungry or unsatisfied, they can offer larger or more frequent feeds of their established formula. There is no harm in trying different brands of formula or a second stage milk(casein dominant) - this is preferable to the early introduction of solid food.

Formula marketed for 'comfortable digestion'

These formula have the following features aimed at reducing feeding discomfort in infants:

- Partially hydrolysed protein

- 100% whey protein
- Lower lactose
- Slightly thicker than standard formula due to added starch
- Prebiotics
- Blend of vegetable oils designed to more closely mimic the fats in breast milk

The evidence for the use of these formula in reducing feeding discomfort is based on limited research studies of small numbers of infants. However anecdotal feedback from parents has reported positive results.

Additions to infant formula

In recent years there have been a number of additions to standard infant formula in attempts to reproduce the beneficial components of breast milk, both nutritional and protective.

- **Long chain polyunsaturated fatty acids (LCPs)**
LCPs are part of the omega 3 and omega 6 series and are naturally present in breast milk. Research suggests that they enhance growth and development of brain, eye and nervous tissue in babies. The two main LCPs found in breast milk and which are added to infant formula are Docosahexanoic (DHA), an omega 3 fatty acid and Arachidonic acid (AA), an omega 6 fatty acid.
- **Nucleotides**
Nucleotides occur naturally in breast milk and play a role in the growth and the development of the immune system.
- **Prebiotics**
Prebiotics are non digestible food ingredients that stimulate the growth or activity of indigenous beneficial, or 'friendly', bacteria in the gut. This modulation of gut flora may help the prevention of constipation and colic symptoms in formula fed infants. (Savino 2006). There is also some evidence that this has a beneficial effect on the immune system of infants and may reduce the risk of allergic disease (Boehm and Moro, 2008). Further research is needed to establish these functional effects of prebiotics on infant health.
(NB The addition of prebiotics may result in softer stools similar to those of a breast fed baby.)
- **Betapol®**
Betapol is a trade name for a triglyceride fat mixture derived from vegetable oils, and modified to more closely resemble fats found in breast milk and may help reduce constipation and improve calcium absorption.

- **Alpha lactalbumin**

Alpha-lactalbumin is the main whey protein found in breast milk, whereas beta-lactalbumin is the main whey protein in cows' milk. Alpha-lactalbumin rich formula have an amino acid profile closer to breast milk.

2.3. Soya Formula

Soya formula is based on soya beans from which the protein is extracted and modified to make it suitable for use in formula. Vitamins, minerals, fats and carbohydrate are added to make the formula nutritionally complete. The carbohydrate is supplied as glucose syrup and consequently soya formula is lactose free.

Soya formula has traditionally been used as first line treatment in proven case of cows' milk protein or lactose intolerance. However there has been concern over the use of soya formula due to the phytoestrogen content. Phytoestrogens occur naturally in plants and can behave like a weak form of oestrogen. The relatively high intakes of phytoestrogens per kg body weight when soya formula is used as the sole source of nutrition is the reason for this concern. One study found that the production of testosterone was suppressed in neonatal marmosets which were partially fed soya formula(Sharpe et al 2002). There is no scientific evidence that soya formula can cause long term damage to human infants. However in 2004 the Chief Medical Officer advised that soya formula should only be recommended in exceptional circumstances where there is a clinical need to ensure adequate nutrition e.g:

- infants with cows' milk allergy /intolerance who refuse to take extensively hydrolysed formula.
- vegan infants where the mother is unable or chooses not to breastfeed.
- Infants with galactosaemia

The British Dietetic Association Paediatric Group have produced a position statement on the use of soya formula that recommends that the use of a soya based formula as first line treatment should be discouraged during the first six months of life(except for the above exceptional circumstances) for the following reasons:

1. An infant receiving soya based formula as a sole source of nutrition between the ages of 0-6 months will consume between 4.5-9 mg isoflavones per kg body weight/day. Permanent changes due to phytoestrogens are most likely to occur during this developmental stage of 4-6 months.
2. Some infants with atopy or cows' milk allergy/intolerance will become sensitised to soya protein. The risk of sensitization as with all allergenic foods is likely to be greatest in the first six months of life. Consequently use of soya in allergic infants or in infants at high risk of developing allergy is not recommended before six months of age (Host et al 1999).
3. Recent concerns of an increased risk of peanut allergy in infants fed soya based infant formula give further support to delaying exposure to soya (Lack et al 2003).

From the age of six months the BDA paediatric Group advise that soya formula can be used for the treatment of cows' milk protein allergy/intolerance and lactose intolerance. The risks after the age of six months are likely to be reduced as the dose of phytoestrogens per kg body weight will be lower as the infant begins to take solids. Also the infant's potentially vulnerable organ systems are likely to have matured by this age.

Therefore, an infant under 6 months presenting with symptoms of cows' milk intolerance who is not being breast fed, should not be prescribed a soya formula, but instead should be prescribed a protein hydrolysate formula. Soya formula may be used for infants over 6 months – see Section 7 for more information.

Care should be taken with the use of soya formula and dental hygiene, because the carbohydrate source is glucose which is known to be more cariogenic than lactose. Dental hygiene and good feeding practices will minimise the cariogenic effect and should be given close attention in infants on soya formula.

Cartoned soya milks are not suitable as a main milk substitute for infants and generally also not for children under two years because they are low in energy.

2.4. Goats' milk formula

The Department of Health does not recommend the use of formula based on goats' milk protein for infants. The previously available goats' milk formula is no longer approved for use in Europe due to lack of scientific data establishing the nutritional adequacy and safety of goats' milk as a source of protein in infant formulas.

Some proteins in goats' milk are similar to those in cows' milk and the levels of lactose in the formula are similar. Most babies who react to cows' milk protein or who have lactose intolerance are also likely to react to goats' milk formula.

2.5. Follow-on formula

Follow-on formula are modified milks designed for use in older infants. Levels of vitamin D, iron and protein are higher than those for standard infant formula.

Follow-on formula should not be given before six months due to the nutritional composition and higher solute load.

There is no evidence that follow-on formula are superior to standard formula in the prevention of toddler anaemia. Breast milk or infant formula should be given as the main drink until one year of age to help prevent anaemia. The use of follow-on milk is preferable to the use of cows' milk between six months and one year of age.

2.6. Goodnight formula

Goodnight formula are a type of follow-on formula that are marketed as a formula to help with sleeping. These formula contain cereal and some brands contain gluten. The Scientific Advisory Committee on Nutrition (SACN) Subgroup on Maternal and Child Nutrition (SMCN) have advised that there is no evidence that these "Good Night" milks offer any nutritional or other health advantage over the use of infant formula or follow-on formula. SCMN also raise concerns that the claims made about a "good night's sleep" could undermine breastfeeding and use of these products to "settle" babies at night could promote poor dental hygiene due to the additional carbohydrates added.

2.7. Specialised infant formula available over the counter from a pharmacy without a prescription

- Lactose free infant formula (e.g. SMA LF, Enfamil O-Lac) have been produced to treat lactose intolerance. They are based on cows' milk but the lactose has been replaced by glucose. They are unsuitable for cows' milk protein intolerance. They may be helpful in treating diarrhoea that persists following a gastro-intestinal infection, if lactose intolerance is thought to be a contributing factor.
- Pre-thickened formula (e.g. Enfamil AR, SMA Staydown) have been developed for infants with mild reflux as an alternative to adding a thickening agent to a standard infant formula. The added constituents of these formula thicken the formula when it reaches the stomach.
- Partially hydrolysed 100 % whey formula (e.g. Nan HA) have been developed for infants who are unable to breastfeed, or have stopped breastfeeding and are at high risk of developing an allergy. There is currently no conclusive evidence base on which to recommend these formula. They are not suitable for babies with allergy or intolerance to cows' milk protein as the partially hydrolysed protein could cause an allergic reaction.

These formula are not available under the Healthy Start Scheme.

2.8. Other specialised infant formula

The following formula are only available on prescription. They should be used under the direction of a medical practitioner or dietitian.

- **Extensively hydrolysed formula**

The protein in these products is hydrolysed enzymatically so that the protein is broken down to peptides. This makes them suitable as a milk substitute in the treatment of cows' milk protein intolerance/allergy.

- **Amino acid based formula**

The protein in these formula is broken down to amino acids. They are designed to treat severe food allergy including those situations where there is intolerance to the extensively hydrolysed formula.

- **High Energy Formula**

These formula have a higher calorie and protein content and are designed for use with infants with faltering growth. They are available on prescription in a ready to feed format only.

2.9. Feed Preparation

Infant formula are presented as dried and packaged in tins but some are also available as liquids which are ready to feed. Some brands are also available in pre-measured sachets, which contain the right amount of formula for a six or eight ounce feed.

The following is the advice from the Food Standards Agency and Department of Health published in December 2006.

Guidance for health professionals on safe preparation, storage and handling of powdered infant formula

Powdered infant formula is not a sterile product and may be contaminated with pathogens that can cause serious illness. Correct preparation and handling reduces the risk of illness.

The Department of Health and the Food Standards Agency have issued revised guidance on the preparation and storage of powdered infant formula milk. **This guidance covers the home and other care settings, including nurseries and child minders.**

The risks

The European Food Safety Authority's Scientific Panel on Biological Hazards has issued an opinion in relation to the microbiological risks in powdered infant and follow-on formulae. The panel concluded that *Enterobacter sakazakii* and *Salmonella* are the micro-organisms of greatest concern. Younger infants are likely to be more susceptible to these organisms than older infants.

Although infections with these micro-organisms from formula milk are rare, the risks can be reduced by following the guidelines below.

For high risk infants (pre-term, low birth weight and immunocompromised) using ready to feed liquid formula, which is sterile, in place of making up powdered formula is considered the safest option.

The Department of Health and the Food Standards Agency advise all health professionals, particularly nurses, midwives and health visitors, to change/revise/ update their advice to parents and carers on the preparation and storage of infant formula milk in the home and in other care settings.

Health professionals should re-emphasise to parents and carers:

- that powdered infant formula is not sterile and good hygiene practices are essential in preparing and storing feeds made from powdered formula
- failure to follow the manufacturer's guidelines may increase the chances of a baby becoming ill

In order to reduce the risk of infection it is recommended that the following steps are taken:

Cleaning and sterilising feeding equipment

It is very important that all equipment used for feeding and preparing feeds has been thoroughly cleaned and sterilised before use.

- Wash hands thoroughly before cleaning and sterilising feeding equipment
- Wash feeding and preparation equipment thoroughly in hot soapy water
- Bottle and teat brushes should be used to scrub inside and outside of bottles and teats to ensure that all remaining feed is removed
- After washing feeding equipment rinse it thoroughly under the tap
- If using a commercial steriliser, follow manufacturer's instructions

- If your bottles are suitable for sterilising by boiling: fill a large pan with water and completely submerge all feeding equipment, ensuring there are no air bubbles trapped; cover the pan and boil for at least 10 minutes, making sure the pan does not boil dry. Keep the pan covered until equipment is needed.
- Wash hands thoroughly and clean the surface around the steriliser before removing equipment.
- It is best to remove the bottles just before they are used.
- If the bottles are not being used immediately, they should be fully assembled with the teat and lid in place to prevent the inside of the sterilised bottle and the inside and outside of the teat from being contaminated.

Guidance for Preparing Feeds in the Home

Preparing a feed using powdered infant formula

Important Normally each bottle should be made up fresh for each feed. Storing made-up formula milk may increase the chance of a baby becoming ill and should be avoided.

1. Clean the surface thoroughly on which to prepare the feed
2. Wash hands with soap and water and then dry.
3. Boil fresh tap water in a kettle. Alternatively bottled water that is suitable for infants can be used for making up feeds and should be boiled in the same way as tap water.
4. **Important:** Allow the boiled water to cool to no less than 70° C. This means in practice using water that has been left covered, for less than 30 minutes after boiling.
5. Pour the amount of boiled water required into the sterilised bottle.
6. Add the exact amount of formula as instructed on the label always using the scoop provided with the powdered formula by the manufacturer. Adding more or less powder than instructed could make the baby ill.
7. Re-assemble the bottle following manufacturer's instructions.
8. Shake the bottle well to mix the contents.
9. Cool quickly to feeding temperature by holding under a running tap, or placing in a container of cold water.
10. Check the temperature by shaking a few drops onto the inside of your wrist – it should feel lukewarm, not hot.
11. Discard any feed that has not been used within two hours.

Guidance for the Use of Powdered Infant Formula Feeds in Care Settings

When it is not practical to make up feeds just before feeding:

It is best to make up infant formula fresh for each feed but, there are times when this may not be practical and feeds need to be prepared in advance. For example, when taking an infant to a **nursery** or to the **child minder** or when **leaving the house** for a prolonged period of time.

Ready to use liquid feeds are sterile and are the safest option. However, they are a more expensive option and therefore may not suit all parents.

Preparing powdered feeds for later use

It is the length of time for which the reconstituted formula is stored that increases the risk of bacterial growth. Reducing the storage time will therefore reduce the risk. For example, when taking an infant to the nursery it is best to make up the feed(s) on the same morning before leaving home rather than on the night before.

The steps below outline the safest way to prepare and store feed for later use:

- Prepare feeds in separate bottles, not in one large container (e.g. a jug)
- Follows steps 1 to 9 of the section above 'Preparing a feed using powdered infant formula'
- Store the feed in the fridge at **below 5° C**. Prepared bottles are best kept in the back of the fridge and not in the door.
- The temperature of the fridge should be checked regularly using a fridge thermometer. A fridge that is opened frequently may need to be set at a lower temperature to ensure that it does not rise above 5 °C during times of frequent access. The thermostat in older fridges without temperature settings may need to be adjusted to ensure that the temperature is **below 5° C**.
- The risk of infection to a baby will be lower if the feed is only stored for a short time. Feeds should never be stored for longer than 24 hours and this length of time is no longer considered ideal especially for young babies.

Alternatively, you may:

- Put boiling water in a sealed vacuum flask and use this to make up fresh formula milk when needed.
- Care should be taken to avoid scalding when making up the feed

Re-warming stored feeds

- Only remove stored feed from the fridge just before it is needed.
- Re-warm using a bottle warmer, or by placing in a container of warm water.
- Microwaves should never be used for re-warming a feed.
- Never leave a feed warming for more than 15 minutes.
- Shake the bottle to ensure the feed has heated evenly.
- Check the feeding temperature by shaking a few drops onto the inside of the wrist - it should be lukewarm, not hot.

Transporting feeds

Because of the potential for growth of harmful bacteria during transport, feeds should first be cooled in a fridge (below 5° C) and then transported.

- Prepare feed(s) and place in the fridge as outlined in section 'preparing feeds for use later'.

- Ensure feed has been in the fridge for at least one hour before transporting.
- Only remove feed from the fridge immediately before transporting.
- Transport feeds in a cool bag containing a frozen ice brick.
- Feeds transported in a cool bag should be used within 4 hours.
- Re-warm at the destination as in section 'Re-warming stored feeds'.
- Alternatively if you reach the destination within 4 hours, feeds transported in a cool bag can be placed in a fridge and kept for up to a maximum of 24 hours from the time of preparation - this is not ideal as the risk of illness increases the longer it is stored.

Preparation of infant formula in hospitals and Special Feed Units

Detailed advice about the safe preparation and storage of powdered infant formula for health professionals in hospitals, especially intensive care units, will be published separately.

Further Information

Further information on the Safety Guidelines issued by the European Food Safety Authority's (EFSA) Scientific Panel on Biological Hazards can be found on:
http://www.efsa.eu.int/science/biohaz/biohaz_opinions/691_en.html

Question and Answers

What is the safest option for feeding babies?

Breastmilk is the safest way to feed a baby. Ready to use liquid feeds are sterile until opened and are the safest option if using infant formula. Powdered infant formula is not sterile and should be made using water that is hotter than 70° C.

Why is powdered infant formula not sterile?

The bacteria *Enterobacter sakazakii* is ubiquitous in the environment and may contaminate powdered infant formula during manufacture. It is impossible to be sure of avoiding this contamination. The bacteria may also be present on work surfaces in homes and nurseries and can contaminate feeds while they are being prepared by parents or carers.

Why should the water be 70 degrees Celcius?

Water at 70° C will kill most of the bacteria present in the powdered formula. This is the most important step in making up powdered infant formula as powdered infant formula cannot be guaranteed to be free of bacteria

Why should made up formula be cooled quickly?

Bacteria multiply most quickly between 7 and 63° C. The longer formula is at this temperature, the greater the increase in the bacterial content and so the risk of infection for the baby will increase.

Why should storage times of made up formula be minimised?

Even when formula is made up with water at more than 70° C it may still contain some bacteria which will continue to multiply during storage. At less than 5° C the rate of multiplication of the bacteria will reduce but will not completely cease.

How long can made up formula be stored in a fridge?

Made up formula can be stored for a maximum of 24 hours but this is no longer considered ideal particularly for young babies because the bacterial content continues to increase during storage. This increases the risk of infection for the baby.

Once a feed is ready for feeding, how long before it should be discarded?

Discard any feed that has not been used within 2 hours. All left-over feed should be discarded and never saved for later.

If you are out and cannot boil water how do you make up a feed?

Mothers should be advised to fill a vacuum flask with boiling water. If the flask is full and sealed the water will stay above 70° C for several hours. This flask can be safely transported and used to make up a feed when necessary.

Do vacuum flasks need to be sterilised if they are used to store boiled water for making up a feed later?

No, the vacuum flasks do not need to be sterilised but they should be washed thoroughly and rinsed with boiling water before being filled with boiling water intended for the feed. The boiling water should kill bacteria present in the vacuum flask.

If water is boiled and put into the sterilised feeding bottles can it be stored in the fridge like this until the powder is added?

No, the water must be above 70° C when the powder is added otherwise the bacteria in the powder will not be killed.

2.10. Water and formula feeding

Tap water should be the first choice of water to be used for the preparation of infant formula. Despite strict water regulations in the UK, all tap water used to make infant formula should be boiled and cooled before use.

Hospitals may choose to use sterile water for convenience.

A fresh kettle of water should be used each time for the preparation of infant formula as repeated boiling increases the sodium content.

Water which has been artificially softened has a high level of sodium and should not be used for preparing infant formula.

Domestic water filters remove chlorine, some metals such as aluminium and lead and some pesticides, thus affecting the taste of the water. They do not however remove bacteria, in fact water filters can be a breeding ground for bacteria as the water remains static in the filter and container. There is no advantage in using filtered water rather than tap water in the UK, therefore it is not recommended.

Bottled waters other than those labelled "natural mineral water" must comply to the same regulations as tap water.

Natural mineral waters have different regulations that do not cover mineral and solute content. Consequently these may contain higher concentrations of solutes such as nitrate, sodium, fluoride and sulphate which may lead to solute overload if given to infants.

In guidelines sent to health authorities (Dept of Health, 1998) the Department of health recommends checking the label and avoiding using bottled waters with concentrations greater than those given in the list below for infant feeding:

Maximum mineral concentrations for drinking water (UK Department of Health)

Sodium	200mg/l
Nitrate	100mg/l (best below 50mg/l)
Nitrite	3mg/l
Sulphate	500mg/l

All bottled water used must be within its “best before” date.

Sparkling water or effervescent water is not suitable for preparing infant formula.

When abroad boiled tap water should be used. If this is unsuitable, boiled, bottled water may be used checking for levels of solutes as per above list.

All water, whether it is tap, bottled or filtered should be boiled before being used to make infant formula.

During hot weather bottle fed babies may require extra fluid. This should be given in the form of cooled, boiled water. Breast fed babies do not need additional water.

2.11. Marketing of infant formula

All companies’ marketing infant formula in the UK must comply with the Infant Formula and follow-on Regulations, 2007.

- The regulations do not allow:
- advertising of infant formula, except to members of the health care system or for the purposes of trade before the retail stage
- adverts to contain pictures of babies
- free samples to be given to mothers or pregnant women or free or subsidized supplies to be given to hospitals- samples can only be given to health professionals for “professional evaluation, research or the education and counseling of mothers”

All information must also promote breastfeeding.

All health workers in Oxfordshire should therefore promote breastfeeding and give unbiased advice to mothers who choose to bottle feed.

2.12. Healthy Start

Healthy Start replaced the Welfare food scheme in November 2006. The Healthy Start scheme differs from the Welfare Food Scheme in that the range of foods available has been increased to include fruit and vegetables as well as milk and infant formula.

Healthy Start vouchers can be used for infant formula that is labelled suitable for babies from birth. Follow-on formula and formula made from soya are not included in Healthy Start.

Information about the scheme can be found at www.healthystart.nhs.uk

2.13. Summary points

- Breastfeeding should be encouraged but where it is not possible or where parents choose not to, an infant formula should be used. Parents should be supported and receive advice on safe preparation of feeds.
- Breast milk or formula should be the main milk drink for infants during the first year of life. Both provide the infant with significantly larger amounts of iron and vitamin D than cows' milk.
- Soya formula should only be recommended in exceptional circumstances where there is a clinical need to ensure adequate nutrition.
- A child presenting with symptoms of cows' milk intolerance who is not being breast fed, should be prescribed a protein hydrolysate formula.
- Follow-on formula should not be given before six months due to the nutritional composition and higher solute load.
- Formula should be made up with boiled water cooled to 70⁰ C, ideally just before each feed.

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Appendix 2 – Examples of infant formula available in the UK

Type of Formula	Name of formula	Manufacturer
Standard whey based formula	SMA Gold First Infant Milk from Newborn Nurture 1 Aptamil First Hipp Organic First Milk	SMA Cow and Gate Heinz Milupa Hipp Organic
Standard casein based formula	SMA White Infant milk for hungrier babies Nurture 2 Hungry baby Aptamil Extra hungry	SMA Cow and Gate Heinz Milupa
Follow-on formula	SMA Progress Follow-on milk for Hungrier babies 6 months + Nurture 3 Growing baby Follow-on Aptamil Follow-on Hipp Organic Follow-on milk	SMA Cow and Gate Heinz Milupa Hipp Organic
Goodnight milks	Good Night Milk Good night milk drink	Cow and Gate Hipp Organic
Soya formula	Wysoy Infasoy Nurture Soya Prosobee	SMA Cow and Gate Heinz Mead Johnson Nutritionals
Lactose free formula	SMA LF Enfamil O-Lac	SMA Mead Johnson Nutritionals
Pre-thickened formula	SMA Staydown Enfamil AR	SMA Mead Johnson Nutritionals
Partially hydrolysed 100% whey (marketed for 'comfortable digestion')	Comfort 1 Comfort 2 from 6 months Aptamil Easy Digest Nurture Gentle Newborn Nurture gentle follow on from 6 months	Cow and Gate Cow and Gate Milupa Heinz Heinz
Partially hydrolysed 100% whey (marketed for 'allergy prevention')	Nan HA 1 Nan HA 2 from 6 months	Nestle Nestle

Extensively hydrolysed formula	Nutramigen 1 Nutramigen 2 (from 6 months) Pepti (contains lactose) Peptide Prejomin Peptijunior(contains MCT fats) Pregestimil (contains MCT fats) MCT peptide	Mead Johnson Nutritionals Mead Johnson Nutritionals Cow and Gate SHS Milupa Cow and Gate Mead Johnson Nutritionals SHS
Amino acid formula	Neocate and Neocate Advance (>1 year) Nutramigen AA	SHS Mead Johnson Nutritionals

3. Weaning

3.1. Introduction

Weaning is the process of expanding the diet to include foods and drinks other than breast milk or infant formula.

3.2. When to wean

Exclusive breastfeeding is recommended for the first six months of life, as it provides all the nutrients a baby needs. Six months is the recommended age to introduce solid foods for all normal healthy infants, both breastfed and formula fed infants. Although there is sufficient evidence that exclusive breastfeeding for 6 months is nutritionally adequate, there are other factors involved in an individual's decision about when to start weaning and there should be some flexibility in the advice to reflect this. Mothers who are unable to follow these recommendations, or who choose to give solid foods before 6 months should be supported and given appropriate advice to optimize their baby's nutrition. They should be encouraged to view 4 months (17 weeks) as the earliest age to introduce solids.

The age at which to start weaning was reviewed by the Department of Health in 2003 following guidance from the World Health Organisation (WHO) and is summarised in their report 'Infant feeding recommendations' (2004). The Department of Health lists the advantages of exclusively breast feeding until 6 months as:

- Reduces the risk of age related gastrointestinal disease
- Enables the maturation of the kidneys and gut so that the baby can cope with a varied diet
- Reduces the risk of developing asthma and eczema
- Delays the introduction of foods, some of which can cause allergic reactions

The recommendation also applies to babies fed infant formula milk. The Scientific Advisory Committee on Nutrition concluded there are unlikely to be any risks associated with delaying weaning to six months in infants who are solely fed on infant formula or who are mixed fed (on breast and infant formula).

More recently a position paper on complementary feeding by the ESPGHAN (European Society for Pediatric Gastroenterology, Hepatology and Nutrition) committee on Nutrition has reviewed the evidence and advocates that exclusive breastfeeding for about six months is desirable and that solids should not be introduced before 17 weeks but not later than 26 weeks (ESPGHAN, 2008). Such a weaning age range may be better than a "one fit for all" approach when infants vary widely in their developmental and social needs and carers have diverse lifestyles and variable family support. This may also help alleviate the guilt that some mothers feel when they are unable to delay weaning until six months. The 2005 Infant feeding Survey found that only 2% of mothers were managing to delay weaning onto solids until six months, with 47% introducing solids in the 17 weeks to 26 weeks period, 41% between 13 and 17 weeks and 10% earlier than 13 weeks (Infant feeding survey,2005).

Premature infants

There is very little published work to guide advice but anecdotal reports suggest that weaning should start between five and seven months uncorrected age, if the infant is physically and developmentally ready, unless otherwise directed by a consultant neonatologist. (Shaw, V., and Lawson, M., 2007)

Once weaning has started it should proceed as for term infants.

3.3. Why wean

Weaning is important for nutritional, developmental and social reasons. After 6 months solids should be introduced for the following reasons:

- Breast milk or formula milk alone will no longer meet nutritional requirements. Nutrient requirements are increased and body stores of iron are decreased.
- Infants are ready to learn about taste, texture, chewing, swallowing and self-feeding. These experiences are encouraged by the weaning process. The muscles and co-ordination developed by the chewing process are also used in speech development.
- Eating and drinking is an important part of social interaction and eating habits develop from an early age.

It is important that weaning does not start before the infant is physically and developmentally ready. Mothers who choose, for whatever reason, to give their babies solid foods before 6 months should be encouraged to view 4 months (17 weeks) as the earliest age to introduce solids for the following reasons:

- Renal maturation – Fluid conservation and solute excretion are limited in the newborn, hence the suitability of breast milk or infant formula as high volume, low solute foods. By 4 months the kidney has matured sufficiently to cope with the reduced fluids and higher solute concentration of a weaning diet
- Neuromuscular co-ordination is not sufficiently developed before this time.
- Gastric acid secretion may not be sufficient for the effective digestion of solids
- Gut closure – the infant gut is relatively permeable to large molecules present in protein foods. By around 4 months this permeability has reduced significantly and is termed 'gut closure'. Introduction of foods before this gut closure increases the likelihood of allergic reaction.

Bearing in mind the recommended age for starting solids, the following pointers are useful when deciding whether an infant is ready for weaning:

- the baby finishes the breast or bottle feed and appears to want more or starts to demand feeds more frequently for an extended period (e.g. one week)
- shows an interest in food e.g. reaching out for food
- starts to put things in mouth to explore taste and texture
- shows an increased need to chew

It is normal for infants aged three to five months to begin waking in the night when they have previously slept through. It is not necessarily a sign of hunger at this age and starting solids will not make the infant more likely to sleep through the night again.

3.4. Preparation of weaning foods

Home cooked weaning foods should be encouraged as this helps the transition to family foods. Commercial baby foods are useful for convenience but are expensive and the energy levels can be low. Over reliance on commercial food in the early stages of weaning can result in the difficulty moving the infant on to family foods later.

Salt should not be added to weaning foods as infantile kidneys are still maturing and high solute loads can cause renal stress. The current maximum recommended intake of salt for infants is less than 1g salt/day (see Section 4.3).

Sugar should not be added to weaning foods. Sugary foods and drinks can encourage the preference for sweet tastes and lead to tooth decay.

Solids should not be placed in a bottle or in drinks as this does not aid the development of eating skills. There is also a risk of choking.

Food should be cooked, pureed, mashed or chopped depending on the stage of weaning. If additional fluid is required to achieve the right consistency, breast milk, infant formula, cows' milk or cooled boiled water may be added.

3.5. Starting weaning

The aim of the first stage is to accustom the infant to new tastes and develop new feeding skills by taking food from a spoon. The quantity of food taken is not important initially.

Weaning foods should be offered once a day at the start of weaning. This should be increased as the infant dictates which may be more quickly with infants who are near 6 months old than younger infants.

First weaning foods should be mashed or pureed.

Suitable first weaning foods

Mashed potato

Mashed or pureed starchy vegetables e.g. carrot, parsnip, yam, swede, sweet potato

Mashed or pureed ripe fruit e.g. pear, banana, avocado or cooked fruit e.g. apple

Mashed or pureed rice mixed with usual milk (baby rice or home cooked white rice) or sago, millet, maize and cornmeal are also suitable grains

Plain whole milk yoghurt

Once the infant learns to take food from a spoon the variety of foods offered should increase to introduce a range of tastes.

More foods to try

Blended, or pureed meat, chicken, fish

Mashed or pureed pulses e.g. lentils, chick peas
Well cooked scrambled egg
Increased variety of fruit and vegetables
Soft finger foods e.g. toast, pitta bread, cooked soft vegetables e.g. green beans, carrots,
thick cut chips
Cereals, e.g. weetabix, porridge,
Pasta shapes

3.6. Foods to avoid before 6 months

If babies are being offered solids before six months, the following foods should be avoided:

- **Gluten** containing cereals. Gluten is found in wheat and wheat based foods. Rye, barley and oats contain proteins similar to gluten and should not be introduced until after six months. More recently the ESPGHAN (2008) nutrition committee recommend to avoid both early (before seventeen weeks) and late (more than seven months) introduction of gluten which may favour the onset of coeliac disease in predisposed individuals. (ESPGHAN, 2008)
- **Eggs**. When introduced, after six months, they should be well cooked. (See Section 4.4)
- **Honey** should not be given to infants under one year. Very occasionally honey may contain small numbers of bacterial spores. These are harmless to older children but can cause infant botulism in infants.
- **Nuts and seeds**, including ground nuts and, peanut butter and other nut spreads. Delaying the introduction to six months may help reduce the risk of developing allergy. Until recently children who were at risk of allergy (i.e. those whose parents or siblings suffer from hayfever, asthma, eczema or any food allergy) were advised to avoid nuts, especially peanuts, and obvious sources of nuts until the age of three years). However the advice on peanut consumption during early life and allergy risk has now been updated by the Department of Health (DH, 2009) as a result of a major review of the scientific evidence now available carried out in 2008 by the independent expert Committee on Toxicity (COT). This review has shown there is no clear evidence that eating or not eating peanuts (or foods containing peanuts) during early life stages influences the chances of a child developing a peanut allergy. COT concluded that the previous precautionary dietary recommendations are no longer appropriate.

The revised advice is as follows:

- **During pregnancy and breastfeeding:** The revised advice states that if mothers would like to eat peanuts or foods containing peanuts during pregnancy or breastfeeding, then they can choose to do so as part of a healthy balanced diet, irrespective of whether their child has a family history of allergies.

- **When introducing peanuts into a child's diet:** General advice is that all mothers should try to exclusively breastfeed their baby for the first 6 months of life. The revised

advice states that if mothers choose to start giving their baby solid foods before 6 months of age, they should not introduce peanuts or other allergenic foods (such as other nuts, seeds, milk, eggs wheat, fish or shellfish) before this time, and when they do these foods should be introduced one at a time so that they can spot any allergic reaction.

- **The revised advice additionally advises that where a child already has another kind of allergy** (e.g. diagnosed eczema or a diagnosed allergy to foods other than peanut), or **if there is a history of allergy in the child's immediate family** (parents, siblings) then mothers should talk to their GP, Health visitor or medical allergy specialist before giving peanuts to the child for the first time, because these children are at higher risk of developing peanut allergy.

When introduced in infants of non atopic families the nuts should be suitably prepared for the child's age i.e. ground or as spreads. Whole nuts should not be given to children under five years because of the risk of choking.

- **Fish and shellfish** because of the risk of allergy. Shark, swordfish and marlin should be avoided by infants and young children because they contain relatively high levels of mercury, which might affect a child's developing nervous system.
- **Soft and unpasteurised cheeses** which may contain harmful bacteria.
- **Liver.** The Scientific Advisory Committee on Nutrition has recommended that no-one should increase their consumption of liver beyond one portion per week because of the high vitamin A content. There are no recommendations for infants and young children but it is prudent to avoid liver before six months and limit it to once a week in older infants and children. If children are eating liver regularly (i.e. weekly) they should not take any additional vitamin A in the form of a vitamin supplement (SACN 2005).

3.7. Weaning and allergy

There is no evidence that delaying the introduction of potentially allergenic foods beyond the age of six months is beneficial even in infants who are at risk of developing allergy. These infants are those with parents or siblings with atopic disease. (See Section 7)

For such infants, high allergenic foods such as wheat, egg and milk should be commenced by adding in each food singly, starting with a small amount and introducing no more than one new potentially allergenic food at a time. See 3.6 for specific advice about introducing peanuts in these children.

3.8. Drinks

As weaning progresses and the amount of food eaten increases, the amount of milk infants take will decrease.

Breast or formula milk should continue to be the main drink until the infant is one year of age. Formula fed infants will still require 500-600 mls of formula milk per day until one year of age.

Water is the best additional drink and should ideally be given from a cup. This should always be boiled and cooled before the age of six months. Sweet drinks should be discouraged. The sugars in soft drinks, including 'baby' fruit juices and herbal drinks, together with the acidity can cause dental caries (see section 5)

Breast fed babies do not need additional drinks during the first six months.

If fruit juices are given they should be well diluted with water (e.g. 1 part fruit juice to 10 parts water) and given in a cup at mealtimes only. The risk of dental caries is greater from a bottle or cups with a teat/spout because of the position of the teat/spout against the teeth.

Carbonated drinks are acidic and can damage teeth, so are not recommended. Diet soft drinks are not intended for infants and may result in high intakes of artificial sweeteners.

Tea and coffee both contain caffeine and are therefore unsuitable for infants. Tea and coffee also inhibit the absorption of iron and other minerals, and caffeine can suppress the appetite.

3.9. From around nine months to twelve months

Foods at this stage should have gradually progressed to a minced or chopped consistency.

Foods should be offered at three mealtimes each day, interspersed with healthy snacks and/or milk drinks.

Finger foods should be offered each day. Infants should always be supervised when feeding. Harder finger foods such as raw fruit and vegetables can be offered with close supervision.

Ideas for finger foods

Ripe, peeled soft fruit e.g. banana, pear, peach
Cooked soft vegetables e.g. carrot, courgette, parsnip
Grated carrot
Fingers of buttered toast, pitta bread
Cubes or thin slices of cheese
Well cooked past shapes
Strips of well-cooked meat or chicken

The amount of food eaten will increase as the infant becomes more active.

By the age of twelve months infants should be offered most family foods.

The use of salt should still be discouraged.

From one year of age full fat cows' milk can be given as the main milk drink.

Goats' and sheep's milk can be used, if desired, once an infant is one year of age providing it is pasteurized. Some proteins in goats' and sheep's milk are similar to those in cows' milk and the levels of lactose are similar. Most babies who react to cows' milk protein or who have lactose intolerance are also likely to react to goats' milk or sheep's milk.

3.10. 'Baby led' weaning

Baby-led weaning (often also referred to as **BLW**) is a method of gradually weaning a baby from a milk diet onto solid foods. It allows a baby to control his or her solid food intake by self-feeding from the very beginning of the weaning process.

Infants are offered a range of foods to provide a balanced diet from around 6 months. They often begin by picking up and licking the food, before progressing to eating. Babies typically begin self feeding around 6 months, although some will reach for food as early as 5 months and some will wait until 7 or 8 months. The intention of this process is that it is tailored to suit each particular baby and their personal development. Initial self-feeding attempts often result in very little food ingested as the baby explores textures and tastes, but the baby will soon start to swallow and digest what is offered. Breastfeeding is continued in conjunction with weaning and milk is always offered before solids in the first 12 months.

Baby-led weaning places the emphasis on exploring taste, texture, colour and smell as the baby sets their own pace for the meal, choosing which foods to concentrate on. Instead of the traditional method of spooning puréed/mashed food into the baby's mouth, the baby is presented with a plate of varied finger food from which to choose.

The basic principles of baby-led weaning are:

- At the start of the process the baby is allowed to reject food, and it may be offered again at a later date.
- The child is allowed to decide how much it wants to eat. No "fill-ups" are to be offered at the end of the meal with a spoon.
- The meals should not be hurried.
- Sips of water are offered with meals.
- Initially, soft fruits and vegetables are given. Harder foods are lightly cooked to make them soft enough to chew on even with bare gums.
- Food given is free of added salt and sugar.
- Food is not cut into bite-sized pieces until the baby has mastered object permanence and the pincer grasp.
- Initially, food is offered in baton-shaped pieces or in natural shapes that have a 'handle' (such as broccoli florets), so that the baby can get a good grip and the food is visible for babies that have not yet mastered object permanence.
- Foods with clear danger, such as peanuts, are not offered.
- Foods can be offered to the baby on a spoon, but the baby is allowed to grab the spoon and the adult helps the baby guide it to the mouth.

Finger foods are encouraged as a normal part of weaning. Parents choosing to follow baby led weaning should be supported with their choice. They need to offer their baby a wide variety of foods to ensure nutritional requirements are met and ensure close supervision at all meals, as with all weaning, due to the risk of choking.

3.11. Vitamin supplements

Vitamin supplements containing vitamins A, C and D are recommended for:

- breast fed infants from 6 months old
- formula fed infants who are taking less than 500 mls formula per day

- all children from the ages of one to five should take vitamin drops containing vitamins A, C and D unless adequate intake and exposure to sunlight can be assured. It is particularly important to give vitamin drops to faddy eaters, children on restricted diets and children of Asian, African and Middle Eastern origin.

Healthy start vitamins contain vitamin A, C and D and are available free to those families eligible for Healthy Start vouchers.

For further information see the Healthy Start leaflet *A Healthy Start for Pregnant Women and Young Children*. Leaflets are available by calling 08701 555 455.

Information on Healthy Start is also available at www.healthystart.nhs.uk

3.12. Summary points

- Weaning should start around six months of age in a normal healthy infant. If parents/carers choose to wean before this they should be encouraged to view 17 weeks as the earliest age to introduce solids.
- Salt and sugar should not be added to weaning foods.
- Foods to avoid before six months are gluten, eggs, nuts and seeds, fish and shellfish, liver and soft and unpasteurised cheeses.
- Honey should not be given to infants under one year.
- From twelve months infants should be able to eat most family foods.
- Vitamin supplements containing vitamins A, C and D are recommended for breast fed infants from 6 months old, formula fed infants who are taking less than 500 mls formula per day, and all children from the ages one to five unless adequate intake and exposure to sunlight can be assured.

3.13. Further resources

- Birth to five, Department of Health, 2007, Booklet
- Food Standards Agency website www.eatwell.gov.uk
- British Dietetic Association (2007) Weaning your child. Download from www.bda.uk.com Food Facts section
- British Dietetic Association (2008) Vitamin supplements for babies and children. Download from www.bda.uk.com Food facts section
- Department of Health (2008) Weaning leaflet. DH Publications Orderline, tel 0870 555 455, email dh@prolog.uk.com, www.dh.gov.uk/publications
- BLISS (charity for premature babies) Weaning your premature baby leaflet. Download from www.bliss.co.uk

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4. Eating for Future Health Feeding the Child Aged One to Five

4.1. Introduction

Many expert committees recommend a diet lower in fat, sugar and salt and higher in fibre than the average British diet. This is to help prevent, and reduce morbidity and mortality, from, diet related diseases such as cardiovascular disease, hypertension, diabetes, obesity and cancer.

Eating habits established in the first years of life will influence food choices throughout life.

However young children have specific requirements for growth and development. It is inappropriate to apply healthy eating guidelines designed for older children and adults to the under fives as this could result in a diet that is too bulky and low in energy for young children which would compromise growth and development.

The adult healthy eating guidelines of low fat and high fibre do not apply to children under two years. Between the ages of two and five, the transition towards a higher fibre and lower fat diet should be a gradual process.

4.2. Energy Requirements

A child's energy requirement varies according to age, sex and physical activity. The diet should provide adequate energy to achieve optimal growth. Energy requirements of young children are high in relation to their size. Small children are unable to eat large quantities of food. Consequently they require energy and nutrient rich foods.

To ensure a nutritionally adequate diet, energy requirements should be met by selecting a variety of foods from the five food groups.



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The Eatwell plate is the Food Standard Agency's food guide and shows the five food groups and proportions needed to achieve a healthy balanced diet. However the guide must be adapted for young children as described below.

4.3. Healthy eating for one to five year olds

Milk and dairy foods

Young children are recommended to have a pint of milk per day, or the equivalent as cheese or yogurt (1/3 pint/200mls milk = 1 oz/30g cheese or a 5 oz/125g serving of yogurt).

Dairy foods are an important source of fat, fat soluble vitamins (A and D) and calcium in children's diets.

Full fat milk and dairy products are recommended for children under two years. Semi-skimmed milk may be introduced after two years and skimmed milk after five years, providing growth is satisfactory.

Meat, fish, eggs, beans (and other non dairy sources of protein)

Children should eat a variety of these protein foods including those rich in iron (see section 8) and should be offered two portions per day of these foods. (see 4.6 for information on oily fish)

Bread, rice, potatoes, pasta, (and other starchy foods)

These foods should be offered at each meal. Some fibre rich foods should be encouraged to ensure the moderate fibre intake recommended for the under fives. Fibre is found in foods such as wholemeal bread, wholegrain breakfast cereals (Weetabix, porridge, Shredded Wheat etc), brown rice, wholemeal pasta, jacket potatoes, fruits and vegetables. It has an important role together with fluid in preventing constipation.

However a high fibre intake may result in a diet that is too bulky, leading to inadequate energy intakes and reduced absorption of minerals such as iron and zinc.

Unprocessed bran is particularly unsuitable for these reasons and is not recommended for young children.

Fruit and vegetables

Fruit and /or vegetables should be encouraged as part of each meal and for snacks. The recommendation to eat 5 whole portions of fruit and vegetables every day is too much for the majority of children aged 1-5. The 5-a-day message relates more to the frequency of trying to have fruit and vegetables rather than the quantity eaten at this age. Fresh, frozen or canned varieties are all suitable.

Vitamin C rich fruit and vegetables aid the absorption of iron. (See section 8)

Food and drinks high in fat and /or sugar

Fats are an important source of energy for young children and provide essential fatty acids and fat soluble vitamins.

Unsaturated margarines and oils such as sunflower, corn and olive oils, should be used in preference to saturated fats, such as butter, lard and ghee.

Foods containing fat such as fried food, pastry and fatty meats and high fat snack foods such as crisps and chocolate, should be limited to occasional rather than every day foods.

Foods and drinks high in sugar should be limited. A high intake of sugar may contribute to obesity and is certainly implicated in the development of tooth decay. A high intake can also result in a reduced appetite for other more nutritious foods.

Where foods and drinks containing sugar are given they should be consumed at mealtimes, rather than between meals, to help prevent dental caries.

Salt and salty foods

There is increasing evidence that high blood pressure in adults is linked to high levels of sodium (salt) intake (Dept of health,2003).

Recommendations for salt intake have been set for children depending on their age (Dept of Health 2003). These are:

- Less than 1 g per day for infants aged 0-6 months
- 1g per day for infants aged 7-12 months
- 2g per day for 1-3 year olds
- 3g per day for 4-6 year olds
- 5g per day for 7-10 year olds
- 6g per day for 11-14 year olds (and adults)

(NB 1g of sodium is equivalent to 2.5g of salt)

Salt should not be added to children's food and salty foods such as crisps should be limited. This will help prevent a taste for salt developing.

4.4. Foods to avoid giving young children

- **Nuts**

Whole nuts should not be given to children under five years because of the risk of choking. Until recently children who were at risk of allergy (i.e. those whose parents or siblings suffer from hayfever, asthma, eczema or any food allergy) were advised to avoid nuts, especially peanuts, and obvious sources of nuts until the age of three years.

However the advice on peanut consumption during early life and allergy risk has now been updated by the Department of Health (DH, 2009) as a result of a major review of the scientific evidence now available carried out in 2008 by the independent expert Committee on Toxicity (COT). This review has shown there is no clear evidence that eating or not eating peanuts (or foods containing peanuts) during early life stages influences the chances of a child developing a peanut allergy. COT concluded that the previous precautionary dietary recommendations are no longer appropriate.

The revised advice is as follows:

- **During pregnancy and breastfeeding:** The revised advice states that if mothers would like to eat peanuts or foods containing peanuts during pregnancy or breastfeeding, then they can choose to do so as part of a healthy balanced diet, irrespective of whether their child has a family history of allergies.

- **When introducing peanuts into a child's diet:** General advice is that all mothers should try to exclusively breastfeed their baby for the first 6 months of life. The revised

advice states that if mothers choose to start giving their baby solid foods before 6 months of age, they should not introduce peanuts or other allergenic foods (such as other nuts, seeds, milk, eggs wheat, fish or shellfish) before this time, and when they do these foods should be introduced one at a time so that they can spot any allergic reaction.

-The revised advice additionally advises that where a child already has another kind of allergy (e.g. diagnosed eczema or a diagnosed allergy to foods other than peanut), or **if there is a history of allergy in the child's immediate family** (parents, siblings) then mothers should talk to their GP, Health visitor or medical allergy specialist before giving peanuts to the child for the first time, because these children are at higher risk of developing peanut allergy.

When introduced the nuts should be suitably prepared for the child's age i.e. ground or as spreads. Whole nuts should not be given to children under five years because of the risk of choking.

- **Raw eggs**

Raw eggs sometimes contain Salmonella bacteria which may cause food poisoning in young children. Avoid giving your child foods such as homemade ice creams, mayonnaise or deserts that contain uncooked raw egg. All eggs should be cooked well so that the yolk and white are firm.

- **Shark, swordfish and marlin**

These fish should be avoided by young children because they contain relatively high levels of mercury, which might affect a child's developing nervous system.

NB- Liver

The Scientific Advisory Committee on Nutrition has recommended that no-one should increase their consumption of liver beyond one portion per week because of the high vitamin A content. There is no recommendation for infants and young children but it is prudent to avoid liver before six months and limit it to once a week in older infants and children. If children are eating liver regularly (i.e. weekly) they should not take any additional vitamin A in the form of a vitamin supplement (SACN 2005).

4.5. Vitamins

All children from the ages of one to five should take vitamin drops containing vitamins A, C and D unless adequate intake and exposure to sunlight can be assured. It is particularly important to give vitamin drops to faddy eaters, children on a restricted diet and children of Asian, African and Middle Eastern origin. See section 3 for more details.

Healthy start vitamins contain vitamin A, C and D and are available free to those families eligible for Healthy Start vouchers.

For further information see the Healthy Start leaflet *A Healthy Start for Pregnant Women and Young Children*. Leaflets are available by calling 08701 555 455.

Information on Healthy Start is also available at www.healthystart.nhs.uk

4.6. Omega 3 Fatty acids

Long chain Omega 3 polyunsaturated fatty acids are derived primarily from oil-rich fish.

Optimum brain functioning and sight are dependant on an adequate intake of the Omega 3 long chain polyunsaturated fatty acids (LCPs), eicosapentanoic acid (EPA) and docosahexanoic acid (DHA), during foetal growth and early infancy. (Koletzko et al 2001, Gil A, et al 2003) They are present in breast milk and are added to whey dominant and most casein dominant formulas. These omega 3 LCPs are also thought to be beneficial for heart health in adults.

Whether their presence in food or supplements for older children influences brain function, behaviour or the risk of allergy or are beneficial for health remains controversial and there is currently insubstantial evidence to recommend supplements of omega 3 fats for children.

A weekly serving of oily fish will ensure an adequate intake of the omega 3 LCPs. EPA and DHA e.g. salmon, trout, herring, mackerel, sardines, pilchards and fresh tuna.

However because of the varying levels of dioxins that accumulate in the fatty tissues of oily fish, the Food standards Agency recommend that boys have a maximum of four portions of oily fish per week. A maximum limit of two portions is set for girls to reduce the amounts they will have accumulated in their tissues as they enter child bearing years. (FSA, www.eatwell.gov.uk)

Other omega 3 polyunsaturated fats can be found in oils such as rapeseed oil, soya oil, walnuts, almonds, pumpkin seeds, and organic milk. However there is no evidence that these omega 3 polyunsaturated fatty acids protect against heart disease.

4.7. Prebiotics and probiotics

Prebiotics are a component of dietary fibre called oligosaccharides, which have been shown to have 'prebiotic effect'- this means that they encourage the growth of beneficial ("good") bacteria in the colon. Oligosaccharides are found in breast milk and are now added to some infant formula milks. Other natural sources of oligosaccharides include pulses, fruits, vegetables and wholegrains.

Probiotics are live bacteria that may improve the intestinal microbial balance and have beneficial effects on health – these "good" bacteria include lactobacillus and bifidobacteria. It has been suggested that probiotics can have a beneficial effect on reducing the incidence of diarrhoea and some allergies (e.g. eczema) in young children but there have been insufficient studies to recommend supplements of either probiotics or prebiotics in young children.

4.8. Eating habits

Eating habits are established in early childhood and may have an impact on eating behaviour and health in later life. Children should be offered regular meals. Mealtimes are opportunities for social interaction and sharing. Eating with family and peers should be encouraged.

4.9. Summary points

- The adult healthy eating guidelines of low fat and high fibre do not apply to children under two years.
- Between the ages of two and five, the transition towards higher fibre and lower fat should be a gradual process.
- Energy requirements should be met by selecting a variety of food from the five food groups.
- All children between the ages of one and five, especially those who eat a limited variety and /or poor quality of food should take suitable vitamin drops containing vitamin A, C and D

4.10. Further resources:

- Birth to five, Department of Health, 2007, Booklet
- Food Standards Agency (2005) Feeding you toddler. Leaflet
- Food Standards Agency (2007) Feeding your growing child. Leaflet
- British Dietetic Association (2007) Healthy eating for Children. Download from www.bda.uk.com Food Facts section
- Food Standards Agency website www.eatwell.gov.uk
- Infant and toddler forum factsheets available from website – “Healthy eating for toddlers”, “Combining food for a balanced diet”, “Nutrients, function, sources and requirements”.Download from www.infantandtoddlerforum.org

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5. Dental Health

5.1. Introduction

The two major dental diseases are tooth decay (dental caries) and gum disease (periodontal disease). Caries can first appear in infancy and gum disease can develop in older children.

Dental Caries has decreased in prevalence during the last 20 years but remains a major health and social problem. Peak activity occurs during childhood and 30.7% of 5 years olds in Oxfordshire are affected (2003 BASCD survey).

From about six months to two and a half years, 20 deciduous teeth will erupt in a baby's mouth and with care they will remain healthy until they are replaced by the permanent dentition. A healthy start before teeth erupt includes breastfeeding, followed by a good weaning diet and the introduction of 'safe' drinks. The majority of dental disease is preventable.

5.2. Causes of dental caries

Dental caries is caused by bacteria in dental plaque which convert sugars from food, drinks and medicines into acid which then attacks the enamel of the tooth surface.

Cariogenic sugars

The following sweeteners added to food and drink during processing manufacture or before consumption have a potential to cause dental caries. To recognize products containing sugar look for any ingredient ending in the letters 'ose' as it is almost certainly a sugar. The following can be used to hide the sugar content even though they are either a form of sugar or they contain a sugar.

Sugar	Hydrolysed starch	Concentrated fruit juice
Sucrose	Honey	Treacle
Glucose	Dextrose	Syrup
Maltose	Com syrup	Molasses
Fructose	Maltodextrin	Invert sugar

Ingredients are listed in the order of quantity so if sugar is listed near the front of the list there is probably a high amount of sugar in the product.

Parents often think that if a food or drink is labelled 'no added sugar' or 'free from added sugar' that it is sugar free. However there can be significant amounts of sugar already present within the ingredients as in the case of fruit juices which may contain sugar (fructose) as a normal component of fruit and be labelled 'contains only natural fruit sugars'.

A common ploy to hide the sugar content in the ingredient list of baby food is to sweeten the product with another ingredient which itself contains significant amounts of sugar, eg honey. Concentrated fruit juices are widely used as a way of adding sweetness and therefore sugar to baby yoghurts and bottled baby fruit juices.

Foods and drinks containing sugars

Dietary advice should be aimed at limiting the frequency as well as the amount of sugar.

Sweetened food and drinks should be consumed at mealtimes only.

Snacks containing sugar should be discouraged between meals.

After milk, water is the safest drink to offer.

The most common cause of decay in children under 2 years is from drinks containing sugar. The committee on the Medical Aspects of Food Policy (COMA) Report on Weaning and the Weaning Diet (DH, 1994) does not encourage the use of commercial juices and other similar drinks marketed for children. It advises that milk and water are the two most suitable and safe drinks for children. It states:

'Drinks, other than breast milk, infant formula and follow on milks, contribute little to nutrient needs and if consumed to excess or between meals, they are likely to reduce appetite for more nutrient dense foods and drinks'.

5.3. Drinks and dental health

- **Breast Milk**

'In line with the positive health effects of breastfeeding, epidemiological studies have associated breastfeeding with low levels of dental caries' (WHO, 1996)

A few case studies have concluded that prolonged, on demand breastfeeding especially at night, after teeth have erupted, can result in dental caries (WHO, 1996).

However two systematic reviews of breast feeding and early childhood caries (Ribeiro & Ribeiro, 2000; Valaitis et al, 2000) conclude that there is a lack of methodological consistency in studies which makes it difficult to draw conclusion. Ribeiro concludes 'that there is no scientific evidence that confirms that breast milk is associated with caries development'.

All mothers, regardless of feeding method, should ensure that baby's teeth are cleaned thoroughly and carefully twice a day with an appropriate fluoride toothpaste. Together with a healthy weaning diet the risk of dental caries can be minimised.

- **Water**

Water is the best drink to quench thirst, however, babies that are solely breast fed for the first 6 months need no other drink. For formula fed babies less than 6 months, tap water should be boiled and cooled to sterilise it. When making up infant formula, water needs to be boiled (see section 2).

- **Bottled 'Baby waters'**

These are expensive and not necessary though some parents find them more convenient. The Department of Health advises that all bottled waters are boiled before 6 months even if they state that they are suitable for infant feeding.

- **Ordinary bottled waters**

Bottled water for general use is often not suitable for babies and needs to be checked carefully. Generally the quality of bottled waters is expected to conform with the

regulations which control the quality of the water but 'natural mineral water' is covered by less comprehensive regulations and may have high levels of minerals such as sodium and nitrate which are not recommended for babies and small children.

Many parents believe that bottled waters are cleaner or more pure than tap water and that this means they do not have to be boiled and cooled for babies. This is not true and if used need to be treated exactly the same as tap water, ie boiled for babies under 6 months.

Effervescent or fizzy water is not suitable for infants. Flavoured waters often contain sugar or artificial sweetener or a combination of both and may also be acidic. They can cause both decay and erosion.

- **Milks**

Cows milk or standard infant formula are safe and nutritious daytime drinks for young children and suitable for both mealtimes and in between meals. Milk is an ideal drink to accompany sugar-free snacks. The calcium and phosphates present in milk, apart from being essential for bone growth, also appear to help protect teeth from decay.

Consumption should be no more than one pint (600mls) per day and milk should be kept refrigerated. Although milk is an excellent drink for use during the day, it can still cause dental problems at bedtime or during the night. Younger babies may still need a milk feed at bedtime or during the night but as the baby grows older and milk feeds are no longer required, it is safer for the teeth to give water as the bedtime or night time drink.

- **Flavoured milks and milk shakes**

These almost always contain quite large amounts of added sugars, often being the main ingredient after milk. They are only safe for teeth if drunk at mealtimes and should be avoided at all other times. Their high sugar levels may reduce children's appetite for other, more nutritious foods. They are particularly damaging to teeth if given at bedtime.

- **Soya milk**

This is a special case. It is not recommended for general use and should only be given when specifically advised by a health professional. From a dental perspective, the sugars in soya milk, ie glucose, sucrose, maltose or concentrated apple juice are more harmful to teeth than lactose, the sugar found in ordinary milks. In addition soya milk does not contain the protein casein which is present in other milks and thought to protect teeth. If soya milk is recommended, dental advice and checks should be sought to ensure that decay is prevented.

- **Specially modified baby formula milks**

These milks for babies with medical conditions can contain sugars which are more harmful to teeth than the sugars in other milks. It is important to prevent decay occurring in children with special needs and dental advice should be sought.

- **Herbal baby drinks**

Herbal drinks for babies are made from dried powder and water which usually have a combination of fruit and herb spice flavours. They usually have maltodextrin as their main ingredient and although less is known about the dental effects maltodextrins, it

thought that the sugars in maltodextrin are harmful to teeth. These should be treated as sugared drinks, ie given only at mealtimes and not used at bedtime or during the night.

The extent of the use of herbal teas as a drink for infants as a popular remedy for colic and minor illnesses or even the symptoms of teething is not known. The COMA Weaning Report (DH, 1994) cautions the use of herbal extracts for babies although the use of some herbal extracts such as fennel and camomile are suggested by some as useful for minor illnesses. There is no consensus or authoritative research and more evidence is needed before they can be recommended.

- **Pure fruit juices and fruit juice drink**

All fruit juices, including commercial drinks made especially for babies and toddlers, almost always contain sugar; even unsweetened juice contains naturally occurring sugars. Fruit juices are also acidic and can cause dental decay and erosion. For these reasons only water or milk should be offered in between meals.

However inevitably some parents/carers will buy pure fruit and fruit juice drinks to give to infants and it is important to try to minimise the risk to teeth. Although there is some debate about the extent to which dilution of fruit juice may help to prevent erosion, it is best to only use a few drops of juice added to water to drink between meals just to give a hint of flavouring in order to discourage the development of a sweet tooth.

Parents/carers should be advised that even diluted fruit juices and fruit drinks can be harmful to teeth if consumed frequently. Fruit drinks are safe for teeth and nutritionally more beneficial if given at mealtime. The vitamin C content of fruit drinks enhances the absorption of iron if consumed at the same time as food, thus reducing the risk of iron deficiency anaemia.

- **Squash (and fruit flavoured drinks)**

There are a variety of squash type drinks and it is difficult to generalise. Many contain sugar as a naturally occurring ingredient, others have added sugar and most contain one or more artificial sweeteners such as saccharine. Numerous brands use a combination of sugars and artificial sweeteners and some so called sugar free drinks contain only artificial sweeteners. It is important for parents to read and understand the ingredients of such products. As with other drinks they may also be acidic and are only safe for teeth if drunk at mealtimes and even then they should be diluted according to the instructions.

- **Cola and other fizzy drinks**

These drinks are not suitable for young children as they contain sugar or artificial sweeteners and often caffeine. They are also acidic (usually containing citric and phosphoric acids) and cause dental erosion.

- **Tea and coffee**

Tea and coffee are not advisable for young children. They both contain caffeine and in addition the tannin in tea binds with iron and other minerals making it more difficult for the body to absorb them. If sugar is added to the tea or coffee there is a risk of dental decay.

- **Artificial sweeteners**

Artificial sweeteners such as saccharine and aspartame are not recommended for young children and are not permitted in food and drinks specially made for babies and toddlers. However they are common ingredients in many squashes, fruit flavoured drinks or drinks that are low in sugars labelled 'diet' or 'No added sugar'. The FSA set Acceptable Daily Intakes (ADI's) for sweeteners based on amount per kg body weight per day. Consequently small children are more at risk of exceeding ADI's. Artificially sweetened squashes should be very well diluted with water.

- **Bottles, non-spill feed/trainer cups and ordinary trainer cups**

Sweetened drinks given in a feeding bottle are the most common cause of nursing bottle decay especially when used overnight because there is little or no saliva present to protect the teeth. Non drip feeder cups are often used in the same way as a bottle and can have the same effect. If the drink is acidic it can also cause erosion. A child who continuously sips from a bottle or non-drip feeder cup can fill up with fluid, decreasing their appetite for more nutrient dense food.

A free-flow feeder/trainer cup or an ordinary unlidged cup encourages parental supervision of drinks and reduces the risk of continuous sipping. Any additional drinks to breast or formula milk should be given in a cup or trainer cup from 6 months. All bottle feeding should be discouraged from 12 months. Once babies no longer require a bedtime milk feed, water should be offered as the safest drink for use at bedtime or during the night.

5.4. How to change drinking habits to reduce the risk

- Encourage the dilution of any fruit juices to squashes by adding more water, gradually making the drink weaker and weaker until it is plain water.
- Continue to offer fruit juices or squashes but only at mealtimes and give either milk or water between meals.
- Offer any additional drinks to breast milk or formula milk from a free flow trainer cup and then onto an ordinary cup or mug with an open top to reduce tendency to sip drinks throughout the day.
- Discourage bottle feeding from 12 months.
- When children can manage it, drinking through a straw will help reduce the risk of erosion to the front teeth.

5.5. Diet, dental decay and erosion

Frequent sugar consumption is a major risk factor for dental decay in young children, one of the most prevalent diseases of the western world. Where sugar is combined with fats and other fermentable carbohydrates such as biscuits and cakes, the quantity of intake is also a risk factor in the development of obesity with associated risks of stroke, heart disease and cancer. Where sugar is combined with acid in drinks (citric and phosphoric being the most common acids) there is an additional risk of erosion of the tooth surface.

Sugar has no nutritional value apart from providing energy in the form of 'empty calories'. High sugar consumption affects general as well as dental health because children who 'fill up' on the calories from sugar in foods and especially in drinks are less likely to have an appetite to eat a well-balanced, nutritious and health diet.

Sugars are categorised as intrinsic or extrinsic:

- Intrinsic sugars are contained within the cell walls of fruit and vegetables and are not harmful to teeth. The recommendation is that children under 5 should consume five small portions of fruit and vegetables a day.
- Milk extrinsic sugars (sugars which are present in milk but are not contained within the cell wall) are not generally considered to be harmful.
- Non-milk extrinsic sugars found in the sugar bowl and refined foods such as drinks, sweets, cakes, biscuits and many breakfast cereals are potentially harmful to teeth. The recommended maximum of this type of sugar is 10% of total dietary energy intake which would require the current levels of consumption to be almost halved.

How sugar causes decay

In terms of dental health the critical factor is the frequency of sugar consumption, ie the number of times a day that sugar comes into contact with the teeth. Every time sugar enters the mouth the bacteria present in plaque quickly convert the sugar into acid which then attacks the enamel of the teeth. Each attack can last for up to an hour during which time the enamel is softened and starts to dissolve, a process called de-mineralisation. After this attack the saliva gradually neutralises the acids. Only then can the minerals in saliva (and fluoride if it is present) repair and rebuild the damaged tooth, a process known as re-mineralisation.

Therefore two opposing processes happen throughout the day, one damaging the teeth and the other repairing them. The critical factor deciding which of these two processes prevails is the frequency of sugar consumption. If sugar is consumed just three or four times a day, the re-mineralisation process prevails and the teeth normally remain healthy. If sugar is eaten more frequently the de-mineralisation will dominate, causing decay. This is why the advice is to restrict sugar intake to mealtimes only, ie three or four times a day.

Systemic fluoride during the period of tooth development can significantly strengthen the tooth against the effects of de-mineralisation.

How acidic drinks cause erosion

Erosion is caused by the chemical interaction of acids at the tooth surface and although some foods can be acidic, for example citric fruits, there is little evidence to link consumption of whole fruit with increased erosion. However fruit juice, carbonated drinks (including water), squashes, cola-type drinks (containing phosphoric acid) and other soft drinks, especially if consumed frequently and over long periods, can have a severe erosive effect on the tooth surface.

The degree of severity varies from affecting only the enamel to extensive damage through to the dentine. In severe cases a significant proportion of the volume of the tooth is lost as the habit of grinding teeth exacerbates the damage caused by erosion. Recent surveys have shown erosion in over half of 5 years old's teeth.

To prevent erosion, avoid the frequent consumption of acidic drinks. If used they should be confined to mealtimes only and not given at bedtime or during the night. There is some debate about the extent to which dilution of fruit juice may help to prevent erosion. It is advisable not to brush the teeth immediately after consuming an acidic drink but allow 1 hour for the saliva to re-mineralise the enamel.

The process of erosion does not usually cause pain but children with erosion should seek dental advice in order to preserve the existing tooth tissue and prevent the disease

continuing. This is particularly important if the continuation of the drinking patterns that cause the erosion would lead to damage to the permanent dentition.

By restricting the consumption of sugar and acidic drinks to mealtimes and applying fluoride toothpaste twice a day to teeth as soon as they erupt, dental decay and erosion can be avoided in the primary teeth of young children and provide a healthy start for the permanent teeth which will erupt from the age of 6 years.

5.6. Fluoride

Fluoridation of water supplies

The association between the presence of fluoride in public water supplies and decreased prevalence of dental caries has been demonstrated by over 130 surveys. These surveys confirm that fluoride in the water at a concentration of about one part per million (1ppm) is associated with about half the caries experienced in comparable non-fluoride areas. In Oxfordshire the naturally occurring fluoride level is low and no scheme exists for adding to the water artificially.

Fluoride tablets and drops

Fluoride supplements are no longer generally recommended as most children will get enough fluoride from regular tooth brushing with a suitable fluoride toothpaste. However supplements may be advised:

- Where the dental health of pre-school children is poor
- Where consequences of decay pose a hazard to general health
- Where dental treatment would be difficult because of medical or physical condition.

The need for their use should be determined with professional advice from a dentist and reviewed at intervals.

5.7. Four key messages to provide good oral health

- 1) Diet – reduce the consumption and especially the frequency of intake of drinks, confectionary and food with sugars.**

Recommendations

- After milk, water is the safest drink to offer
- Prevent the development of a sweet tooth by not adding sugar to baby foods or drinks
- Commercial weaning foods should be free from or low in sugar
- Choose sugar free snacks, eg fruit, raw vegetables, bread, cheese and unsweetened yoghurt
- Keep sweets to special occasions or straight after meals
- Do not dip dummies into honey, sugar or jam
- Use sugar free medicines where possible

2) Tooth brushing – clean teeth as soon as they erupt twice a day with an appropriate fluoride toothpaste.

Recommendations

- Children’s teeth should be brushed twice a day with a small toothbrush and a small pea sized amount of tooth paste as soon as they appear
- An adult should help children under seven to brush their teeth
- Children should spit out the toothpaste but not rinse
- Allow 1 hour to elapse before brushing teeth after consuming acidic and fizzy drinks
- After brushing the teeth in the evening, only water should be given

3) Fluoride – where there are high levels of dental disease, water fluoridation is a safe and effective public health measure. On an individual level, the most convenient method of applying fluoride to the tooth surface is by using fluoride toothpaste.

Recommendations

Children aged up to three should use a smear of toothpaste containing no less than 1000ppm fluoride.

Children aged 3-6 should use a pea-sized amount of toothpaste containing 1350 – 1500 ppm fluoride.

4) Dental attendance

Recommendation

- Young children should have regular dental checks to allow for monitoring and advice and treatment if needed.

5.8. Summary Points

- **Diet** - reduce the consumption and especially the frequency of intake of drinks, confectionary and food containing sugar.
- **Tooth brushing** - clean teeth as soon as they erupt twice a day with an appropriate fluoride toothpaste.
- **Fluoride** - water fluoridation is a safe and effective public health measure. On an individual level the most convenient method of applying fluoride to the tooth surface is by using a fluoride toothpaste.
- **Dental Attendance** - Everyone should be registered with a dentist and have an oral examination each year as directed, irrespective of age or dental condition.

5.9. Further resources

- NHS Direct will give details of NHS dentists
The helpline number is 0845 4647
- Head Office of Oxfordshire Salaries Primary Care Dental Service
OSPCDS
Astral House
Granville Way
Bicester
Oxon
OX28 4GJ Tel: 01869 606040
- Oral health Promotion Unit, 63 Blackbird leys Road, Tel: 01865 787167

5.10. References

NB Most of this chapter was based on the dental section of the Surrey Infant and Feeding Guidelines 2007 written by Polly Munday, Salaried Primary Care Dental Service, Surrey PCT in partnership with Surrey NHS Trusts.

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6. Vegetarian and Vegan Infants and Children

6.1. Introduction

People may choose to follow a vegetarian or vegan diet for a variety of reasons including ethical, ecological, religious or cultural.

A well planned vegetarian or vegan diet is nutritionally adequate and compatible with normal growth and development.

The same guidelines for weaning and feeding the one to five year olds apply equally to the vegetarian or vegan infant and child.

Appendix 2 illustrates the essential nutrients and how they can be obtained from a vegetarian and vegan diet.

6.2. Energy

Vegetable protein sources are bulky and can result in diet that is high in fibre and low in fat and consequently low in energy. Including some lower fibre cereal foods such as white bread, white rice, white pasta, low fibre breakfast cereals (Rice Krispies, cornflakes) and concentrated sources of fats e.g. dairy foods (if acceptable), margarines, oils, nut or seed butters and spreads e.g. peanut butter, tahini (sesame seed paste), can help avoid excessively high fibre, low fat diets which are unsuitable for young children.

Vegan diets in particular require careful planning to ensure adequate energy and other nutrients for growth. Infants weaned onto a vegan diet should be weighed regularly. Dietary advice should be given where weight gain is of concern. Referral to a dietitian can be made for this purpose.

6.3. Vitamins

- **Vitamin B12**

Vitamin B12 is not found in vegetable foods and cannot be stored in the body. Vegans or vegetarians who consume little or no dairy products or egg daily, require foods fortified with vitamin B12 or a vitamin B12 supplement. This includes breast feeding vegan mothers as vitamin B12 deficiency can occur in breast fed infants of vegan mothers where maternal intakes is inadequate.

- **Riboflavin**

Riboflavin (vitamin B2) may also be inadequate in a vegan diet and supplementation using fortified foods or a supplement is required. (see Appendix 6)

- **Vitamin D**

Vitamin D is present in only a limited range of foods including oily fish, eggs, meat margarines and some fortified breakfast cereals. Safe exposure to sunlight is important to help ensure an adequate vitamin D intake. The Department of Health recommend that all children aged one to five years of age should take a vitamin supplement containing vitamins A,

C and D, especially if they are on a restricted diet. Children on strict vegetarian or vegan diets should always take these supplements.

6.4. Calcium

Breast milk or infant formula is recommended for the first year.

Vegan infants should have breast or a soya based infant formula until 2 years of age to help ensure adequate energy, calcium, and iron intakes.

Cartoned soya milks that are fortified with calcium to the level equivalent to milk (120mg/100mls) can be used in small amounts in food preparation but the fat content is similar to that of semi-skimmed milk which makes them unsuitable as the main dairy alternative for children under 2 years. Vegan children over two years who are eating and growing well can use a calcium fortified soya milk as the main dairy alternative.

6.5. Iron

The iron from vegetables, pulses and cereal is poorly absorbed. Foods containing vitamin C enhance the absorption of iron and should be included with meals. Tea and coffee inhibit iron absorption and should be discouraged. (see Section 8)

6.6. Summary points

- Vegan infants should have breast milk or a soya based infant formula until at least aged 2 years of age.
- The same guidelines for weaning and feeding the one to five year old apply equally to the vegetarian or vegan infant and child.
- Vegans or vegetarians who consume little or no animal produce require foods fortified with vitamin B12 or a vitamin B12 supplement daily.
- Children on strict vegetarian or vegan diets should take a vitamin supplement containing vitamin A, C and D.
- Foods containing vitamin C should be given with meals to enhance iron absorption
- Infants and children weaned onto a vegan diet should be weighed regularly.

6.7. Further resources

- Food Standards Agency website www.eatwell.gov.uk
- The Vegetarian society website, www.vegsoc.org
- The Vegan Society website, www.vegansociety.com

6.8. References

Department of Health(1994) Weaning and the weaning diet,(Committee on Medical Aspects of Food Policy) Report on Health and Social subjects No. 45, HMSO, London.

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Appendix 3 - Vegetarian and vegan sources of some essential nutrients

Nutrient	Vegetarian	Vegan
Protein	Milk and milk products Quorn (a mycoprotein derived from fungi family, containing small amounts of egg) Pulses: soya beans and soya products (e.g. soya mince, tofu), baked beans, chick peas, kidney beans, lentils etc Nuts and seeds, nut butters and spreads, Eggs	Pulses – soya beans and soya products (e.g. soya mince, tofu), baked beans, chick peas, kidney beans, lentils etc Nuts and seeds, nut butters and spreads Cereals and grains
Concentrated Energy	Full fat milk, yogurt, cheese Vegetable margarines and oils Nut butters, seed paste e.g. tahini (sesame seed) Dried fruit, Avocado, Jam, Honey (> 1 year)	Dairy free vegetable margarines and oils Nut butters, seed paste e.g. tahini (sesame seed) Dried fruit, Avocado, Jam, Honey (>1 year)
Iron	Egg yolk, Pulses, especially soya, baked beans, peas, nuts, lentils Sesame and pumpkin seeds, wholegrain cereals, wholemeal bread, dried fruit Dark green leafy vegetables e.g. spinach, broccoli Fortified infant foods, fortified breakfast cereals	Pulses, especially soya, baked beans, peas, nuts, lentils Sesame and pumpkin seeds, wholegrain cereals, wholemeal bread, dried fruit Dark green leafy vegetables e.g. spinach, broccoli Fortified infant foods, fortified breakfast cereals
Vitamin C	Citrus fruits and juices Berry fruits Kiwi fruit Red and green peppers, watercress, tomatoes Green leafy vegetables Potatoes, parsley	Citrus fruits and juices Berry fruits Kiwi fruit Red and green peppers, watercress, tomatoes Green leafy vegetables Potatoes, parsley
Vitamin B12	Regular intake of milk, cheese, yogurt, eggs Fortified yeast extracts e.g. Marmite, Vegemite Fortified breakfast cereals Tofu, Quorn	Fortified yeast extracts e.g. Marmite, Vegemite Fortified soya milks Fortified breakfast cereals Tofu
Calcium	Milk ,cheese, yogurt Sesame seed spread (tahini), nuts and pulses Fortified bread and cereals Unboiled hard water	Fortified soya milk and soya yogurts Sesame seed spread (tahini) Fortified bread and cereals Unboiled hard water
Vitamin D	Fortified foods e.g. margarines, breakfast cereals Eggs, milk, cheese Safe exposure to sunlight	Fortified foods e.g. margarines, breakfast cereals Fortified soya milk Safe exposure
Riboflavin (Vitamin B2)	Milk and milk products Wheatgerm Green leafy vegetables Fortified yeast extracts e.g. Marmite, vegemite Avocado Fortified soya milk	Wheatgerm Green leafy vegetables Fortified yeast extracts e.g. Marmite, vegemite Avocado Mushrooms Fortified soya milk
Zinc	Cheese, Green vegetables Sesame and pumpkin seeds, Lentils, Wholegrain cereals	Green vegetables, Sesame and pumpkin seeds, Lentils, Wholegrain cereals

7. Food Allergy and Intolerance

7.1. Introduction

Prevalence of food hypersensitivity is estimated to be between 2.2% and 5.5% of infants in the first year of life (Venter, 2006). Perceived prevalence however is often much higher.

The most common reactions to foods in children are to cows' milk, hens' egg, soya, peanuts and tree nuts, wheat, sesame seed, kiwi and seafood. (Sicherer, 2002).

Correct diagnosis and treatment of food allergy or intolerance is important. Unnecessary restrictions can put a child at risk of nutrient deficiency and put significant stress on the family.

7.2. Definitions

Food Allergy - a reproducible adverse reaction to food. Food allergy can be IgE mediated (where there is evidence that the reaction involves IgE antibodies) or non-IgE mediated. Reactions that involve IgE are likely to be within 2 hours of ingestion of the food. Non-IgE reactions may take up to 2 days to develop.

Food Intolerance - a reproducible reaction to food which does not involve the immune system (now also classified as non-allergic food hypersensitivity or NAFH) (Johansson et al., 2004).

Atopy - a tendency to produce IgE antibodies in response to exposure to allergens. Common atopic diseases include: asthma, eczema, allergic rhinitis, allergic conjunctivitis and some cases of urticaria.

7.3. Symptoms

Symptoms resulting from an IgE mediated reaction are usually immediate and may include abdominal pains, asthma, anaphylaxis, angioedema, diarrhoea, itchy rash, hives, shortness of breath, rhinitis, urticaria or vomiting.

Non IgE-mediated symptoms are more likely to be delayed and include eczema, colic, abdominal pain, constipation, diarrhoea, reflux and vomiting.

There is considerable overlap between the two and other conditions also share some of these symptoms e.g. inflammatory bowel disease or coeliac disease. It is important therefore that early diagnosis is made.

7.4. Diagnosis

A suspected food allergy or intolerance should always be discussed with the child's general practitioner and/or paediatrician. A diagnosis is made on the basis of clinical history and possibly skin prick tests, radio allergen sorbent blood test (RAST) or the elimination and challenge of the suspected food.

Alternative Tests

There are many commercially available tests that claim to be able to diagnose food allergy or intolerance. Currently there is no scientific evidence to support these tests and they are not recommended. See Further resources for more information.

7.5. Management

An allergy or intolerance to a food can only be managed by exclusion of the offending food(s). The ease of exclusion and the effects on the nutritional well-being of the child depends on the food or foods excluded. If the child is exclusively breast fed, it may be necessary for the mother to follow the exclusion diet. In this case, or if the child is excluding more than one food, a dietitian should be involved to ensure that the resulting diet is nutritionally adequate.

7.6. Cow's milk allergy or intolerance

Cow's milk allergy (CMA) affects 2-3% of infants and young children. The majority (85-90%) will outgrow their allergy by the age of 3 (Host, 2002). Symptoms often occur within one week of introduction of a cow's milk based formula or weaning foods containing cow's milk. Cow's milk proteins can also be passed through breast milk so symptoms may be seen from birth.

Exclusion of cow's milk

Breast milk is always the preferred choice and should be encouraged throughout the first year if possible.

Exclusively breast-fed babies

It may be necessary for the mother to trial an exclusion of cow's milk from her diet. This should only be done with supervision from a dietitian to ensure that the diet is followed correctly and that the remaining diet is nutritionally adequate.

Formula fed babies

The formula given as first choice should be an **extensively hydrolysed formula** (EHF). These formulas are based on a variety of different protein sources including cow's milk protein, soya and pork. The protein has been enzymatically hydrolysed to break down the protein into peptides.

Partially hydrolysed formulae are not sufficiently hydrolysed to be used in the treatment of food allergy and are therefore not suitable. (Host et al., 1999).

An **amino acid formula** may be required when an EHF is not effective or for more severe symptoms (Hill et al., 2007).

Acceptance of these formulas may be an issue in some infants, particularly older infants, but can often be overcome by gradual introduction over several days (table 1).

Table 1 - Recommended introduction of an extensively hydrolysed infant formula

NB. This protocol is NOT suitable for immediate-type reaction e.g. respiratory problems, swelling or anaphylaxis

	Infant formula recipe (based on a 4floz/120ml bottle)
Day 0	4 scoops of current IF or EBM to 4floz/ 120ml water
Day 1	1 scoop of EHIF + 3 scoops of current IF/EBM to 4floz/ 120ml water
Day 2	2 scoops of EHIF + 2 scoops of current IF/EBM to 4floz/ 120ml water
Day 3	3 scoop of EHIF + 1 scoops of current IF/EBM to 4floz/ 120ml water
Day 4 onwards	4 scoops of EHIF to 4floz/ 120ml water

Key: IF -Infant Formula, EBM -Expressed Breast Milk,
EHIF -Extensively Hydrolysed Infant Formula

(Copied with permission from Draft integrated care pathway for management of cow's milk allergy in Nottinghamshire, Oct 2007, lead author Dr Lisa Waddell, Nottingham PCT).

Issues to consider when recommending changing to an EHIF:

1. The above is only an example based on a child taking 4floz feeds. Determine the quantity taken by the family, and adapt the above, maintaining a 4-staged increase in concentration.
2. If breastfeeding, a number of additional stages may need to be considered, such as expressing breast milk and introduction of a bottle or beaker.

Soya formulas are based on modified soya protein and contain glucose polymers as the carbohydrate source. The Department of Health advise that soya formula should only be recommended in exceptional circumstances where there is a clinical need to ensure adequate nutrition e.g:

- Infants with cow's milk allergy/intolerance who refuse to take extensively hydrolysed formula
- Vegan infants where the mother is unable or chooses not to breastfeed
- Galactosaemia

Concern over the use of soya formula under the age of 6 months is due to the following issues:

- Relatively high intakes of phytoestrogens per kg body weight when soya formula is used as the sole source of nutrition

- There is evidence that soya intolerance can be induced, particularly in infants at high risk (COT, 2003, BDA, 2009, Host et al 1999). High risk families are those where one or both parents have significant atopic disease or where there is a sibling with significant atopic disease.

The risk after 6 months is likely to be reduced as the dose of phytoestrogens per kg body weight is likely to be lower once the infant is taking solids. Also the infants' organ systems are more mature so further reducing the risk of long term damage (BDA, 2009).

Benefits should be seen within 2-4 weeks of starting the new formula and the formula should be continued until the infant is 1 year of age or older. (AAP, 2006)

Table 2 gives details of available products and their recommended usage.

Table 2. Breast milk substitutes for the management of CMPA

Type of Infant formula (company)	Recommended usage
Extensively hydrolysed formula	
<ul style="list-style-type: none"> • Nutramigen 1/Nutramigen 2(> 6 months (Mead Johnson Nutritionals) • Peptide (SHS) • Prejomin (Milupa) 	<ul style="list-style-type: none"> • Prevention • Management of food allergy other than for multiple food allergies, severe enteropathy and faltering growth
Extensively hydrolysed formula with MCT fats	
<ul style="list-style-type: none"> • Pregestimil (Mead Johnson Nutritionals) • Peptijunior (Cow and Gate) • MCT Peptide (SHS) 	<ul style="list-style-type: none"> • As above, but with medium chain triglycerides. Only to be used if necessary (i.e. malabsorption)
Extensively hydrolysed formula containing lactose	
<ul style="list-style-type: none"> • Pepti (Cow and Gate) 	<ul style="list-style-type: none"> • Prevention • Management of IgE mediated symptoms and some gastrointestinal symptoms e.g. constipation (Presence of lactose may be advantageous in these instances)
Amino Acid formula	
<ul style="list-style-type: none"> • Neocate (SHS) • Nutramigen AA (Mead Johnson Nutritionals) 	<ul style="list-style-type: none"> • Management of multiple food allergies, severe enteropathy and faltering growth • Useful tool for the diagnosis of severe cow's milk allergy • Very low allergenicity

Soya formula	
<ul style="list-style-type: none"> • Infasoy (Cow and Gate) • Wysoy (SMA) • Nurture Soya (Heinz) • Prosobee (Mead Johnson Nutritionals) 	<ul style="list-style-type: none"> • Only to be used for the management of cow's milk allergy under 6 months when there are no suitable alternatives (eg galactosaemia, vegan infants, or where extensively hydrolysed formula refused) • Management of cow's milk allergy from 6 months, for IgE mediated allergy, lactose intolerance and where soya is being considered or used in the weaning diet

(adapted with permission from Draft integrated care pathway for management of cow's milk allergy in Nottinghamshire, Oct 2007, lead author Dr Lisa Waddell, Nottingham PCT).

Other milks

Goats' and sheep's milk formula

Significant immunological cross reactivity between cows', goats' and sheep's milk exists. Goats' or sheep milk infant formula should therefore not be used as alternatives to cow's milk formulae (AAP,2000 and Restani et al.,1999).

The Department of Health does not recommend the use of formula based on goats' milk protein for infants. The previously available goats' milk formula is no longer approved for use in Europe due to lack of scientific data establishing the nutritional adequacy and safety of goats' milk as a source of protein in infant formulas.

Cartoned soya, rice and oat milks

These milks will not usually be suitable under the age of 2 years (or under 4.5 years for rice milk- see below) as the main milk drink and suitability will depend upon the child's overall nutritional intake and growth. Calcium fortified versions should always be chosen for all ages.

Rice milk and arsenic levels

Arsenic is widely distributed in the environment. It occurs in soil, water – both sea and fresh – and in almost all plants and animal tissues. As a result, arsenic occurs naturally at very low levels in many foods and it is not possible to avoid it completely. How harmful the arsenic is depends on the chemical form in which it is present. The organic form is less harmful than the inorganic form which can cause cancer by harming our genetic material (DNA). Rice and rice products have higher levels of the inorganic form of arsenic compared with other food. Low levels of inorganic arsenic were detected in rice drinks. The Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) (an independent scientific committee that provides advice to the Food Standards Agency) has not been able to set specific thresholds of exposure (tolerable intakes) and has concluded that people should consume as little of this form of arsenic as reasonably practicable.

The Food Standards Agency (FSA) published results in May 2009 for two studies, one regarding arsenic levels in rice based drinks and one on the effect of cooking methods on the arsenic content of rice.

The main recommendations of these studies include:

- Toddlers and young children between 1 and 4.5 years old should not have rice milk as a replacement for cows' milk, breast milk or infant formula i.e. as their main milk drink. This is because they will drink a relatively large amount and their intake of arsenic will be greater than that of older children and adults relative to their body weight.
- The FSA are not advising anyone to change the way they cook rice as a result of the study.
- This research does not affect advice on any other weaning foods including baby rice.

There is no immediate risk to children who have been consuming rice drinks and it is unlikely that there would have been any long-term harmful effects but to reduce further exposure to arsenic, parents should stop giving these drinks to toddlers and young children.

Further guidance on rice milk

- Children under 4.5 years old who are allergic to cows' milk protein, and who are already on rice milk, should be switched to calcium enriched soya milk (if not soya allergic), calcium enriched oat or almond milk or hypoallergenic formula.
- Children between one and two years who are allergic to cows' milk should continue on breast milk or hypoallergenic formula or soya formula as the main milk drink until two years of age to help ensure adequate calories. Where none of these are possible/suitable a calcium enriched soya milk or calcium enriched oat or almond milk may be considered. Nutritional adequacy of the diet should be taken into account if these are used as they are lower in calories than formula or cows' milk.

Exclusion of cow's milk from weaning onto solid foods

Infants with CMA should be weaned onto a cow's milk free diet. Dietitians can give further advice on this.

Calcium supplements

Calcium supplements are needed when a child will not take a minimum of 2/3 pint (400mls) of an alternative formula or calcium enriched soya milk.

A supplement providing 400mg of calcium is appropriate for children under the age of five years.

Cows' milk allergy and avoidance of egg

Parents of children already diagnosed with cow's milk protein allergy may ask whether egg should also be avoided. There is no evidence to suggest that avoidance or delaying the introduction of egg is necessary unless a positive test result has shown that a reaction is likely. If there is any concern, egg can be introduced gradually into the diet, starting with baked egg products containing small amounts of egg such as in cakes or biscuits.

However, infants already diagnosed with **significant immediate reactions (see 7.3)** to cows' milk who have been seen at the Allergy clinic in Oxford may be advised to delay the introduction of egg until one year. This advice, although not currently evidence

based, is recommended at the Allergy clinic in Oxford for these children and is aimed at avoiding allergic reactions in infants. Egg would then be introduced gradually into the diet, starting with baked egg products containing small amounts of egg such as biscuits or cakes.

Children with **mild/moderate delayed type reactions (see 7.3)** to cows' milk do not need to delay the introduction of egg beyond six months old but should introduce any potentially allergenic foods, such as egg, in small amounts, one at a time – see 7.14.

7.7. Lactose Intolerance

Lactose is the sugar found in all mammalian milk including human milk.

Lactose intolerance can be primary or secondary. Primary lactose intolerance is rare in the under fives in the UK, whilst secondary lactose intolerance is seen following severe cases of gastro-intestinal infection in some children. This is a temporary condition.

Infants present with diarrhoea and colicky symptoms. Lactose intolerance can usually be confirmed by testing stools for the presence of reducing sugars.

Management of lactose intolerance

Lactose free infant formula can be given in place of usual formula (see Appendix 1). A reduced lactose diet may also be necessary. Reduction of lactose is usually only necessary for 4-8 weeks until the gut recovers; lactose containing foods and usual infant formula can then be gradually reintroduced into the diet.

7.8. Egg Allergy

Prevalence of egg allergy is estimated to be 1.6% at 2½ years of age (Eggesbo et al. (2001)). Around 80% of children with egg allergy will outgrow it by the age of 5 years.

Avoiding egg during weaning is straight forward due to the simplicity of first weaning foods. This becomes more complex as a wider range of foods are eaten. Avoiding egg has few nutritional consequences as protein is readily obtained from other foods.

Egg allergy is not a contraindication to receiving MMR. All egg allergic children should be vaccinated in the usual vaccination clinic with the combined MMR. As a precaution, some children who have experienced anaphylactic reactions in the past or those who have poorly controlled asthma, should receive the vaccine on a hospital ward. (Recommendation of the BSACI Paediatric Allergy Group 2007).

7.9. Wheat intolerance

Wheat intolerance is seen far less frequently than intolerance to cow's milk and egg. Avoiding wheat is difficult to do and has significant nutritional consequences. Children with wheat intolerance should always be referred for dietetic advice to ensure complete exclusion and dietary adequacy.

7.10. Coeliac disease

Coeliac disease is a gluten sensitivity resulting in damage to the small intestinal mucosa. It is a permanent disorder. Presentation can occur throughout childhood and is increasingly being seen in adulthood. The treatment is a lifelong gluten free diet. Gluten

is found in wheat rye, barley and oats contain proteins similar to gluten and should also be avoided. There is a wide range of gluten free products available on prescription for a gluten free diet.

Coeliac disease must always be diagnosed by a paediatrician and referral to a dietitian is essential.

Cereals given to all infants before the age of six months should be wheat and gluten free.

7.11. Peanut, tree nut and seed allergy

Allergy to peanut is estimated to be around 1% although a recent UK cohort study in children of 4 to 5 years found a rate of 1.8% (Hourihane et al 2007). There are no exact figures for tree nut allergy but studies of peanut allergy suggest a high co-prevalence of tree nut allergy (du Toit and Lack, 2003).

Reactions can be severe and fatal and may occur following first exposure.

Children with nut or seed allergy are recommended to avoid all nuts or seeds and foods containing them. Nuts and seeds do not contribute significantly to nutritional intake in the UK diet but total exclusion of nut protein is not easy. Minute particles can cause an allergic reaction in some individuals.

Children with suspected nut or seed allergy should be referred by the general practitioner to a paediatrician.

7.12. Atopic Eczema and food allergy

NICE have recently published guidance on atopic eczema in children. (NICE, 2007). Within their recommendations the following relate to diet:

- Formula fed infants with moderate to severe eczema that has not responded to optimal treatment with emollients and topical corticosteroids should be offered a 6-8 week trial of an extensively hydrolysed formula or amino acid formula in place of cow's milk formula. These children should be referred to a dietitian for specialist dietary advice if they continue on a cows' milk free diet.
- It is not known whether altering a breastfeeding mother's diet is effective in reducing the severity of the eczema. A trial of an allergen specific exclusion diet should be considered under dietetic supervision if food allergy is strongly suspected. (NICE 2007)

7.13. Food Additives

The link between diet and hyperactivity is still controversial. Food additives have been implicated in some studies but there is currently insufficient evidence to confirm a connection between certain food additives and hyperactive behaviour in children. See further resources (7.15) for more information.

7.14. Prevention of food allergy

Recommendations based on research to date are:

- Allergen avoidance during pregnancy or lactation is **not** recommended. Until recently pregnant and lactating women were advised to avoid peanuts if there was a family history of atopy in the family (DH, 1998). However the advice on peanut consumption during early life and allergy risk has now been updated by the Department of Health (DH, 2009) as a result of a major review of the scientific evidence now available carried out in 2008 by the independent expert Committee on Toxicity (COT). This review has shown there is no clear evidence that eating or not eating peanuts (or foods containing peanuts) during early life stages influences the chances of a child developing a peanut allergy. COT concluded that the previous precautionary dietary recommendations are no longer appropriate.

The revised advice is as follows:

- **During pregnancy and breastfeeding:** The revised advice states that if mothers would like to eat peanuts or foods containing peanuts during pregnancy or breastfeeding, then they can choose to do so as part of a healthy balanced diet, irrespective of whether their child has a family history of allergies.

- **When introducing peanuts into a child's diet:** General advice is that all mothers should try to exclusively breastfeed their baby for the first 6 months of life. The revised advice states that if mothers choose to start giving their baby solid foods before 6 months of age, they should not introduce peanuts or other allergenic foods (such as other nuts, seeds, milk, eggs wheat, fish or shellfish) before this time, and when they do these foods should be introduced one at a time so that they can spot any allergic reaction.

-**The revised advice additionally advises that where a child already has another kind of allergy** (e.g. diagnosed eczema or a diagnosed allergy to foods other than peanut), or **if there is a history of allergy in the child's immediate family** (parents, siblings) then mothers should talk to their GP, Health visitor or medical allergy specialist before giving peanuts to the child for the first time, because these children are at higher risk of developing peanut allergy.

(Whole nuts should not be given to children under five years because of the risk of choking)

- Exclusive breast feeding from birth until 6 months (or at least 4 months) (although this does not guarantee that an allergy or intolerance will not develop).
- **Breast feeding should therefore be encouraged for all families especially where one or more parent or sibling has an atopic disease.**
- If breast feeding is not possible, where one or more parent or sibling has an atopic disease extensively hydrolysed formula should be given until the age of 6 months (Grimshaw, K and Warner, JO 2005).
- Encourage a healthy, well balanced maternal diet with a good intake of fruit, vegetables and oily fish.
- There is no evidence that slow introduction of weaning foods or delaying the introduction of high allergenic foods beyond six months has a preventive effect on the development of allergies. (Grimshaw, K and Warner, JO 2005). For infants at risk of developing allergy (i.e. those with a family history of atopy or allergies) the Paediatric group of the British Dietetic Association recommend introducing potential allergenic foods in small amounts and introducing no more than one new

allergenic food at a time allowing at least a week between each new food in order to enable easy identification of any causing reactions. These foods include wheat, well cooked egg, cows' milk (as part of the diet rather than the sole source of nutrition), fish, shellfish and soya products. By the age of twelve months, all the major high-risk foods should have been introduced. See above for specific advice about giving peanuts to children with a diagnosed allergy and/or a family history of allergy in the immediate family.

- It is prudent to avoid early (<4 months) and late (>7 months) introduction of gluten and to introduce gluten gradually while the infant is still breast-fed. This **may** reduce the risk of coeliac disease and wheat allergy (ESPGHAN, 2007).

7.15. Summary points

- Correct diagnosis and treatment of food allergy or intolerance is important. Unnecessary restrictions can put a child at risk of nutrient deficiency and put significant stress on the family.
- Suspected food allergy or intolerance should always be discussed with a GP or paediatrician
- Diagnosis is made on basis of clinical history and possibly skin prick tests, radio allergen sorbent blood test (RAST) or the elimination and challenge of the suspected food.
- An allergy or intolerance to a food can only be managed by the exclusion of the offending food(s).
- In cow's milk allergy, breast milk is the infant feed of choice, followed by extensively hydrolysed formula.
- Children following a milk free or wheat free diet should be referred to a dietitian for advice and support in maintaining an adequate nutritional intake.
- Exclusive breast feeding until 6 months may help prevent allergy and should be encouraged for all families especially where one or more parent or sibling has an atopic disease.

7.16. Further resources

- British dietetic association fact sheet (2007) Food allergy and intolerance. Download from www.bda.uk.com Food facts section.
- British dietetic association fact sheet (2005) The truth about...food allergy and food intolerance testing. Download from www.bda.uk.com Food facts section.
- British dietetic association fact sheet (2007) Diet, behaviour and learning in children. Download from www.bda.uk.com Food facts section.

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8. Iron Deficiency Anaemia

8.1. Introduction

Iron deficiency anaemia is the most common nutritional deficiency affecting toddlers.

Full term babies are born with iron stored in the liver which is mobilized during the first six months of life. By the age of six months the infant's stores are becoming depleted so iron is needed from the weaning diet to meet the demands of rapid growth during the first year.

8.2. Prevalence

The overall prevalence of iron deficiency anaemia in children aged 1 ½ to 2 ½ in the UK has been found to be 12% and 6 % in children aged 2 ½ to 4 ½. (Gregory, J. 1995) It is more common in socio-economically deprived areas and in certain ethnic groups, notably Asian and African Caribbean children.

8.3. Consequences of iron deficiency anaemia

Iron deficiency anaemia results in apathy, tiredness, reduced exercise capacity, poor appetite, and psychomotor delay. In addition, anaemia may result in growth delay, increased susceptibility to infection, abnormalities of behaviour and diminished mental performance.

Anaemia can be reversed with iron treatment. The duration and severity of iron deficiency combined with concurrent confounding variables may have a permanent effect on cognitive function.

8.4. Causes of iron deficiency anaemia

There are a number of dietary practices which may contribute to the development of iron deficiency anaemia. These include:

- Late weaning
- Slow progression through weaning stages and therefore delaying the introduction of iron rich foods
- Use of cows' milk as the main milk drink before one year of age
- Excessive use of cows milk over the age of one year which reduces appetite for other foods. (i.e. more than 600 mls/pint per day)

The table below shows the iron content of various milks.

N.B. Absorption varies greatly – see text below.

Milk	Average iron content (mg per 100mls)
Infant formula	0.80
Follow on milk	1.3
Breast milk	0.07
Cows' milk	0.05

Breast milk has a low iron content but is much more readily absorbed than the iron present in formula or cows milk. Infant formula and follow-on formula, are fortified with iron.

There is no evidence that follow-on formula are superior to standard formula in the prevention of toddler anaemia.

In order to prevent iron deficiency anaemia, cows' milk should not be given as a main milk drink until one year of age. Infants who are not breastfeeding should be fed on infant formula. Follow-on formula can be used from the age of six months.

8.5. Iron in the diet

A good intake of iron rich foods should be encouraged in the weaning diet. Iron is a poorly absorbed mineral. Approximately 10% of the iron from meat (haem iron) is absorbed and approximately 1.5% of the iron from vegetables and cereals (non haem iron) is absorbed.

(See table for sources of iron in the diet.)

Absorption

Various dietary factors aid or inhibit the absorption of iron:

- Vitamin C increases iron absorption and therefore vitamin C rich foods should be given with meals – see table.
- The presence of animal protein enhances the absorption of non haem iron
- Tea contains tannin and coffee contains polyphenols, both of which inhibit iron absorption. Tea and coffee are not suitable for young children and their use should be discouraged especially at mealtimes.
- Phytic acid in bran inhibits iron absorption. Unprocessed bran is not suitable for children under five.

Sources of iron in the diet

Haem iron sources	Non-haem iron sources	Vitamin C sources
Liver, liver pate, liver sausage Beef, lamb, corned beef Sausages – pork or beef, beefburgers Pork Sardines, pilchards Chicken	Egg yolk Wholemeal bread Fortified cereals Chapatti Soya beans Baked beans, peas, lentils Spinach, broccoli White bread Tofu, creamed coconut Peanut butter Dried fruit- apricots, prunes, figs, raisins, sultanas	Oranges, orange juice (remember to dilute) Mangoes Blackcurrants, Pineapple Strawberries Tomatoes Kiwi fruit Potatoes Vegetables

Liver

The Scientific Advisory Committee on Nutrition has recommended that no-one should increase their consumption of liver beyond one portion per week because of the high vitamin A content. There is no recommendation for infants and young children but it is prudent to avoid liver before six months and limit it to once a week in older infants and children. If children are taking liver regularly (i.e. weekly) they should not take any additional vitamin A in the form of a vitamin supplement (SACN 2005).

8.6. Premature babies

Premature babies will be born with low iron stores and are particularly at risk of developing anaemia. They need medicinal iron. A paediatrician will advise on this.

8.7. Summary points

- To prevent iron deficiency anaemia cow's milk should not be given as the main milk drink until one year of age.
- Cow's milk intake should be restricted to 500-600 mls per day in children over one year to encourage an appetite for other foods including iron containing foods.
- Weaning foods should be introduced at six months of age and should include foods containing iron.
- A source of vitamin C should be given with meals to enhance iron absorption. This is especially important for vegan/vegetarian children.
- Tea and coffee should be discouraged particularly at mealtimes.

8.8. Further resources

- Food Standards Agency website www.eatwell.gov.uk
- Infant and toddler forum factsheet 4.4 'Iron Deficiency Anaemia in Toddlers'. Download from www.infantandtoddlerforum.org

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9. Faddy Eaters

9.1. Introduction

Young children often become fussy or faddy about their food and may refuse to eat or refuse to try new food. In the majority of cases it is a normal part of growing up. Anecdotal evidence suggests that after the first year of life, young children do show a suspicion or “fear” of new tastes (food neophobia). This is a normal stage of development. Repeated exposure to these new foods and ‘modelling’ their behaviour on others around them helps children to overcome resistance to new foods and these foods to become an accepted part of the child’s diet.

9.2. Initial assessment

In many cases where a child is reported as being a faddy eater, the child is actually adequately nourished. Parents’ expectations may be unrealistic. Weighing and measuring a child may reassure parents there is little cause for concern, as can asking the parent/carer to keep a food diary to show what food is actually consumed.

9.3. Dietary history

When dealing with a child with a poor appetite or limited food intake, it is useful to obtain a diet history from the parents particularly looking at between meal snacks and fluid intake. An excessive number of snacks or more than one pint of milk per day (including night time milk drinks) may severely impair a child’s appetite for other foods. Similarly the “squash drinking syndrome” where excessive amounts of drinks are taken between meals, may severely affect a child’s intake at mealtimes.

9.4. Behavioural issues

Parents should reward good feeding behaviour and ignore bad behaviour. The easiest way to reward a child is by praising them.

Points to consider include the following:

Mealtime structure

- 3 meals per day
- Sitting down for meals.
- Children often eat better when eating with other people, especially their peers. The child also learns that mealtimes are social occasions and learn eating behaviour from watching their parents and/or siblings at mealtimes. Feeding them in isolation should be avoided.
- Avoid distractions, such as the TV, at mealtimes.
- Mealtimes should be limited to 20-30 minutes. If the meal is not eaten in this time, it should be taken away without comment and no alternatives given.
- Don’t offer drinks for 30 mins before a meal

Offering food

- Small meals should be given and the child praised for eating. This is better than offering a large meal which may cause tension when it is left. Second helpings can always be given.
- Some encouragement can be given to persuade the child to eat, but too much game playing and coercion effectively rewards the child for not eating.
- Avoid offering several options of food – limit any choice to two options.
- Avoid offering food as a reward as this can reinforce the idea that sweets and puddings are more desirable than savoury foods. Offer other rewards such as a trip to the park or play a game with them after the meal.

Eating

- Mess is an inevitable aspect of early feeding and infants and toddlers need to be allowed the opportunity and encouraged to self feed either with fingers or a spoon. Controlling feeding and being over anxious about the mess can lead to food refusal or behaviour problems.
- The child's feeding behaviour should not be discussed in front of the child.
- When a child does eat well or try new foods give lots of praise and attention.

Trying new foods

- If a child refuses the food, gently encourage. Encourage to touch, sniff, lick etc new foods. When offered new tastes, young children instinctively turn away or even grimaces. This signifies that the food is new, not necessarily that they dislike it. New foods may need to be offered several times before they are accepted.
- Allowing the child to try new foods off their parents plates can help with acceptance.
- A star chart, or other reward system, is often a good idea if the child is old enough to understand (not usually before the age of 3 years). A star is given when the child, for example, tries a new food and after a certain number of stars the child has a reward.

Outside mealtimes

- Encourage messy play to help the child experience new textures e.g finger painting, building sandcastles, playing with cups and water, play dough etc
- Involve in shopping, food preparation, baking, etc

9.5. Vitamins

It is appropriate to give a vitamin supplement to children who are faddy to help ensure requirements are met. This can also help reassure parents of faddy eaters and relieve some of the anxiety which may have a positive effect on the eating behaviour.

Healthy start vitamins or other supplements providing vitamins A,C and D are appropriate in most situations.

9.6. Severe feeding problems

The aetiology of severe feeding problems is often complex. Many cases may have started as organic difficulties i.e. a medical problem affecting a child's feeding experience, such as reflux causing pain on eating and drinking, or long term gastostomy/nasogastric feeding. Other factors may stem from force feeding, poor parenting skills or severe parental anxiety in relation to feeding.

There are also children who have an innate, or inborn, resistance to eating a wide range of foods. They may have extreme anxiety about trying new foods, or have an extreme reaction to the different senses, touch, taste and smell (sensory-sensitive). They may be termed selective eaters. If these children are given a disliked food they will often gag and vomit.

In these more severe cases children may be consuming only a very limited range of foods and /or foods of a similar texture.

9.7. Referral

If the child is extremely faddy and consuming only a few types of food, dietary adequacy should be checked by a dietitian. Dietitians will advise on practical strategies for improving adequacy and any requirement for supplementation.

For children who have difficulty taking textures appropriate to their age, referral to speech and language therapy for assessment should be considered.

If the child is not thriving adequately as shown on the child's centile charts, the situation should be discussed with the general practitioner and referral to a paediatrician considered.

If the child's eating behaviour is extreme and causing a significant problem to the child and/or parents, once physical reasons have been excluded, referral to a child psychiatrist/child psychologist may be appropriate.

9.8. Summary points

- Feeding problems are common in the under fives and in the majority of cases are a normal part of growing up
- Initial assessment of feeding problems should involve assessment of growth
- Structured eating times, rewarding good mealtime and eating behaviour, avoiding force feeding and ignoring undesirable behaviours are key to minimizing the duration of this common stage in toddlers eating.

9.9. Further resources

- Birth to five, Department of Health, 2007, Booklet
- Infant and toddler forum factsheets 2.1 'Why toddlers refuse food', 2.2 'How to manage simple faddy eating in toddlers' and 2.3 'Understanding and managing extreme food refusal in toddlers'. Download from www.infantandtoddlerforum.org

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10. Obesity

10.1. Introduction

Childhood obesity has become a major health issue in recent years and is the most common nutritional disorder worldwide. Currently there are two systems for defining obesity in the UK and these produce different estimates for the prevalence of overweight and obesity. The two reference standards are:

1. The 1990 UK growth charts arbitrarily set the 85th centile as overweight and the 95th centile as obese for epidemiological studies (and importantly the 91st and the 98th centile for clinical use).
2. The International Obesity task Force (IOTF) use the Child Growth Foundation BMI charts to define overweight and obesity. As with the height and weight charts there are nine centile curves from the 0.4th to the 99.6th. The IOTF has created cut-off centiles for overweight and obesity that correspond to the adult values at 18 years old i.e. a BMI of 25 for overweight and 30 for obesity. These roughly correspond to the 90th and 99th centiles on the growth charts so give a lower total estimate for obesity.

The debate about which of these cut-off points should be used to define childhood overweight and obesity is likely to continue for some time. However studies are continuing to appear to support the 95th centile cut-off as more specific and sensitive for diagnosis than the international cut-off point (Reilly JJ, 2005, Neovius et al, 2004)

Clinically the Body Mass index (BMI) is generally recognized as the most appropriate measure for diagnosing childhood obesity and overweight (Lobstein et al, 2004, SIGN, 2003, NICE 2006).

10.2. Body mass index (BMI)

BMI is defined as weight in kilograms divided by the square of height in metres:

$$\text{BMI} = \text{weight}(\text{kg})/\text{height}(\text{m})^2$$

BMI in children varies with increasing age and this variation is different for boys and girls. BMI should decrease during toddler years as the toddler becomes more active. To assess if a child is overweight or obese, he or she should be weighed and measured accurately using calibrated equipment. The BMI is then calculated to one decimal place and plotted on the BMI centile charts. There is one for boys and one for girls. These are available from Harlow Printing - see Further resources.

10.3. Prevalence

The increase in childhood obesity in the UK has been well documented and approximately 30% of boys and 28% of girls aged 2-10 years are overweight or obese. (Dept of Health, 2006)

More recent figures show that around 13% of English toddlers aged 2-3 years old were obese. (Government Statistical Centre, 2008).

10.4. Consequences of obesity

Obesity in children increases their risk of a number of physical and psycho-social consequences. Overweight and obese children may be more likely to suffer low self-esteem, social alienation and depression. Health complications may include insulin resistance, orthopaedic problems, skin problems, sleep disturbances and poor immunity. Longer term health concerns that may emerge if obesity persists include type 2 diabetes, hypertension, hyperlipidaemia and an increased risk of some types of cancer.

The progression or tracking of obesity into adulthood is not inevitable- about half of obese children become obese adults. However this risk of persistence into adulthood is affected by a number of factors the most significant being:

- Parental obesity – high risk if one parent obese, higher if both
- Level of obesity; increasing risk with increasing level of obesity
- Obesity in adolescence

(Reilly et al 2003)

10.5. Causes

The vast majority of obesity in children is caused by an imbalance between energy intake from food and energy expenditure through activity levels, growth and development.

Medical causes affect only a minority of children with obesity. These include endocrine disorders, often signaled by short stature including Cushing's syndrome, hypothyroidism, growth hormone deficiency, and chromosomal disorders such as Prader-Willi syndrome. See 10.9. for advice on referral

10.6. Risk factors for childhood obesity

The Avon Longitudinal Study of Parents and Children(ALSPAC) has identified the following risk factors for childhood obesity at seven years irrespective of whether the child was overweight as a toddler:

- Parental obesity of one or both parents
- High birth weight
- Rapid weight gain in the first year
- Catch-up growth between birth and two years
- Early adiposity rebound – this is the term given to the time when BMI begins to increase after falling to a low point at around four to five years. Toddlers who have an early rebound at three to four years are at risk of obesity
- Sedentary behaviour: more than eight hours watching TV per week at three years old
- Less than 10 hours sleep per day at three years

(Reilly et al 2005)

10.7. Management of obesity

There are a number of guidelines on childhood obesity including the NICE guidelines (2007). At present there is a lack of good quality evidence on the successful management of childhood obesity. However there is consensus on the following key points:

- treatment should only be commenced when the parents are ready and willing to make lifestyle changes
- treatment should be family based with at least one parent involved
- lifestyle changes in diet, physical activity and sedentary behaviours should be targeted
- weight maintenance is an acceptable goal of treatment for most, with height increasing and the BMI decreasing over time as the child grows taller.
- for children over 7 with obesity and/or complications years slow weight loss of 0.5kg/month may be advised. (SIGN,2003, RCPCH 2002)

Infants

Obesity is rare in infants, particularly in breast fed infants. The following dietary points should be checked:

- The parent should be aware that the infant may be crying for reasons other than hunger e.g. boredom, tiredness, being uncomfortable.
- If bottle fed, the preparation of the feed should be checked to make sure that it is not being over-concentrated
- There should be no additions to the bottle, e.g. sugar or cereal/rusk
- Weaning should be around the age of six months if possible (and not before 17 weeks)
- Initial weaning foods should have a low energy density (e.g. mashed/pureed vegetables and fruit). Vegetables or fruit that are initially rejected should be offered again on a regular basis and parents informed that the infant will usually accept them after a few attempts on separate occasions.
- As the quantity of solids increases, the volume of milk should be reduced (but not less than one pint or 600 mls per day). If the infant eats a lot of calcium rich foods such as yogurt and cheese, less milk may be given.
- Encourage a three meal and two to three healthy snack pattern- the practice of constant "grazing" should be discouraged.
- Infants should be introduced to a cup or beaker from about six months and bottles discontinued by one year.
- Water should be offered with and between meals rather than juice.

Pre-school children

In the under fives a strict "calorie"-counted regime is rarely appropriate. Advice and support should be given to parents or carers on a healthy balance diet as described in chapter 4. It is important to address the whole family's eating and lifestyle habits. Changes made then become a normal part of family life and may be maintained long-term.

Factors to consider:

- **Physical activity**

Physical activity should be increased by, for example, reducing pushchair use, limiting the amount of television watched or time spent in front of any screen and encouraging active play. At least one hour of moderate activity per day is recommended for all children from two years of age (NICE, 2006). "Moderate activity" means enough to make them feel warm and slightly out of breath. This can be made up of several shorter episodes of 10 minute or more.

- **Limiting sedentary behaviour**

There is no evidence based guidelines for this in the UK, but in the USA watching television is not recommended for the under- two's. For those three years and over sedentary behaviour such as TV watching should be limited to not more than 2 hours per day.(Gidding et al. 2006)

- **Healthy eating**

Advice on healthy eating for the whole family – with emphasis on reducing the fat and sugar content of the family's diet.

- **Regular meals**

A regular meal pattern with healthy snacks is recommended. The practice of constant eating -"grazing" - should be discouraged.

- **Portions**

Portion sizes of meals need to be considered. Is the parent giving the young child the same amount as for older children or adults? Young children should be allowed to stop eating when they signal they have had enough- they should not be pressurised to finish all the food on their plate.

- **Snacks**

Snacks should be low fat and low sugar, such as fresh fruit, low fat yogurt, bread or toast or raw vegetable sticks. Limit higher fat or sugary snacks such as crisps, sweets, and chocolate to occasional foods.

- **Non food treats**

Parents should be encouraged to try alternative non-food "treats" for their child such as buying a comic or stickers or crayons, going to the park, or for a walk or swim or other outing.

- **Milk intake**

Milk should be restricted to one pint/600mls per day. Low fat milks such as semi-skimmed or skimmed may be used for obese children after the age of two years. Healthy start vitamin drops or alternatives providing vitamins A, C and D are recommended for all children under five years. This is particularly important when low fat milks are given to obese toddlers as these milks are lower in these vitamins.

- **Other Drinks**

Water is the alternative drink of choice. A small amount of very dilute unsweetened fruit juice or low calorie squash may be given if water is refused. To help prevent tooth decay these should be kept to mealtimes.

- **Fruit and vegetables**

Many children are fussy about eating fruit and/or vegetables. Different ideas need to be discussed with parents to optimize the child's intake of these foods e.g. sticks of raw vegetables, home-made vegetable soups/pasta sauces, fresh fruit salads/fruit kebabs etc

10.8. Supporting Lifestyle Changes

Strategies that may help include:

- **Goal setting**

Agreeing goals for behaviour change using the SMART mnemonic enables any progress with change to be clearly identifiable- e.g.

Goal: Go swimming on Saturday afternoons for the next month

This goal is **S**pecific, **M**easurable, **A**chievable, **R**ealistic (providing it was agreed!) and **T**ime limited. General advice such as "eat more healthily" is vague, not easily measurable and does not give the family anything specific to achieve which is likely to have a negative effect on motivation.

- **Rewards**

Young children are more likely to repeat behaviours which are rewarded with parental praise and attention. Parents should be encouraged to reward children for good behaviour. Food or drinks should not be used as rewards. More suitable rewards are eg. Playing a game with them, playing with them in the park, going on a family swimming trip, star charts for children over three years old.

10.9. Referral

The following groups should be referred to hospital or community paediatric consultants before treatment is considered in primary care:

- Children who may have serious obesity-related morbidity that requires weight loss (for example, benign intracranial hypertension, sleep apnoea, obesity hypoventilation syndrome, orthopaedic problems and psychological morbidity)
- Children with a suspected underlying medical (for example, endocrine) cause of obesity including all children under 24 months of age who are severely obese (BMI > 99.6th centile)
- All children with BMI > 99.6th centile (who are at higher risk of obesity-related morbidity)

The primary purposes of referral are to exclude underlying medical causes of obesity and to treat comorbidity. Most patients will not have an underlying medical cause and should be discharged back to management in the community (SIGN, 2003; RCPCH, 2002).

Referral to Community Dietitians

Health visitor/ School nurse/GP to give first line advice using a whole family approach on healthy eating including healthy snacks and drinks, increasing activity and restricting sedentary activities. If required obese/overweight children can be referred to the community dietitians for additional advice and assessment.

Patients will be seen within 3 months of receiving the referral. They will be offered a minimum of 3 appointments and when appropriate will be discharged back to the referrer for ongoing support.

MEND – Mind, Exercise, Nutrition... Do it! – programme

MEND is a group programme for children aged 7- 13 years old and their families. The programme consists of 18 x 2 hour sessions (twice a week for 2 hours per session) including fun and practical activities aimed at improving eating habits, interactive discussion about ways of improving behaviour and self-confidence and an exercise session for the children. The programme is free and parents can apply for a place- they will be asked for details of their child's age, weight and height to ensure their child qualifies. The contact number to apply is 01865 337029. MEND is currently running in two venues in Oxfordshire- one in Oxford City and one in Banbury. (See Further resources for website)

10.10. Summary points

- Obesity is associated with multiple health risks and psychological effects.
- Childhood overweight is clinically classified as BMI>91st centile, and obesity>98th centile on BMI for age charts.
- Prevention of overweight and obesity and the promotion of healthy lifestyle should be prioritised
- Treatment should only be commenced when the parents are ready and willing to make lifestyle changes
- Treatment should be family based with at least one parent/carer involved
- Lifestyle changes in physical activity, diet and sedentary behaviours should be targeted
- Weight maintenance is an acceptable goal of treatment in most cases with height increasing and BMI decreasing over time as the child grows taller

10.11. Further resources

- Infant and toddler forum factsheet 3.3., "Overweight and obesity". Download from www.infantandtoddlerforum.org

- Growth charts/BMI charts available from Harlow Printing and can be ordered from www.healthforallchildren.co.uk
- Department of Health Change4Life resources – see www.dh.gov.uk/change4life
- MEND programme – further details www.mendprogramme.org

10.12. References

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11. Toddler Diarrhoea

11.1. Introduction

Toddler diarrhoea is also known as chronic non-specific diarrhoea. It is the most common cause of chronic diarrhoea in young children. It affects children between the ages of 1 and 5 years. It is not serious but can lead to a high level of parental anxiety.

11.2. Symptoms

The child has frequent loose watery stools (bowel motions) daily. The stools are often more smelly and pale than usual and there are often bits of undigested vegetable food in the stools such as carrot and sweetcorn. The child however is well; growing and gaining weight.

11.3. Possible causes

The cause of toddler diarrhoea is not fully understood.

Children with this disorder are known to have a rapid gut transit time and intestinal motility is generally thought to be abnormal, but not serious.

Toddler diarrhoea is **not** due to malabsorption of food in the small intestine or to a serious bowel problem.

The diet of the child may contribute to the diarrhoea. Possible contributing factors to toddler diarrhoea are:

- Excessive drinking of juices/squash. Incomplete carbohydrate absorption may be a factor because apple juice has been implicated in causing toddler diarrhoea. Studies have shown that galacturonic acid is produced by enzymatic treatment of the fruit pulp in clear fruit juices, including apple, grape and bilberry juices. It is now thought that this may cause problems in sensitive individuals.
- Fibre very often has been reduced in the diets of these children in attempt to normalise the stools. However fibre will actually increase the bulkiness of the stool and make it less runny.
- Low fat diets – fat delays gastric emptying and intestinal transit time.

11.4. Recommendations

Parental reassurance is very important.

Parents need to know from a health professional that it is not a serious condition and will, in the majority of cases resolve on its own.

- Excessive fluid intake especially clear fruit juices such as apple juice should be discouraged.
- A suitable average fluid intake for a toddler is 6-8 cups daily

- Fibre intake should be normalised to include fruit and vegetables, and wholemeal bread.
- An adequate fat intake, such as a diet including full fat milk and dairy products and use of unsaturated margarines and oils, should be encouraged.

Once the diagnosis has been made, any foods that parents have excluded because of possible food intolerance need to be reintroduced.

11.5. Outcomes

Whilst dietary modification can ease symptoms, in most cases the diarrhoea resolves spontaneously, generally between 2-4 years of age.

11.6. Summary points

- Toddler diarrhoea is the commonest cause of chronic diarrhoea without failure to thrive.
- The child is well.
- Modifying the diet to normalize fluid, fibre and fat intake can usually ease the symptoms.
- Most cases resolve spontaneously

11.7. References

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12. Constipation

12.1. Introduction

Constipation is generally taken to mean a delay in the passage of stools, often associated with hard stools that are difficult to pass. Average stool frequency has been estimated to be four stools per day in the first week of life, two per day at one year of age decreasing to the adult pattern of between three per day and three per week by the age of four years. Within this pattern there is great variation. (Lawson, M. & Shaw, V., 2006)

Constipation is usually associated with harder stools. The last part of the gut absorbs water from the stool. The longer the stools take to pass through the gut the more water will be extracted. When these harder, larger stools are passed they can cause secondary symptoms including pain. The onset of constipation can give rise to a vicious circle where a child does not want to pass a stool because it hurts. The gut can therefore become distended and less effective. A chronic situation is set up leading to long term problems such as faecal incontinence (soiling) and associated psychological upset.

Chronic constipation has been defined as the occurrence of two or more of the following characteristics during the last 8 weeks:

- Less than three bowel movements per week
- More than one episode of faecal incontinence per week
- Large stools in the rectum or palpable on abdominal examination
- Passing of stools so large they obstruct the toilet
- Retentive posturing and withholding behaviour
- Painful defaecation

(PACCT, 2005)

Children with chronic constipation usually present between the ages of one and five years.

Constipation does not normally occur in the breastfed infant, in whom bowel habit can vary widely.

12.2. Dietary factors and constipation

Constipation is a symptom rather than a disease. Anatomical and or physiological causes should be considered, particularly in the younger constipated infant, but dietary and/or psychological factors commonly contribute to constipation. Constipation may be due to a poor food, fluid or fibre intake.

Fluid

In bottle fed infants, over concentration of the milk formula can lead to a low fluid intake so correct preparation of the formula and total fluid should be checked. The introduction of extra fluid as water can often be helpful.

If a breastfed infant appears constipated, attachment to the breast should be checked to ensure the infant is receiving an adequate milk supply.

Poor intake

Poor diet/appetite may be present in children with constipation.

Consuming more than 600mls of milk daily, or excessive drinking of squashes etc, may affect appetite for food. In children who eat well, constipation may be caused by a lack of dietary fibre and/or limited fluid intake.

Fibre

Increasing dietary fibre intake can help treat constipation. There are currently no guidelines on fibre intake in children in the UK. However American studies have suggested a minimum fibre intake of age + 5g/day for children over 2 years until they meet the suggested intake for adults of an average of 18g/day (Williams CL et al,1995). For example, a four year old child would be recommended to consume: 4 + 5 = 9g fibre per day.

Fibre should be increased gradually to allow the gut to adapt to its ingestion.

Good sources of fibre include wholegrain breakfast cereals, wholemeal pasta, wholemeal bread, fruits and vegetables.

It is important to check adequate fluid intake when dietary fibre is increased, as additional fluid is excreted in the stools. Toddlers require 95 mls fluid/kg/day, approximately 6-8 cups per day.

Excessive intake of fibre with high phytate levels, such as unprocessed bran, is not recommended as this may interfere with calcium and mineral absorption by causing a rapid transit time.

12.3. Recommendations

- in bottle fed infants, check correct preparation of formula and that the infant is meeting fluid requirements
- in breast fed infants, check attachment to the breast
- in toddlers, ensure adequate fluid intake: 95 mls/kg/day, approximately 6-8 cups
- reduce milk intake to one pint or 600mls/day to encourage an appetite for other foods
- encourage regular meals and snacks
- increase dietary fibre in the diet e.g. wholemeal bread, wholegrain breakfast cereals, wholemeal pasta, fruit, vegetables, beans and pulses

If simple measures, including first line medication, do not improve constipation, referral to the Community Children's nurses for further assessment and advice is recommended.

12.4. Constipation and allergy

In a select group of children with constipation who fail to respond to conventional treatment, cow's milk protein free diets have shown to be beneficial (Lacano et al., 1995). Key pointers in clinical history include:

- Early onset
- Normal stools but straining
- Associated atopic signs
- Proctitis- perianal redness
- Painful defecation

(Carrocio et al 2005)

A trial of a cow's milk free diet may be considered for children with chronic constipation who fail to respond to normal treatment especially if they are atopic.

12.5. Summary points

- Constipation may be due to poor food, fluid or fibre intake
- Adequate fluid intake should be addressed for infants
- Adequate amounts of fibre containing foods should be encouraged from weaning
- If dietary changes have not helped, medical advice should be sought

12.6. Further resources

- Treatment algorithm for the management of children with constipation, ORH intranet site, Childrens hospital, gastroenterology.
- Infant and toddler forum factsheet 4.6 'Constipation in Toddlers'. Download from www.infantandtoddlerforum.org

12.7. References

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13. Gastroenteritis

13.1. Introduction

Acute gastroenteritis is a very common and infectious illness involving vomiting and diarrhoea.

Diarrhoea

Diarrhoea is the passing of frequent watery stools.

Acute Diarrhoea

Acute diarrhoea is usually caused by a viral or bacterial infection.

Infants and young children are particularly vulnerable to the effects of acute diarrhoea because of their greater relative fluid requirements.

It is usually mild and self limiting and can be managed at home.

The diarrhoea should settle in a few days.

13.2. Management

It is very important to keep the child hydrated, by offering plenty of fluids.

As a guide, after each loose stool (Brown KH et al, 1994)

- Children under 2 years of age 50-100ml ($\frac{1}{4}$ -1/2 large cup) of fluid.
- Children aged 2-10 years 100- 200ml ($\frac{1}{2}$ - whole large cup)
- Even if the child is vomiting give frequent sips of water. A small amount fluid is better than none.
- As soon as the child feels like eating, this should be encouraged. Continue to offer extra drinks.
- Suitable fluids are water, dilute squash, oral rehydration solution.

Infants

Dilution of milk feeds and use of lactose free formulas is no longer justified in the treatment of infants (ESPGAN 1997).

It is now recommended (1997 ESPGAN) that in the bottle-fed infant, feeds should be stopped for only 4 hours and the infant re-hydrated with a low osmolar oral rehydration solution (ORS); followed by rapid re-introduction of full strength feeds (ESPGAN 1997).

This results in greater weight gain and no worsening of symptoms.

Supplementation with ORS should continue to

compensate for stool losses whilst diarrhoea continues.

In the **breast-fed** infant breastfeeding should be continued at all times with supplementation of ORS to replace stool losses.

Infants and children with acute gastroenteritis should not be treated with anti-diarrhoeal medicines.

If the infant is less than 6 months medical advice should be sought.

Examples of ORS available in the UK :

Dioralyte (powder)	Aventis Pharma
Electrolade	Baxter
Rapolyte	Provalis

13.3. Summary points

- It is important to keep the infant and child hydrated.
- Offer the child plenty of extra fluid.
- Feeds should be stopped for 4 hours in the bottle infant and the infant given ORS; followed by introduction of normal full strength feeds.
- Breastfeeding should be continued at all times.

13.4. Further resources

- www.cks.library.nhs.uk/gastroenteritis.

13.5. References

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14. Process for Monitoring Compliance

The Guidelines will be subject to internal review by the community dietitians to determine the compliance to these guidelines and their effectiveness.

15. Process for Review

The guidelines are to be reviewed on a 2 yearly basis by the named authors.