



GUIDELINE	
Nutrition for children - birth to 12 months	
Scope (Staff):	Community health staff
Scope (Area):	CACH, WACHS

This document should be read in conjunction with this [DISCLAIMER](#)

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Aim

To provide guidance for Community Health Nurses in the provision of safe and adequate nutrition information for infants from birth to 12 months. A companion guideline exists entitled *Nutrition for children – 1 to 11 years*.

Risk

Suboptimal infant feeding in the first year of life can negatively affect an infant's nutritional, physical and psychological wellbeing.

Background

Infancy is a period of rapid growth and development. Appropriate early growth and development through good nutrition provides a range of benefits to the developing infant, including protection against morbidity and mortality. Appropriate feeding during infancy protects against growth faltering at one extreme, and obesity at the other.

The World Health Organization (WHO) states that breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants and is viewed as the biological and social norm for infant and young child feeding.¹ The WHO recommends:

Breastfeeding should start early, within one hour after birth.

Breastfeeding should be exclusive for six months.

Appropriate complementary feeding should start at around six months with continued breastfeeding up to two years and beyond.^{2,3}

The complete global recommendations for appropriate feeding of infants and young children can be found in the WHO [Guiding Principles for Complementary Feeding of the Breastfed Child](#).

It is estimated that, worldwide, about 36% of infants are exclusively breastfed for the first six months of life, the majority receiving some other food or fluid in the early months.^{2,3} For mothers who cannot, or choose not to breastfeed, it is important to ensure they know that commercial infant formulas are the only acceptable alternative to breastmilk for the first 12 months.

Maintenance of positive energy and nutrient balance is critical in achieving and sustaining normal growth and development. Between six and twelve months, breastmilk (or infant formula) continues to be a major source of bioavailable nutrients.⁴ However, by around six months of age, breastmilk (or infant formula) alone no longer provides sufficient nutrients and energy for growth and development, and the infant requires additional nutrients from solid foods.

Multiple factors determine the appropriate nutrient content, energy density, texture and timing of solid foods introduced. The aim is to match appropriate food intake with the developmental and behavioural cues of the infant. Even at this early age, a variety of food should be offered to ensure an adequate supply of energy and nutrients.

The human microbiome (bacteria colonising the gut, formally referred to as gut flora) has recently gained much attention due to its links with health. It is recognised as having a significant influence on our health, affecting the immune, nervous and metabolic systems.⁵ This gut microbiota begins developing early in life, and research shows the initial colonisation in particular, is important because it influences long term microbiota. Breastmilk plays a major role in shaping the early-life microbiota and promoting its development, thus affecting health.⁶

Microbes colonise the infant's gut immediately following birth, and are strongly influenced by maternal microbiota, delivery mode and gestation. Microbiota establishment is partly controlled by specific compounds present in breastmilk⁷ and following this initial period, the type of feeding strongly influences the infant's microbiota. By 2–3 years of age, adult-like microbiota is established and is continually influenced by the individual's diet. Modifications in the gut microbiota composition during these early years can have long-term effects on health.⁶

Given its key role, maintaining a protective microbiota could prevent conditions such as allergies, autoimmune disorders, and metabolic syndrome.⁶ Therefore an increasing amount of research is looking into how the early human gut microbiota may affect adult health conditions.⁷

Key points

- Optimum nutrition is essential for normal growth and physical and cognitive development of children.
- All parents/caregivers have the right to receive accurate and impartial information to enable them to make informed choices about infant feeding and lactation. A family's informed choice is encouraged, respected and supported.
- The WHO recommends protecting, promoting and supporting exclusive breastfeeding for the first six (6) months of life, and continued breastfeeding with appropriate complementary solid foods, for two (2) years and beyond.¹ In Australia, the National Health and Medical Research Council (NHMRC) recommends exclusive breastfeeding to around six (6) months of age, with then the introduction of solid foods, whilst continuing breastfeeding until twelve (12) months of age and beyond, for as long as the mother and child desire.⁴
- As well as normal growth, physical and cognitive development, breastfeeding provides socio-emotional outcomes for infants and their mothers. Regular close contact promotes responsiveness, sensitivity, bonding and attachment.⁴
- Health workers have a responsibility to protect, promote and support breastfeeding. Any breastfeeding is beneficial to the infant and mother.
- When infants are unable to breastfeed, manufactured infant formula is the only suitable and safe alternative for the first 12 months of life. Nurses will educate and support parents/caregivers about formula feeding, only to those who require it, during individual consultations.
- Deviations from normal (which may include unexpected increases, decreases or stasis in growth trajectories from a previously established rate of growth) may indicate an underlying health or developmental issue.
- Nurses will have a range of attitudes around breastfeeding, infant formula and solids introduction, based on personal experience and/or beliefs. It is important to recognise that Community Health Nurses' professional standards and ethical practice require nurses to use evidence based approaches when working alongside clients, without any conflicts of interest.
- Nurses are expected to take CAHS-CH policies fully into account when exercising their clinical judgement. However, the guidance does not override the responsibility of nurses to make decisions appropriate to the circumstances of each client, in consultation with the parent/caregiver.

PART 1: BREASTMILK

General information

Breastfeeding and the consumption of breastmilk have positive effects on the nutritional, physical, psychological and social health of the infant, and lactation has health benefits for the mother. Breastmilk is a natural, convenient, hygienic and inexpensive food for babies.⁸

Ballard and Morrow (2013) state that “human milk is not ‘merely nutrition.’ Rather, human milk contains a variety of factors with medicinal qualities that have a profound role in infant survival and health.”⁹

In Australia, it is recommended that infants are exclusively breastfed until around 6 months of age when solid foods are introduced, and that breastfeeding is continued until 12 months of age and beyond, for as long as the mother and child desire.⁴ Refer to *Breastfeeding protection, promotion and support* guideline for more information.

Breastmilk composition

The composition of breastmilk is dynamic and contains antibodies, live cells (macrophages, lymphocytes, neutrophils and epithelial cells) and other bioactive substances as well as human protein.⁴

Breastmilk protects the infant from infection and inflammation, and is involved in organ development and colonisation of microbiota.⁹ Breastmilk provides a source of energy and nutrition for infants, as well as compounds which guide the development of the infant’s immune system and microbiota.⁵ The composition of breastmilk varies over a single feed, as well as over the period of lactation and the changes match the infant’s needs at that time. The composition of breastmilk can also be influenced by time since last feed, diurnal variation, birth weight and maternal factors such as age, diet (depending on nutrient), and ethnicity.⁵

- Fats are the largest energy source in breastmilk, containing a large variety of fatty acids which allow for a variety of functions.
- Bioactive compounds develop the gastrointestinal tract and microbiota, and serve an immune function.
- Antibodies in breastmilk protect the infant whilst its own immune system is maturing.
- Carbohydrates, including lactose, help meet the energy needs of the infant’s brain. Oligosaccharides feed the microbiota which, in turn, protect the infant from pathogenic bacteria which cause diarrhoeal disease and respiratory tract infections.⁵
- Water in breastmilk provides hydration.

Detailed information about the composition of human milk is found in Appendix A.

A comparison of the composition of breastmilk, cow’s milk and infant formula can be found in the *Infant Feeding Guidelines*.

Colostrum

At around 16 weeks’ gestation, colostrum begins to be produced (lactogenesis I) so that it is available to the infant immediately after birth. Colostrum contains very high levels of immunoglobulins (for immune protection) compared to mature breastmilk, as well as

growth factors, protein and fat-soluble vitamins. Both colostrum and breastmilk contain oligosaccharides, however colostrum contains double the quantity found in mature breastmilk. These oligosaccharides are a type of carbohydrate that 'feed' the microbiota. They also form a physical barrier on the intestinal wall, providing protection against entry of pathogens.¹⁰

Health outcomes

*"Breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants, and has a unique biological and emotional influence on the health of both mother and child."*¹¹

Outcomes for infants who breastfeed

The health outcomes include improved visual acuity, psychomotor development and cognitive development⁴ and also protection against the development of chronic disease in adulthood and influences on future bone mass.^{12, 13} There is also increasing evidence in relation to obesity rates and cognitive development.

Breastfeeding can provide psychological benefits to the infant. The close interaction and physical contact between a mother and her infant during breastfeeding⁴ is an important factor in bonding and attachment. Mothers should be encouraged to look at their infant whilst breastfeeding, and discouraged from looking at screens.

Breastfeeding has also been shown to affect cognitive development, particularly with preterm infants having higher intelligence scores at 7-8 years of age, compared with pre-term infants who received infant formula. It is hypothesised that this is due to the higher concentration of polyunsaturated fatty acids in breastmilk.⁴

Breastfeeding confers a range of benefits to the developing infant, including improved visual acuity, psychomotor development, and reduced malocclusion as a result of the facilitation of normal jaw development.⁴

Breastmilk is bio-dynamic and species-specific. Infants grow and develop at a very rapid rate in early life, yet many of the infant's anatomical systems including the digestive, hepatic, neural, renal and immune systems are still immature. Human milk caters for this immaturity. The nutrients contained in breastmilk are easily absorbed and exist in bioavailable forms. Breastmilk also contains growth factors and other bioactive factors that promote optimal function of the immature organ and vascular systems.⁴

Numerous reports^{4, 14-16} informed the *Infant feeding guidelines: information for health workers* which state that breastmilk consumption reduces the risk or severity of a number of conditions in infancy and later life, including:

- Physiological reflux
- Pyloric stenosis
- Gastrointestinal infections
- Respiratory illness
- Otitis media
- Urinary tract infections
- Bacteraemia-meningitis
- Sudden unexpected death in infancy
- Necrotising enterocolitis in preterm infants

- Asthma
- Some childhood cancers
- Type 1 and type 2 diabetes
- Coeliac disease
- Inflammatory bowel disease
- Cardiovascular disease risk factors, including blood pressure and total and low-density lipoprotein (LDL) cholesterol
- Obesity in childhood and in later life.⁴

Breastfeeding is associated with the lowest risk of obesity later in life and, when compared to formula fed infants, breastfed infants have lower incidence of obesity in part due to lower protein intake in breastmilk compared to that in infant formula. Other contributions come from the numerous appetite, growth and obesity-related hormones found in breastmilk. One of these hormones is leptin, which provides moderate protection from excess weight gain via the regulation of energy intake and appetite.¹⁷

A dose response relationship is apparent for the duration of breastfeeding on the prevalence of obesity.¹⁸ The longer the duration, the greater the protective effect; however, any breastfeeding is beneficial.

Outcomes for mothers who have lactated include:

- An accumulative reduced risk of breast and ovarian cancer⁴

Expressed breastmilk

When an infant is unable to breastfeed, they can be offered expressed breastmilk. Breastmilk can be expressed by hand or by using a manual or electric pump. Expressed breastmilk can be fed to an infant by finger feeding, cup, spoon or bottle. Written information on how to express is located in Women and Newborn Health Service booklet *Breastfeeding and breast care*.

Refer parents/carers to the [Breastfeeding: expressing and storing breastmilk](#) resource.

Refer parents/carers to Healthy WA [Sterilising teats, bottles and dummies](#) resource.

Considerations for the breastfed infant

Medications

Most medications can be consumed by a lactating mother without posing danger to the infant.⁴ The safety of any medication, prescribed or otherwise (including herbal medicines), should be checked by contacting the King Edward Memorial Hospital (KEMH) Obstetric Medicines Information Service, a pharmacist or medical practitioner before being taken by a lactating woman.¹¹

KEMH Obstetric Medicines Information Service can be contacted via (08) 6458 2723.

Alcohol

Alcohol is excreted into the breastmilk in the same concentrations as blood levels because alcohol moves freely between blood and breastmilk. The NHMRC guidelines recommend that 'maternal alcohol consumption can harm the developing foetus or breastfeeding baby. For women who are pregnant, planning a pregnancy or breastfeeding, not drinking is the safest option.'⁴

For lactating mothers who chose to drink alcohol:

- Be guided by the *Feed Safe App* on what a safe interval is between drinking alcohol and breastfeeding.
- Express some milk prior to drinking alcohol to feed the baby while mother is drinking.
- If feeds are missed while drinking alcohol, mothers can be encouraged to express in order to maintain milk volume (the expressed milk will be discarded).

Drugs

The WHO guidelines on Acceptable medical reasons for use of breastmilk substitutes¹⁹ give the following guidance on substance use: “maternal use of nicotine, alcohol, ecstasy, amphetamines, cocaine and related stimulants has been demonstrated to have harmful effects on breastfed babies; alcohol, opioids, benzodiazepines and cannabis can cause sedation in both the mother and the baby. Mothers should be encouraged not to use these substances, and given opportunities and support to abstain.”

Where the mother has used heroin or methadone throughout her pregnancy, it is considered safer for the infant to continue to receive them in the breastmilk than be subjected to symptoms associated with withdrawal. In this case, the other associated benefits of receiving breastmilk outweigh the costs of inducing a state of withdrawal in the infant, as long as the mother is considered stable.²⁰

Marijuana, heroin and methadone are excreted in breastmilk and the active components of these drugs are fat-soluble and concentrate in the breastmilk.

A mother who is not fully alert can present hazards while breastfeeding, preparing infant formula or sleeping near her infant.

The *Clinical Guidelines for the Management of Substance Use During Pregnancy, Birth and the Postnatal Period (2014)* provides information for all health professionals working with pregnant and lactating women experiencing a drug or alcohol use problem, particularly drug dependency, but including other drug uses such as alcohol bingeing.

Smoking

There is significant evidence that maternal and paternal smoking is negatively associated with breastfeeding outcomes, including initiation and duration.⁴ Nicotine can affect a mother’s milk volume by reducing basal prolactin levels and oxytocin levels. Smoking also exposes infants to the toxic, carcinogenic and mutagenic compounds in tobacco smoke, and can cause gastro-intestinal upsets.⁴ There is strong evidence that infants of mothers who smoke after birth experience more lung conditions in their first year of life, and have double the normal risk of serious airway infection. Smoking is also associated with an increased risk of Sudden Unexpected Death in Infancy (SUDI) and premature cessation of breastfeeding.²¹

If a mother smokes, it is advised she give up or limit her smoking as much as possible. Cigarettes should be completely avoided one hour before feeding and during feeding to decrease the harmful effects of nicotine.⁴ However, breastfeeding is still recommended over formula feeding. If the mother smokes, it is recommended that she smokes after a breastfeed and in another room or avoids smoking in the house completely. In WA, smoking is prohibited in a car when a child under 17 years is present.

The two most commonly used medications to assist smoking cessation in Australia, varenicline (Champix) and bupropion (Zyban), are not recommended during pregnancy or lactation.

PART 2: INFANT FORMULA

General information

If an infant is unable to breastfeed or partially breastfeeds, commercial infant formulas are the only suitable alternatives to breastmilk for the first 12 months for meeting primary nutritional needs. Infant formula can meet all the infant's nutritional requirements for growth for the first 6 months. However, it lacks the living cells, human protein, enzymes and the wide range of other bioactive substances that breastmilk contains.⁴

All infant formulas sold in Australia must meet nutritional and safety standards set out in *Standard 2.9.1 Infant Formula Products* of the Australian New Zealand Food Standards Code.²² The Standard also allows for voluntary addition of permitted forms of nutritive substance, e.g. nucleotides, lutein and other ingredients such as lactic acid cultures. The Standard is listed in the useful resources section in this document. Manufacturers continually develop and produce new products; however, more evidence is required to indicate clear long-term benefits or dangers for the use of additional nutritive substances voluntarily added to infant formula.

Infant formulas are available in ready-to-use or powder form. Food Standards Australia New Zealand regulate standards for the quality, composition and labelling of infant formulas sold in Australia.

If for any reason an infant formula is used, it is the responsibility of the nurse to:

- enquire about the reasons for infant formula use, e.g. medically indicated, short term feeding strategy or parental choice.
- provide accurate information to enable parents/caregivers to make informed choices about infant feeding.
- supply relevant information on correct selection, preparation, storage and feeding technique.
- discuss minimising the risks associated with formula feeding.¹⁴
- ensure families are aware of the potential health risks and financial considerations associated with infant formula use.

Composition of infant formula

The constituents of human milk are used as a reference in developing infant formula. However, infant formula will never duplicate the variety of nutrients and active factors present in human milk⁴, (as breastmilk is a dynamic living fluid that is species-specific) or the changing nature of breastmilk over time.⁴

Although research into the development of formulas is continuing, it is impossible that these products could ever duplicate the variety of nutrients present in breastmilk. See Appendix B: Composition of mature human milk, cow's milk and infant formula.

Types of infant formula

Although there are many cow's milk-based formulas available, there is little evidence that any one is superior for healthy term infants.⁴ Likewise, the use of a particular formula by a hospital does not mean that formula is preferable to any other. All brands are regulated under the *Australian New Zealand Food Standards Code for Infant Formula Products (Standard 2.9.1)* and must be nutritionally complete.⁴

Cow's milk-based formula

Cow's milk-based formula is recommended for healthy, term infants. It is recommended over formula made from soybeans, rice or goat's milk, modified lactose formula, or specialised formulas, unless medically indicated.⁴ It can meet the daily nutrient requirements of infants to 6 months of age.

Soy-based formula

Soy is a source of protein that is inferior to cow's milk, with a lower digestibility, and bioavailability. It contains high concentrations of phytate, aluminium, and phytoestrogens (isoflavones), which may have negative effects. According to the European Society of Pediatric Gastroenterology, Hepatology and Nutrition, there is no data to support the use of soy protein formulae in preterm infants.²³

Indications for soy protein formula include:

- severe persistent diagnosed lactose intolerance
- cow's milk protein allergy
- galactosemia
- ethical considerations (e.g. vegan diets).²³

Soy protein formula has no role in the prevention of allergic diseases^{24, 25} and is not recommended for infants with food allergy during the first 6 months of life.²⁵ There is no evidence supporting the use of soy protein formula for:

- prevention or management of infantile colic or regurgitation
- prolonged crying.²³

Goat's milk-based formula

Compared to cow's milk formulas, there have been fewer studies evaluating the safety and efficacy of goat's milk formulas. Goat's milk is not considered to have any role in preventing or treating allergic disease. Many infants who are allergic to cow's milk are also allergic to goat's milk and soy drinks. The use of goat's milk formula is *not* recommended.⁴

Specialised formulas

Specialised formulas are designed for infants with specific nutritional needs and should only be used, with medical and/or health professional supervision, for clinically diagnosed conditions.⁴

Hydrolysed formulas

Evidence no longer supports the use of partially hydrolysed formulas for the prevention or treatment of cow's milk protein allergy.²⁴⁻²⁶

Extensively hydrolysed formulas and amino acid formulas, (from cow's milk or rice proteins) continue to be recommended for infants who have been medically diagnosed with cow's milk protein allergy.²⁷

Standard 'starter' formulas

Starter formulas are labelled 'suitable from birth' and are suitable for infants from birth to 12 months. It is not necessary to replace the starter formula with 'follow-on formula' for infants 6-12 months.

Changing the type of formula used because of minor rashes, irritability and/or infant or parent distress is usually of no benefit. Changing formula can also create confusion with formula preparation.⁴

As per the WHO Code, nurses should not recommend specific brands of formula.

Choosing an infant formula

Evidence suggests that the preferred levels of protein in formula to promote optimal growth rates similar to breastfed infants are those that are similar to the levels in human milk, subject to a minimum content of specific amino acids.^{4,28} Human breastmilk contains 1-1.1 grams of protein/100 mL compared to the protein content in infant formulas now available in Australia in the range of 1.3–2.0 g/100 mL (goat’s milk formula is at the high end of this range).⁴

The higher protein content of infant formula is associated with higher weight gain in the first 2 years of life.⁴ Families can be advised to select a formula with a protein level that is closest to breastmilk.

Refer to Appendix B: Composition of mature human milk, cow’s milk and infant formula.

Average daily formula requirements

The volume of formula an infant will take per feed and over a 24-hour period varies among individual infants. The quantities published on formula packages are a guide only and are not necessarily suitable for every infant. See Table 2 for average daily formula requirements.

Anticipatory guidance needs to be given to families about an infant’s cues. When the infant does not finish a whole bottle, it may indicate they have had enough and should not be forced to consume all the formula offered.

Indicators that an infant is getting enough formula include:

- clear to pale yellow urine
- appropriate rate of growth
- a thriving and active infant.⁴

Table 2: Average daily formula requirements* for infants and toddlers⁴

Days 1 - 4	30 – 60 mL / kg / and increase over the next few days
Day 5 to 3 months	150 mL / kg / day <i>Some infants (e.g. Premature or low birth weight) may require up to 180–200mL</i>
3 to 6 months	120 mL / kg / day
6 to 12 months	100 mL / kg / day <i>Some may reduce to 90mL depending on solids consumption</i>

* values given are a guide only

International Code of Marketing of Breast Milk Substitutes

The *International Code of Marketing of Breast Milk Substitutes (WHO Code)* was developed to provide safe and adequate nutrition for all infants, including those who are consuming formula. The WHO Code encourages informed infant feeding choice and appropriate marketing of breastmilk substitutes, feeding bottles and teats.

In support of the WHO Code, the Australian government developed the *Marketing in Australia of Infant Formula: Manufacturers and Importers Agreement* (MAIF Agreement).²⁸

The MAIF Agreement aims to ensure safe and adequate nutrition for infants by protecting the promotion of breastfeeding and by ensuring the proper use of infant formula on the basis of adequate information and through appropriate marketing and distribution.⁴

Nurses working for WA Health have a responsibility to adhere to the WHO Code regarding the acceptance, marketing and distribution of infant formula in health services.

Feeding with infant formula “should be demonstrated only by health workers... and only to the mothers and other family members who need to use it; and the information given should include adequate instructions for appropriate preparation and the health hazards of inappropriate preparation and use.”²⁹

Refer to Appendix B: Interpretation and implementation of the WHO code.

Outcomes for infants not receiving breastmilk⁴

Not consuming breastmilk increases the risk of infant health conditions including:

- Otitis media
- Eczema
- Gastrointestinal infections
- Hospitalisation of lower respiratory tract diseases
- Asthma
- Childhood obesity
- Type 2 diabetes mellitus
- Leukaemia
- Sudden Unexpected Death in Infancy
- Necrotising enterocolitis in preterm infants

*The risk of breast and ovarian cancers is increased in mothers who have not lactated.

Minimising risks for infants receiving infant formula

As powdered infant formula is not sterile, there is a risk of infection from *C.sakazakii* which is invasive and has a high mortality rate.⁴

To minimise the risk of contamination with bacteria, formula should be prepared, stored and transported correctly and safely. The WHO recommends water is heated to 70 degrees Celsius to destroy bacteria (and cooling to lukewarm prior to feeding).

Refer parents/caregivers to Healthy WA [Safe preparation and use of infant formula](#).

An infant's immune system is not strong enough to fight off infection so it is important to ensure bottle-feeding equipment is cleaned in hot soapy water after every use. Equipment also needs to be sterilised until the infant is twelve months old.⁴

Refer parents/carers to Healthy WA [Sterilising teats, bottles and dummies](#) resource.

In certain towns in the Midwest and Goldfields, nitrate levels in the water are deemed unsafe for infants under three months of age to consume and therefore parents/carers are advised to use bottled water to prepare formula feeds. The Water Corporation provides bottled water for these families.³⁰

To prevent obesity, an infant should never be 'forced' to finish the bottle, and families should be encouraged to respond to the infant's cues for fullness.

Nurses can assess the infant to ensure they can teat-feed efficiently in order to consume an appropriate amount of formula (and energy).

Feeding infant formula

When feeding an infant, the milk should drip easily at a steady rate without pouring out in a stream. To determine the flow rate of a teat, the bottle should be filled with room-temperature milk and held upside down.

If the bottle has to be shaken vigorously, the teat is too slow. A slow teat may result in the infant falling asleep before taking all of the milk needed.⁴

Good practice in bottle-feeding involves making feeding a comfortable experience for parent/caregiver and infant while avoiding risks associated with incorrect bottle-feeding. This includes:

- always checking the temperature of the formula before feeding by shaking a little milk from the teat onto the inside of the wrist – it should feel warm, not hot.
- holding, cuddling and talking to the infant (if it is not too distracting) while feeding and responding to infant cues; parent–infant contact is extremely important.
- not leaving an infant to feed on their own (i.e. with the bottle propped) – the milk may flow too quickly and cause the infant to splutter or choke.
- not putting an infant to sleep while drinking from a bottle – as well as the risk of choking, this increases the risk of ear infection and dental caries.⁴

For formula-fed infants, cooled boiled tap water may be used if additional fluids are needed. From around 6 months, small amounts of cooled boiled water can supplement breastmilk or infant formula. Consuming any other drinks in the first 12 months may interfere with an infant's adequate intake of breastmilk or infant formula.⁴

Refer parents/caregivers to Healthy WA [Safe preparation and use of infant formula](#).

PART 3: INTRODUCING SOLIDS

Breast milk or infant formula provides sufficient nutrients for most infants' growth and development until around 6 months. At around 6 months, the addition of solid food is required to meet the infant's increasing nutritional and developmental needs. Stores of several nutrients including iron and zinc are often falling at around 6 months in exclusively milk-fed infants (both breast and formula), and these nutrients are best sourced from food.

Introducing solids to an infant's diet does not mean 'weaning' or stopping breastfeeding. Due to this potential misinterpretation, and the inconsistent use of 'weaning' in literature, this document will use the same terminology as the *Australian Infant Feeding Guidelines*, which is complementary feeding,⁴ and is defined as 'any nutrient-containing foods or semi-solid given to infants in addition to breast milk or commercial infant formula'. This phrase more accurately conveys the idea that the process does not involve cessation of breastfeeding. It is recommended that breastfeeding be continued until 12 months of age and beyond, for as long as the mother and child desire.⁴

Appropriate complementary feeding is:

- **Timely.** Foods are introduced when infants are showing developmental signs of readiness for solids, and when energy and nutrients needs exceed what can be provided through exclusive and frequent breastfeeding.
- **Adequate.** Provision of nutritious foods with sufficient energy, protein and nutrients to meet a growing child's nutritional needs, particularly for iron and zinc.
- **Safe.** Foods are hygienically stored, prepared and fed with clean hands, using clean utensils.
- **Properly fed.** Foods offered are consistent with the child's signals of appetite and satiety, and that the meal frequency and feeding methods are suitable for age, i.e. actively encourage the child to consume sufficient food using fingers, spoon or self-feeding (not through bottles or teats).²

Invite parents/caregivers to *A Solid Start*: a universal group program providing information on introducing solids at the Universal 4 month contact and refer to *Baby's First Foods* pamphlet or *Raising Children Network* website for more information.

Cultural considerations

Cultural, social and medical factors can influence the age at which solids are introduced and different cultures have their own traditions about what food is most suitable to begin with. Some cultural groups within the Australian community have unique needs in relation to infant feeding. This may be due to socioeconomic disadvantage; a diverse range of cultural practices, languages, or their life experiences prior to arriving in Australia.

Culturally-appropriate foods and preparation methods should be encouraged when they are nutritionally adequate.²

Timeliness of introducing solids

At around 6 months of age most infants are able to adapt to different foods, food textures and modes of feeding.⁴ This age has been identified as a time when:

- Infants are developmentally and physically ready to cope with solid foods specifically in relation to, but not limited to, being able to sit supported in a chair with trunk and head upright (to prevent choking risk). Nurses should emphasise that the exact timing depends on signs of readiness in the individual child. If a child is

showing signs of having difficulty in trunk control, or shoulder girdle strength, they may require referral to a paediatric physiotherapist.

- Breastmilk or infant formula alone and are insufficient to meet the infant's nutritional needs and appetite. Stores of several nutrients e.g. iron and zinc, are falling in exclusively milk-fed infants (both breast and formula). Iron status is of particular concern after 6 months.
- Feeding has developed from sucking to biting. Infants are often chewing by 7-9 months and can manage soft finger foods at 8 months.
- Infants lose the tongue-extrusion reflex and have an increasing ability to sit without support. This allows for greater manipulation of food in the mouth before swallowing (so thicker foods can be managed).
- The digestive system has matured allowing digestion of starches.
- Interest in their environment increases. The infant may be showing interest in those eating around them, and may reach out for food. This facilitates the acceptance of new textures and flavours – and this is advantageous for offering a variety of foods

In the absence of definitive research on the optimal timing of solids introduction for pre-term infants, the timing will vary from one baby to another. Generally, however, families with pre-term infants are encouraged to introduce solids at around 6 months actual age depending on individual developmental progress and signs of readiness. Where possible, this should be guided by the overseeing paediatrician.

Problems with incorrect timing

Nurses should emphasise that the exact timing depends on signs of readiness in the individual child.

Timing the introduction of solids correctly is extremely important, and problems may arise if solids are introduced too early or too late.⁴ Foods provide a variety of stimulation to infants and many important milestones are reached through meal times and eating. Solids should not be offered to infants before the age of 4 months.

Research suggests that infants adjust more quickly to solids introduced at around 6 months, and that the younger the infant was at the time solid foods were introduced, the longer it took to establish the new pattern.^{4, 31, 32}

Parents/caregivers may feel their child is somewhat advanced and state their intention to introduce solids prior to the recommended time. Nurses are well placed to discuss with parents/caregivers, the issues which may be associated with early introduction of solids described below:

Too early⁴

The following problems may arise if solids are introduced too early:

- Reduced maternal milk production as a result of the infant spending less time at the breast. Extreme cases may result in under-nutrition
- Possible development of food allergies and coeliac disease if gluten is introduced before 4 months of age
- Rejection of the spoon if the tongue-extrusion reflex is still strong. Early introduction of solids does not result in earlier loss of this reflex

- Exposure to pathogens in foods, increasing the risk of diarrhoeal diseases and other problems in the infant
- Increased risk of obesity.³³

Too late⁴

The following problems may arise if solids are introduced too late:

- Micronutrient deficiencies (e.g. iron, zinc) can develop as breastmilk alone can no longer meet dietary requirements
- Developmental delay of motor skills, such as, chewing and impairment of important developmental milestones such as, gross and fine motor skills and oral motor skills
- An unwillingness to accept new tastes and textures; fussy eating and/or feeding difficulties
- Impaired growth, as breastmilk alone is insufficient to meet energy (kilojoules) and nutrient needs after 6 months
- Compromised immune protection
- Increased risk of food allergies.⁴

What foods should be introduced?

There is no universal model of feeding infants aged 6 months. Exposing the infant to a variety of foods is required for good nutrition and to help the infant to accept a range of smells, sights, textures and flavours.

First foods

The introduction of solid foods at around 6 months should start with foods high in iron⁴, including iron-enriched infant cereals, pureed meat, poultry and fish (all sources of haem iron), or cooked egg, tofu and legumes. Vegetables, fruits, and dairy products such as full-fat yoghurt, cheese and custard can then be added. Other than recommending the use of iron-rich first foods, there are no recommendations on the order in which foods should be introduced or the number of new foods that can be introduced at one time.

Slow introduction of solid foods is not necessary.⁴

Nutrient content is the most important factor when including adequate amounts of iron and zinc, fat, protein, vitamins and other essential minerals. Introduced foods should be of high nutrient density and include a variety of foods from each of the five food groups. Fruit and vegetable purees should be varied even at this early stage.⁴

Common allergenic foods including peanut, egg, tree nuts, cow's milk and wheat should be introduced in the first year of life. Refer to 'Food allergies and intolerance' section.

Feeding in the first 12 months

An increasing variety and quantity of foods should be offered as the infant moves towards 12 months of age to ensure adequate energy and nutrient supply. The variety offered may assist enjoyment of a broader range of foods in later life.³⁴

- Food offered should be an appropriate texture and consistency for the infant's developmental stage.
- Offer a wide variety of foods.
- From 6 months, offer water in a cup.

- By 8 months most infants can manage soft 'finger foods'. Generally, solids are offered before a milk feed from around this time.
- By 12 months, infants can have nutritious choices from the foods eaten by the rest of the family, and should be consuming a wide variety of foods.

Food may be spat out at first when learning to eat new textures and tastes.

- Children are all individuals and learn to eat at different rates. Not all same-aged infants eat the same amount of food.
- Infants eating a balanced and varied diet do not usually require nutritional supplements; however, those with diagnosed deficiencies are an exception.

Feeding bottles should be used only for breastmilk or infant formula. 'Comfort sucking' on a bottle can become a habit that is hard to reverse. Feeding cups or lidded cups are preferred for water from six months of age.^{35, 36}

Refer to Appendix C: Food Safety, for information on safe preparation and storage of food.

Developmental feeding skills

Learning to eat is a skill that requires practice. Infants may spit out and gag on solids when they are first introduced, but they will soon learn to swallow. Patience and persistence may be required. Foods that are refused need to be re-offered many times to allow the infant to familiarise themselves with the taste and texture.³⁶ The gradual introduction of solid foods allows an infant to become used to different foods, textures and modes of feeding.

The texture of foods should be suitable to the infant's stage of development, progressing from pureed to lumpy to family food during the 6-12 month period.⁴ Increasing and varying food texture is essential also for oral motor development.⁴ Eating requires coordination and muscle strength. It involves movement of mouth, lips, tongue, cheeks and jaw. Up-down, munching/ chewing, side to side tongue movements and rotary jaw movements are skills that develop over time with experience.

Infants should progress quickly from purees. An infant will learn to manage foods of different textures and will accept food that is mashed with a fork or minced. Encouraging the infant to chew is important. Infants not given 'lumpy' textured food until after 10 months have greater feeding difficulties at 15 months than those introduced to lumpy food between 6 and 9 months of age.⁴

Bottles, dummies and feeding children from food pouches, tend to encourage the sucking action, and may not give a child enough practice to develop other feeding skills.

Some infants may have a very sensitive gag reflex which is a normal reaction in response to new textures and tastes. This is a safety mechanism to prevent them choking on foods which they are not yet skilled to eat. Infants need to learn to control this reflex and may gag quite a bit as they learn to eat solid foods. They may also gag if they are full, don't like the food given, or if the breastmilk or formula is flowing too quickly.²⁴ Parents/caregivers may panic and mistake gagging for choking. The easiest way to tell the difference between the two is that gagging is noisy (with lots of coughing and spluttering), and choking is silent as the child is unable to cough, cry or speak.

Some parents/caregivers are anxious about progressing through the textures due to fear of their child choking. They should be reassured that gagging is common and is different to choking and that this is how the infant learns to protect their airway. The parent/caregiver can help a child feel safe while they are gagging by remaining calm and encouraging the child to have a cough and then safely swallow. Some infants with a very sensitive gag

reflex may progress directly from pureed food to bite and dissolve/bite and collapse food, and not manage lumps.

If the parent/caregiver panics, this can cause the child to panic and the next time the child is presented with the same food, they associate it with a panic feeling and immediately refuse the food.

Refer families to the *Baby's first foods* pamphlet and *Raising Children Network* website for more information.

Refer to Appendix D: Developmental stage and feeding guide.

Choking prevention

Hard, small and round, smooth and sticky solid foods are not recommended for infants and young children as they can cause choking and aspiration. Foods that are not suitable include whole nuts and seeds; popcorn and corn chips; chunks of hard fruits and vegetables; sausages with skin on; whole grapes; cherry tomatoes; hard lollies.⁴

Anticipatory guidance to parents/caregivers to keep infants safe from choking should include the following points:

- supervise meal and snack times
- have them seated when eating
- never force them to eat
- remove small bones and gristle from meat, fish or poultry
- start with soft, mashed textures at around 6 months of age and progress to chopped and finger foods as the child's eating skills develop (around 8- 9 months). Cook and mash hard fruits and vegetables initially, e.g. peas, beans, carrots and apple, then reduce cooking time or extent of mash as eating skills progress. For example, offering thinly sliced apple to practise biting skills is appropriate for an average 8-9 month old.
- cut grapes lengthways, and cherry tomatoes in half, and check they are well chewed.

Parents/caregivers should be encouraged to learn emergency first aid to manage choking. Refer families to *Baby's first foods* pamphlet for more information on introducing solid foods.

Commercial baby foods

Commercial baby foods can provide a convenient option for travelling or emergency situations. However, these products are not suitable for frequent use as they are generally a uniform texture. It is important that infants are introduced to coarser textures and individual flavours of foods. Homemade food offers more variety, taste and texture, and is usually cheaper than commercial baby foods.

Food pouches encourage continued sucking rather than muscle development required for chewing. They also remove the sight and smell of the food, limiting the sensory experience of eating. If pouches are used, parent should be advised to place the food on a spoon and feed it to the infant that way, rather than allowing the child to suck from the pouch.

Parents/caregivers should be encouraged to read information on the packaging, including the ingredients list and nutrition information panel and check expiry dates.

Feeding practices

Research supports a link between parenting and dietary practices.³⁷ Sensitive, responsive parenting can provide a foundation for positive feeding practices, and non-aversive, reinforcing parent-child interactions have been shown to positively predict a child's diet quality later in life.³⁷ Infants who have a stable and secure relationship with their carer can freely explore new foods in a safe, supportive environment.

Mealtimes are an opportunity for parents/caregivers to engage with their babies, supervise their children eating and role model the enjoyment of food. Mealtimes can be a time for connection, eye-contact and conversation. The use of television and other screens during mealtimes should be discouraged. Pleasurable, emotionally safe exposure to foods over time can help shape the child's mealtime preferences towards nutritious foods. Parental modelling of eating is crucial for feeding development, mealtime behaviour and food acceptance in children.

When solid food is introduced, a child tends to breastfeed less often and their intake of breastmilk decreases, therefore the food displaces breastmilk.³ Offering a variety of foods from the five food groups will ensure their energy needs are met and growth should be as expected.

Tuning in to sensory preferences³⁸

Just as adults do, infants learn by using all of their senses – sight, sound, smell, taste and touch. Both adults and children have sensory preferences, i.e. sometimes 'more' or 'less' of something is preferred. As parents/caregivers begin to understand the sensory preferences of their infants, they can be mindful of how these shape the way they feel and behave. Be aware of the infant's reaction to the eating environment and the temperature, taste and texture of new foods. Feeding engages all the senses and infants have varied sensitivities and tolerances to different sensations.

When sensory experiences at mealtimes are 'just right', a child *"will feel safe which can bring pleasure and will begin to positively shape a child's mealtime behaviours."*³⁸

Division of Responsibility³⁹

The incidence of significant childhood eating problems is estimated at 25–30% (and higher if the unreported cases are included).⁴⁰ The Division of Responsibility is an evidence-based philosophy of feeding based on the work of Dr Ellyn Satter, which aims to help children eat well. It is based on a child's innate ability to eat as much nutritious food as they need to, and learn to eat from their parent/caregivers. It allows a child's food intake to be guided by their appetite.

Essentially, parents/caregivers decide 'what' food will be offered and the child decides if they will eat and 'how much' they will eat, according to their appetite. A parent/caregiver should respect this and never force or bribe a child to eat.

Forcing a child to eat a food is likely to limit their acceptance of the food. Bribing a child to eat may induce a power struggle about whether the child will eat or not; however, the power struggle is removed when the division of responsibility is in place.⁴⁰ When parents/caregivers encourage a child to eat past their internal satiety cues, they risk disrupting the child's innate self-regulation of food intake. This can lead to overweight and obesity.

*Division of Responsibility is not suitable for particularly sensitive children with very limited preferences who are highly anxious at meal times. These children should be referred to a relevant health professional or multidisciplinary team.

Baby-led feeding

Responsive parenting underpins 'baby-led feeding' where the parent/caregiver offers the baby a range of foods and encourages the baby to choose foods they are interested in eating. The parent/caregiver is responsive to the baby's cues for hunger and signs of readiness to progress through the textures, and offers foods and textures according to their individual baby's capabilities. This encourages self-feeding and can be done in conjunction with spoon feeding.

On the other hand, *Baby-led Weaning (BLW)* is a specific method of introducing solids (documented by Gill Rapley). Information about BLW has been summarised below from the Department of Health and Human Services, Community Nutrition Unit, Tasmania.⁴¹

The concept of BLW is based around the infant managing his/her own introduction to solids in his/her own time by self-feeding and exploration of usual family foods (rather than the conventional method of starting with pureed foods and progressing through lumps and finger foods to family meals by the age of 12 months). BLW's key messages are:

- For infants between six and 12 months of age, food is to be emphasised as an opportunity for play and exploration rather than eating.
- There is no need to expect the baby to eat consistently; they will when they are ready.
- The interpretation of 'ensuring good nutrition' is to emphasise that a wide range of food is offered (not necessarily eaten) and to avoid 'fast foods', commercially prepared baby products and foods with added sugar and salt.

Whichever method of introducing solids the parent/caregiver chooses, key considerations include:

- Nurses should avoid using the term 'weaning', as it may be misinterpreted by parents/caregivers and unintentionally lead to the cessation of the breastfeeding relationship.
- Safety should remain paramount. Choking hazards (e.g. raw carrot, chunks of apple) should never be offered to an infant and they should never be left alone while eating.
- Specific nutrients are needed from six months to complement breast or formula feeding. Therefore, some foods provided, such as foods high in iron, need to be ingested and not just used for exploration or for play.
- Some infants need more time than others to explore the food before they are willing to put it into their mouths; anything from a few minutes to multiple exposures over a few months.
- The transition through food textures needs to be flexible to suit the development of the child.
- A combination of baby led feeding and spoon feeding can be used.

Nurses are well placed to discuss methods of introducing solid foods in a safe and appropriate way with parents/caregivers, so the nutritional and developmental needs of the child are met.

Unsuitable food and beverages

A number of foods are hazardous to an infant or need to be offered with care. Infants and children are highly susceptible to food borne illness as their developing immune systems are unable to fight infection as effectively as adults. Attention to hygiene is very important when preparing foods for infants and children.⁴ Detailed information on this can be found in Appendix I. In addition, parents/caregivers can be referred to the *Raising Children Network* website for more information on 'food poisoning'.

The following foods should *not* be offered to infants and young children⁴

- **Honey** can contain the spores of *Clostridium botulinum*. The bacterium can produce toxins in an infant's intestines resulting in serious illness known as infantile botulism. Honey and foods containing honey are not recommended for children under 12 months of age.
- **Raw or partially cooked eggs and egg products** can cause salmonella poisoning. All eggs and egg products offered to infants should be well cooked.
- **Raw or undercooked meat**, particularly minced meat, poultry, fish and shellfish.
- **Unpasteurised milk and products made from unpasteurised milk** such as raw milk cheese.

Other foods that are **not suitable for infants**⁴, or that should be used with care, include the following:

- **Tea** contains tannins and other compounds that bind minerals (e.g. iron) and impair the body's ability to absorb them. In addition, sugar is often added to tea, which increases the risk of dental caries. Excessive tea intake may also displace intake of other nutrient-dense foods in the diet.
- **Nuts** are not suitable for small children because of the risk of aspiration and choking. Smooth peanut paste is acceptable and should be treated as any other food, and can be introduced at around 6 months of age.
- **Coffee, cola drinks, soft drinks, cordials, energy drinks** have low nutrient density, are high in sugar, cause tooth decay and can displace other nutritious foods in the diet. Caffeine is not suitable for children.
- **Reduced fat milks** are **not recommended for children under the age of two years**. (This includes nut and cereal-based milks which are extremely low in fat and protein). Infants and young children are in a period of rapid growth, and milk is a major energy source during this time. When children reach two years of age, reduced-fat dairy products are suitable. Full fat (4%) milk should be offered between 12–24 months.
- **Fruit juices** made from freshly squeezed fruit contain the same nutrients present in the whole fruit, but no dietary fibre. Fruit juice offers no nutritional benefits to infants. Consumption of juice may displace and reduce an infant's nutrient intake from breastmilk. Whole fruit is recommended after six months rather than juice. Avoid packaged fruit juice. Fruit juice should not be given under 12 months.

Excessive juice consumption by young children has been linked with:

- gastrointestinal symptoms, including loose stools
- failure to gain weight
- decreased appetite
- obesity
- increased risk of dental caries.⁴

Children should be encouraged to eat fresh fruit to meet their recommended daily fruit intake, and drink water as the main drink.

Nutrition related matters

Healthy bowels

Parents/caregivers should be reassured there is a wide variation in colour, frequency and consistency of normal bowel movements in babies, over the first 12 months. The number of bowel motions of breastfed infants will decrease between 6 weeks and 3 months and it is common for an infant to go several days between stools.

Constipation refers to the *consistency* of stools being hard and dry rather than the frequency of bowel motions. Constipation is rare in infants who are exclusively breastfed even though they may appear uncomfortable or 'straining' before passing stools. This is normal and does not indicate constipation.

No food or drinks other than breastmilk or infant formula should be given to infants until around 6 months of age. After this time, small amounts of prune juice may be offered to soften stools. Adequate fluids (breastmilk or cooled, boiled tap water) should be offered. If hard stools persist, referral to a medical practitioner should be considered.

Regular monitoring of the infant's progress is important for all infants. Constipation may occur when formula is introduced. While formula-fed infants tend to pass firmer and fewer stools than breastfed infants, hard, dry stools may indicate incorrect preparation of formula. If diarrhoea occurs, it may be necessary to briefly interrupt formula feeding for rehydration.⁴ If the concern is out of scope for the nurse, the client should be referred to a medical practitioner.

Dental health

Dental decay occurs when plaque, an almost invisible film of bacteria that forms on teeth, uses available sugars to produce acids that attack teeth. When the acid attack occurs often, teeth can decay over time. Other factors that can cause decay include poor oral hygiene, dental care, non-fluoridated water supplies and the type of food eaten. The more often foods and drinks containing added sugars are consumed, the greater the risk of caries, since frequent consumption does not allow remineralisation of the teeth. The duration of exposure depends on how long sugary foods stay in the mouth and the number of eating occasions.⁸

Oral health care should begin even before the teeth start to erupt. From birth to 18 months, Dental Health Services recommend that:

- A baby's gums can be wiped with a clean, damp cloth or finger brush after each feed.
- When a few teeth are present, the cloth should be replaced by a toothbrush with a small head and soft bristles.⁴² Cleaning should be done at least once a day with plain water only, following the last feed.⁴³
- No toothpaste should be used for children under 18 months of age.⁴²
- A toddler's first visit to the dentist should take place early, ideally before their second birthday.

Refer parents/caregivers to *Give your child's teeth a healthy start* pamphlet for more information.

Vegetarian diets

An infant's nutritional needs for growth and development *may* be met by a *well-planned* vegetarian diet. It is important to note that vegetarian diets do not provide sufficient iron or zinc to meet the needs of an infant or young child aged 6-12 months without the use of iron-fortified cereals, milks or other foods.^{4, 32, 44}

- Care needs to be taken with a plant-based diet to ensure that supplies of iron, vitamin B₁₂ and zinc are adequate. This is an important issue because iron is critical for neurocognitive development.
- Mothers on a vegan diet should breastfeed their infants for as long as possible; for 2 years or more is desirable. Infants being fed a vegan diet who are not breastfed or are partially breastfed, need a commercial soy-based infant formula during the first 2 years of life.
- After dietary assessment, an infant on a vegan diet may require nutritional supplementation, especially iron and vitamin B₁₂ (vitamin B₁₂ is only found in animal-based foods).⁴

Guidelines for the introduction of solid foods are the same for vegetarian and non-vegetarian infants. Infants 6 months and older should receive iron from solid foods high in iron, such as, iron-fortified infant cereal, legumes, nuts, tofu, wholemeal pasta, grains, eggs and brown rice. Children eating a vegetarian diet should consume protein-rich foods such as tofu (soy bean curd), cottage cheese, soy yoghurt, cooked eggs and pureed legumes (e.g. beans, split peas, chickpeas, lentils). It is important to include a vitamin C-rich food as part of every meal to increase iron absorption from plant based foods.

At around 8 months, soft finger foods such as cubed tofu, cheese or soy cheese and bite size pieces of soy burgers can be offered. Commercial full-fat, fortified soy milk or pasteurised cow's milk can be used as a primary beverage starting at 1 year or older for a child who is growing normally and eating a wide variety of foods. Foods that are rich in energy and nutrients, such as legume spreads, nut and seed pastes (peanut, hummus, and tahini), tofu and mashed avocado should be used when the infant is starting solids. Dietary fat should *not* be restricted in children younger than 2 years.⁴

Advice from an accredited practicing dietitian (or medical practitioner where dietetic advice is not available) is required for infants following a vegan or restricted diet.

Food allergy and intolerance

Food allergy is an abnormal immune-mediated reaction to ingested food, resulting in clinical symptoms.

Food intolerance can result in similar clinical reactions to food allergy, but the reaction is not mediated by the immune system. These reactions can be caused by a lack of enzymes (e.g. lactose intolerance), presence of food chemicals (e.g. caffeine), or presence of toxins in foods. The prevalence of food intolerance in children is unknown.

The incidence of food allergy in infants in Australia is 10% and in children under 5 years of age is around 4 to 8%.⁴⁵ While any food can cause an allergic reaction, around 90% of food allergic reactions are caused by nine allergens, these being egg, milk, peanut, tree nuts, sesame, fish, crustaceans, wheat and soy.⁴⁶

Around 85% of children with allergy to cow's milk, egg, soy and wheat will outgrow their allergy sometime in childhood. Allergies to peanut, tree nuts, sesame, fish and shellfish tend to persist into adulthood.⁴⁵

Below is a summary of the recommendations from the Australasian Society of Clinical Immunology and Allergy (ASCIA) *Infant Feeding and allergy prevention guidelines* reviewed in 2016.^{1, 26} The change from previous ASCIA guidelines is based on emerging studies suggesting that avoiding allergenic foods does not appear to reduce allergies, and may even be associated with an increased risk. *Note that research is ongoing in this area.*

Infant feeding:

- Breastfeed for at least 6 months and for as long as the mother and infant wish to continue.
- Exclusion of allergenic foods from the maternal diet during breastfeeding or pregnancy has not been shown to prevent allergies.
- Introduce common allergy causing foods including peanut, egg, tree nuts, wheat, fish and cow's milk before an infant is one year of age. This can greatly reduce the risk of them developing an allergy to that food. Begin with a small amount and gradually increase the quantity each time the food is offered.
- ASCIA recommends that once allergenic food are introduced and accepted, they should continue to be given the food regularly (about twice a week), as part of a varied diet.⁴⁵
- There is good evidence that introducing peanut in the first year of life in infants who already have severe eczema or egg allergy can significantly reduce the risk of developing peanut allergy by around 80%.^{47, 48}
- Breastfeeding whilst introducing solids may help to reduce the risk of the infant developing allergies.⁴⁵
- Infants are unlikely to develop a new allergy to any milk that is already tolerated, if it is given regularly.

Symptoms of adverse food reactions

Parents/caregivers should be aware of the symptoms of food allergy classed as mild to moderate, or as anaphylaxis, which is severe and requires immediate treatment with adrenaline and emergency medical aid.

Mild to Moderate symptoms include:

- swelling of lips, face, eyes
- hives or welts
- tingling mouth
- abdominal pain, vomiting
- eczema or rashes.⁴⁵

Anaphylaxis is defined by any one of the following, which may occur in isolation or in conjunction with the mild to moderate symptoms listed above:

- difficult/noisy breathing
- swelling of tongue
- swelling/tightness in throat
- difficulty talking and/or hoarse voice
- wheeze or persistent cough

- persistent dizziness or collapse
- pallor and floppiness in young children.⁴⁵

Note: Minor redness around the mouth from citrus, berries and tomatoes is common and is usually due to contact irritation not food allergy.²⁶

Refer to Appendix E: Infants at high risk of allergy.

Diagnosis

If an infant or child has symptoms suggestive of an adverse food reaction, the child should be referred to a specialist paediatric clinical immunology/allergy specialist for diagnosis. If there are signs of anaphylaxis, parents/carers should seek urgent medical attention and call an ambulance.

Diagnosis of a food allergy or intolerance is difficult and should be supervised by a medical practitioner and dietitian as an elimination diet may be required. Highly restrictive diets can adversely affect nutritional status and affect feeding development, so it is important for immunologists to assess if a true food allergy or other underlying medical conditions could be responsible for symptoms in the infant or child. Poor growth and poor nutritional status in children on long term exclusion diets have been documented.⁴⁵ Feeding disorders in children with a food allergy are common.⁴⁵

Management of diagnosed food allergy

Food allergies are managed by complete avoidance of single or multiple food allergens that cause reactions. A child with symptoms suggestive of an adverse food reaction needs appropriate health professional care and follow up, such as a paediatric allergist or immunologist, paediatrician and dietitian, to provide individualised advice and support regarding:

- diagnosis and appropriate follow up of their condition⁴⁵
- emergency action plans, including being trained in the use of an adrenaline autoinjector
- environmental controls
- allergen avoidance education and risk management
- ensuring the child's diet is nutritionally adequate for growth and developmental needs, and
- monitoring/optimising treatment of asthma and eczema.⁴⁹

Food intolerance

Food intolerance and food allergy are commonly confused because food intolerance can result in similar symptoms to food allergy but the reaction is not mediated by the immune system.⁴⁵

Most food intolerances are:

- Metabolic – such as lactose and other carbohydrate intolerance which is the result of an enzyme deficiency and can cause bloating and diarrhoea.
- Pharmacological – reactions to components in food such as caffeine, monosodium glutamate (MSG) and, uncommonly, naturally occurring food chemicals such as salicylates and amines. Diets restricting these substances are not well substantiated in the literature and should be used with caution in children.⁵⁰

- Toxic - such as scombroid fish toxin.
- Ideopathic/undefined - such as reactions to sulphite preservative.

The exception to this is coeliac disease, which is an immune mediated intolerance to the dietary protein gluten.⁴⁵ This is one of the most common autoimmune illnesses in Australia with 1.5% of Australians having coeliac disease. However, the broad range of symptoms and often subtle presentation makes detection challenging, and means 80% of Australians with coeliac disease remain undetected.⁵¹

There are no reliable skin or blood tests to diagnose food intolerance (apart from coeliac disease). It is therefore imperative that diagnosis of food allergy and risk of anaphylaxis is medically confirmed for an infant or young child before proceeding to investigate whether symptoms are due to food intolerance.

Documentation

Document advice, information provided and actions, according to local processes.

Recording Infant feeding data

Nurses will record infant feeding status according to local processes. Measuring feeding practices allows for service planning and contributes to national data collection efforts.

Referrals

In addition to the GP, support from other relevant supplementary services may be considered. Availability of support services vary across the state.

Recommendations for supplementary support and actions taken should be clearly documented in progress notes.

Dietetic services:

- Public - some local health services (hospitals or community health centres) provide dietetic services for children.
- Private – see the [Dietitians Association of Australia](#) website to locate private dietetic services.
- Child Development Services (CDS) – Children with developmental mealtime difficulties persisting after universal services (e.g. child health) and/or attempting common management strategies may be eligible for CDS. Please note that the CDS does not provide medical investigation/services for feeding difficulties.

Related internal policies, procedures and guidelines
The following documents can be accessed in the Community Health Manual via the HealthPoint link or the Internet link
Anaemia in childhood
Breastfeeding deviations from normal
Breastfeeding protection, promotion and support
Groups for parents
Growth – birth to 18 years
Growth faltering
Nutrition in children 1 – 11 years
Oral health examination
Overweight and obesity

Related internal resources and forms
The following resources and forms can be accessed from the HealthPoint CACH Intranet link
Baby's first foods pamphlet
Breastfeeding – expressing and storing breastmilk
Child Development booklets
Give your child's teeth a healthy start
A Solid Start – parenting group materials (facilitator guide, presentation and handouts)

Useful external resources
Resources for professionals
Australasian Society of Clinical Immunology and Allergy For health professional e-training; Health professional information papers; position statements; Dietary avoidance information for consumers
ASCIA Guidelines – Infant feeding and allergy prevention (2016) – information for health professionals
Division of Responsibility in Feeding - summary sheet for health professionals

Food Standards Australia and New Zealand (FSANZ) - Food Standard 2.9.1 - Infant Formula Products
Infant Feeding Guidelines (NHMRC) – Information for health workers and summary booklet
KEMH Obstetric Medicines Information Service - (08) 6458 2723
Multicultural Health Communication Services (NSW Government) – a library of translated health fact sheets, by topic.
New South Wales Department of Health - Guidelines for the Management of Substance Use During Pregnancy, Birth and the Postnatal Period (2014)
Resources for families
Allergy & Anaphylaxis Australia - – a national patient support group
Australian Breastfeeding Association – helpline, support and resources
Alcohol and breastfeeding: a guide for mothers
Baby's First Foods Child and Adolescent Community Health (CACH)
Better Health Channel – Victoria Department of Health website. Information on various health topics, including calcium and iron.
Breastfeeding and breast care booklet - Women and Newborn Health Service
Drinking from a cup – Dental Health Service flyer for parents advising how to introduce a cup
Feed Safe App – alcohol consumption and breastfeeding (available for download onto smart phones)
Formula feeding pamphlet – Women's and Newborn's Health Service
Healthy WA – resources and information on a variety of topics
Introducing peanut to high risk infants – handout for parents with children who are at high risk of food allergy.
Introducing Solids to Premature Babies - Royal Women's Hospital
Nip Allergies in the Bub – Information and guidance for parents regarding introducing solid foods to babies at high risk of food allergy.
Raising Children Network website – a non-profit organisation providing infant feeding articles, parenting in pictures and recipes

Appendix A: Nutritional composition of mature human milk⁹

Component	Functions
Fat	<ul style="list-style-type: none"> • Large variety of fatty acids serve as the largest energy source in breastmilk • Often higher in the hind milk compared to foremilk • The types of fatty acids in human milk vary according to maternal diet
Protein	<ul style="list-style-type: none"> • Protein is broken down into amino acids during digestion. Breastmilk contains a large variety of amino acids allowing for a variety of functions • Protein levels generally decrease over the first 4-6 weeks
Carbohydrates	<ul style="list-style-type: none"> • Carbohydrates are broken down into glucose when digested to meet energy needs of the infant • The main carbohydrate in human milk is lactose, which is the main energy source for the infant's brain • Oligosaccharides 'feed' the microbiota
Vitamins (A, B, D)	<ul style="list-style-type: none"> • Quantity varies according to maternal diet (and sun exposure)
Minerals	<ul style="list-style-type: none"> • Iodine is a vital component of thyroid hormones and varies according to maternal diet • The concentration of most other minerals are largely unaffected by maternal diet
Bioactive compounds	<ul style="list-style-type: none"> • Develop the gastrointestinal tract • Develop microbiota • Serve an immune function
Growth factors	<ul style="list-style-type: none"> • Stimulate cell proliferation and tissue repair • Neuron growth and maturation • Growth of the intestinal lining • Assist in repairing the damage of necrotizing enterocolitis
Pre-biotics	<ul style="list-style-type: none"> • Oligosaccharides stimulate beneficial bacterial growth which reduce colonisation of pathogens
Immunological compounds	<ul style="list-style-type: none"> • Anti-microbial (antibodies protect against bacterial, viral and fungal infection and are highest in colostrum) • Anti-inflammatory properties (protect against inflammation) • Respond to allergens • Macrophages protect against pathogens
Metabolic hormones	<ul style="list-style-type: none"> • Regulate energy intake/appetite by modifying infant metabolism • Increase red blood cells and prevent anaemia

Appendix B: Interpretation and implementation of the WHO Code in Australia⁴

Section 8.2 of the *Infant Feeding Guidelines: Information for Health Workers* (IFG) is devoted to the implementation of the WHO Code for health workers in Australia. The following is a summary of the main points covered by the MAIF Agreement and the IFG:

- The restrictions in the WHO Code apply to infant formula and other products marketed or represented as breastmilk substitutes and to feeding bottles and teats. Responsibilities are outlined for companies that manufacture, market or distribute these products, as well as for health professionals and the health care system.
- Educational materials produced by companies for parents must be unbiased and consistent; include all the facts, describe all the hazards, and avoid reference to a specific product. Distribution of materials must be only through the health care system, not through retail outlets.
- Infant formula companies are not permitted to promote their products to the general public, either directly or through retail outlets. Companies may not give samples or gifts to parents. Health professionals may not give samples to parents.
- Health professionals should consider the message about infant feeding that their actions and their health care facility gives to mothers. There must be no display or distribution of products or of company materials that refer to a product or encourage artificial feeding.
- Marketing personnel - even if they are health professionals - must have no contact with parents and not perform any educational or health care functions.
- Companies may provide scientific and factual information about their products directly to health professionals through meetings or materials.
- Companies may not offer, and health professionals may not accept, gifts or other inducements that might influence a health professional's product recommendations to parents or their health care facility. Study grants may be accepted in some circumstances, but they must be disclosed.
- All products within the scope of the WHO Code must conform to standards for quality, composition and labelling.
- Independently of measures taken to implement the WHO Code, companies and health professionals must take steps to conform to the principles and aim of the WHO Code and to monitor their own practices.

In Australia, concerns about or breaches of the MAIF Agreement must be reported to the Department of Health in Canberra. Complaints should be submitted to the Department of Health on the [Complaint Form](#). The link below provides more information on the complaint process. [Information for Lodging Complaints](#).

MDP 802, GPO Box 9848, Canberra ACT 2601, Phone: (02) 6289 7358

Appendix C: Food safety

Food safety is especially important for storing and preparing foods for infants and children due to their increased susceptibility to food borne illness. Utensils and high chairs should be thoroughly cleaned before feeding times. Parents/caregivers should be advised to avoid inappropriate feeding practices such as sharing spoons and other utensils, or tasting infant's food with shared utensils.⁵²

Food storage messages for parents/caregivers

Foods need to be stored properly to retain nutrient value, freshness, aroma, texture and to keep them safe.

- Attention to food hygiene is very important when preparing and storing foods for infants and children to reduce the risk of infection.³
- Try adapting family meals rather than preparing separate meals, i.e. puree meats and vegetables.⁴
- Meals can be prepared in bulk, i.e. freeze casseroles in small containers for convenience.
- Always read the food label for storage instructions.
- Storage areas should be clean. Foods should be stored away from harmful substances.
- Milk and infant formula should be stored on shelving at the back of the fridge. Storage in the fridge door may not provide a consistent low temperature.
- Raw foods should be stored away from ready-to-eat foods to avoid cross contamination.
- In the fridge, cooked foods should be covered and stored on a shelf above uncooked foods.
- Leftovers should be used the next day at the latest, or stored in the freezer.
- Canned foods and foods sealed in glass jars should be stored in a cool place.
- When opening vacuum-sealed jars, listen for a popping sound, which shows that the jar's seal was intact. This is very important with baby food. If there is no 'pop', the food should not be used.⁴
- If only serving a small quantity of food, transfer the required amount to a separate container to feed, and store leftovers in the fridge.

Food preparation

Food preparation and hygiene is very important when preparing infant foods. The main causes of food borne illnesses in Australia are:

- inadequate cooking
- improper holding temperatures
- contaminated equipment
- unsafe food sources
- poor personal hygiene.⁴

The following steps should be followed to ensure safe food preparation:

- Before preparing food, thoroughly wash hands under running water and dry using a clean towel or paper towel.
- Use a different chopping board and utensils when preparing foods to be eaten raw and foods for cooking.
- Always use different utensils for raw meat and vegetables.
- Do not place cooked food on plates that have held raw meat, poultry or seafood.
- Foods should be thawed in the refrigerator or under cold water or in the microwave oven using the defrost setting.
- Fruits and vegetables should be washed thoroughly under running water before peeling and cutting.
- Rolled and/or stuffed meats, poultry, pork, sausages and mince should always be cooked all the way through until the juices run clear when the meat is pierced.
- When using a microwave to cook, rotate and stir the food so that it cooks evenly.
- When reheating food, heat it until it is steaming hot. When heating pre-prepared frozen or refrigerated dinners, follow the instructions.
- All work surfaces, crockery, cutlery, cooking utensils and other equipment should be thoroughly cleaned to remove any food or other residue.



Appendix D: Developmental stage and feeding guide^{3, 4, 32, 35, 53}

(Note: This is only a guide. Each child is different so foods introduced at each stage may vary in type, texture and amount tolerated. The table shows the types of foods that can be consumed and swallowed successfully; it does not necessarily show when they should be offered. Refer to a child health nurse, dietitian or doctor for more information.)

Age (months)	Developmental reflexes and skills	Tolerated food textures	Amount	Examples of suitable food	How
0 – 6	Suckling, sucking and swallowing.	Liquids.	As desired.	<ul style="list-style-type: none"> Breastmilk or infant formula only. No other liquids are needed up to 6 months. 	Breastfeed on demand according to infant's hunger. If infant given formula, follow instructions on packaging.
Around 6 months: first foods	<p>Starting to chew and bite.</p> <p>Increased strength of suck.</p> <p>Gag reflex moved from mid to posterior third of tongue.</p> <p>Wanting to put things in mouth.</p> <p>Interested in food eaten by others.</p> <p>More frequent feeding.</p> <p>Sits unsupported, with good head and neck control.</p>	<p>Start with thick porridge/ well mashed foods.</p> <p>Move from pureed to lumpy to normal textures during the 6-12 month period.</p>	<p>Breastmilk or formula remains the predominant source of nutrients (<i>Breastmilk can provide one half or more of a child's energy needs</i>).</p> <p>Start with 2-3 teaspoons of each food once per day and gradually increase amount to appetite.</p> <p>From 6-8 months the infant may have 2-3 small meals per day. Increase the amount at each meal (1/2 a cup as a guide).</p> <p>Consider solid foods and other liquids as small 'tastes' for the infant.</p> <p>When first introducing solids, offer food when the baby is relaxed, happy and interested.</p> <p>Introduce foods early in the day to monitor response to the new foods.</p>	<p>Foods can be introduced in any order, provided iron-rich nutritious foods are started first. Mix each of the following examples with a little breastmilk, formula or cooled, boiled water to the smooth consistency:</p> <ul style="list-style-type: none"> Cereal eg. Iron-fortified rice cereal. Iron rich foods such as meat, liver, chicken, fish, eggs, legumes, lentils and dark green leafy vegetables. <p>Liquids</p> <ul style="list-style-type: none"> Encourage water as the preferred drink. Boil and cool tap water given to an infant. Lidded sip cups should be used for fluids other than breastmilk. Cow's milk as a drink is NOT recommended for infants until 12 months of age. Ensure other liquids do not displace breastmilk or formula feeds. 	<p>There is no particular order that foods should be introduced, but iron-rich foods should be introduced first to prevent anaemia.</p> <p>Start with a soft but firm infant-sized plastic teaspoon or finger feed.</p> <p>Gradually increase the texture, quantities, variety and frequency of feeds offered according to the baby's appetite and texture tolerance.</p> <p>Small quantities of food can be frozen in ice cube trays, stored in airtight containers and thawed as needed.</p>

Nutrition for Children - birth to 12 months

Age (months)	Developmental reflexes and skills	Tolerated food textures	Amount	Examples of suitable food	How
6 - 12 months: other nutritious foods to be introduced	<p>Clearing spoon with lips.</p> <p>Biting and chewing (with or without teeth).</p> <p>Lateral movements of tongue and movement of food to teeth.</p> <p>Pincer grip control of fingers to pick up spoon and finger foods. Start to teach self-feeding with finger foods.</p>	<p>Progression from mashed, chopped and finger foods.</p> <p>Interested in an extended range of foods and textures.</p> <p>Note: chewing minced and chopped foods help develop baby's oro-motor skills and mouth strength.</p> <p>Always supervise the child when eating, to prevent choking.</p> <p>Avoid hard foods such as popcorn and lollies.</p>	<p>Continue to increase amount and variety of solid foods according to appetite.</p> <p>As the infant grows, solid foods should provide an increasing proportion of the energy intake and should be offered before breastmilk/formula.</p> <p>From 9-11 months the infant may have 3-4 small meals per day and 1-2 snacks. Increase the amount to about ½ a cup at each meal.</p> <p>Establish meals before introducing nutritious snacks.</p> <p>Total breastmilk/formula intake reduces as solid food intake increases. About 3-4 breastfeeds or 600mL infant formula/day is adequate but can vary between infants.</p>	<p>Nutrient content and food texture are important determinants of foods selected.</p> <p>Solid foods should provide an increasing proportion of the energy intake to meet nutrient needs during this period of rapid growth.</p> <p>Offer:</p> <ul style="list-style-type: none"> ▪ Cooked or raw vegetables (e.g. carrot, potato, tomato), fruit (e.g. apple, banana, melon) ▪ whole egg ▪ cereals (e.g. wheat, oats), bread, pasta, toast fingers and rusks ▪ nut pastes ▪ dairy foods such as full-fat cheese, custards and yoghurt. <p>From about 8 months, offer finger foods such as avocado, pieces of soft pear/apple, cooked baby carrots and cooked pasta noodles to encourage self-feeding.</p> <p>Encourage water as the preferred drink</p> <ul style="list-style-type: none"> ▪ Cow's milk as a drink is not recommended for infants until 12 months of age. <p>Avoid added salt, sugar or honey to any food.</p>	<p>Encourage self-feeding from about 7- 8 months. Reassure parents/caregivers that this could be messy.</p> <p>Family mealtimes encourage social interactions and help the child become used to eating like the rest of the family.</p> <p>Children learn to eat by watching other people.</p> <p>Encourage good role modelling.</p>

Note: Guide only. Each child is different so foods introduced at each stage may vary in type, texture and amount tolerated. The table shows the types of foods that can be consumed and swallowed successfully; it does not necessarily show when they should be offered. Refer to a child health nurse, dietitian or doctor for more information.

Nutrition for Children - birth to 12 months

Age (months)	Developmental reflexes and skills	Tolerated food textures	Amount	Examples of suitable food	How
From 12 months.	Rotary chewing movement. Jaw stability. Assisted self-feeding. Drinking independently.	Full range of food textures. Toddlers enjoy salad textures. Encourage self-feeding and drinking from a cup. Stop bottle feeding.	A guide for babies over 12 months is 3-4 small meals per day and 1-2 snacks. Increase the amount to about $\frac{3}{4}$ - 1 cup at each meal. Allow the child to self-regulate according to appetite. Establish meals before introducing nutritious snacks. Continue breastfeeding as long as desired. Children wean at varied ages and this should be a gradual and gentle process.	Keep offering a variety of nutritious family foods from all food groups. Breastmilk can be continued or replaced with plain pasteurised milk (limit to 500mL/day). (Dairy requirements would be less if still breastfeeding). Encourage water as the preferred drink and limit or avoid sweet drinks such as juice, cordial and soft drinks. Limit salt, sugar and high-fat foods.	Always supervise eating and avoid foods that may cause choking. Avoid low fat diets. Use good oils such as canola, olive and sunflower in cooking.

Note: Guide only. Each child is different so foods introduced at each stage may vary in type, texture and amount tolerated. The table shows the types of foods that can be consumed and swallowed successfully; it does not necessarily show when they should be offered. Refer to a child health nurse, dietitian or doctor for more information.



Appendix E: Infants at high risk of allergy

Risk factors for developing a food allergy

Children have a higher risk of developing food allergy if:

- A parent or sibling has current allergic disease, or a history of allergic disease (this includes food allergy, asthma, eczema, allergic rhinitis).⁵⁴
- The child has moderate to severe atopic dermatitis. The risk is even higher if the infant developed early onset severe eczema (within the first 3 months of life).⁵⁴

When the skin integrity is compromised in children with eczema, the food allergen can enter the body when the allergenic food comes into contact with the disrupted skin barrier and leads to allergic sensitisation (compared with early oral exposure which induces tolerance). This can result in the child developing an allergy to that food.⁵⁵

Other factors that are currently under investigation for their role in the development of food allergy include ethnicity, exposure to cigarette smoke and other environmental factors, the role of dietary nutrients including vitamin D, gut microbiota and the role of probiotics and prebiotics, and omega 3 and omega 6 long chain polyunsaturated fatty acids.

Prevention of food allergy and infant feeding advice for high risk infants²⁶

The development of allergic diseases is complex and not well understood. When providing allergy-related advice to parents/caregivers, consider and discuss the individual child's allergy risk as well as other factors such as breastfeeding practice and milk supply, infant growth and developmental milestones, food safety, perceived allergy risk and parental concerns.

For the general population, the National Health and Medical Research (NHMRC) *Infant Feeding Guidelines*⁴ recommend to introduce solids at around six months, with continued breastfeeding. This is based on ensuring nutritional adequacy and preventing infections.

For *infants at increased risk of allergy*, hydrolysed formula is no longer recommended for allergy prevention. There are no particular allergenic foods that need to be avoided; however, a parent/caregiver may choose to introduce one new food at a time so that the problematic food can be more easily identified. It is important to continue to breastfeed during the period that foods are first introduced, as this may help prevent the development of allergy to those foods. Once a food has been introduced and is tolerated by the child, the food should continue to be included as a regular part of the child's diet (at least twice a week).

Introduction to solid foods for high risk infants

- At around 6 months (but not before 4 months), when the child is ready, start to introduce a variety of solid foods, beginning with iron rich foods.²⁶ Parents/caregivers may choose to give one new food at a time so that reactions can be clearly identified. If a food is tolerated, continue to give this as part of a varied diet.
- Breastfeeding during the period that foods are first introduced may help prevent the development of allergy to those foods.
- There are no particular allergenic foods that need to be avoided (unless the infant is already allergic to that food).²⁶

Parents/caregivers are encouraged to introduce allergenic foods during the day time rather than before bedtime so that any potential reactions can be observed.

Even if all the above measures are followed, there is still a chance that high risk children will develop allergies. If an adverse reaction occurs⁴⁵:

- The suspected food should be avoided until assessed by a medical practitioner; referral to a specialist allergist or immunologist may be necessary.
- Continue to introduce other new foods.

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