Infant Feeding Guidelines

For

Health Workers

DRAFT FOR PUBLIC CONSULTATION

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National Health and Medical Research Council

Acknowledgements

Summary and Recomendations

Purpose and scope

The purpose of this document is to support optimum infant nutrition by providing a review of the evidence, and clear evidence-based recommendations on infant feeding for health workers.

This guideline and recommendations are relevant to healthy, term infants of normal birthweight (>2500 g). Although many of the principles of breastfeeding can be applied to low birthweight infants, specific medical advice is recommended for premature and underweight infants.

Summary

Breastmilk is a living tissue that includes many unique compounds. The World Health Organization states that "breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants" (http://www.who.int/nutrition/topics/exclusive_breastfeeding/en/). Exclusive breastfeeding confers protection against infection and some chronic diseases, and contributes to improved cognitive development in the infant.

In Australia, it is recommended that as many infants as possible be exclusively breastfed until around six months of age (22 – 26 weeks) when spoon foods are introduced. It is further recommended that breastfeeding be continued until 12 months of age and beyond. If infants are not breastfed, appropriate education and support should be provided to promote optimum growth and development. This document provides information that will help health professionals promote these objectives.

With support and encouragement, most mothers can breastfeed their infants. Breastfeeding outcomes (including initiation rates and duration) are improved where the mother has the support and encouragement of the infant's father, other family members, the hospital, and the community. There is probable evidence that any type of breastfeeding support increases the duration of both exclusive and non-exclusive breastfeeding in the immediate post-natal period and at six months of age (Evidence Grade B) (Chung, Raman et al. 2008).

While many mothers encounter some difficulties with breastfeeding, usually these can be overcome with support and encouragement from health professionals, family and community organisations. Many mothers can also continue breastfeeding if they choose to return to work. While exclusive breastfeeding is ideal, any amount of breastmilk is beneficial to the infant and mother. If mothers express and store breastmilk it is important that the correct procedures are followed to ensure food safety and hygiene.

Similarly, if an infant is not breastfed it is important that feeds be prepared and stored correctly. The Marketing in Australia of Infant Formulas: Manufacturers and Importers Agreement (MAIF) is based on the WHO International Code of Marketing of Breast-milk Substitutes (the WHO Code) and provides the basis for control of the marketing of infant formula in Australia.

All health workers should promote breastfeeding in the community and ensure that best practice in breastfeeding is followed.

In comparison with many other countries, Australia's breastfeeding record is good. The role of health workers in supporting breastfeeding is important to further increase Australia's breastfeeding initiation and duration rates.

The main principles of infant feeding are briefly described in the remainder of this summary.

Breastfeeding

Breastfeeding is the healthiest start for infants. Exclusive breastfeeding confers protection against infection and some chronic diseases, and contributes to improved cognitive development in the infant.

Ideally, the aim is for exclusive breastfeeding until around six months of age and continued breastfeeding for 12 months and beyond. There is convincing evidence that being breastfed in infancy is associated with reduced risk of becoming obese in later life (Evidence Grade A) (Owen, Martin et al. 2005; Horta, Bahl et al. 2007; Ip, Chung et al. 2007; Monasta, Batty et al. 2010) and probable evidence that it is associated with lower blood pressure in later life (Evidence Grade B) (Martin, Gunnell et al. 2005; Horta, Bahl et al. 2007; Ip, Chung et al. 2007; Owen, Whincup et al. 2008). There is also suggestive evidence that breastfeeding is associated with a reduced risk of asthma and atopic disease (Evidence Grade C) (Martin, Gunnell et al. 2005; Horta, Bahl et al. 2007; Ip, Chung et al. 2007; Owen, Whincup et al. 2008), lower rates of expression of coeliac disease (Evidence Grade C) (Akobeng, Ramanan et al. 2006) and inflammatory bowel disease (Evidence Grade C) (Barclay, Russell et al. 2009)and lower total and LDL cholesterol concentrations in adult life (Evidence Grade C) (Ip, Chung et al. 2007). Breastfed infants have improved cognitive development (Kramer, Aboud et al. 2008). It is probable that infants who are exclusively breastfed for six months experience less morbidity from gastrointestinal infection (Evidence Grade B) (Kramer, Guo et al. 2003; Ip, Chung et al. 2007). There is suggestive evidence that not breastfeeding is associated with an increased risk of Sudden Infant Death Syndrome (Evidence Grade C) (Ip, Chung et al. 2007). The NHMRC supports

a greater rate of breast feeding in Australia and suggests that policy makers should consider setting targets for infants being breastfeeding at six months.

RECOMMENDATION

- Encourage, support and promote exclusive breastfeeding to around six months of age. Continue breastfeeding with appropriate complementary foods until 12 months of age and beyond. While breastfeeding is recommended for six to 12 months and beyond, any breastfeeding is beneficial to the infant and mother.

Promotion of supportive social and physical environments for breastfeeding

There is convincing evidence that the active promotion and support of breastfeeding by community health, lay and peer organisations, primary health care services, hospitals, and workplaces will increase the proportion of women breastfeeding (both exclusive and non-exclusive) up to age six months (Evidence Grade A) (Chung, Raman et al. 2008).There is also probable evidence that the implementation of the Baby-friendly Hospital Initiative improves breastfeeding outcomes (Evidence Grade B) (DiGirolamo, Grummer-Strawn et al. 2008).

The evidence suggests that the use of a pacifier before four weeks of age is associated with a reduced duration of breastfeeding (any, full and exclusive) (Evidence Grade C) (Karabulut, Yalcin et al. 2009; Kronborg and Vaeth 2009)

RECOMMENDATIONS FOR INDIVIDUALS

- Provide antenatal information and counselling about the benefits and practical aspects of breastfeeding and the evidence regarding not breastfeeding to all potential mothers and fathers.
- Pay particular attention to the importance of correct attachment and positioning when breastfeeding
- Manage any breastfeeding difficulties to extend the duration of breastfeeding, for example, attachment difficulties.
- Discourage use of a pacifier (dummy) with infants less than four weeks of age.

RECOMMENDATIONS FOR CREATING A SUPPORTIVE ENVIRONMENT

- Support the principles of the Baby-friendly Hospital Initiative (BFHI).

- Encourage community-based programs supporting breastfeeding families: such programs are of increasing importance as the length of hospital stays decreases.
- Encourage support in the community and workplace for flexible work schedules, suitable environments for breastfeeding, expressing breastmilk, storage of expressed breastmilk and child care. Use available paid parental leave schemes. Use expressed breastmilk and 'part-time' breastfeeding as appropriate.
- Continue to implement the WHO International Code of Marketing of Breast-milk Substitutes and the Marketing in Australia of Infant Formulas: Manufacturers and Importers Agreement and ensure that all health professionals understand their related obligations.

Special considerations

There are few contra-indications for breastfeeding. There is convincing evidence that maternal and paternal smoking is negatively associated with breastfeeding duration and full or exclusive breastfeeding (Evidence Grade A) (Horta, Bahl et al. 2007), but smoking and environmental contaminants are not valid reasons for stopping breastfeeding. It is probable that the consumption of moderate amounts of alcohol by breastfeeding women is associated with increased risk of adverse infant outcomes (Evidence Grade B) (Haber and Allnutt 2005; Giglia 2010) , but moderate alcohol use is not an indicator for stopping breastfeeding. Most prescription and over-the-counter drugs, and most maternal illnesses are not indications for discontinuing breastfeeding.

RECOMMENDATIONS

- Encourage mothers, fathers and other household members who smoke to stop or reduce smoking and to avoid exposing the infant to tobacco smoke. Even if parents persist with smoking, breastfeeding remains the best choice.
- Advise mothers that not drinking alcohol is the safest option. For women who choose to drink, provide advice on the recommended maximum intake level and the optimal timing of breastfeeding in relation to intake.
- Encourage and support mothers to avoid illicit drugs. (Specialist advice is needed for each individual case.)
- Most prescription drugs are compatible with breastfeeding, but each case should be specifically assessed by a health professional.
- At present, breastfeeding is contra-indicated when a mother is known to be HIV positive. (Specialist advice is needed for each individual case.)

When an infant is not receiving breastmilk

If an infant is not breastfed or is partially breastfed, commercial infant formulas should be used as an alternative to breastmilk until 12 months of age.

RECOMMENDATIONS

- Inform parents of the benefits of breastfeeding.
- If supplementary feeding is needed in hospital, it should only be given for specific medical indications and with the mother's agreement.
- Use commercial infant formulas until 12 months of age. (All infant formulas available in Australia are iron-fortified.) Use soy-based, goat's milk-based or other special formulas only for infants who cannot take cow's milk-based products or because of specific medical, cultural or religious reasons.
- Specialty formulas are indicated only for infants with confirmed pathology: health care professionals should advise parents accordingly.
- When an infant formula is used, the instructions for preparation must be followed. Use the correct scoop and never overfill.

Other fluids in infant feeding

Exclusively breastfed infants do not require additional fluids up to six months of age. For infants over the age of six months or who are not exclusively breastfed, tap-water that meets Australian water standards and commercially bottled water, but not mineral, carbonated or flavoured water are generally suitable for infants and children. Limit the use of fruit juices, to avoid interfering with the intake of nutrient-dense foods and fluids and to reduce risk of damaging emerging teeth. Herbal teas and other beverages are of no known benefit to an infant and could possibly be harmful.

RECOMMENDATIONS

- Boil any water that is to be given to an infant.
- Limit an infant's fruit juice intake, to avoid interfering with their intake of breastmilk or infant formula (see page 135).
- Do not use herbal teas, soft drinks or other beverages.

After 12 months

It is not appropriate to use nutritionally incomplete alternate milks as the sole source of nutrition for infants. Pasteurised full cream cow's milk is,

however, an important component of a mixed diet for a child older than about 12 months.

RECOMMENDATIONS

- Pasteurised full cream milk may be introduced to a child's diet as a drink at around 12 months of age and be continued throughout the second year of life, and beyond. It is an excellent source of protein, calcium and other nutrients. Do not use unpasteurised cow's or goat's milk.
- Reduced-fat milks (skim milk and milk with 1-2 percent fat) are not recommended in the first two years of life.
- Soy (except soy formula where specifically indicated), rice and other cereal beverages are inappropriate alternatives to breastmilk, formula or pasteurised whole cow's milk in the first two years of life.

The transition to solid foods

At around the age of six months (22 – 26 weeks), infants are physiologically and developmentally ready for new foods, textures and modes of feeding and need more nutrients than can be provided by breastmilk or formula. By 12 months of age, a variety of nutritious foods from the five food groups, as described in the Australian Guide to Healthy Eating, is recommended.

RECOMMENDATIONS

- Introduce solid (spoon) foods at around six months (22-26 weeks), to meet the infant's increasing nutritional and developmental needs.
- To prevent iron deficiency, iron-containing foods are recommended to be included in the first foods. Iron-containing foods include iron-fortified cereals, pureed meat and poultry dishes, and some pureed vegetables; these can be introduced in any order along with other nutritious foods such as pureed fruits and other vegetables.
- Ensure that spoon foods are of acceptable texture (no nuts or similar hard foods) and taste.
- Introduce a variety of solid (spoon) foods for good nutrition and to help the infant to accept the flavours of a wide variety of foods.
- Do not add sugar to infant foods as this increases the risk of dental caries.
- Do not add salt to foods for infants.

Caring for infants' food

Foods provided to an infant must be free of pathogens and of suitable quantity, size and texture. Infants should be supervised during feeding, and bottle propping should be avoided due to the risk of choking, ear infection and tooth decay. Foods should provide essential nutrients and be fed to the infant in a safe way.

RECOMMENDATIONS

- Store foods safely and prepare them hygienically.
- To prevent botulism, do not feed honey to infants.
- To prevent salmonella poisoning, cook all eggs thoroughly and do not use products containing raw eggs.
- Hard, small and round, smooth and sticky solid foods are not recommended because they can cause choking and aspiration.
- Ensure that infants are always supervised during feeding.
- Avoid feeding an infant using a 'propped' bottle.

Nutrition into the second year of life

Healthy eating is important in the second year of life and builds on nutritious practices established in infancy. It provides the energy and nutrients needed for growth and development; develops a sense of taste and an acceptance and enjoyment of different family foods; and instils attitudes and practices that can form the basis for lifelong health-promoting eating patterns.

RECOMMENDATION

- Small, frequent, nutritious and energy-dense feedings of a variety of foods from the five food groups are important to meet nutrient and energy needs during the second year of life. The nutritious family diet (see the Australian Guide to Healthy Eating) should be the basis of the child's meals.

Other aspects of infant nutrition

Food allergies

Current evidence suggests that breastfeeding is associated with a reduced risk of atopic disease in infants both with and without a family history of atopy (Evidence Grade C) (Ip, Chung et al. 2007). Introducing a variety of solid foods around the age of six months is consistent with reducing the risk of developing allergic syndromes. There is no evidence that delaying the

introduction of solids (spoon foods) beyond this age reduces the risk of atopic disease.

Treatment of proven food allergies involves avoiding foods known to cause symptoms.

RECOMMENDATIONS

- Encourage exclusive breastfeeding for around six months. There is no particular order that is advised for the introduction of solid (spoon) foods or rate that new foods can be introduced, other than first foods should be iron-rich, nutritious foods.
- If food choices have to be restricted for medical reasons, the advice of a dietitian or appropriate health care professional should be sought to ensure that the dietary intake meets nutrient and energy needs.

Colic

Changes in diets and restrictions on individual foods have had very limited success in the treatment of colic.

RECOMMENDATION

- Ensure that any dietary modification or pharmacological intervention is safe and does not result in nutritional deficiencies.

Constipation

In infancy, true constipation is infrequent.

RECOMMENDATION

- To avoid unnecessary intervention, inform parents about the wide variation in normal bowel function in infants (particularly those who are breastfed). If parents are concerned, they should consult a doctor.

Dietary fat

Dietary fat is an important source of energy and the primary source of essential fatty acids. It also promotes the absorption of essential fat-soluble vitamins.

RECOMMENDATION

- Restriction of dietary fat is not recommended during the first two years of life because it may compromise the intake of energy and essential fatty acids and adversely affect growth, development, and the myelination of the central nervous system.

Dental caries

The prevalence of dental caries is lower where infants and children have access to fluoridated water and when long-term exposure of teeth to sugar-containing foods and liquids is avoided. However excessive fluoride intake can cause dental fluorosis. There evidence suggests that the frequent consumption of added sugars in childhood is associated with increased risk of dental caries (Evidence Grade C) (Levy, Warren et al. 2003; Ruottinen, Karjalainen et al. 2004; Marshall, Eichenberger Gilmore et al. 2007; Anderson, Curzon et al. 2009; Warren, Weber-Gasparoni et al. 2009).

RECOMMENDATIONS

- Fluoride supplementation is not recommended for infants aged less than six months.
- For children between the ages of six months and two years who are living in areas where the household water supply is not fluoridated, further health care professional advice should be sought for the infant's location.
- Avoid leaving a bottle with a sleeping infant or using one as a pacifier. Avoid leaving a baby unattended with a bottle containing liquids (i.e. no bottle propping).
- Do not dip pacifiers or bottle teats in sugar, jam or honey.
- Limit intake of high sugar foods and drinks.

Diarrhoeal disease

Mild to moderate dehydration associated with gastroenteritis should be managed with continued breastfeeding and, if required, oral rehydration therapy on the advice of a health professional.

RECOMMENDATIONS

- For breastfed infants, continue breastfeeding while supplementing their fluid intake with an oral electrolyte solution as necessary.
- Manage mild to moderate dehydration with an oral electrolyte solution and early re-feeding.

Iron deficiency

Iron deficiency is common, but preventable if suitable feeding choices are made (Thorsdottir and Gunnarsson 2006). The form of iron in breastmilk (lactoferrin) is readily absorbed and has high bioavailability. Exclusive breastfeeding to around the age of six months will ensure that breastmilk is not replaced by foods of lower nutrient density and will minimise the risk of iron deficiency.

RECOMMENDATIONS

- Continue exclusive breastfeeding to around six months.
- Introduce complementary foods containing iron at around six months of age.
- Delay the introduction of whole cow's milk as a drink until around 12 months of age.
- Continue to offer iron-fortified foods and meat or iron-rich alternatives beyond 12 months of age.

Vegetarian diets

Nutritional needs can be met by a well-planned vegetarian diet. The advice of a dietitian or appropriate health care professional may be needed in particular situations, for example for infants in families following a vegan diet.

RECOMMENDATIONS

- Advise mothers who are vegetarian to breastfeed their infants for as long as possible, two years or more, if they can. For vegan infants who are not breastfed or are partially breastfed, use of a commercial soy-based infant formula during the first two years of life is recommended. Dietetic advice may be necessary.
- After dietary assessment, infants on vegan diets may require nutritional supplements, especially vitamin B12 as this vitamin is found primarily in animal foods.

Low-birth weight infants

Breastmilk is the best food for low-birth weight infants, although special supplements may be required. Specialist paediatric and dietetic care is required.

Contents

Recommendations table

Recommendation	Document reference
Breastfeeding	
Encourage, support and promote exclusive breastfeeding to around six months of age. Continue breastfeeding with appropriate complementary foods until 12 months of age, and beyond. While breastfeeding is recommended six to 12 months and beyond, any breastfeeding is beneficial to the infant and mother.	Chapter 1
Promotion of supportive social and physical environments for breastfeeding	
Recommendations for individuals	
Provide antenatal information and counselling about the benefits and practical aspects of breastfeeding and the evidence regarding not breastfeeding to all potential mothers and fathers.	Chapter 1.2.3 Chapter 2.1
Pay particular attention to the importance of correct attachment and positioning when breastfeeding.	Chapter 2.2.8
Manage any breastfeeding difficulties to extend the duration of breastfeeding, for example, attachment difficulties.	Chapter 4
Discourage use of a pacifier (dummy) with infants less than four weeks of age.	Chapter 3.3.1
Recommendations for creating a supportive environment	
Support the principles of the Baby-friendly Hospital Initiative (BFHI).	Chapter 1.2.3
Encourage community-based programs supporting breastfeeding families: such programs are of increasing importance as the length of hospital stays decreases.	Chpater 1.2.3
Encourage support in the community and workplace for flexible work schedules, suitable environments for breastfeeding, expressing breastmilk, storage of expressed breastmilk and child care. Use available paid parental leave schemes. Use expressed breastmilk and 'part time' breastfeeding as	Chapter 1.2.3 Chapter 5 (Expressing and storing breastmilk) Chapter 6.5 (Women and paid work)

appropriate.	
Continue to implement the WHO International Code of Marketing of Breast-milk Substitutes and the Marketing in Australia of Infant Formulas: Manufacturers and Importers Agreement and ensure that all health professionals understand their related obligations.	Chapter 11
Special Considerations	
Encourage mothers, fathers and other household members who smoke to stop or reduce smoking and to avoid exposing the infant to tobacco smoke. Even if parents persist with smoking, breastfeeding remains the best choice.	Chapter 6.3.1
Advise mothers that not drinking alcohol is the safest option. For women who choose to drink, provide advice on the recommended maximum intake level and the optimal timing of breastfeeding in relation to intake.	Chapter 6.3.2
Encourage and support mothers to avoid illicit drugs. (Specialist advice is needed for each individual case.)	Chapter 6.3.3
Most prescription drugs are compatible with breastfeeding, but each case should be specifically assessed by a health professional.	Chapter 6.2.4
At present, breastfeeding is contra-indicated when a mother is known to be HIV positive. (Specialist advice is needed for each individual case.)	Chapter 6.1.5
When an infant is not receiving breastmilk	
Inform parents of the benefits of breastfeeding.	Chapter 1
If supplementary feeding is needed in hospital, it should only be given for specific medical indications and with the mother's agreement.	Chapter 3.3.2 Chapter 7
Use commercial infant formulas until 12 months of age. (All infant formulas available in Australia are iron-fortified.) Use soy-based, goat's milk-based or other special formulas only for infants who cannot take cow's milk-based products or because of specific medical, cultural or religious reasons.	Chapter 8

Specialty formulas are indicated only for infants with confirmed pathology: health care professionals should advise parents accordingly.	Chapter 8.5
When an infant formula is used, the instructions for preparation must be followed. Use the correct scoop and never overfill.	Chapter 8.3
Other fluids in infant feeding	
Boil any water that is to be given to an infant.	
Limit an infant's fruit juice intake, to avoid interfering with their intake of breastmilk or infant formula (see page 135).	Chapter 10.4
Do not use herbal teas, soft drinks or other beverages.	
After 12 months	
Pasteurised full cream milk may be introduced to a child's diet as a drink at around 12 months of age and be continued throughout the second year of life— and beyond. It is an excellent source of protein, calcium and other nutrients. Do not use unpasteurised cow's or goat's milk.	Chapter 10.5, 10.6
Reduced-fat milks (skim milk and milk with 1-2 percent fat) are not recommended in the first two years of life.	Chapter 10.7
Soy (except soy formula where specifically indicated), rice and other cereal beverages are inappropriate alternatives to breastmilk, formula or pasteurised whole cow's milk in the first two years of life.	
The transition to solid foods	
Introduce solid (spoon) foods at around six months (22-26 weeks), to meet the infant's increasing nutritional and developmental needs.	Chapter 9
To prevent iron deficiency, iron-containing foods are recommended to be included in the first foods. Iron-containing foods include iron-fortified cereals, pureed meat and poultry dishes, and some pureed vegetables; these can be introduced in any order	Chapter 9

along with other nutritious foods such as pureed fruits and other vegetables.	
Ensure that spoon foods are of acceptable texture (no nuts or similar hard foods) and taste,	Chapter 9
Introduce a variety of solid (spoon) foods for good nutrition and to help the infant to accept the flavours of a wide variety of foods.	Chapter 9
Do not add sugar to infant foods as this increases the risk of dental caries	Chapter 9
Do not add salt to foods for infants.	Chapter 9
Caring for infants' food	
Store foods safely and prepare them hygienically.	
To prevent botulism, do not feed honey to infants.	Chapter 10.1
To prevent salmonella poisoning, cook all eggs thoroughly and do not use products containing raw eggs.	
Hard, small and round, smooth and sticky solid foods are not recommended because they can cause choking and aspiration.	Chapter 9
Ensure that infants are always supervised during feeding.	
Avoid feeding an infant using a 'propped' bottle.	
Nutrition into the second year of life	
Small, frequent, nutritious and energy-dense feedings of a variety of foods from the five food groups are important to meet nutrient and energy needs during the second year of life. The nutritious family diet (see the *Australian Guide to Healthy Eating*) should be the basis of the child's meals.	
Other aspects of infant nutrition	
Food allergies Encourage exclusive breastfeeding for around six months. There is no particular order that is advised for the introduction of solid (spoon) foods or rate that new foods can be introduced, other than first foods should be iron-rich, nutritious foods.	Chapter 1.1.1 Chapter 9.2

Food allergies If food choices have to be restricted for medical reasons, the advice of a dietitian or appropriate health care professional should be sought to ensure that the dietary intake meets nutrient and energy needs.	Chapter 9.2
Colic Ensure that any dietary modification or pharmacological intervention is safe and does not result in nutritional deficiencies.	
Constipation To avoid unnecessary intervention, inform parents about the wide variation in normal bowel function in infants (particularly those who are breastfed). If parents are concerned, they should consult a doctor.	Chapter 3.4.4
Dietary Fat Restriction of dietary fat is not recommended during the first two years of life because it may compromise the intake of energy and essential fatty acids and adversely affect growth, development, and the myelination of the central nervous	
Dental caries Fluoride supplementation is not recommended for infants aged less than six months.	Chapter 8.6
Dental caries For children between the ages of six months and two years who are living in areas where the household water supply is not fluoridated, further health care professional advice should be sought for the infant's location.	Chapter 8.6
Dental caries Avoid leaving a bottle with a sleeping infant or using one as a pacifier.	
Dental caries Avoid leaving a baby unattended with a bottle containing liquids (i.e. no bottle propping).	
Dental caries	

Do not dip pacifiers or bottle teats in sugar, jam or honey.	
Dental caries Limit intake of high sugar foods and drinks.	
Diarrhoeal disease For breastfed infants, continue breastfeeding while supplementing their fluid intake with an oral electrolyte solution as necessary.	
Diarrhoeal disease Manage mild to moderate dehydration with an oral electrolyte solution and early re-feeding.	
Iron Deficiency Continue exclusive breastfeeding to around six months.	
Iron Deficiency Introduce complementary foods containing iron at around six months of age.	
Iron Deficiency Delay the introduction of whole cow's milk as a drink until around 12 months of age.	
Iron Deficiency Continue to offer iron-fortified foods and meat or iron-rich alternatives beyond 12 months of age.	
Vegetarian Diets Advise mothers who are vegetarian to breastfeed their infants for as long as possible, two years or more, if they can. For vegan infants who are not breastfed or are partially breastfed, use of a commercial soy-based infant formula during the first two years of life is recommended. Dietetic advice may be necessary.	
Vegetarian Diets After dietary assessment, infants on vegan diets may require nutritional supplements, especially vitamin B_{12} as this vitamin is found primarily in animal foods.	

Definitions

The definitions of breastfeeding used in this document are consistent with the 'The Australian National Breastfeeding Strategy 2010-2015', the 'WHO Infant Strategy', and are in general use in Australia (WHO, 2008; Australian Health Ministers' Conference 2009; Binns, Fraser et al. 2009).

Breastfeeding Definitions

Category of infant feeding	Requires that the infant receive	Allows the infant to receive	Does not allow the infant to receive
Exclusive breastfeeding	Breastmilk (including milk expressed or from wet nurse)	Prescribed drops or syrups (vitamins, minerals, medicines)	Anything else
Predominant (Full) breastfeeding	Breastmilk (including milk expressed or from wet nurse) as the predominant source of nourishment)	Liquids (water, and water-based drinks, fruit juice, oral rehydration solutions), ritual fluids and drops or syrups (vitamins, minerals, medicines)	Anything else (in particular: non-human milk, solid foods, food-based fluids)
Complementary breastfeeding	Breastmilk and solid or semi-solid foods	Any food or liquid including non-human milk	
Any breastfeeding	Some breastmilk	Any food or liquid including non-human milk	
Ever breastfed	Received breastmilk or colostrum on at least one occasion		
Bottle feeding	Any liquid or semi-solid food from a bottle with nipple/teat	Also allows breast milk by bottle	

'**Breastmilk substitute**': Any food being marketed or otherwise represented as a partial or total replacement for breastmilk, whether or not it is suitable for that purpose (WHO, 1981). As this term has the potential to imply an equivalence to breastmilk, it is not used in this document. The term 'infant formula' or 'commercial infant formula' is used instead throughout this document. 'Infant formula' is the term used in the Food Standards Australia New Zealand (FSANZ) Code.

'**Infant formula**': is defined in Standard 2.9.1 of FSANZ (FSANZ, 2011) (http://www.comlaw.gov.au/Details/F2010C00089)

The standard includes the following definitions:

> '**Infant formula product**': A product based on milk or other edible food constituents of animal or plant origin which is nutritionally adequate to serve as the principal liquid source of nourishment for infants.

> '**Infant formula**': An infant formula product represented as a breastmilk substitute for infants and which satisfies the nutritional requirements of infants aged up to four to six months.

> '**Follow-on formula**': An infant formula product represented as either a breastmilk substitute or replacement for infant formula and which constitutes the principal liquid source of nourishment in a progressively diversified diet for infants aged from six months.

> '**Lactose free formula and low lactose formula**': Infant formula products which satisfy the needs of lactose intolerant infants.

> '**Pre-term formula**': An infant formula product specifically formulated to satisfy particular needs of infants born prematurely or of low birth weight.

> '**Soy-based formula**': An infant formula product in which soy protein isolate is the sole source of protein.

Other definitions

'**Breastfeeding duration**': The total length of time during which an infant receives any breastmilk at all, from initiation until breastfeeding has ceased.

'**Breastfeeding Initiation**': An infant's first intake of breastmilk (or colostrum).

'Complementary food': Any food, manufactured or locally prepared, suitable as a complement to breastmilk or infant formula, if either becomes insufficient to satisfy the nutritional requirements of the infant. In the Infant Feeding Guidelines for Health Workers the following working definition is used: any nutrient-containing foods or semi-solid given to infants in addition to breastmilk or commercial infant formula.

'Container': Any form of packaging of products for sale as a normal retail unit, including wrappers (WHO, 1981).

'Distributor': A person, corporation or other entity in the public or private sector engaged, directly or indirectly, in the business of marketing at the wholesale or retail level a product within the scope of the WHO Code. A 'primary distributor' is a manufacturer's sales agent, representative, national distributor or broker (WHO, 1981).

'Health care system': Government, non-government and private institutions or organisations engaged, directly or indirectly, in providing health care for mothers, infants and pregnant women. Also includes nurseries, health workers in private practice, and, for the purpose of this document, child care facilities. For the purposes of the WHO Code, the term does not include pharmacies or other established sales outlets.

'Health worker': A professional or non-professional person working in a component of a health care system; includes voluntary unpaid workers (WHO, 1981).

'Infant': A child aged less than 12 months.

'Label': Any tag, brand, mark, pictorial or other descriptive matter written, printed, stencilled, marked, embossed or impressed on, or attached to, a container of any product within the scope of the WHO Code.

'Manufacturer': A corporation or other entity in the public or private sector engaged in the business or function—whether directly, through an agent, or through an entity controlled by or under contract with it—of manufacturing a product within the scope of the WHO Code.

'Marketing': Product promotion, distribution, selling and advertising; product public relations; and product information services (WHO, 1981).

'Marketing personnel': Any people whose functions involve the marketing of a product or products coming within the scope of the WHO Code.

'Nursing staff': The terms used for nursing staff associated with infant care change from time to time and in different localities. In this document the

term encompasses all staff involved in infant and maternal care, regardless of their current or former titles.

'Samples': Single or small quantities of a product provided without cost (WHO, 1981). For the purposes of this document, and in the Australian context, free or subsidised samples or supplies of infant formula are those given by manufacturers to health care facilities at no cost or at a cost that is substantially less than the normal retail or wholesale cost.

'Spoon foods': Many of the first foods given to infants are semisolid foods or finger foods or solid foods. To include all foods other than liquids given to infants the term 'spoon foods' have used in this document.

'Supplementary': Additional liquids given to the infant during the first seven days after birth, including glucose solutions, water and commercial infant formula (definition used in this document).

'Supplies': Quantities of a product provided for use over an extended period, free or at a low price, for social purposes, including those provided to families in need (WHO, 1981).

'Toddler': A child aged from one to two years.

'Weaning': The period during which an infant is introduced to breastmilk substitute or solid foods, or both, with the intention of ceasing breastfeeding. (This term should be used with care as in the literature, 'weaning', 'weaning foods' and 'weaned' are used in several different ways.)

'Weaned': The infant or child no longer receives any breastmilk.

Note: When comparing breastfeeding rates ensure that standard definitions have been used. The accuracy of breastfeeding rates is also influenced by the method of collection, e.g. by cross sectional, retrospective or cohort studies (Binns, Fraser et al. 2009; Flaherman, Chien et al. 2011).

Introduction: Breastfeeding in Australia

Australia has a long and successful history of caring for mothers and infants through the establishment more than a century ago of a network of community health nurses and general practitioners. Improving health, health care and nutrition is reflected in the decline of infant mortality, from 104 deaths per 1000 live births at the time of Federation to four deaths per 1000 live births in 2008 (Australian Bureau of Statistics 2008).

In the 1950s and 60s, breastfeeding rates declined in many countries. Recognition of the potential for detrimental effects on health led to the prioritisation of breastfeeding as one of the most important health initiatives. Australia has been successful in increasing breastfeeding rates over the last few decades. Among the Organisation for Economic Co-operation and Development (OECD) countries, Australia is just above average for the percentage of infants ever breastfed (Organisation for Economic Co-operation and Development 2009).

In the OECD countries in around 2005, the proportion of children who were ever-breastfed varied widely, ranging from less than 70% in Ireland and France to almost 100% in Denmark, Sweden and Norway. In Australia in 2004 around 92% of infants receive some breastmilk and the percentage has been increasing in recent years.

Several limitations relevant in estimating current breastfeeding rates in Australia include the use of different definitions of breastfeeding and different methods in studies (see Appendix A). Combining the results of several studies, it is estimated that 90-94% of mothers in Australia initiate breastfeeding, that is, the percentage ever breastfed (Graham, Scott et al. 2005; Australian Institute of Family Studies 2008; Centre for Epidemiology and Research 2010). At six months of age approximately 50% of Australian infants are still breastfeeding (any breastfeeding) (Graham, Scott et al. 2005; Centre for Epidemiology and Research 2010).

Although the majority of women in Australia commence breastfeeding, only a small proportion of women achieve the goal of exclusively breastfeeding to around age six months. In 2007-2008, a NSW report on child health found that the proportion of children aged 0-23 months who were exclusively breastfed at each month of age declined from 91% at birth to 67% at one month, 50% at three months and 16.7% at six months (Centre for Epidemiology and Research 2010). Caution needs to be taken when interpreting these results as this study was cross-sectional in nature and the classification of exclusive breastfeeding was made on the basis of the past 24 hours. For these reasons actual rates of exclusive breastfeeding may be lower than reported.

Solids are being introduced significantly earlier than the recommended 'around six months'. The Growing Up in Australia longitudinal study of Australian children involved 4,606 families with infants less than 12 months of age, and found that 11% of three month-old infants were fed solids. The percentage of infants on solids rose to 38% at four months and 62% at five months. At six months, 91% of infants had started solids(Australian Institute of Family Studies 2008). In the NSW cross-sectional study, 48% of children aged 0-23 months were introduced to solids before six months (Centre for Epidemiology and Research 2010). The 2001 Australian National Health Survey reported that at 25 weeks approximately 65% of infants were regularly receiving solid food (Donath and Amir 2005).

The current recommendation is to continue breastfeeding until 12 months of age, and beyond. It is estimated that at present only 22-28% of mothers are still breastfeeding by age of 12 months (Graham, Scott et al. 2005; Australian Institute of Family Studies 2008; Centre for Epidemiology and Research 2010).

There is also evidence of considerable variation between socio-economic groups in both the acceptance and the maintenance of breastfeeding in the Australian community with women in higher socio-economic groups more likely to breastfeed (see Chapter 1). Health professionals should be aware of these differences, so initiatives and strategies to support women to improve rates and duration can target these groups.

Historical aspects

Although there is plenty of scope for Australia to increase its breastfeeding rates, there has been a significant increase in both the rates and the duration of breastfeeding in Australia in the last few decades. Breastfeeding reached a low point in Australia in the 1960s; records from Victoria show that only 50–60% of mothers were breastfeeding on discharge from hospital and only 21% after three months (Lester 1994). In the early 1970s, breastfeeding rates started to rise again in Australia and comparable overseas countries, beginning in the higher socio-economic groups. By 1983 both the prevalence and the duration of breastfeeding in Australia were among the highest in the western world, with 85% of infants breastfed at discharge and 54–55% three months later (Palmer 1985). Breastfeeding remained around this level for the next two decades (Donath and Amir 2005), with a gradual increase in initiation and duration rates in recent years.

Even though national breastfeeding rates have increased, from a public health perspective, there is considerable room for improvement in both the type and duration of breastfeeding. Achieving these improvements offers considerable benefits for maternal, infant and child health and life course health for Australians.

The 1993 Health Goals and Targets for Australian Children and Youth documented a goal of 90% of infants breastfeeding at hospital discharge and 75% being breastfed at six months of age by the year 2000. In the 2003 edition of the Infant Feeding Guidelines for Health Workers, targets were suggested of 90% initiation (ever breastfed) and 80% of infants being breastfed at the age of six months (NHMRC 2003). The initiation rate of 90% has been achieved and the six months target remains a suitable aspirational target for Australia (Graham, Scott et al. 2005).

The World Health Organization (WHO) recognises the importance of good nutrition in promoting the health of infants and children. Breastfeeding is central to improving the nutrition of infants. The WHO's International Code of Marketing of Breastmilk Substitutes (the WHO Code) (WHO 1981), was formulated in response to concerns over the effects on infant health of unfettered promotion of infant formula throughout the world. The drive for the Code came from recognition of the increased risks of morbidity and mortality in infants who are not breastfed. The Code itself, as approved by the World Health Assembly (WHA), is not legally binding unless individual nations enact legislation making it so.

Australia stated at the WHA:

> in voting for the adoption of this Code, Australia made an international commitment to take action to give effect to its aims and principles and accepted responsibility for their implementation as appropriate to social and legislative frameworks in this country (NHMRC 1985).

The first edition of the Infant Feeding Guidelines for Health Workers was developed by the Infant Nutrition Panel of the National Health and Medical Research Council (NHMRC) beginning in October 1992, and was published in 1996. The impetus to develop the Infant Feeding Guidelines for Health Workers came from two sources. Firstly, the demand from health workers for additional information on infant feeding to supplement the NHMRC Dietary Guidelines (the development of the NHMRC Dietary Guidelines for Children and Adolescents also commenced in 1992); secondly, as a part of Australia's response to supporting the WHO Code.

Australia's current measures to implement the WHO Code are:

- the Marketing in Australia of Infant Formulas: Manufacturers and Importers Agreement 1992 (MAIF Agreement)—a voluntary, self-regulatory code of conduct between manufacturers and importers of infant formula in Australia which aims to protect and promote breastfeeding by ensuring the proper use of breast milk substitutes

when they are necessary;

- inclusion in the Australia New Zealand Food Standards Code of mandatory labelling and composition provisions for infant formula, consistent with Article 9 of the WHO Code and

- the provision of the NHMRCs Infant Feeding Guidelines for Health Workers.

The following aim was included in the first edition of the NHMRC Infant Feeding Guidelines: 'The guidelines aim to help all health workers understand how the WHO Code and the MAIF Agreement affect their work in both breastfeeding and using infant formula'.

The WHO Code has never been revised, although there have been supplementary resolutions and decisions by the WHA leading to the publication of a consolidated edition of the Code in 2008. In May 2010, the WHA passed a resolution (sponsored by Norway) urging countries to strengthen their commitments to the WHO Code and the companion Baby-friendly Hospital Initiative.

The process used to develop the revision of the Infant Feeding Guidelines for Health Workers is consistent with the approach used to revise the Dietary Guidelines and is outlined in detail in Appendix K.

1. Encouraging and supporting breastfeeding in the Australian community

1.1 Breastfeeding as the physiological norm

Numerous studies have demonstrated the importance of breastfeeding for mothers and infants. The epidemiological evidence provides convincing evidence of the protective effects of breastfeeding as detailed below, in both developed and less-developed countries (Horta, Bahl et al. 2007; Ip, Chung et al. 2007).

Breastfeeding has positive effects on the nutritional, health and psychological make-up of the infant and brings health and some fertility-control benefits for the mother. It also offers economic benefits to the family and society.

1.1.1 Benefits to the infant

1.1.1.1 Nutrition

The composition of breastmilk is uniquely suited to the neonate, at a time when growth and development are occurring rapidly while many of the infant's systems—such as the digestive, hepatic, neural, renal, vascular and immune systems—are functionally immature. Many of the nutrients contained in breastmilk are in readily absorbed and bioavailable forms (Lawrence and Lawrence 2005) .

Breastmilk contains many nutritious and bioactive components including bile salt–stimulated lipase, glutamate, certain polyunsaturated long-chain fatty acids, oligosaccharides, lysozyme, immunoglobulin A, growth factors and numerous other bioactive factors. These components facilitate optimal function of the infant's immature systems and confer both active and passive immunity (Labbok, Clark et al. 2004). The living cells found in breastmilk are also important functionally (Schack-Nielsen and Michaelsen 2007).

1.1.1.2 Infant growth

There is probable evidence that infants from developing and developed countries who are exclusively breastfed for six months do not have deficits in growth compared to those who are not exclusively breastfed (Evidence Grade B) (Kramer and Kakuma 2009). No apparent risks have been reported in recommending exclusive breastfeeding for the first six months of life in both developing and developed countries (Kramer and Kakuma 2009). However,

health professionals should manage all infants, no matter how they are fed, on an individual basis so that any faltering of growth or other adverse outcomes do not go unnoticed.

1.1.1.3 Health

Globally, suboptimal infant feeding is responsible for 45% of neonatal infectious deaths, 30% of diarrhoeal deaths and 18% of acute respiratory deaths in children under five years (WHO 2009). Studies have shown that breastfeeding reduces the risk or severity of a number of disease states in infancy and later life, among them the following:

- physiological reflux (Hegar, Dewanti et al. 2009)
- pyloric stenosis (Demian, Nguyen et al. 2009; Osifo and Evbuomwan 2009)
- gastrointestinal infections (Evidence Grade B) (Kramer, Guo et al. 2003; Ip, Chung et al. 2007)
- respiratory illness (Ip, Chung et al. 2007)
- otitis media (Brown and Magnuson 2000; Ip, Chung et al. 2007)
- urinary tract infections (Riccabona 2003; Mrild, Hansson et al. 2004)
- bacteraemia-meningitis (Cochi, Fleming et al. 1986; Takala, Eskola et al. 1989)
- SIDS—sudden infant death syndrome (Evidence Grade C) (Ip, Chung et al. 2007)
- necrotising enterocolitis reduced incidence in premature infants (Ip, Chung et al. 2007)
- atopic dermatitis in children with a family history of atopy (Evidence Grade C) (!!! INVALID CITATION !!!)(!!! INVALID CITATION !!!)(Ip, Chung et al. 2007)
- asthma (Evidence Grade C) (Australian Centre for Asthma Monitoring 2008; Oddy 2009)
- some childhood cancers (Ip, Chung et al. 2007)
- reduced malocclusion as a result of better jaw shape and development (Medeiros, Ferreira et al. 2009)
- improved visual acuity, psychomotor development (Horta, Bahl et al. 2007)and cognitive development (Kramer, Aboud et al. 2008)
- type 1 (Ip, Chung et al. 2007) and type 2 diabetes (Horta, Bahl et al. 2007; Ip, Chung et al. 2007)
- coeliac disease (Evidence Grade C) (Akobeng, Ramanan et al. 2006)
- inflammatory bowel disease (Evidence Grade C) (Barclay, Russell et al. 2009)
- cardiovascular disease risk factors including blood pressure (Evidence Grade B) (Horta, Kramer et al. 2001; Martin, Gunnell et al. 2005; Ip, Chung et al. 2007; Owen, Whincup et al. 2008) and total and LDL

cholesterol (Evidence Grade C) (Horta, Bahl et al. 2007; Ip, Chung et al. 2007)

- obesity in childhood and in later life (Evidence Grade A) (Horta, Bahl et al. 2007; Ip, Chung et al. 2007; Monasta, Batty et al. 2010).

The National Maternal and Infant Health Survey in the USA reviewed the association between breastfeeding and illnesses in the first six months of life analysing illness episodes in 7092 infants (Raisler, Alexander et al. 1999). Full breastfeeding was associated with the lowest illness rates, while minimal breastfeeding (defined in this study as infants getting more other foods and liquids than breastmilk) was not protective. Breastfeeding conferred health benefits on infants from all socio-economic groups. More recent evidence from the UK Millennium Cohort Study suggests that each month an estimated 53% of hospitalisations for diarrhoea and 27% for lower respiratory tract infections could have been prevented by exclusive breastfeeding and 31% of hospitalisations for diarrhoea and 25% for lower respiratory tract infection by partial breastfeeding (Quigley, Kelly et al. 2007).

Two comprehensive systematic reviews provide detailed summaries and meta-analyses of the most relevant studies for a variety of health outcomes for infants and mothers (Horta, Bahl et al. 2007; Ip, Chung et al. 2007)

1.1.1.4 Diabetes

Breastfeeding for at least three months has been shown to be associated with a reduced risk of childhood type 1 diabetes (Ip, Chung et al. 2007). However evidence from the large Eurodiab study (2002) indicates that the risk of type 1 diabetes is unrelated to the introduction of either cow's milk or infant formula before three months of age as previously hypothesised (Mayer, Hamman et al. 1988).

Horta et al (2007) analysed data from five studies that evaluated the relationship between breastfeeding and type 2 diabetes and reported a protective effect of breastfeeding with a pooled adjusted odds ratio (OR) of 0.63 (95% CI 0.45-0.89), although further studies are needed to confirm this conclusion. Ip et al. (2007) came to a similar conclusion, but drew attention to the fact that most studies were retrospective case-control studies relying on long-term recall of breastfeeding exposure and that studies that have used existing infant records to determine breastfeeding initiation and duration failed to show this same association. There is no evidence linking infant feeding method and type 2 diabetes, but there is an indirect relationship through infant growth, particularly the velocity of growth (Eriksson, Forsen et al. 2003; Phillips, Goulden et al. 2005; Knip, Virtanen et al. 2010).

1.1.1.5 Leukaemia

A meta-analysis of three case-control studies concluded that a history of breastfeeding for at least six months is associated with a reduction in the risk of acute lymphocytic leukaemia (OR 0.80: 95% CI 0.71-0.91) (Ip, Chung et al. 2007). Further studies are needed to investigate the biological mechanisms underlying this relationship (Ip, Chung et al. 2007).

1.1.1.6 Bowel disease

A meta-analysis showed that the risk of coeliac disease was significantly reduced in infants who were breastfeeding at the time when gluten was introduced (pooled OR 0.48; 95% CI 0.40-0.59) compared with infants who were not breastfed at this time (Akobeng, Ramanan et al. 2006). A recent meta-analysis indicated that breastmilk exposure had a significant protective effect (OR 0.69; 95% CI 0.51-0.94) against developing early-onset inflammatory bowel disease (IBD), although a non-significant difference was shown for ulcerative colitis and Crohn's disease individually (Barclay, Russell et al. 2009). Overall the evidence suggests a relationship between breastfeeding and lower rates of IBD (Evidence Grade C), but further well-designed prospective studies are required.

1.1.1.7 Specific immune factors

Hanson and Korotkova (2002) have reviewed the specific and non-specific factors present in breastmilk which offer active or passive immuno-protection. Immunoglobulin A (IgA) is the most abundant antibody in breastmilk. It is manufactured in and excreted by the breast in response to specific bacteria and viruses to which the mother is exposed. This provides protection against the pathogens infants are most likely to encounter in their local environment. IgG and IgM antibodies offer further protection against specific pathogens (Hanson and Korotkova 2002).

Breastmilk factors have an important role in antigen recognition as a host defence mechanism (LeBouder, Rey-Nores et al. 2006). This group has recently reported soluble CD14 (sCD14) and soluble TLR2 in breast milk, but not in formula. During the first post-partum week breast milk, but not formula enhanced the TLR4 and TLR5 responses, and inhibited TLR2 responses to LPS. These effects are modulated via soluble CD14 and TLR2 molecules plus other as yet unidentified molecules. Bacterial recognition by mucosal receptors, an important component of the non-specific innate immune system is enhanced by components of breast milk (but not formula) in the first 5 days of life, facilitating the ability of the newborn to deal with pathogenic bacteria.

Non-specific and pattern-specific protective factors in Breastmilk (Hale and Hartmann 2007)

- Lactoferrin has a high binding affinity with iron, making it unavailable to micro-organisms such as E. coli and Candida albicans, which require iron for growth. A peptide with bactericidal properties is also released from lactoferrin and may be responsible for much of the antibacterial action attributed to lactoferrin (Labbok, Clark et al. 2004). Similarly, vitamin B12-binding proteins make vitamin B12 unavailable to micro-organisms.
- Lysozyme is bactericidal against certain gram-negative rods and gram-positive bacteria.
- Prolactin enhances the development of B- and T-lymphocytes and affects differentiation of intestinal lymphoid tissue. Cortisol, thyroxine, insulin and growth factors promote maturation of the newborn's intestine and the development of intestinal host defences.
- The functions of cellular components such as macrophages and monocytes, neutrophils and B- and T-lymphocytes are not yet fully understood but do include the inhibition and/or destruction of micro-organisms such as bacteria and viruses (Labbok, Clark et al. 2004). The concentration of these cellular components is especially high in colostrum, but they are present in all breastmilk.
- Oligosaccharides form the third most abundant class of compounds in breastmilk (12–24 grams per litre). Over 130 different oligosaccharides have been isolated from human milk (Renner 1989), and most are resistant to digestion in the small intestine (Bode 2009). They provide specific growth factors for the desirable bifidus bacteria of the large intestine. They also inhibit the attachment of pathogenic bacteria to the mucosal surfaces of the intestinal and urinary tracts and may provide important precursors for the development of the brain in early infancy. Oligosaccharides may be the essential component of breastmilk that reduces the incidence of necrotising enterocolitis (Bode 2009)
- Fatty acids are released from milk fat by the hydrolytic action between milk and infant lipases. Some of these free fatty acids have antimicrobial actions (Subcommittee on Nutrition during Lactation 1991; Thormar and Hilmarsson 2007).
- Breastmilk also includes a substantial nucleotide fraction that is thought to be required for the nuclear material needed for the rapid expansion of the immune system in the immediate post-partum period resulting from microbial exposure during birth (Hanson and Korotkova 2002).

The concentration of most of these protective factors is highest in colostrum; it decreases as lactation is established and increases again during gradual weaning. Although breastfeeding is of particular value while the infant's

immune system is immature, it continues to offer some protection throughout lactation (Goldman, Goldblum et al. 1983; Oddy 2001).

1.1.1.8 Allergy, Asthma and Breastfeeding

In western countries, asthma and atopic disease are public health concerns because of their high prevalence, associated morbidity, and substantial health care and societal costs. In Australia 11 to 13 percent of children and nine to 11 percent of adults have asthma(Australian Centre for Asthma Monitoring 2008). As many as four in ten children have evidence of allergic sensitisation and many will go on to develop allergic diseases such as eczema and allergic rhinitis (Prescott and Tang 2005). The prevalence of asthma and atopic disease has increased markedly since the 1970s, but now may be decreasing in prevalence (Anandan, Nurmatov et al. 2010). The WHO and most major professional and national bodies, including the NHMRC, recommend exclusive breastfeeding to six months or 'around six months of age'. These recommendations are associated with the lowest levels of morbidity and mortality and offers some protection against allergy. In the general population and in atopic families, exclusive breastfeeding for around six months can protect against allergic rhinitis, wheezing, asthma and atopy in children (Oddy, Holt et al. 1999; Gdalevich, Mimouni et al. 2001). In a prospective study of 2187 Western Australian children, Oddy and colleagues (1999) showed that breastfed infants had lower rates of asthma and atopic disease. After adjusting for confounding factors, the introduction of milk other than breastmilk before six months of age led to increased rates of asthma at six years of age (OR 1.25; 95% CI 1.02-1.52) and of atopic disease (OR 1.30; 95% CI 1.04-1.61).

One high quality meta-analysis from 2001 concluded that breastfeeding was associated with a reduction in the risk of developing asthma (Ip, Chung et al. 2007). However, when three new primary studies and one follow-up study were included in a new meta-analyses, there is a protective association between breastfeeding and a reduction in the risk of asthma in those subjects without a family history of asthma, OR 0.74 (CI 0.6-0.92), and in children under the age of ten with a family history of asthma (Ip, Chung et al. 2007).

The same reviewers concluded that evidence from one well-performed systematic review/meta-analysis on full-term infants in developed countries suggests that exclusive breastfeeding for at least three months was associated with a reduction in the risk of atopic dermatitis in those subjects with a family history of atopy (OR 0.58; 95% CI 0.41-0.92) (Ip, Chung et al. 2007). There is no evidence from the American Academy of Pediatrics (AAP) or relevant Cochrane reviews that restricting the diets of mothers who are pregnant or who are breastfeeding reduces the likelihood of the allergies (Kramer and Kakuma 2006; Greer, Sicherer et al. 2008).

The policy statement from the AAP states 'there is evidence that breastfeeding for at least four months, compared with feeding formula made with intact cow milk protein, prevents or delays the occurrence of atopic dermatitis, cow milk allergy, and wheezing in early childhood'. The statement is silent about introducing solids before six months (Greer, Sicherer et al. 2008).

Recent evidence from animal and human studies also suggests that the maintenance of breastfeeding during the period of antigen introduction facilitates the development of oral tolerance (West, Videky et al. 2010). It is proposed that transforming growth factor-beta (TGFβ) in breastmilk may be a critical component in this process (Verhasselt 2010). The presence of allergen and TGFβ in breast milk protects the progeny from allergic asthma (Brandtzaeg 2010).

For infants who are not breastfed, the use of specialized formulas for the prevention of allergy is not recommended, except under medical supervision for those who have a family history suggestive of a very high risk of atopy (Greer, Sicherer et al. 2008). Most studies on the use of hydrolysed formulas have involved high risk infants rather than the normal population and have shown only modest benefits. Additional randomised studies are needed among infants at low risk. The use of amino acid–based formulas for prevention of atopic disease has not been studied (Greer, Sicherer et al. 2008). Soy-based infant formulas, on the other hand, have a long history of use for atopic disease in infants, although there is insufficient evidence to justify their use. A Cochrane review concluded that feeding with soy formula should not be recommended for the prevention of atopy in infants at high risk of developing allergy (Osborn and Sinn 2006). The evidence on the use of probiotics in infant formula to prevent atopic disease gives varying results and a Cochrane review again concluded there was insufficient evidence to recommend their use (Osborn and Sinn 2007).

In summary, breastfeeding exclusively to around six months is compatible with achieving the lowest rates of atopic disease, maximising the health benefits of breastfeeding and minimising morbidity and mortality. For infants with a strong history of atopy, standard infant formulas are recommended, on medical advice. For infants with a strong history of atopy, the evidence for hydrolysed formulas is not strong; a Cochrane review recommended further research (Osborn and Sinn 2009). There is no evidence that the avoidance of any particular foods or food allergens during pregnancy, lactation or infancy has provided any benefit in allergy prevention and is no longer recommended (West, Videky et al. 2010).

> ***Box 1.1 Minimising the risk of allergy in infants with a strong family history of serious allergy.***
>
> - Do not smoke during pregnancy and provide a smoke-free environment for your child after birth (Dietert and Zelikoff 2008).
> - Dietary elimination of potential allergens during pregnancy is not recommended for prevention of childhood allergy.
> - Exclusively breastfeeding for around six months (which is also associated with maximising the other health benefits of breastfeeding and minimising morbidity and mortality) is compatible with achieving the lowest rates of atopic disease.
> - If breastfeeding is discontinued for any reason, there is no advantage in using specialised formulas, except under medical supervision.
> - Soy milk and goat's milk formulas do not reduce allergies, and should not be used as an alternative to cow's milk formulas.
> - Solid foods should be introduced at about six months of age.
> - Introduce a variety of foods. Foods can be introduced in any order.
> - Continue breastfeeding while introducing solid foods.

1.1.1.9 Benefits later in life

Breastfeeding confers health advantages that persist into later life (Horta, Bahl et al. 2007; Ip, Chung et al. 2007) This is a difficult area for study and the evidence comes predominantly from observational studies with the inherent problem of confounding. Other limitations of the evidence include the potential for recall bias associated with the retrospective design of most studies and differences in definitions of breastfeeding exposure. Nevertheless, numerous systematic reviews and meta-analyses have provided suggestive evidence of a protective association between breastfeeding and several risk factors for cardiovascular disease in later life, including total and LDL cholesterol (Evidence Grade C), glucose levels (Evidence Grade C) and probable evidence of a protective association between breastfeeding and high blood pressure in later life (Evidence Grade B) (Martin, Gunnell et al. 2005; Horta, Bahl et al. 2007; Ip, Chung et al. 2007; Owen, Whincup et al. 2008).

1.1.1.10 Obesity

Recent systematic reviews and meta-analyses have provided convincing evidence that, compared to infants who are formula fed, being breastfed, is associated with reduced risk of becoming obese in childhood, adolescence and early adulthood (Evidence Grade A) (Owen, Martin et al. 2005; Horta, Bahl et al. 2007; Ip, Chung et al. 2007; Monasta, Batty et al. 2010). The protection offered by breastfeeding appears to increase with duration of breastfeeding and plateau at nine months (Harder, Bergmann et al. 2005; White House Task Force on Childhood Obesity 2010). In a random effects model, breastfed individuals were less likely than individuals who had never been breastfed to be considered overweight and/or obese, with a pooled OR of 0.78 (95% CI 0.72-0.84) (Horta, Bahl et al. 2007). Harder and colleagues (2005) reported an inverse association between duration of breastfeeding and the risk of overweight. A Western Australian cohort study found that infants breastfed for >12 months were leaner at 1 year but not at 8 years. Breastfeeding for less than4 months was associated with greatest risk of overweight. Familial factors may modify associations between breastfeeding and adiposity beyond infancy (Burke, Beilin et al. 2005). However this association was not found in another study in Belarus (Kramer, Chalmers et al. 2001).

1.1.1.11 Psychological benefits

Breastfeeding can be an important factor in the bonding between mother and infant. The interdependence between the breastfeeding mother and infant, the regular close interaction and the skin-to-skin contact during breastfeeds encourage mutual responsiveness and attachment (Moore, Anderson et al. 2009).

Several studies have shown that the method of feeding in early life affects cognitive development. A recent meta-analysis of eight studies of at least one month duration of breastfeeding indicated that children who were breastfed reported higher scores on intelligence tests (mean difference: 4.9; 95% CI 2.97-6.92) than those who were never breastfed or breastfed for less than one month (Horta, Bahl et al. 2007). This beneficial effect becomes more pronounced with increasing duration of breastfeeding (Lancet 1996; Angelsen, Vik et al. 2001). Benefits are more obvious in pre-term infants, with those given breastmilk for at least one month having enhanced cognitive development (approximately 7 IQ units) at seven to eight year of age compared with formula fed pre-term infants (Carlson 1990; Bauer, Ewald et al. 1991; Lucas, Morley et al. 1992; Horwood, Darlow et al. 2001). This response may be related to the higher concentration of a particular polyunsaturated long-chain fatty acid (docosahexaenoic acid, or DHA) in breastmilk (Fleith and Clandinin 2005).

> **Box 1.2 Breastfeeding to around six months: Summary of major points**
>
> - Exclusive breastfeeding to around six months is associated with the lowest short, medium and long term risk of morbidity and mortality, including obesity and allergic disease.
> - Introduction of complementary foods before three - fourmonths is associated with increased risk of allergic disease
> - Delay in the introduction of solid foods until after the age of six months is associated with increased risk of developing allergic syndromes.
> - Around six months is compatible with the "window of tolerance" postulated for the introduction of complementary foods to minimize allergies.
> - Around six months is defined as within four weeks of six months, ie 22-26 weeks
> - Exclusive breastfeeding for around six months is associated with the lowest risk of later obesity

1.1.2 Benefits to the mother

1.1.2.1 Health

There is evidence that breastfeeding reduces the risk of ovarian and breast cancer, the latter particularly in premenopausal women (Ip, Chung et al. 2007). The Collaborative Group on Hormonal Factors in Breast Cancer considered worldwide data from epidemiological studies in 30 countries that included information on breastfeeding patterns and other aspects of childbearing (Beral, Bull et al. 2002). Their meta-analysis showed a relative risk of breast cancer reduction of 4·3% (95% CI 2·9–5·8) for every 12 months of breastfeeding in addition to a decrease of 7·0% (95% CI 5·0-9·0) for each birth.

There is some evidence that breastfeeding reduces the risk of developing type 2 diabetes amongst women with a history of gestational diabetes. There is little evidence however, from six case-control studies, of an association between lifetime duration of breastfeeding and risk of fractures due to osteoporosis (Ip, Chung et al. 2007).

Breastfeeding hastens uterine involution after birth and reduces the risk of haemorrhage (thus reducing maternal mortality) and preservation of maternal

haemoglobin stores through reduced blood loss, leading to improved iron status (Chan, Nelson et al. 2001; Sobhy and Mohame 2004). There is equivocal evidence that breastfeeding helps the mother regain her pre-pregnancy body weight (Ip, Chung et al. 2007). Ip et al. (2007) identified a number of methodological challenges in studying the effect of breastfeeding on postpartum weight loss including 'the accurate measurement of weight change, adequate control for numerous covariates including the amount of weight gain during pregnancy and quantifying accurately the exclusivity and the duration of breastfeeding'.

1.1.2.2 Contraceptive effect

Although breastfeeding is not regarded as a reliable method of contraception for individual women in Australia, it does provide useful benefits on a population-wide basis. There is probable evidence that women who exclusively breastfeed for six months experience more prolonged lactational amenorrhoea (Evidence Grade B) (Lopez, Hiller et al. 2002 (reprinted 2010)). If all women in the world stopped breastfeeding, it is estimated that 30-50% more children would be born in the following 12 months (Becker, Rutstein et al. 2003; Labbok 2006). The likelihood of pregnancy during periods of lactational amenorrhoea is as low as 1.7% in the first six months if a woman is amenorrhoeic, fully or nearly fully breastfeeding day and night (Short, Lewis et al. 1991; Heinig, Nommsen-Rivers et al. 1994; WHO 1995). Even in developed countries that rate compares favourably with barrier methods of contraception, as long as the woman remains amenorrhoeic (Gray, Campbell et al. 1990; Kennedy and Visness 1992; Labbok 1995). The contraceptive effects of lactational amenorrhoea were included in summaries of the Cochrane Review (2002) and the most recent study of lactational amenorrhoea in Australia, which was published in 2002 (Gross and Burger 2002; Hiller, Griffith et al. 2002).

1.1.2.3 Economic benefits

Breastmilk also offers economic benefits to both the family and society and in 1992 the breastmilk supplied by Australian women was estimated to be worth $2.2 billion, which was equivalent to about 0.5% of Gross Domestic Product (GDP), or 6% of private spending on food (Smith 1999). In 2001, it was estimated that a minimum of US$3.6 billion would be saved from the costs of treatment of three childhood illnesses: otitis media, gastroenteritis and necrotising enterocolitis if breastfeeding levels were increased to those recommended by the US Surgeon General (75% in-hospital and 50% at six months) (Weimer 2001). Similarly, in 2002, it was calculated that not breastfeeding led to extra costs to the Australian Capital Territory (ACT) health system of one to two million per year from just five diseases: gastrointestinal illness; respiratory illness; otitis media; eczema; and necrotising enterocolitis (Smith, Thompson et al. 2002). A more recent

analysis from the US found that if 90% of US families could comply with medical recommendations to breastfeed exclusively for six months, the United States would save $13 billion per year and prevent an excess 911 deaths per year (Bartick and Reinhold 2010). The economic case for promoting breastfeeding to at least six months is overwhelming.

1.2 Protection, promotion and support of breastfeeding

All pregnant women should be encouraged and supported to breastfeed and their right to be supported in their decision to breastfeed should be protected. In 2009, the Australian Health Ministers' endorsed the Australian National Breastfeeding Strategy 2010-2015. The strategy 'provides a framework for priorities and action for all governments to address the protection, promotion, support and monitoring of breastfeeding throughout Australia' (Australian Health Ministers' Conference 2009). This strategy builds on State and Territory breastfeeding policies and the earlier National Breastfeeding Strategy (1996-2000).

1.2.1 Protection of breastfeeding

Breastfeeding protection is described in the Australia National Breastfeeding Strategy (Australian Health Ministers' Conference 2009) as enabling mothers to breastfeed their babies and young children anywhere a mother and child have a right to be, with confidence and without harassment. Most Australian jurisdictions have specific legislation to prevent discrimination against breastfeeding mothers.

There is probable evidence that intention to work or return to paid employment is negatively associated with both the initiation and duration of breastfeeding in the majority of recent Australian studies (Evidence Grade B) (Scott, Binns et al. 2006; Cooklin, Donath et al. 2008). Breastfeeding duration tends to be longer in those countries with paid parental leave schemes, such as the Scandinavian countries (Australian Health Ministers' Conference 2009). A paid parental leave scheme was introduced in January 2011 in Australia as a national scheme (Department of Families Housing Community Services and Indigenous Affairs 2010). No data are available at the time of printing on the impact of this on breastfeeding rates.

1.2.2 Promotion of breastfeeding

The Australian National Breastfeeding Strategy 2010-2015 has defined breastfeeding promotion in the context of the definition of health promotion proposed by Howat et al. (2003):

> A combination of educational, organisational, economic and political actions designed with consumer participation, to enable individuals, groups and whole communities to increase control over, and to improve

their health through attitudinal, behavioural, social and environmental changes.

More details of the Australian National Breastfeeding Strategy 2010-2015 are provided in Appendix E (Page 171)

The Australian Government is committed to protecting, promoting and supporting exclusive breastfeeding to around six months of life and continued breastfeeding thereafter (Department of Health and Ageing 2010). Australia is one of the few developed countries in the world to include a guideline related to on breastfeeding in its Dietary Guidelines and has done so since 1981 (NHMRC 2003). The guideline is included in recognition of the role the whole community plays in encouraging and supporting breastfeeding.

A number of systematic reviews provide evidence-based actions for promoting the initiation and duration of any and/or exclusive breastfeeding among healthy, full-term babies (Dyson, McCormick et al. 2005; Shealy, Li et al. 2005; Dyson, Renfrew et al. 2006; Chung, Raman et al. 2008; Britton, McCormick et al. 2009).

1.2.3 Maternity care practices

Chung et al. (2008) conducted a systematic review of the effectiveness of primary care (including maternity services) initiated interventions to promote breastfeeding and found convincing evidence that compared with usual care primary care, breastfeeding interventions resulted in increased rates of breastfeeding initiation and short (one to three months) and long-term (six to eight months) exclusive breastfeeding (Evidence Grade A). A further sub-group analysis revealed that interventions involving both ante- and postnatal actions had a larger effect than either ante- or postnatal interventions alone.

Baby-friendly Hospital Initiative

The joint WHO–UNICEF Baby-friendly Hospital Initiative (BFHI), launched in 1991, seeks to eliminate hospital practices that may interfere with successful initiation and maintenance of breastfeeding (www.unicef.org/programme/breastfeeding/baby.htm). Although most Australian mothers now remain in hospital for only a short period after delivery, the hospital environment can still have a positive and lasting influence on breastfeeding. If hospitals however, are not supportive of breastfeeding the negative effects can be marked. For instance, a Cochrane systematic review (Donnelly, Snowden et al. 2005) has shown that that hospital practices such as the distribution of commercial sample packs can have an adverse effect on breastfeeding. The distribution of these packs (with or without formula) to mothers while in hospital reduces the number of

women who exclusively breastfeed (Rosenberg, Eastham et al. 2008; Bartick, Stuebe et al. 2009; Merewood, Grossman et al. 2010).

There is probable evidence that the implementation of the BFHI improves breastfeeding outcomes (Evidence Grade B) (DiGirolamo, Grummer-Strawn et al. 2008). All steps in this program have been shown to positively influence breastfeeding outcomes (DiGirolamo, Grummer-Strawn et al. 2008). In particular, evidence suggests that breastfeeding within the first hour after delivery is associated with improved breastfeeding outcomes (Evidence Grade C) (Scott, Aitkin et al. 1999; Scott, Binns et al. 2006). Evidence also suggest that the use of prelacteal feeds negatively affects breastfeeding duration (Evidence Grade C) (Szajewska, Horvath et al. 2006) and the use of a pacifier before four weeks is associated with a reduced duration of breastfeeding (Evidence Grade C) (Karabulut, Yalcin et al. 2009; Kronborg and Vaeth 2009).

The BFHI promotes the following actions as the core of its program:

Ten steps to successful breastfeeding

Every facility providing maternity services and care for newborn infants should (World Health Organization/UNICEF 2008):
1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within half an hour of birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they are separated from their infants.
6. Give newborn infants no food or drink other than breastmilk, unless medically indicated.
7. Practise rooming-in (allow mothers and infants to remain together), 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Abrahams and Labbok (2009) analysed country level data from 14 developing countries and reported that BFHI implementation was associated with average annual increases of 1.54 percentage points in the rate of exclusive breastfeeding of infants under two months and 1.11 percentage points in the rate of exclusive breastfeeding in infants under six months. The most robust evidence of the effectiveness of the BFHI is provided by the PROBIT study, a cluster randomised trial conducted in Belarus which reported that infants

from the intervention group were significantly more likely to be exclusively breastfed at three months and to be breastfed to any degree at 12 months (Kramer, Chalmers et al. 2001). In Scotland, breastfeeding initiation rates increased in Baby Friendly hospitals (Broadfoot, Britten et al. 2005) and similarly in Switzerland breastfeeding duration and level of exclusive breastfeeding were higher among babies born in BFHI accredited hospitals than hospitals without such accreditation (Merten, Dratva et al. 2005).

The Baby-friendly Hospital Initiative in Australia

In Australia the Baby-friendly Hospital Initiative is administered by the Australian College of Midwives. As of early 2011, there were 74 hospitals across Australia that had achieved 'Baby-friendly' status. This represents around 23 percent of all Australian hospitals providing maternity services (http://www.bfhi.org.au/text/bfhi_hospitals.html). While to date there is neither direct evidence that breastfeeding outcomes are better in Australian hospitals with 'Baby-friendly' status, nor evidence that BFHI implementation is likely to lengthen the duration of breastfeeding, the 'implementation of the BFHI is likely to protect against future erosion of exclusive breastfeeding initiation in Australian maternity hospitals' (Fallon 2005). The BFHI is not agreed Australian government policy.

Education and/or support programs

It is probable that breastfeeding support increases duration of exclusive and any breastfeeding both in the immediate post-natal period and at six months of age (Evidence Grade B) (Britton, McCormick et al. 2009, p. 7). The Cochrane Review which included 34 trials (29,385 mother-infant pairs) from 14 countries reported that professional support increased the rate of intermediate duration breastfeeding (up to four months) and had a beneficial effect on exclusive breastfeeding, particularly in the first three months (Britton, McCormick et al. 2009. p. 7). Lay or peer support had a significant beneficial effect on exclusive breastfeeding up to three months. Professional and lay support combined (five studies) showed a significant reduction in cessation of 'any breastfeeding', especially in the first two months with two studies showing a significant reduction in the cessation of exclusive breastfeeding (Britton, McCormick et al. 2009, p. 7). Additionally, peer support in the antenatal and postnatal period has been shown to be effective in increasing breastfeeding initiation (Dyson, McCormick et al. 2005).

Routine structured antenatal education classes have not been shown to increase breastfeeding success (Gagnon and Sandall 2007). However, breastfeeding targeted antenatal education in small groups is effective in increasing breastfeeding initiation rates and one-to-one health education can be effective in increasing initiation rates in low income mothers (Shealy, Li et al. 2005; Dyson, Renfrew et al. 2006).

The UK National Institute for Health and Clinical Excellence (Dyson, Renfrew et al. 2006, p. 26) provides the following evidence based action for promoting breastfeeding initiation and duration in relation to education and/or support programs.

An appropriate mix of the following education and support programmes should be routinely delivered by both health professionals/practitioners and peer supporters in accordance with local population needs.

- Informal, practical breastfeeding education in the antenatal period should be delivered in combination with peer support programmes to increase initiation and duration rates among women on low incomes.
- A single session of informal, small group and discursive breastfeeding education should be delivered in the antenatal period (including topics like the prevention of nipple pain and trauma) to increase initiation and duration rates among women on low incomes.
- Additional, breastfeeding specific, practical and problem solving support from a health professional/practitioner should be readily available in the early postnatal period to increase duration rates among all women.
- Peer support programmes should be offered to provide information and listening support to women on low incomes in either the antenatal or both the antenatal and postnatal periods to increase initiation and duration rates.
- The provision of easily accessible counseling and support services for all mothers, including those who are breastfeeding and those who are not breastfeeding their infants.

Educating fathers

There is evidence that fathers can influence the initiation of breastfeeding (Wolfberg, Michels et al. 2004; Scott, Oddy et al. 2006), contribute to maternal breastfeeding confidence (Ekstrom, Widstrom et al. 2003), and impact decisions regarding duration and weaning (Hauck 2004; Swanson and Power 2005). Without fathers' support, there is probable evidence that mothers are more likely to breastfeed for a shorter duration (Evidence Grade B) (Scott, Binns et al. 2006).

While some programs targeting the father's role in promoting breastfeeding have been effective in increasing initiation rates (Stremler and Lovera 2004; Wolfberg, Michels et al. 2004), less success has been achieved regarding impact on duration (Wolfberg, Michels et al. 2004; Pisacane, Continisio et al. 2005).

Support for breastfeeding in the workplace

There is evidence that workplace interventions can have a beneficial effect on prolonging breastfeeding (Shealy, Li et al. 2005). A nursing mothers' room that is centrally located and suitably equipped, where mothers can express their breastmilk in private, and safely store their milk is an important element of an effective workplace intervention. Additionally, flexible working hours and breastfeeding breaks will further support mothers to continue to breastfeed on return to work. Healthcare workers can have a positive influence in encouraging supportive workplaces (for example, http://www.activehealthycommunities.com.au/content/breastfeeding-baby-care), although it is recognised that providing this support may be more difficult in some workplaces than others.

Programs to increase social acceptance of breastfeeding

Embarrassment with breastfeeding is frequently cited by women, particularly from Western cultures, as a reason for not breastfeeding (Heath, Tuttle et al. 2002; Li, Fridinger et al. 2002; Scott and Mostyn 2003). Those women who do initiate breastfeeding but are embarrassed at the prospect of breastfeeding in public often will confine themselves to home or attempt to restrict their movement and length of time that they are away from home to avoid the need to nurse in public, usually to the detriment of breastfeeding duration (Scott 2011). The work of Li and associates (Li, Fridinger et al. 2002; Li, Hsia et al. 2004) which attempts to quantitatively measure public attitudes and beliefs has revealed a variety of contradictory opinions amongst US adults. For instance, while 43.1% of adults surveyed supported a woman's right to breastfeed in public only one in four adults (27.9%) thought it appropriate to show a woman breastfeeding her baby on television shows (Li, Hsia et al. 2004). Their work highlights the apparent contradiction between society's endorsement of breastfeeding as the best way to feed a baby while at the same time frowning on, or even prohibiting, breastfeeding in public.

While media campaigns, particularly involving paid television advertising, have been shown to improve attitudes towards breastfeeding and increase initiation rates there have been no scientific studies to increase the public acceptance of breastfeeding in public places (Shealy, Li et al. 2005).

Supporting vulnerable groups

There is evidence that certain groups are less likely to breastfeed than others and would benefit from increased antenatal and postnatal support. These include Indigenous women (AIHW 2009), younger women, particularly those less than 20 years of age, (Evidence Grade B) (Yeoh, Eastwood et al. 2007; Cooklin, Donath et al. 2008), less well-educated women (Evidence Grade C) (Baghurst, Pincombe et al. 2007; Cooklin, Donath et al. 2008) and/or those of

lower socio-economic status (Evidence Grade C) (Amir and Donath 2008). Approximately 10 to 15 percent of women experience depression within 12 months of delivery (Grote, Vik et al. 2010) and evidence suggests that postnatal depression is associated with shorter breastfeeding duration (Evidence Grade C) (Dennis and McQueen 2009).

The evidence that caesarean section delivery is negatively associated with the initiation of breastfeeding, particularly exclusive breastfeeding, and to a lesser extent duration is very limited (Evidence Grade D) (Scott, Binns et al. 2006; Baxter, Cooklin et al. 2009).

2. Initiating, establishing and maintaining breastfeeding

Health professionals and voluntary health workers can provide invaluable help for mothers initiating breastfeeding. Offering factual information and empathetic support, demonstrating practical skills, and discussing strategies for problem solving, all work to create a positive environment for breastfeeding. Nevertheless, it is important to view this role as one of encouragement and support between mother and worker, always having regard for the mother's suggestions, concerns and cultural background.

2.1 Breastfeeding education for parents

Breastfeeding should be regarded as 'best practice' for most full term infants.

All women should be informed of the benefits of breastfeeding. Health professionals should also discuss the management of breastfeeding with mothers, and they should be encouraged to use the services available for antenatal education. Routine antenatal education should cover the importance of exclusive breastfeeding to around six months (including the nutritional and protective benefits), basic breastfeeding management, and anticipatory guidance for coping with minor problems. Physiologically, almost all women can breastfeed (i.e. they produce breastmilk after giving birth), but for some breastfeeding is not easy and learning and patience are necessary (Brodribb 2006).

In many cultures the support of grandmothers and other female relatives is very important and changes in family structures in Australian society now mean that the father's role has assumed greater importance. Education programs should involve fathers and help them understand the advantages of breastfeeding and the important role they can play in supporting the breastfeeding mother (Scott and Binns 1998).

A range of useful, easy-to-read, publications dealing with pregnancy and breastfeeding is available through antenatal programs, hospital wards, outpatient services, early childhood centres, community health centres, health department publication services and websites and medical practitioners. Many hospitals and other agencies also offer information about the Australian Breastfeeding Association (ABA) and contact details for local support groups. A resource list is provided in Appendix H. The ABA's Lactation Resource Centre has breastfeeding information available in a variety of media. Many of these resources are also available from local ABA groups.

In hospital, during the postnatal period, midwives give support, help and advice as mothers begin breastfeeding. A lactation consultant is generally available if someone experiences difficulties and needs specialist advice.

Women whose babies are in special care should be encouraged—using both practical demonstration and written information—to initiate and maintain an adequate milk supply. When expression of breastmilk is required, mothers sometimes have particular difficultly in the immediate post-partum period and may require extra support.

Following discharge from hospital, support, particularly from community midwives and lactation consultants, may be beneficial. Mothers are also encouraged to seek assistance from other people, such as maternal and child health nurses and ABA counsellors. General practitioners need to be familiar with breastfeeding or at least with points of referral for assistance.

2.1.1 Antenatal advice

The initial antenatal interview between a woman and her doctor or midwife should include a careful assessment of a woman's (and her partner's) attitudes, beliefs, expectations, knowledge and experience in relation to infant feeding. Nursing and medical practitioners often leave discussion of breastfeeding until later in the pregnancy, but research shows that the earlier in the pregnancy a decision to breastfeed is made the more likely that breastfeeding will be successful (Scott, Oddy et al. 2006).

During antenatal examination the following breast characteristics should be noted:
- scars indicating previous surgery
- extra-large breasts, which may sometimes cause initial difficulties with attachment
- nipple or areola eczema or dermatitis
- minimal or absent development of the mammary tissue—very rare
- any other breast pathology.

Physical problems that interfere with breastfeeding are extremely rare, and in most societies breastfeeding has been universal (Binns 1976; Dettwyler 1995). However, there is limited evidence that perceived breast milk sufficiency is the reason for 25 to 35 percent of lactating women reducing the duration or exclusivity of breastfeeding (Evidence Grade D) (Gatti 2008). Approximately eight to ten percent of lactating women have at least one flat, inverted or non-protractile nipple, for which antenatal treatment is not recommended as it has been found to be ineffective and associated with a negative impact on breastfeeding (Alexander, Grant et al. 1992; MAIN Trial Collaborative Group 1994). Various practices for antenatal nipple preparation—including some form of nipple friction, applications of cream, and antenatal expression of colostrum—have been evaluated by a number of researchers, but no evidence has been found to support these practices (Lawrence and Lawrence 2005, p. 268). Nor is there evidence to support the

commonly-held belief that fair-skinned women are more likely to experience nipple problems (Brockway 1986) (Giugliani 2004).

2.2 Physiology of breastmilk and breasfeeding

2.2.1 Breastmilk production

The alveoli of the breast mature during pregnancy under the control of the hormones of pregnancy. Progesterone, prolactin and human placental lactogen are essential for the final stages of mammary growth and differentiation. Lactogenesis Stage One is complete by mid-pregnancy; the breast is then able to secrete and lactose is found in blood and urine. During the first three to four days post-partum, copious milk secretion occurs; this is Lactogenesis Stage Two (Hale and Hartmann 2007) and it involves preparation of the mammary epithelium, progesterone withdrawal, maintained prolactin levels, and removal of milk from the breast (Neville, Morton et al. 2001).

Milk 'comes in' about 48 to 72 hours after birth and is perceived by the mother as the start of lactation (Perez-Escamilla and Chapman 2001). However, milk 'coming in' does not mean a sudden increase in the infant's milk intake, and the aetiology of associated engorgement is poorly understood.

2.2.2 Regulation of milk production

It has long been known that one of the most important factors in successful lactation is removing milk from the breasts. Research shows that the lactating mammary gland exercises a local feedback inhibitory control over milk synthesis, referred to as autocrine control (Hartmann, Sherriff et al. 1995; Wilde, Addey et al. 1995). It is important to emphasise the following simple equation:

$$\text{SUPPLY} = \text{DEMAND}$$

The rate of milk production is regulated to match the amount of milk removed, with the baby controlling milk intake (Ramsay, Kent et al. 2004). If milk withdrawal has not started within three days post-partum, the changes in milk composition with lactogenesis are reversed and the likelihood of the establishment of successful breastfeeding declines (Kulski, Hartmann et al. 1978; Neville, Morton et al. 2001).

Prolactin is secreted by the anterior pituitary gland in response to sucking and the consequent stimulation of the nerve endings in the nipple and areola. The secretion is greatest in early lactation and declines to only a small response six months after birth. There does not appear to be any relationship

between the release of prolactin and milk yield once lactation is established (Kent 2007). It is thought that hormonal influences regulate the maximum potential for milk production in women and that autocrine control 'down regulates' milk synthesis to match the mother's supply of milk to the infant's appetite. The rate of milk synthesis is related to the degree to which the breast has been drained; the subsequent rate of milk synthesis is higher if the breast is well-drained (Daly, Kent et al. 1996; Kent 2007).

A meta-analysis of the milk volumes of exclusively breastfeeding women shows that milk production is fairly constant across studies from a number of different countries, at about 800 millilitres a day (mean 820ml; SD 110ml) (Neville 2001). A more recent detailed study of Australian mothers found an average production of 798 grams per day (range 478-1356 grams per day) (Kent, Mitoulas et al. 2006).

2.2.3 Milk ejection

Within seconds of a baby stimulating the sensory nerve endings around the nipple by sucking, a pulse of oxytocin is released from the posterior pituitary gland. Oxytocin stimulates the contraction of myoepithelial cells surrounding the alveoli, and milk is forced into the ducts and milk sinuses towards the nipple. This process is known as milk ejection or milk let-down. Multiple releases of oxytocin can occur during a breastfeed (or during breast expression). Milk ejection can be blocked by stress, but it rarely seems to be a problem in breastfeeding mothers; on the other hand, eliciting milk ejection can at times be a problem for mothers expressing breastmilk.

2.2.4 Control of the initiation of lactation after birth

Late in pregnancy, copious milk production is inhibited by the high concentrations of blood progesterone. In the presence of permissive hormones (prolactin, cortisol and insulin), the withdrawal of progesterone following the delivery of the placenta triggers a rapid increase in milk production approximately 30 to 40 hours after birth (Kulski, Smith et al. 1977).

Delayed onset of lactation has been associated with stressful deliveries which may interfere with the release of oxytocin, the hormone that is responsible for milk ejection (Dewey 2001).

The withdrawal of progesterone and the changes in milk composition following delivery by caesarean section are similar to those following normal delivery (Kulski, Smith et al. 1981; Chapman and Perez-Escamilla 1999) There is limited evidence (Evidence Grade D) (Patel, Liebling et al. 2003; Scott, Oddy et al. 2006; Zanardo, Svegliado et al. 2010) that delivery by caesarean section may be negatively associated with the initiation of breastfeeding, particularly exclusive breastfeeding, and to a lesser extent

breastfeeding duration. Not all studies have reported a negative association between breastfeeding and caesarean section delivery (Patel, Liebling et al. 2003; Scott, Binns et al. 2006). These differences may be related to the type of anaesthesia used, the post-partum management of women who deliver by caesarean section and the prevalence of caesarean section in the population (Qiu, Binns et al. 2008). For instance, mothers who delivered by caesarean section have been shown to have a longer time to first breastfeed than those who deliver by spontaneous or instrumentally assisted vaginal delivery (Rowe-Murray and Fisher 2002), and it is suggested that the early initiation of breastfeeding within one hour of birth is associated with improved breastfeeding outcomes (Evidence Grade C) (Rutishauser and Carlin 1992; James 2004). Where possible, management of breastfeeding after a caesarean section delivery should be similar to that after a normal birth.

Initiation of lactation is delayed a further 24 hours in women who have type 1 diabetes (Hartmann and Cregan 2001) and may be inhibited if there is a retained placental fragment (Lawrence and Lawrence 2005). These factors should be considered in the perinatal management of lactation with women receiving additional support and encouragement to breastfeed.

Maternal obesity has a probable negative association with the initiation of breastfeeding and breastfeeding duration (Evidence Grade B), and has been associated with delayed onset of lactation (Dewey, Nommsen-Rivers et al. 2003; Rasmussen and Kjolhede 2004). It has been postulated that, as adipose tissues concentrate progesterone, obese women may have higher levels of progesterone, which would lead to a reduced prolactin response and a subsequent delay in the onset of lactogenesis stage II (Rasmussen and Kjolhede 2004). Lovelady (2005) argues however, that it is impaired suckling as a result of mechanical difficulties that leads to the diminished prolactin response and not elevated levels of progesterone, suggesting a physical rather than a physiological mechanism. Despite initial difficulties, with sufficient lactation guidance the vast majority of overweight women are able to successfully establish exclusive breastfeeding (Dewey, Nommsen-Rivers et al. 2003).

2.2.5 Breastmilk composition

Human breastmilk is a very complex secretion, consisting of thousands of compounds and cellular components (Picciano 2001). Furthermore, the composition of milk varies greatly between different species, and mature human milk tends to fall at one extreme (see Tables II.1 and II.2), having very low concentrations of protein and sodium chloride and high concentrations of lactose and oligosaccharides (McClellan, Miller et al. 2008).

Human breastmilk has a characteristic very pale whitish-blue appearance. One important component is, of course, water. This meets all the infant's requirements, and for at least six months no additional fluids are required when breastfeeding. Breastmilks whiteness is a result of its fat content, so hind milk, which usually has a higher fat content than fore milk, has a whiter appearance. It is misleading to describe breastmilk as 'thin' or 'watery'; it contains the same energy and total solids content as cow's milk. Precipitation of the casein curd from milk produces whey that contains soluble proteins, lactose and many water-soluble minor components.

Table II.1   Composition of mature human milk and cow's milk and composition of infant formula

Mean Value for Component (per Litre)

	Mature human milka	Cow's milkb	Infant formulac
Energy (kJ)	2929	2830	2500–3550
Energy (kcal)	700	677	597–848
Protein (g)	10.3	34	11–24.8
Fat (g)	44	34	26–53
Carbohydrate (g)	69	62	72–75
Sodium (mg)	7.4	360	125-532
Calcium (mg)	320	980	min 300
Phosphorus (mg)	140	890	150–887
Iron (mg)	0.3-0.9d	negligible	5–17.7e
Vitamin A (mcg)	670	510	350-1526
Vitamin C (mg)	40	negligible	min 42.5
Vitamin D (mcg)	0.55	5.2	6.25-22.3
Potassium (mg)	13	1420	500–1775

a.   Sources: Brodribb (2006), Mahan and Escott-Stump (2008)
b.   Regular fat (~3.5%) cow's milk. Source: AUSNUT 2007 (2008)
c.   Ranges for infant formula products (from birth, cow's milk–based). Adapted from: Australia New Zealand Food Standard Code 2.9.1 (2011)
d.   Iron in breastmilk is highly bioavailable, with absorption of 50–70%.
e.   Iron in infant formula is poorly bioavailable, with only about 10% absorption.

Table II.2   Composition of milk from selected species: a comparison (grams per litre)

Species	Lactose	Protein	Fat
Human	70	8	41
Horse	62	19	13
Pig	55	56	83
Cow	48	32	37
Goat	41	29	38
Sheep	48	55	74
Dog (she-wolf)	38	75	95
Rabbit	22	103	151
Harp seal	1	87	422

Source: Hale and Hartman (2007)

The increase in the fat content as milk is withdrawn from the breast is a feature of mammalian lactation. Much emphasis has been given to the significance of this change for an infant's energy intake, but the physiology of milk synthesis, secretion and removal is not fully understood. There are only two ways a breastfed baby can obtain a higher energy intake over a 24 hour period: if the mother produces more milk, or if the mother produces the same volume of milk with a higher fat content. Since animal studies demonstrate that it is indeed very difficult to alter the average daily composition of milk, it is not surprising that research has shown that variations in the intervals between breastfeeds and in the amount of milk withdrawn during a breastfeed explain only a small proportion (20-26%) of the variation in the fat content of breastmilk (Jackson, Imong et al. 1988; Daly, Di Rosso et al. 1993). The degree of breast emptying explains changes in the fat content, but not fatty acid composition, of human milk (Daly, Di Rosso et al. 1993).

One factor that does determine the fat content of breastmilk is the fullness of the breast. The first milk withdrawn from a full breast has a low fat content, and the fat content begins to rise more rapidly after the removal of about 40 percent of the breast's storage capacity. Depending on both the fullness and the storage capacity of the mother's breasts, the fat content at the end of one breastfeed (the hind milk) may be either lower or higher than that at the beginning (the fore milk) of a subsequent breastfeed (Daly, Di Rosso et al. 1993; Hale and Hartmann 2007).

Colostrum, which is produced in the breast during late pregnancy and for the first 30 to 40 hours after birth, is yellowish and thicker than mature milk, and it contains a high concentration of immunoglobulins (Brodribb 2006).

2.2.6 Individual variation

Mothers and babies vary considerably in a range of aspects of breastfeeding (Daly, Owens et al. 1993). The anatomy of the breast varies greatly between women. Some women can store up to six times more milk than other women (Daly, Owens et al. 1993; Daly and Hartmann 1995). As a result, women with large storage capacity have great flexibility in their frequency of breastfeeding, while women with a smaller storage capacity need to feed more frequently to maintain similar levels of milk production. This latter group should spread breastfeeds fairly evenly over the 24 hour day. This highlights the importance of infant-led feeding—allowing the infant to regulate intake according to need. It also shows the value of letting the infant 'finish' the feed in his/her own time, not according to the clock.

Apart from storage capacity, there is considerable variability in the rate of milk flow, the nature of mouth–breast positioning, and the changes in milk composition during a feed. Advice should be tailored to each mother and her infant's circumstances, rather than arbitrary rules on timing and positioning being imposed (Dewey and Lonnerdal 1986).

2.2.7 Maternal nutrition and lactation

Good nutrition is very important for the health and wellbeing of all women and particularly for lactating women, who have additional nutritional requirements (Picciano 2001). The additional nutrient requirements are documented in the Nutrient Reference Values for Australia and New Zealand (NHMRC & MoH 2006). A range of dietary patterns providing these nutrient requirements have been described in the new Food Modelling System for Australia to inform the revision of the Australian Guide to Healthy Eating.

While milk intakes of infants are quite variable, average intakes of exclusively breastfed infants range from 710 g/day at birth to two months of age to 900 g/day at nine to 11 months of age. For partially breastfed infants, average intake decreases from 640–687 g/day at birth to five months of age to 436–448 g/day after nine months of age.

Mothers have increased energy needs while breastfeeding. It is estimated that a woman who fully breastfeeds for the first six months and partially breastfeeds thereafter will require, on average, an extra 2000–2100 kJ/day (NHMRC & MoH 2006). However this amount will vary depending on the mother's level of milk production, rate of postpartum weight loss and changes in physical activity level.

Milk production and protein, fat and lactose concentration are largely unaffected by maternal diet (Kent 2007). However, the maternal diet can influence the micronutrient and fatty acid composition of breastmilk (Gonzalez-Cossio, Habicht et al. 1998; Canfield, Kaminsky et al. 2001;

Picciano 2001).The principles of the Australian Guide to Healthy Eating and the Dietary Guidelines for Australians (NHMRC 2011) remain the basis of an appropriate diet for a lactating woman. Mothers who are on very restrictive diets—vegans, for example—will need specific assessment to ensure that they are not deficient in nutrients such as vitamin B12.

Vitamin D

The vitamin D content of breast milk is highly variable and is directly related to the mother's vitamin status (Wagner and Greer 2008). If a mother's stores are replete her infant has an 8-12 week store of vitamin D (Pettifor 2004), thereafter the vitamin D content of breast milk is inadequate to meet infant requirements. In Australia however, the incidence of rickets in breastfed infants is still rare, particularly in infants less than six months of age. Most breastfed infants receive adequate amounts of vitamin D through breastmilk and casual exposure to sunlight (Henderson 2005).

Nevertheless, vitamin D deficiency has re-emerged as a significant paediatric health issue in specific population sub-groups (Munns, Zacharin et al. 2006). Breastfed infants of dark-skinned peoples who are at greater risk due to their increased skin pigmentation, which necessitates a considerably longer exposure to sunlight to produce vitamin D, as are infants of veiled women who have limited exposure to sunlight for cultural reasons, exacerbated by increased skin pigmentation (Scanlon 2001; Munns, Zacharin et al. 2006).

The American Academy of Pediatrics (AAP) recommends that all breastfed infants receive a daily supplement of 400IU (10 mcg) of vitamin D per day (Wagner and Greer 2008). In Australia the recommendation to use vitamin D supplements (10 mcg/day) is limited to 'at risk' breastfed infants of dark-skinned and veiled women (Munns, Zacharin et al. 2006). The vitamin D status of mothers and infants requires further research in Australia.

Breastfeeding and weight loss diets

While there is some evidence that breastfeeding promotes postpartum weight loss, during pregnancy many women gain weight in excess of recommended guidelines and, even with breastfeeding, fail to return to their pre-pregnancy weight. Excess weight gain in pregnancy and failure to return to pre-pregnancy weight within six months postpartum have been reported to be predictors of long-term obesity (Rooney and Schauberger 2002; Amorim, Linne et al. 2007).

There is a theoretical risk that weight reduction may compromise lactation and it has been argued that lactating women should not attempt weight loss before six months postpartum, after which time breastmilk is no longer the sole source of nutrition for their infant (Butte 2000). However, evidence from

a number of studies suggests that dietary restriction that promotes modest weight loss has no effect on milk volume and concentration and that interventions that involve moderate energy deficits, or higher energy deficits of short term duration, do not impair lactation (Strode, Dewey et al. 1986; Dusdieker, Hemignway et al. 1994; McCrory, Nommsen-Rivers et al. 1999).

2.2.8 Attaching and positioning at the breast: the key to successful breastfeeding

An infant's 'milking' of the breast is dependent on two things: 'latching-on' to sufficient breast tissue containing the lactiferous sinuses or milk glands; and the correct sucking or milking action with the tongue. Correct positioning at the breast and correct latching-on and milking action are vital for the efficient removal of milk from the breast without nipple pain or trauma.

- The mother should be seated comfortably in an upright position, so that her breasts fall naturally. She should have good support for her back, arms and feet. The infant should be unwrapped to allow easy handling and avoid overheating.
- If the nipple is erect, support the outer area of the breast with a 'C' hold, being careful not to alter the breast position. If the nipple is flat or inverted, move the 'C' hold under the breast and shape the breast between the thumb and index finger, well back from the areola.
- The infant should be supported behind the shoulders and facing the mother, with his or her body flexed around the mother's body. The position must be a comfortable drinking position for the infant.
- The infant's top lip should be level with the mother's nipple, and a wide gape should be encouraged by teasing the infant's mouth with the nipple.
- When the infant gapes widely, bring him or her quickly onto the breast. So that the infant will take a good mouthful of breast, it is always advisable to bring the infant to the breast, not the breast to the infant.
- The chin should be tucked well into the breast, and the infant's mouth should be wide open, with the bottom lip curled back. More areola will be evident above the infant's top lip than below the bottom lip. When positioning is correct it is not necessary to hold the breast away from the infant's nose.
- After an initial short burst of sucking, the rhythm will be slow and even, with deep jaw movements that should not cause the mother any discomfort. Pauses are a normal part of the feed and they become more frequent as the feed continues.
- If the cheeks are being sucked in or there is audible 'clicking', the infant is not latched on correctly.
- The infant should stop feeding of his or her own accord by coming off the breast spontaneously. The nipple will appear slightly elongated but there should be no evidence of trauma.

Women normally experience heightened nipple sensitivity and tenderness in the first few days after birth but this subsides as breastfeeding becomes established. If nipples are already sore or cracked, and even if positioning and attaching errors are corrected, they may continue to be tender at the start and end of feeds for some time. The mother should be reassured that the discomfort will diminish as the nipples heal and feeding continues.

If the baby is correctly positioned and attached and is sucking correctly there should be no nipple pain.

2.2.9 Signs of a functioning let-down reflex

Although some mothers report no noticeable signs of the let-down reflex, many mothers do notice one or more of the following signs:
- tingling or prickling—'pins and needles', which may take several weeks to develop
- a sudden feeling of fullness
- an increase in skin temperature
- a feeling of wellbeing or relaxation
- for some mothers, pain or nausea
- dripping, leaking or spurting from the unsucked breast
- for some mothers, an intense thirst
- uterine contractions accompanied by a gush of lochia in the immediate postpartum period—more common in multiparas.

There may also be noticeable changes in the infant's sucking and swallowing pattern. This sign is more consistent than any of the others, but it may take the mother several days of observation after her milk 'comes in' to recognise the changes. There are two types of sucking: non-nutritive and nutritive. Non-nutritive sucking occurs in short, sharp bursts at a rate of up to two per second. Nutritive sucking occurs at a slower rate—about one per second. Once the milk has started to flow the sucking continues at a regular rate. As the feed progresses sucking becomes fragmented into bursts, usually separated by pauses of longer duration than are seen in the non-nutritive phase. At the start of each burst there may be two to three fast sucks typical of non-nutritive sucking— termed restart sucking.

2.3 The first breastfeed

There is evidence that starting to breastfeed within the first hour or so of birth is good for both mother and infant and for continued breastfeeding (Evidence Grade C) (Scott, Aitkin et al. 1999; Scott, Binns et al. 2006). A successful first breastfeed has a number of positive effects:
- it builds the mother's confidence in her ability to breastfeed

- the infant starts to receive the immunological benefits of colostrum
- the infant's digestion and bowel function are stimulated
- correct sucking at the breast at this stage may avert later sucking difficulties
- the bonding and attachment between mother and infant are enhanced.

Ideally, uninterrupted skin-to-skin contact should be maintained following birth. Common practices such as early weighing, bathing the infant, or passing him or her around should be delayed until later. Good antenatal education will help with parents' expectations in this regard. When the infant indicates an interest in sucking, the midwife can guide the mother into a comfortable position that will enable the infant to latch on correctly.

Unless there is a medical reason (such as prematurity) mother and infant should remain together, so that breastfeeding begins and proceeds according to the infant's needs—without restriction on the number or length of feeds. It should also be emphasised that although early contact between mother and infant is the ideal, when this is not possible it does not preclude successful breastfeeding. In Australia, the rates of breastfeeding are similar for infants delivered vaginally or by Caesarean section. In many cultures, the mother may not have contact with her infant for many hours, yet successful breastfeeding is almost universal.

3. Breastfeeding: Early days

3.1 The natural patterns of breastfeeding

Unrestricted feeding, both day and night, is an important factor in successfully establishing breastfeeding and results in optimum milk production. An infant will vary the feeds according to his or her needs and the rate of milk transfer. Babies typically establish a pattern of feeding eight to twelve times per 24 hour cycle during the first week of life. The length of each feed is very variable, and during the early neonatal period feeds can take about an hour. Failure to regularly stimulate milk supply via suckling, and failure to utilize available milk will inevitably lead to inhibition of lactation and under-supply of milk.

The Academy of Breastfeeding Medicine (ABM) state that prior to sending a mother and her infant home assessment of breastfeeding effectiveness should be performed. This requires a trained health professional evaluating position, latch, milk transfer, rate of infant weight loss, presence of jaundice, and stool and urine output. Any breastfeeding problems, either observed during the assessment or anticipated, should be attended to before discharge (Evans 2007).

At all times the aim of the health professional should be to help the mother achieve independence in breastfeeding and caring for her infant. If mothers are managing well, particularly mothers who have previously breastfed successfully, advice from midwives and others may be inappropriate if it is not asked for.

3.2 The sleepy newborn infant

The last trimester of pregnancy and the first months of life constitute a period of rapid change and maturation of the brain stem and sleep control mechanisms, including shifts in the nature of sleep and establishment of circadian rhythms. Newborn babies will vary in their levels of arousal, some remaining quite sleepy for some time after birth and not 'demanding' feeds. It is important to be sure that this is not related to the effects of maternal analgesia during labour and delivery, or to the effects of the birth process or illness. Babies who are born prematurely or post-term are more vulnerable to illness. Babies should not be allowed to sleep in preference to feeding in the first few days of life. This will not facilitate the establishment of lactation, and may mask illness. If the infant does not want to feed after about five hours, he or she should be roused and put to the breast.

3.2.1 Strategies for sleepy infants

A number of strategies can be used to rouse sleepy infants and encourage them to breastfeed:

- Changing the nappy often wakes an infant.
- Expressing a little colostrum and giving it by teaspoon, syringe or cup can give the infant the 'taste' and he or she will then start seeking the breast.
- Unwrapping the infant, talking to him or her, and gently stroking the legs and abdomen may stimulate him/her to wake and start seeking the breast.
- Sometimes getting the infant to suck on a finger will stimulate the sucking reflex; stroking the lip and cheek will stimulate the rooting reflex.
- The mother can cuddle her infant as often as she likes, and holding the infant against her breast may stimulate seeking.
- If the infant does not take the breast in spite of all efforts and is otherwise well, it is essential to express the colostrum and feed it by teaspoon, syringe or cup.

3.2.2 Persistent sleepiness

Occasionally sleepiness persists beyond the first day of life. The infant may be one of the few who do not wake for feeds and so may fail to thrive as well as expected. It is important that any medical causes are excluded before the infant is regarded as a 'sleepy' baby. This will be apparent after several days. If all other causes are excluded—particularly incorrect attaching to and sucking at the breast—the mother must make sure she feeds the infant at least six times every 24 hours. (Six feeds would be a minimum: mothers should expect that they may be feeding their newborn babies eight to twelve times in a 24 hour period.) These infants usually start feeding more frequently as they grow bigger and older. Before going home, the mother should be alerted to the possible need to offer more frequent feeds for some time to come.

3.3 The unsettled infant

Most infants have unsettled periods, which can be distressing for parents even though the causes (when they can be found) are usually minor. The midwife and mother may need to evaluate the feeding progress and develop strategies for settling the infant. Health professionals and parents should be aware that the use of bottles and pacifiers (dummies) is usually inappropriate at this early stage of breastfeeding. Unsettled periods may occur before the mother's milk 'comes in'. It is common for infants to want to feed frequently before the milk comes in, particularly in the second 24 hours. The mother may need to be reassured that this is normal and that frequent feeds help

stimulate the milk supply and reduce the likelihood of engorgement. Frequent feeds can, however, present a problem for tired mothers during the night.

After the milk comes in, the following factors should be assessed:
- Is the infant attached properly and getting the milk?
- Is the mother leaving the infant on the breast until he or she comes off naturally?
- Is the infant sucking properly?

Some infants take several days to establish a good sucking technique. Until that happens, the breastmilk may need to be expressed and given to the infant after the breastfeed, by spoon, cup or syringe.

3.3.1 Unrealistic expectations

Because of entrenched social attitudes about sleeping and eating schedules, many people mistakenly think infants sleep three to four hours in regular patterns around the clock. Infants' individuality and variations in their appetites should be carefully explained to new mothers.

3.3.2 Is the infant needing attention other than for breastfeeding?

Infants need contact for comfort in addition to food. The mother and the health professional should together consider strategies and options for helping restless or crying infants (see 'The crying infant' in Section 4.12).

3.3 Exclusive breastfeeding

Exclusive breastfeeding ensures that an infant receives the full nutritional and protective benefits of colostrum and breastmilk, with longstanding health benefits for the baby, and reductions in health service costs for the community. Maximising opportunities to breastfeed while mother and baby are still in hospital is important in initiating and maintaining breastfeeding. Interventions that may minimize the drive of mother and baby to breastfeed, such as use of pacifiers and supplementary feeds should be resisted.

3.3.1 The effects of bottle and pacifier use

Early use of bottles and pacifiers (dummies, soothers), especially before the first breastfeed, is believed to interfere with the natural processes of breastfeeding, reducing the infant's sucking capacity and the stimulation of the mother's breasts. The likely result is delayed or poor establishment of lactation (Newman 1990). A number of observational studies and a recent systematic review have documented an association of early cessation of breastfeeding with the use of pacifiers (Vogel, Hutchison et al. 1999; Binns

and Scott 2002; Scott, Binns et al. 2006; Karabulut, Yalcin et al. 2009). Recently however this association has been questioned in a prospective cohort study and in a systematic literature review (O'Connor, Tanabe et al. 2009). In the literature review evidence was found to suggest that the use of a pacifier before four weeks is associated with a reduced duration of breastfeeding (any, full and exclusive) (Evidence Grade C) (Karabulut, Yalcin et al. 2009; Kronborg and Vaeth 2009).

However a number of studies have confirmed a probable association between the use of pacifiers during sleep and a decrease in the risk of SIDS (Evidence Grade B) (Jenik, Vain et al. 2009). Overall, at the present time the evidence suggests that pacifiers not be used in the first four weeks of life (Karabulut, Yalcin et al. 2009; Kronborg and Vaeth 2009) but after four weeks that it is probable that the use of a pacifier reduces the risk of SIDS (Jenik, Vain et al. 2009).

3.3.2 The effects of giving supplementary feeds

Offering supplementary feeds—water, glucose or formula milk—when there is no medical reason has been shown to adversely affect the establishment and maintenance of successful breastfeeding (Fewtrell, Lucas et al. 2003; Forde and Miller 2010). An Australian study confirmed that provision of formula feeding in hospital decreased the likelihood of feeding to six months of age (Forde and Miller 2010). In the BFHI framework, step six states: 'Give newborn infants no food or drink other than breastmilk, unless medically indicated'. The literature review found suggestive evidence to support the hypothesis that the use of prelacteal feeds negatively affects breastfeeding duration (Evidence Grade C) (Fewtrell, Lucas et al. 2003; Forde and Miller 2010).

If an infant is unable to take all the feeds directly at the breast, expressed breastmilk should be the preferred method of feeding the infant (ABM 2009; Philipp 2010).

If lactation is not fully established, the mother should be helped to understand the processes of lactation and breastfeeding techniques. She should also be encouraged to call on support people or groups when in need; these can include home care, home midwifery services, lactation consultants, and early childhood nurses. The Australian Breastfeeding Association (ABA) offers counseling and mother-to-mother support seven days a week.

The use of supplementary feeds other than expressed breast milk is rarely necessary, and mothers should give their permission before such a step is undertaken.

Breastfeeding of premature infants is occasionally supplemented by formula feeding (usually a special product for low-birth weight infants) while in

hospital. If these feeds are to be continued after discharge, the mother's competence in formula preparation and bottle feeding should be ensured and follow-up care organised. In particular, the mother will benefit from information about how she can establish full breastfeeding by:

- gradually increasing her milk supply by expressing after feeds;
- increasing the number of breastfeeds per day; or
- gradually reducing the amount of bottle supplements, by putting slightly less in the bottle each time or by cutting down the supplement feed at a time, daily or on alternate days, or more slowly if appropriate.

Even if the mother does need to continue giving supplementary feeds indefinitely, it should not be suggested that the infant be totally formula fed. The mother should be encouraged to continue breastfeeding before offering the supplementary feed.

3.3.3 Rooming-in

Rooming-in 24 hours a day is the usual practice in most Australian hospitals. This means the infant is with the mother from birth. The practice is beneficial across a number of domains, and in particular encourages breastfeeding (Merten, Dratva et al. 2005; Asole, Spinelli et al. 2009; Abrahams, MacKay-Dunn et al. 2010). Rooming-in has become such a part of normal Australian obstetric practice that it is difficult methodologically to show difference and benefit, especially in relation to breastfeeding initiation and duration rates, compared to other practices (Scott, Aitkin et al. 1999; Scott, Binns et al. 2006). Perceived benefits of rooming-in include:

- facilitation of unrestricted breastfeeding
- promotion of mother–infant bonding
- prevention of cross-infection
- allowing both mother and infant contact with the father and other family members
- helping the mother learn about her infant's patterns of behaviour and feeding, which can help foster infant care.

After delivery the infant should remain with the mother, so that they are transferred to the postnatal ward together. The infant's cot remains beside the mother's bed. Many postnatal rooms are single or double rooms only, limiting the number of mothers and infants in each room. Mothers who have their infants with them at night lose no more sleep than mothers whose infants are in a nursery (Keefe 1988). Occasional use of the nursery or staff care during the day or night is an option for the mother, with the midwife caring for the infant between feeds while the mother sleeps or rests. If a mother does choose to place her infant with staff, the infant should be taken to her for breastfeeds or the mother should be encouraged and helped to express breastmilk.

After delivery by Caesarean section an infant is sometimes placed in the nursery. When the mother returns to the postnatal ward, the infant should be with her in her room. Initially, rooming-in after Caesarean section calls for extra support from the midwife.

3.3.4 Co-sleeping

In many cultures and amongst some sections of the communitity, it is common for mothers to sleep with their infants. The Academy of Breastfeeding Medicine (ABM) concluded at present there is insufficient evidence to support routine recommendations against co-sleeping (McCoy 2008). However, there are known 'safe sleeping' practices which include avoiding hyperthermia, not using soft pillows or bed coverings, avoiding smoking, and avoiding drugs that cause drowsiness (such as alcohol).
The Western Australian Department of Health recommends "any benefits of bed-sharing must be carefully considered with the known risk factors. When your baby is settled it is recommended that you return your baby to his/her cot" (Women and New Born Health Service, King Edward Memorial Hospital, www.health.wa.gov.au/circularsnew/attachments/345.pdf).

The safest way of sleeping is for the infant to have a bassinet next to the mother's bed.

3.4 Monitoring an infant's progress

To ensure that an infant is well and to allay any concerns the mother might have, it is important that both mother and health professionals have a means of assessing the infant's progress. Observing the infant and his or her behaviour and documenting his or her feeding and output contribute to this assessment. A healthy infant is alert and responsive when awake and has bright eyes and firm skin with good elasticity. The adequacy of breastfeeding can be assessed by observing the infant's behaviour, feeding patterns, urine output and bowel actions, and by checking the infant's weight and using growth reference charts.

3.4.1 Infants' behavior

Infants are generally content after feeds, although many have a period each day when they want to feed frequently and will not settle (see 'The crying infant' in Section 4.12). This often happens in the evening, and it should not be interpreted as 'running out of milk at the end of the day': milk production is continuous over a 24 hour period.

3.4.2 Feeding patterns

Infants usually breastfeed eight to 12 times during a 24 hour period. Some mothers expect their infant to feed on a regular four-hourly pattern, but they should be reassured that this is not a common pattern of feeding. The length of each feed is very variable, and during the early neonatal period feeds can take about an hour. If an infant is spending long periods on the first breast, however, there is a good chance there is a feeding problem: perhaps he or she is not attached properly and cannot milk the lactiferous sinuses effectively. The positioning and attachment of an infant should be carefully monitored in the early days.

3.4.3 Urine output

Until the mother's milk comes in, an infant will not pass urine often; provided he or she voids once or more every 24 hours there is generally no cause for concern. As the milk volume increases, the infant's urine output will increase, and a nappy will be soaked with pale or colourless urine six or more times every 24 hours. If an infant's urine becomes scanty and strongly yellow in colour, suggesting the development of dehydration, feeding frequency and milk transfer should be evaluated.

3.4.4 Bowel actions

An infant's first bowel actions consist of meconium, which is greenish-black. After 24 to 48 hours the meconium changes—first to brownish 'transitional' stools and then, by the third or fourth day, to typical breastfed infants' stools, which are loose and mustard-yellow (sometimes with milk curds), although occasionally they are green or orange. None of these changes is significant in a healthy breastfed infant. Frequent, runny stools do not mean a breastfed infant has diarrhoea or lactose intolerance: they should simply be viewed as evidence of sufficient milk. Diarrhoea entails very frequent watery stools.

The number of bowel motions of breastfed infants tends to decrease between six weeks and three months of age. Intervals of several days or more between stools are common. If the infant is receiving breastmilk only and no other food or fluid, there is no cause for concern. Infants who are having formula for most of their feeds tend to pass fewer motions than breastfed infants, although there is considerable individual variation (Hyams, Treem et al. 1995; Bekkali, Hamers et al. 2009). Mothers need to be aware of the potential change in their infant's motions when they are weaning.

Constipation refers to the hard, dry consistency of the stools, not the frequency of bowel motions. It has been observed that hard, dry bowel motions are more likely to occur after formula or solids have been

introduced; exclusively breastfed infants are rarely constipated. Many breastfed infants show signs of discomfort or distress before passing a motion: this is a normal response to body sensations they are not used to; it may not indicate pain or constipation.

3.4.5 Infants' weight

A newborn infant adapts to the small amounts of colostrum available. With the passage of meconium and loss of water by evaporation, an initial weight loss of 5–10% of the birth weight is normal. Between four and six days of age the infant starts to regain weight and by two weeks of age should have returned to their birth weight. If the infant appears contented and healthy there should be no immediate cause for concern about minor fluctuations in weight—which can result from factors as simple as passing a stool, urinating, or a recent feed. Static weight or suspected weight loss over several days should, however, be carefully examined. Further investigation to exclude disease should include evaluating feeding frequency and milk transfer.

It is recommended that an appropriate growth chart be used. In general, weight gain should be assessed on a four-week average. The rate of growth is the most important factor, although if growth is above the 95th percentile or below the 5th, or crosses these percentiles, further investigation is required. A growth reference chart should always be used, but the following is a rough guide (Nelson, Rogers et al. 1989; Haschke and van't Hof 2000):
- birth to age 3 months: a gain of 150–200 grams a week
- age 3 to 6 months: a gain of 100–150 grams a week
- age 6 to 12 months: a gain of 70–90 grams a week.

Percentile growth reference charts

Percentile charts are used to assess growth. The international growth reference in wide use in Australia was originally derived from US data, and it contains a high proportion of formula fed infants (CDC 2000). It is known that exclusively breastfed and formula fed infants follow different growth trajectories (Dewey 1998). Recently the WHO has introduced a new set of growth curves, based upon the growth of exclusively breastfed infants, and proposed that these be used as a 'standard' by which to compare infant growth (as opposed to a reference) (de Onis, Garza et al. 1997; World Health Organization 2006). Currently Australian government health officials are reviewing growth charts for use in Australia.

It is important when utilizing growth charts to remember that they are a monitoring or screening tool, not a diagnostic instrument. The pattern of the infant's growth, and in particular whether babies are crossing the centile channels as well as the position on the growth chart, are used in conjunction with clinical assessment in determining if there is a problem.

3.5 Young mothers

The literature review for the dietary guidelines found probable evidence that younger maternal age, particularly less than 20 years, may be negatively associated with both the initiation of breastfeeding and breastfeeding duration (Evidence Grade B) (Scott, Binns et al. 1996; Wambach and Cole 2000). The results of many observational studies, and two intervention studies, show that adolescent mothers breastfeed less often than older mothers (Scott, Binns et al. 1996; Wambach and Cole 2000). Teenage mothers' breastmilk is comparable in composition and volume to that of adults (Wambach and Cole 2000). Many teenagers view breastfeeding negatively, and have adverse experiences in relation to breastfeeding (Wambach and Cole 2000; Wambach and Cohen 2009). There is some evidence to suggest that intensive support may increase the rate of initiation of breastfeeding by teenage mothers, but this does not appear to have influence on duration of breastfeeding or the rate of exclusive breastfeeding (Wambach, Aaronson et al. 2010). Younger mothers, Indigenous mothers and mothers from lower socio-economic groups generally require more support if they are to maintain satisfactory breastfeeding levels.

4. Breastfeeding: Common problems and their management

Many mothers experience some difficulties when breastfeeding, particularly early in the process of establishing breastfeeding (see Table IV.1). These difficulties are usually only minor and can be readily overcome with advice, assistance and support (Walker 2008). However while the problems can seem minor to the health professional, they can be major issues for the infant's parents. Adequate support in the community and in general practice—particularly through the use of lactation consultants and other trained health professionals—is of value in preventing or minimising the impact of problems on breastfeeding outcomes (Britton, McCormick et al. 2009).

Table IV.1 Prevalence of problems during breastfeeding (%)

Difficulty	In hospital	2	Age (weeks) 6	10	14	18
Sore nipples	46.8	15.8	5	2.3	2.2	0.8
Engorged breasts	22.3	2.3	1.2	0.3	0.0	0.0
'Milk too fast'	19.2	1.3	1.5	0.3	0.7	0.0
Sucking difficulty	7	3.6	0.3	0.0	0.0	0.0
Mastitis		2.1	5	3.2	1.1	1.2
Not gaining weight	2.7	0.5	0.3	0.3	1.1	0.0

N=566 in hospital, declining to 218 at 24 weeks (Scott, Binns et al. 1995) .

It is important to note that the quality of research informing the evidence related to the management of breastfeeding problems is sometimes poor, and information in the following section is often based on good clinical practice.

4.1 Hygiene

Good basic hygiene is important when caring for infants. Mothers should be advised to carefully wash their hands with soap and water after changing a nappy and before handling their breasts and preparing expressed breastmilk or infant formula.

4.2 Nipple Pain and Trauma

Nipple pain or discomfort is common amongst breastfeeding women, being reported by almost all during breastfeeding initiation, peaking on the third day (Morland-Schultz and Hill 2005). It is one of the most commonly given reasons for ceasing breastfeeding (Evans and Heads 1995). Despite the frequency of early difficulties, continuing nipple pain is not normal and

could be a sign of problems. The nipple is vulnerable because of its repeated exposure to trauma and bacteria. A number of causes of nipple pain have been identified or postulated. These include both maternal and infant factors (Morland-Schultz and Hill 2005): poor skin health (eczema, thrush), dietary deficiencies, flat or retracted nipples, use of nipple shields, lack of nipple exposure to light and air, breast engorgement, Raynaud's phenomenon of the nipple, improper positioning of the infant at breast, unrelieved negative pressure and breaking suction improperly, incorrect sucking action, mouth or palatal abnormalities.

Many interventions have been proposed to prevent or to treat nipple pain. Antenatal education on positioning and attachment technique is the intervention for which there is most evidence, and is recommended in preventing or reducing nipple pain associated with breastfeeding. Early postnatal education is also supported by evidence (Johanna Briggs Institute 2009). Common treatments for nipple pain include compresses with warm water, breast milk and tea bags; with evidence favouring the use of warm water compresses. There is inadequate evidence to enable recommendation of breast shells and shields, aerosol spray, hydrogel dressing, film dressing, modified lanoline, collagenase and/or dexpanthenol (Morland-Schultz and Hill 2005; Johanna Briggs Institute 2009)

As nipple pain is so prevalent and is a common reason for breastfeeding cessation the Academy of Breastfeeding Medicine (ABM) recommends that 'before leaving the hospital breastfeeding mothers should be able to position the baby correctly at the breast with no pain during the feeding' (Philipp 2010, p. 175).

4.2.1 Nipple care

- Avoid using shampoos and soaps on the nipples
- Air dry the nipples after breastfeeding
- If nursing pads are used, replace damp pads frequently
- Generally avoid applying ointments, sprays, tinctures and powders.

4.2.2 Management

- Identify and treat any associated cause of nipple pain
- Correct positioning and attachment are essential
- Continue breastfeeding unless the pain is intolerable or, in spite of every effort, the trauma worsens
- Except in rare circumstances, an infant who has been removed from the breast should be fed on expressed breastmilk and returned to the breast as soon as possible. Skilled support is usually required.

4.2.3 Raynaud's Phenomenon

The vasospasm of extremities precipitated by cold and recognized by the symptoms of pain and tri-phasic colour change of blanching and then cyanosis and erythema may affect the nipple, and result in pain sufficient to interfere with breastfeeding (Anderson, Held et al. 2004; Morino and Winn 2007). Symptoms may also be precipitated by poor attachment. It is important to recognize this problem. Initial treatment is to avoid triggers of the reaction (typically cold, but also trauma). If these fail to resolve the issue treatment with nifedipine has been utilised and appears to be safe (Anderson, Held et al. 2004).

4.3 Nipple variation

Most women's nipples are perfectly adequate for breastfeeding, in spite of variations in shape and size. There is limited evidence that approximately 8-10% of women have at least one flat, non-protractile or inverted nipple (Evidence Grade D) (Alexander and Campbell 1997; Vogel, Hutchison et al. 1999; Dewey, Nommsen-Rivers et al. 2003; Vazirinejad, Darakhshan et al. 2009). For some of these women, nipple variations can present difficulties when initiating breastfeeding, and which can compromise milk intake and interfere with infant growth (Alexander and Campbell 1997; Vogel, Hutchison et al. 1999; Dewey, Nommsen-Rivers et al. 2003; Vazirinejad, Darakhshan et al. 2009). Previous breast or nipple surgery, or nipple piercing, can cause maternal discomfort, as well as difficulties in attachment and sucking, and there are concerns about potential risks to the baby (Armstrong, Caliendo et al. 2006; Garbin, Deacon et al. 2009).

There is only limited scientific evidence of the benefit of nipple preparation during the antenatal period, and there are concerns regarding the potential for this to stimulate uterine contraction so that it is not generally recommended (Alexander and Campbell 1997; Johanna Briggs Institute 2009).

Approaches to supporting a breastfeeding women with significant variations in nipple shape could include:
- If some degree of flatness or retraction is present it is important to identify this early and advise and assist the new mother in managing these problems.
- Begin breastfeeding early, preferably within an hour of birth, when the infant is alert and eager to suckle. Teaching correct attachment and encouraging correct suckling action at this time may reduce the likelihood of subsequent problems.
- 'Body-art' is usually important to those who have undergone piercing. This should be respected, and it is important that each case should be individually assessed.

- Options for managing difficulties in breastfeeding with piercings include temporary removal of the jewelry during breastfeeding until successful attachment is achieved. Expression should be frequent and thorough to keep the breasts well drained and to stimulate the milk supply.
- If the infant cannot latch onto the breast, the colostrum needs to be expressed and given to him or her.
- Support mothers through the process of establishing breastfeeding (Johanna Briggs Institute 2009).

4.3.1 Nipple shields

Nipple shields, devices placed over the nipple and areola to facilitate attachment typically in women with inverted nipples, have a long history of use, but there is little evidence to support their use. Their use should be limited to situations where all other avenues of treatment have failed. If a nipple shield is needed, the woman should be referred to a qualified health professional with expertise in their use.

4.4 Other nipple problems

4.4.1 Dermatitis and Eczema

Dermatitis is inflammation of the skin, and eczema is a particular form of skin inflammation, typically a reflection of an allergic tendency. The nipples and breasts of breastfeeding women may be affected by dermatitis and eczema. These conditions are recognized by their itchiness, redness and dry flaking skin, but sometimes may have a 'weepy' exudate. It is worthwhile attempting to distinguish atopic eczema and contact dermatitis as either allergic or chemical. In atopic eczema the nipples are affected as part of a more generalised skin disease. Atopic eczema reflects an allergic disposition. Irritant contact dermatitis, is a chemical reaction occurring in response to an agent being applied to the nipples. Allergic contact dermatitis is a delayed hypersensitivity reaction to an allergen in contact with the nipple—for example, an ingredient in nipple cream or even food in the baby's mouth (Barankin and Gross 2004).

Management
- Avoid using soap and nipple creams, except for the treatment of candida.
- If a nipple cream being used for the management of thrush is suspected, change to another antifungal agent.
- Breastfeed before offering solids to the infant and/or rinse the infant's mouth with water to avoid food allergens in the mouth.

- To reduce the infant's exposure, topical corticosteroids should be used only as a last resort. When one is necessary, use the minimum effective preparation strength for the shortest period and apply it sparingly to the nipples after a feed.

4.5 Engorgement

Engorgement is the distension and swelling of the breast that occurs as milk production increases, typically on the third to fifth day after birth when breast feeding has not yet been firmly established, leading to overfilling of the breasts. This is a normal physiological event, identified by most women initiating lactation but is associated with discomfort and pain, and if not managed effectively can be very distressing and may progress to mastitis and abscess formation (Hill and Humenick 1994; Lee, Lui et al. 2006; Mangesi and Dowswell 2010).

There has been limited research into the prevention of engorgement. The ABM suggest the following breastfeeding strategies for reducing the occurrence of engorgement; emptying one breast at each feeding and changing which breast is offered first (Berens 2009).

A range of approaches to managing the symptoms of engorgement have been advocated, including compression binders, cold packs, application of cold cabbage leaves, ultrasound, acupuncture and analgesia. However it is not clear that any of these management techniques offer advantage over no intervention (Mangesi and Dowswell 2010). It is also of note that a single counselling session in hospital was not beneficial in aiding symptom resolution, suggesting that ongoing support may be necessary (de Oliveira, Giugliani et al. 2006).

In the absence of evidence to support any interventions, support of mothers initiating breastfeeding, with attention to attachment and sucking techniques is recommended. If engorgement persists for more than a day or two—especially in the early days of lactation—the cycle can be broken by completely draining both breasts with an electric pump after a feed, but this is a 'one-off' strategy that brings relief and makes it easier for the baby to attach to the breast at the next feed. Young infants often feed eight to 12 times in 24 hours, including several times during the night. If a mother is separated from her infant, complete expression (usually as often as the infant would breastfeed) is necessary. Engorgement tends to decrease with time, however this advice also applies if engorgement is experienced at any time during lactation.

4.6 Inflamatory conditions of the breast

4.6.1 Mastitis

Mastitis is inflammation of the breast tissue, and lactational mastitis is inflammation that arises in a lactating breast. Mastitis manifests itself with pain, but also swelling, redness, and often fever (Thomsen, Espersen et al. 1984). The definitions utilized in the literature are inconsistent and reflect the lack of understanding of the pathological processes involved (Kvist 2010). Approximately 10-25% of lactating women experiencing at least one episode of mastitis (Evidence Grade D) (Evans and Heads 1995; Amir, Forster et al. 2004; Scott, Robertson et al. 2008). It occurs more commonly with first babies and typically in the first month after birth, but can occur at later times (Evans and Heads 1995; Amir, Forster et al. 2004; Scott, Robertson et al. 2008). Risk factors for the development of mastitis are not well established but may include nipple damage, poor drainage of the breast and a prior history of mastitis (Kinlay, O'Connell et al. 2001; Amir and Donath 2008).

The literature is not clear about the role of infection in the development of mastitis (Kvist 2010). There appears to be a continuum from breastmilk stasis and engorgement, through non-infectious inflammation to infectious mastitis. It is not possible to easily differentiate infection from non-infective mastitis, as both may have pain, fever, flu-like symptoms and local redness and swelling. In general mastitis is not associated with poorer breastfeeding outcomes. It is not associated with shortened breastfeeding duration, and is not cited as a reason for weaning (Vogel, Hutchison et al. 1999; Scott, Robertson et al. 2008).

The combination of poor breast drainage and the presence of a colonizing organism and lowered maternal resistance either because of local injury (e.g. a cracked nipple facilitating entry of bacteria) or systemic vulnerability (fatigue, poor nutrition, other illness) make breastfeeding mothers vulnerable to bacterial infection (Abou-Dakn, Richardt et al. 2010). The only way to clearly differentiate infective and non-infective mastitis early is by culture and cell count, which is often not practicable, and so in practice failure of resolution of symptoms with simple treatments, or progression of symptoms will lead to consideration of a diagnosis of infective mastitis. The appearance of a breast harbouring infective mastitis differs from that of a breast with a blocked duct only in degree. In both cases the breast will usually be red, swollen, hot and painful. The skin may appear tight and shiny and be streaked with red. The mother will be feeling very unwell, with general myalgia (muscle pain) and a fever. Infective mastitis is cellulitis, most commonly caused by *Staphylococcus aureus*, or less commonly by a *Streptococcus* or *E. Coli* (Abou-Dakn, Richardt et al. 2010).

Treatment

The ABM state the most important step in the treatment of mastitis is frequent and effective milk removal (Amir, Chantry et al. 2008). Below is a list of steps for managing a mother with mastitis:

- Optimise support of the breastfeeding mother with mastitis and initiate treatment promptly, delay in treatment is more likely to lead to infection and breast abscess (Amir, Chantry et al. 2008; Spencer 2008).
- Breastfeeding can continue. If breastfeeding is very painful, milk must be removed by expression to prevent progression of the condition
- Check infant's positioning and attachment.
- Feed the infant frequently, starting with the affected side.
- If pain inhibits 'let-down', commence feeding the unaffected side, and switch breasts as soon as let-down occurs.
- A warm cloth can be applied before and during a feed to assist the let-down.
- The affected area can be gently massaged, towards the nipple, while feeding or expressing.
- Cold packs can be applied for comfort after feeding.
- Paracetamol or ibuprofen can be taken as needed—simple analgesia, four-hourly.
- When treated promptly, a blocked duct should clear in 24 to 48 hours (Amir, Chantry et al. 2008).
- If after trying these measures the symptoms persist, antibiotics should be started early and continued for 10-14 days (Abou-Dakn, Richardt et al. 2010). Culture of the milk is usually not practicable or necessary. As noted, Staphylococcus aureus is the most common cause, and suitable antibiotics are Cephalexin, Erythromycin and Flucloxacillin (Abou-Dakn, Richardt et al. 2010). On completion of a course of antibiotics, the mother may need to be reassessed by her GP to ensure that the mastitis has resolved completely.
- Hospitalisation and intravenous antibiotics may be required if severe cellulitis has developed. Adequate analgesia should be provided, and bed rest and an adequate fluid intake encouraged.

Mastitis may be a reason some women cease breastfeeding, and infant feeding guidance and support should be available to all mothers.

4.6.2 Breast abscess

A breast abscess is a serious and painful complication of mastitis that occurs when there has been inadequate treatment, or where treatment has been delayed. Breast abscess occurs in approximately 0.1-0.5% of lactating women (Evidence Grade D) (Amir, Forster et al. 2004; Kvist and Rydhstroem 2005) and in approximately 3-10% of lactating women with inflammatory symptoms

of the breast (Evidence Grade D) (Amir, Forster et al. 2004; Kvist and Rydhstroem 2005). If suspected because of persistent high fever or a localized mass then ultra-sound examination is useful in confirming the presence of an abscess (Amir, Forster et al. 2004; Abou-Dakn, Richardt et al. 2010). Breastfeeding should continue on the unaffected breast.

The abscess may be managed with needle aspiration or with surgical incision but, unless the position of the incision makes it impossible, breastfeeding should continue, or resume, once treatment has started (Amir, Forster et al. 2004; Abou-Dakn, Richardt et al. 2010).

It is important to note that continuing breastfeeding is not harmful to the baby and is important for resolution of both mastitis and abscesses. As with mastitis, breast abscess may be a reason some women cease breastfeeding, and infant feeding guidance and support should be available to all mothers.

4.6.3 Candida infection

Candida sp. are dimorphic yeasts which exist as spores and as hyphal forms. They are widespread in the environment and commensal inhabitants of the skin and gastrointestinal tract. They are capable of opportunistically proliferating to cause topical infections, and of invading tissues. Candidiasis is most commonly recognised as an oral infection of young infants or vulvo-vaginal infections of women.

Candida infection of the nipple and of the breast is described, but the literature is largely confined to case reports and it is difficult to confirm true breast infection, given that there is a high prevalence of cutaneous colonization with candida species, and that no studies have reported isolation of the organism with ductal cannulation, excluding contamination from skin.

Symptoms of shooting, burning pain, like 'red-hot needles', that radiates from the nipple into the breast have been ascribed to Candida infection (Wiener 2006). Unfortunately these symptoms do not consistently correlate with the laboratory identification of Candida sp. A 2004 study reported the presence of three or more symptoms or flaky, shiny skin at the areola weakly predictive of Candida in breastmilk (Morrill, Heinig et al. 2005). In contrast a recent study failed to find any link between the typical symptoms ascribed to Candida infection (Hale, Bateman et al. 2009). At the present time it is not clear that ductal Candida infection is a real entity.

Treatment

Clear identification of cutaneous Candidiasis warrants topical treatment. Miconazole or nystatin have been recommended as suitable antifungal agent for topical application to the nipples while simultaneously treating the infant

with an oral preparation (Wiener 2006). There are no controlled trials of topical antifungal treatment of ductal infections. Treatment should continue until mother and infant have been symptom-free for several days. Breastfeeding can continue during treatment.

4.7 Blood in the breastmilk

Blood in the breastmilk occasionally occurs in late pregnancy or in the first few days after delivery. It is sometimes manifest first when the baby vomits blood. The cause of bleeding into the breast milk is often not clear. It is thought to be due to duct hyperplasia. When excess duct cells are dislodged during feeding or expressing, bleeding may result. Since only a small amount of blood is involved, it will not upset the baby and breastfeeding can continue as normal. Sometimes it may be due to damage to the nipple. If bleeding persists beyond a few days medical review is recommended to rule out maternal bleeding disorders. Young babies who vomit moderate amounts of blood they have swallowed during feeding will require medical review to rule out disease.

4.8 'Too much milk'

When an infant is not removing the milk effectively, there might be a perceived 'oversupply' of milk (see also 'Engorgement', Section 4.5). Some women find they initially have so much milk that it causes temporary difficulties. This is more common in the early days of breastfeeding because the breasts have the potential to feed more than one infant. But as an infant continues to feed, local autocrine control of milk production helps to balance the amount of milk produced with the amount he or she is taking.

Management

- Provide reassurance that it is usually a temporary problem and will resolve with time.
- Try temporarily feeding on one breast only at each feeding time. The infant is put back on the first breast instead of being offered the second breast.
- Provide symptomatic relief—ice packs, analgesia (paracetamol) and breast support.
- Expression of milk at the beginning or end of feeds will also help to ease discomfort. It may prolong the excess production but it can be a more comfortable approach while the milk supply is settling down. The expressed milk can be saved and stored for future use (see Section V).
- There is no evidence that posture feeding assists, so this is not recommended.

4.9 'Too little milk'

Mothers are often concerned that they are not producing enough breastmilk. Evidence suggests that maternal perceived insufficient milk (PIM) supply is associated with increased risk of early cessation of lactation (Evidence Grade C) (Blyth, Creedy et al. 2002; Kirkland and Fein 2003; O'Brien, Fallon et al. 2007; Hurley, Black et al. 2008). The evidence suggests that approximately 25-35% of lactating women reduce breastfeeding duration or level due to perceived breastmilk insufficiency (Evidence Grade C) (Blyth, Creedy et al. 2002; Kirkland and Fein 2003; O'Brien, Fallon et al. 2007; Hurley, Black et al. 2008). Despite this perception there is little evidence that there is an inability to produce adequate milk, except in rare circumstances, related to maternal illness.

Mothers can be hastily reassured regarding the adequacy of their milk volume and quality if:
- The infant is fully breastfed—that is, receiving no other fluids or solids— and producing six to eight very wet nappies of pale, inoffensive-smelling urine in a 24 hour period.
- The infant has appropriate weight gain when averaged out over a four week period, remembering that infants often lose 5-10% of their birth weight during the first week (see discussion on 'Infant's weight' in Section III).
- The infant is alert, with bright eyes, moist lips and good skin tone.
- The infant is reasonably content for some time between some feeds.

If these conditions are not met there may be a temporary problem with the adequacy of the milk volume which can compromise initiation of breastfeeding or its maintenance once established.

Factors which can contribute to inadequate milk volume include poor attachment or frequent disruption so that there is inadequate stimulation of breastmilk production, use of nipple shields, abnormal nipples, maternal nicotine or other substance abuse, maternal under-nutrition, maternal illness, social demands (such as work) which limit the mother's time for breastfeeding, the use of pacifiers or dummies and the use of supplementary feeds (Powers 2001; Dearden, Quan le et al. 2002).

It may be difficult to demonstrate that low milk volume is present. Pre- and post-feed 'test weighing' of the baby is probably the simplest method of demonstrating milk volume (Powers 2001). This requires accurate electronic scales capable of measuring in grams and measurement of multiple feeds over several days in order to achieve a reliable indication of the volume of milk delivered. Measurement of breastmilk volume following expression is being used to assess breastfeeding adequacy, but has not been systematically evaluated. It is possible that milk production during expression may be less

than the baby gains from natural breastfeeding and this could give unnecessary concern to the mother.

Management

Attention to ensuring adequate milk supply should occur across a continuum, with an emphasis upon prevention that merges with treatment strategies. Low supply of breastmilk is usually a temporary difficulty; which only occasionally becomes a continuing problem that requires supplementation of the breastmilk. It is important that health care professionals recognise the signs and symptoms of insufficient milk, including infant lethargy and/or irritability, jaundice, infrequent stools, and scant urine production or infrequent urinating. Any failure to gain weight or excessive weight loss (7-10% of birth weight) over a period should be assessed. Intervention is vital if an infant's health might be jeopardised; it should include a full assessment of lactation and a plan that preserves breastfeeding.

A number of strategies may be helpful:
- Check positioning and attachment
- Feed more frequently
  - Offer the breast between the usual feeds
  - Offer the breast as a comforter instead of a pacifier
  - Wake the infant and offer an extra feed before going to bed
- Allow the infant to finish the first breast before offering the second breast
- Always feed from each breast more than once each feed
- Express milk between feeds
- Encourage good maternal nutrition and rest
  - Recommend a healthy, well-balanced diet
  - Discourage excessive exercise and weight-loss diets
  - Ensure adequate fluid intake by encouraging the mother to drink a glass of water every time they breastfeeds and when thirsty
  - Encourage rest and relaxation.
- The use of galactogues has recently been reviewed in an ABM protocol (ABM Protocol Committee 2011). Both metoclopranide and domperidine have been utilised as galactogogues, and domperidone has been tested in a randomized trial to improve breast milk supply (McInnes and Chambers 2008; Wan, Davey et al. 2008). Recently recombinant human prolactin has been shown to be an effective galactogogue in a limited open label trial (Powe, Allen et al. 2010). These drugs have not been approved for use as galactogogues in Australia, and any use would be 'off label'.
- If the infant requires supplementation, this can best be achieved by using a supply line or supplementary nursing system available from the Australian Breastfeeding Association (ABA) or some pharmacies. A supply line consists of a plastic container of expressed breastmilk or

formula hung around the mother's neck; a fine tube leading from it is taped to the mother's nipple, and as the infant sucks on the breast he or she gets both milk from the breast and expressed milk or formula from the supply line. The supply line helps ensure adequate milk, while stimulating breastmilk supply. Mothers using a supply line when discharged from hospital need specific follow-up and referral to a health professional. Careful sterilisation of supply lines is essential.

It should be acknowledged that these conditions and their management may be stressful and upsetting to some mothers, and support and counseling should be made available.

4.10 Postnatal depression and mood disorders

Mood changes are common during and after pregnancy, occurring in up to 85% of women in the first week after delivery and peaking on the third to fifth day postpartum (Cohen, Wang et al. 2010). Postnatal depression is most commonly assessed using the Edinburgh Postnatal Depression Scale (EPDS) (Gibson, McKenzie-McHarg et al. 2009). As well as these regular mood changes which vary from tearfulness to elation and irritability or increased sensitivity, there are more significant psychiatric disturbances including depression, anxiety and psychosis (Brockington 2004). These are severe disorders (EPDS score ≥ 12) which affect approximately 10-15% of women within 12 months of delivery (Evidence Grade B), and appear to occur in all cultural groups (Horowitz and Goodman 2005; Halbreich and Karkun 2006; Jadresic, Nguyen et al. 2007).

Depression is characterized by desolation, sadness, anxiety, fears, irrational thoughts, feelings of inadequacy, loss of libido, tiredness, and dependency (Sichel 2000). Epidemiological studies usually define postnatal depression as occurring within 12 weeks of birth (Wisner, Parry et al. 2002; Hiltunen, Jokelainen et al. 2004). The onset of postnatal depression is usually within the first four weeks after delivery (American Psychiatric Association 2000). In addition, a major depressive episode should be defined as occurring for two weeks or longer during which a woman has either depressed mood or feeling of inadequacy or pleasure in activities which are different from normal functioning (Horowitz and Goodman 2005). Moreover, the presence of four or more of the additional symptoms such as significant weight loss when not dieting, weight gain, change in appetite, insomnia, hypersomnia, psychomotor agitation, and retardation almost every day is required for a diagnosis (Horowitz and Goodman 2005).

There have been many epidemiological studies undertaken to document the prevalence of postnatal depression around the world (di Scalea and Wisner 2009). A review of 59 studies showed that the mean prevalence of postpartum cases was 13% with onset mostly within the first three months postpartum

(Dennis 2005). More recent studies have concluded that 7% of women experienced a major depressive episode within three months of delivery and when cases of minor depression were included, the three month period prevalence rate increased to 19% (Gavin, Gaynes et al. 2005).

4.10.1 Risk factors for postnatal depression

There is considerable variation in the risk factors reported for developing postnatal depression in different countries around the world. A meta-analysis of 44 studies found that 'prenatal depression', 'child care stress', 'life stress', 'social support', 'prenatal anxiety', 'maternity blues', 'marital satisfaction', and 'history of previous depression' are predictor variables of postnatal depression (Beck 1996). Several other meta-analyses have found that factors with moderate to strong association with postpartum depression include 'depression and anxiety during pregnancy', 'postpartum blues', 'previous history of depression', 'stressful life events', 'a poor marital relationship', and 'poor social support' (O'Hara and Swain 1996; Beck 2001; Robertson, Grace et al. 2004; Jones, Scott et al. 2010). Other risk factors such as 'low socioeconomic status', 'obstetric factors', and 'difficult infant temperament' were found to be less strongly related to postpartum depression (Beck 2001; Robertson, Grace et al. 2004).

Postpartum psychiatric disorders typically severely interfere with the mother child relationship, make establishing breastfeeding difficult and can pose threats to the survival of both mother and baby (Brockington 2004). The literature review found evidence suggesting that postnatal depression is associated with a shorter breastfeeding duration (Evidence Grade C) (Henderson, Evans et al. 2003; Stewart 2007; Field, Diego et al. 2008; Dennis and McQueen 2009) and also with psychological attachment difficulties, behavioural abnormalities and growth disturbance in the infant because of breastfeeding difficulties (Henderson, Evans et al. 2003; Stewart 2007; Field, Diego et al. 2008; Dennis and McQueen 2009).

Studies in multiple countries have confirmed the relationship between postnatal depression and low rates of initiation, and early discontinuation of breastfeeding. A longitudinal cohort study of 1745 women in Australia found that postnatal depression was significantly negatively associated with breastfeeding duration, and that women who experience postnatal depression at any time have a greater risk of stopping breastfeeding than women who do not experience postnatal depression (Henderson, Evans et al. 2003). The same association was seen in studies in the UK, Canada and the USA (Cooper, Tomlinson et al. 1999; Dunn and Davies 2006; McLearn and Minkovitz 2006).

4.10.2 Postnatal depression and growth faltering in infants

Several studies, particularly in developing countries, have shown that postnatal depression can influence infant growth. A critical review of 11 studies analysed the relationship between postnatal depression and growth faltering (Stewart 2007), noting that in addition to the confounding effects of poverty, parental education and birth weight the effects of depression such as tiredness, worthlessness and psychomotor slowing can affect the mother's ability to provide proper care, and may interfere with infant growth. It is important to note that the effects upon growth are not long term (Grote, Vik et al. 2010; Santos, Matijasevich et al. 2010).

Recognising Postpartum Depression (Chaudron, Giannandrea et al. 2008)

- The preferred method for identifying women with postpartum depression is the systematic use of a validated screening tool, such as the EPDS, at postpartum follow-up (see Appendix F).
- Ask mothers if they feel down or anxious. Many women with postpartum depression report anxiety as a primary symptom rather than depressed mood. Excessive worrying about the baby's or their own health should be explored.
- Ask mothers about disordered sleeping; either inability to sleep despite being exhausted and their child is sleeping or excessive sleeping and inability to get out of bed may require further investigation.
- Ask mothers if they are losing or gaining weight or have a poor appetite. Many women with postpartum depression report a poor appetite, but eat because they need to keep their strength up or for nursing. Some mothers with postpartum depression may gain weight.
- Ask mothers directly but in an open, non-threatening manner about any intrusive thoughts or fears of harming their children. For example, 'Many new mothers experience anxiety about their new infants. They may have thoughts that are unusual or frighten them such as fears that they may harm their baby. Does this ever happen to you?'. Mothers who experience intrusive thoughts do not wish to harm their children and may avoid the topics of their fears (i.e. a mother is afraid her baby will drown therefore will not bathe the baby and has her partner bathe the infant). It is important to distinguish the woman with postpartum depression whose intrusive thoughts or fears of harming the infant are incongruent with the mother's wish to keep her infant safe, from the woman with postpartum psychosis who is delusional and who may have thoughts of harming her infant to 'save the infant from the devil or a life of torment'.
- Delusional mothers are at great risk of harming their infants or themselves and must be immediately evaluated by a psychiatrist.
- Ask mothers if they have concerns or questions about adapting to a new baby.

- Consider the mother's interactions with the infant, including the responsiveness of mother and baby (Chaudron, Giannandrea et al. 2008).

Due to the risks associated with untreated maternal depression the ABM strongly recommend maternal postnatal depression is treated (Chaudron, Giannandrea et al. 2008). Women with postpartum depression and other psychiatric disorders should be referred for expert psychiatric care; some women will need hospitalisation, and others intensive outpatient treatment and support (Brockington 2004). There is evidence that counselling, psychotherapy and support can have a beneficial effect upon postpartum depression (Dennis and Creedy 2004; Cohen, Wang et al. 2010). Pharmacotherapy, including hormones, is commonly used for treating perinatal depression and postpartum psychosis. The evidence for the efficacy of this form of treatment is based principally on case studies and open trials, with only modest evidence from randomised trials (Hoffbrand, Howard et al. 2001; Dennis and Stewart 2004; Dennis, Ross et al. 2008; di Scalea and Wisner 2009; Cohen, Wang et al. 2010; Ng, Hirata et al. 2010). There is however a strong body of opinion of the benefits of antidepressants, particularly the SSRI group of drugs, for treating postpartum depression (Cohen, Wang et al. 2010).

The use of pharmacotherapy needs to be weighed against potential risks to the breastfeeding infant. There are a limited number of studies assessing levels of antidepressant medications in breastmilk (di Scalea and Wisner 2009; Kendall-Tackett and Hale 2010; Davanzo, Copertino et al. 2011). Current evidence suggests that paroxetine, sertraline and nortriptyline are unlikely to be excreted in the breast milk at high levels. Fluoxetine and citalopram should be used cautiously because of higher levels of excretion into breastmilk in some individuals. It is not clear if exposure to these drugs early in life can have long-term neurocognitive effects. The mood stabilising salt lithium has generally been considered contraindicated for mothers who are breastfeeding because of concerns that the newborn kidney will not clear the salt and is especially vulnerable to toxic effects. A recent study has documented low lithium levels in a group of breastfed infants of mothers taking lithium, so that it may be considered in some circumstances (Viguera, Newport et al. 2007).

Despite these known and potential risks, it is worthwhile promoting breastfeeding to mothers with postpartum depression. In addition to the nutritional benefits of breastfeeding, successful breastfeeding can enhance bonding, and increase maternal self-esteem. Mothers treated for postpartum depression and other psychiatric disorders will however need extra help and support to initiate and maintain breastfeeding, because of the challenges of developing an attachment to the baby, and, if receiving medication, because the serotonin modulating drugs have the potential to inhibit milk secretion (Marshall, Nommsen-Rivers et al. 2010).

4.11 Breast refusal

Breast refusal is sometimes stated as a reason for cessation of breastfeeding, and numerous causes have been postulated, but often no cause can be found. There is no accepted definition of breast refusal, and no literature that informs management of this problem. Possible infant-related causes of breast refusal include: infectious illness (for example, respiratory illness causing a blocked nose and/or ear infection, or thrush) and distraction while feeding. Possible mother-related causes include: a change in perfume or talcum powder, mastitis (which may lead to salty-tasting milk), an unwell mother (with decreased milk supply), postnatal depression, medication altering the taste of milk and hormonal changes (including around ovulation, menstruation and pregnancy), which may affect both the taste and the supply of milk.

Management

A number of management strategies might be helpful:
- Reassurance: encouraging mothers to relax and not to perceive breast refusal as a personal rejection. They need to know this is usually a temporary situation. Support from their health professional or ABA counselor is extremely important
- stopping the feed when the infant cries and refuses the breast
- feeding the infant when he or she is drowsy, either when just awakening or just going to sleep
- encouraging the infant to suck on a finger and then slipping the nipple in
- calming the infant by singing, rocking or massaging him or her before feeding
- trying alternative feeding positions
- expressing milk into the infant's mouth
- expressing milk and feeding the infant with a cup or bottle
- dealing with any underlying causes of an unwell baby.

4.12 The crying infant

Parents of one in five Australian infants report concerns with crying and fussing, and many will seek medical advice, despite the fact that crying is a part of normal infant development. The median crying time at age six weeks is almost three hours per day, and crying is most common in the afternoon and evening (Brazelton 1962; Wake, Morton-Allen et al. 2006; Herman and Le 2007; Douglas and Hiscock 2010). Despite the fact that disease is diagnosed in less than five percent of such babies, they are at risk of medicalisation of their behaviour, and of diagnosis of a range of disorders,

including colic, 'silent reflux' and lactose intolerance (Freedman, Al-Harthy et al. 2009). They are also at risk of early cessation of breastfeeding (Douglas and Hiscock 2010).

Management

Assessment

When confronted with babies who are crying excessively health professionals should exclude simple environmental and local stimuli such as being too hot, too cold or suffering from a rash such as a chemical dermatitis. Excessive hunger due to inadequate milk is rare. Growth and development should be assessed. Crying and fussing babies who need additional assessment include those who have associated fever, vomiting, offensive urine, ear discharge, failure to gain weight, failure to achieve normal developmental progression or abnormalities of head growth and those who have obvious bruising (Herman and Le 2007; Freedman, Al-Harthy et al. 2009). It is important to explore potential parental factors such as parental depression and anxiety which are risk factors for the reporting of excessive infant crying (van den Berg, van der Ende et al. 2009; Yalcin, Orun et al. 2010).

Education and support

For many parents an explanation of the natural history of infant crying and fussiness, plus a demonstration of normal growth and development, will allay their anxieties and enable them to deal positively with their baby. Some parents will need ongoing education and help with coping with their infants crying (Douglas and Hiscock 2010).

Interventions

Wide-ranging advice has been offered to parents as to how they might intervene and reduce excessive infant crying. Most of this advice, including that related to changing milks, reducing or increasing stimulation, massage and manipulation is not supported by evidence from randomised controlled trials (Lucassen 2007). Mothers should be advised not to switch from breastfeeding to formula, as often advised by well-intentioned friends and family members.

4.13 Regurgitation and gastro-oesophageal reflux

Gastro-oesophageal reflux (GOR) is the regurgitation of stomach contents to the oesophagus, mouth, or externally, and is recognised by regurgitant vomiting or spilling of feeds. It is common in infancy with more than half of children reported to have GOR at three to six months of age (Nelson, Chen et al. 1997; Iacono, Merolla et al. 2005; Hegar, Dewanti et al. 2009). In the

majority of infants GOR spontaneously resolves by 12 months of age. Limited data suggests that breastfeeding is neither causative of, nor protective against GOR, although fully breastfed infants tend to regurgitate less frequently than those who are formula or partially breastfed (Heacock, Jeffery et al. 1992; Iacono, Merolla et al. 2005; Hegar, Dewanti et al. 2009).

4.13.1 Assessment of Gastroesophageal Reflux

In assessing any infant with GOR it is essential to consider other causes of vomiting including systemic and enteric infections, intestinal obstructions including pyloric stenosis, metabolic disease and neurological disorders. Regurgitant vomiting is the most important symptom of GOR. A range of other symptoms are ascribed to GOR, but it is not always possible to confirm the relationship between GOR and the particular symptoms. For most infants there is no association between GOR and disease (Iacono, Merolla et al. 2005; Hegar, Dewanti et al. 2009). A small group of infants will develop complications of GOR including growth failure, oesophagitis or respiratory disease. Clinical history of regurgitant vomiting plus poor growth or haematemesis (vomiting blood), apnoea or respiratory symptoms, anaemia, or abnormal posturing, warrant a careful medical review and sometimes more detailed investigation (Vandenplas, Rudolph et al. 2009).

More difficult to assess are infants with irritability and feeding refusal. In an Australian study, Heine et al. investigated a cohort of infants aged 0.5 to 8.2 months who presented with persistent fussiness and found no association between the number of episodes of acid reflux or the total period of acid exposure of the oesophagus and GOR (Heine, Jordan et al. 2006). They also found no association between back-arching and acid reflux. They concluded that in the absence of frequent vomiting GOR is unlikely to account for fussiness in infancy.

Management

Although GOR is sometimes distressing for parents, and approximately 20% will seek medical advice, it is important to emphasise the generally benign nature and course of this symptom, with its tendency to spontaneously resolve by 12 months of age. Therapeutic intervention is usually reserved for those infants who have complications of their GOR: poor weight gain and growth, respiratory disease or oesophagitis. Specialised assessment and investigation may be required to clarify the presence and extent of complications. For complicated GOR treatment typically employs a series of interventions, ranging from modification of feeding patterns, to surgery (Vandenplas, Rudolph et al. 2009).

Change in feeding pattern

For infants the initial treatments are likely to be modification of volume or duration of feeds, and changes in posture, although there is minimal evidence to support changing feed volume (Ewer, Durbin et al. 1996) and some evidence that even small intragastric volume change may induce gastroesophageal sphincter relaxation in some infants (van Wijk, Benninga et al. 2010). There is no evidence to suggest that cessation of breastfeeding is beneficial for GOR.

Feed thickening

Thickening of feeds has some benefit in decreasing the amount regurgitated, but has no efficacy in decreasing the number of episodes of GOR or acid exposure, and thus has no real place in the management of complicated GOR (Horvath, Dziechciarz et al. 2008). In addition feed thickeners cannot be utilised in breastfeeding. Some have also been shown to have adverse side effects, including delaying gastric emptying and increasing GOR (Chao and Vandenplas 2007)

Posture

GOR is decreased in infants in the flat prone position compared with the supine position, and in the head elevated position in comparison with the flat position (Corvaglia, Rotatori et al. 2007; Martin, Di Fiore et al. 2007; van Wijk, Benninga et al. 2007; Omari 2008; Vandenplas, Rudolph et al. 2009). Recently the supine position at an elevation of 40 degrees was shown to be beneficial in an open trial (Vandenplas, Rudolph et al. 2009). The prone position is however associated with increased risks of SIDS and should not be used for sleeping infants (Dwyer and Ponsonby 2009).

Medication

Prokinetic agents which increase lower oesophageal sphincter pressure or enhance gastric emptying have been utilised in children for GOR, although there is only limited data supporting efficacy and the recent expert group concluded that there is no justification for their routine use (Hegar, Alatas et al. 2009; Vandenplas, Rudolph et al. 2009; Maclennan, Augood et al. 2010).

Proton pump inhibitors are widely prescribed for presumed symptoms of GOR. They effectively decrease acid production, and with this volume of gastric secretions they potentially may decrease refluxate volume, but decrease GOR symptoms only as often as placebo (Orenstein, Hassall et al. 2009). Proton pump inhibitors increase the risks of a number of complications, including community acquired pneumonia and enteric infections and should only be used for extended periods where oesophagitis has been confirmed (Orenstein, Hassall et al. 2009; Vandenplas, Rudolph et

al. 2009).

Surgery

Infants with persistent GOR with serious complications despite medical therapy should be considered for anti-reflux surgery. It is important to note that anti-reflux surgery can be lifesaving, but carries risks of significant complications (Vandenplas, et al., 2009).

4.13.2 Eosinophilic oesophagitis

There is an increasingly recognised group of babies who have some evidence of allergic disease or eosinophilic oesophagitis in association with GOR (Cherian, Smith et al. 2006). These children are often clinically indistinguishable from infants and children with reflux oesophagitis, and will need detailed assessment including endoscopic biopsy for diagnosis (Furuta and Straumann 2006). If formula fed, these infants may benefit from switching from a standard to a hydrolysed formula. Anecdotal evidence suggests that a fully breastfed infant with GOR and such features may benefit from maternal dietary elimination of suspected proteins (Vandenplas, Rudolph et al. 2009).

4.14 Physiological jaundice

Sixty percent of normal newborns, and 80% of preterm infants become jaundiced in the first week of life, reflecting an imbalance between bilirubin production from breakdown of red blood cells and clearance of bilirubin by conjugation with glucuronic acid in the liver and secretion as a water-soluble glucuronide (Kaplan, Muraca et al. 2002). Factors promoting neonatal jaundice include increased red blood cell turnover, impaired conjugation and increased enterohepatic circulation associated with slow intestinal transit. The jaundice typically develops between the second and fourth day of life, and is cleared by about a week, or slightly longer in preterm babies. Delay in clearance of meconium delays clearance of bilirubin (De Carvalho, Robertson et al. 1985). The ABM recommend early, frequent breastfeeding to enhance clearance of bilirubin (Gartner 2010).

While physiological jaundice is benign it is important to recognise pathological forms of jaundice: severe unconjugated hyperbilirubinaemia because of its potential to cause brain damage, and conjugated hyperbilirubinaemia because of its association with chronic liver disease. All newborns who are jaundiced in the first 24 hours of life, who are deeply jaundiced, and who are jaundiced beyond two weeks of age should have their total and conjugated levels of bilirubin estimated and attempts made to determine the cause of the pathological jaundice (Rennie, Burman-Roy et al. 2010). If the serum levels of unconjugated bilirubin are significantly elevated

then phototherapy may be utilised to enhance elimination of the bilirubin. Breastfeeding should be maintained during phototherapy, with the baby removed from the phototherapy unit for feeding (Leung and Sauve 2005). The American Academy of Pediatrics (AAP) graded the quality of evidence C (benefits exceed harms) for this recommendation (AAP Subcommittee on Hyperbilirubinemia 2004). If additional fluids are required then breastmilk is the fluid of choice (Rennie, Burman-Roy et al. 2010).

4.15 Breastmilk jaundice

As many as a third of otherwise healthy, breastfed infants will develop jaundice in the first three weeks of life, often after the first week of life, with a persistent unconjugated hyperbilirubinaemia (Preer and Philipp 2010). The cause of breastmilk jaundice is not well understood, but is distinct from inadequate fluid intake. Before breastmilk jaundice is diagnosed it is important to ensure that the baby has adequate fluid intake and to rule out haemolytic disease, hypothyroidism, galactosaemia and intestinal obstruction. If levels of unconjugated bilirubin remain very high, then disorders of bilirubin conjugation need to be considered.

Breastmilk jaundice is a benign disorder, and has not been associated with kernicterus. Once a diagnosis of breastmilk jaundice is established, no further investigation or treatment is required. Most babies will be clear of jaundice by 12 weeks of age (Preer and Philipp 2010).

4.16 Ankyloglossia

Ankyloglossia or 'tongue tie' is a developmental variant in which the tongue has limited mobility within the mouth due to a thickened or shortened lingual frenulum. There is limited evidence that 'tongue-tie' occurs in approximately 4-10% of healthy newborns (Evidence Grade D) (Messner, Lalakea et al. 2000; Suter and Bornstein 2009).

There is difference of opinion regarding the effects of ankyloglossia upon breastfeeding, compounded by inconsistency in definition of the anomaly (Suter and Bornstein 2009). There is limited evidence (Evidence Grade D) to suggest that breastfeeding difficulties are experienced more commonly by babies with 'tongue-tie' (Messner, Lalakea et al. 2000; Ballard, Auer et al. 2002).
The presence of an abnormal lingual frenulum does not however preclude successful breastfeeding, although additional support and counselling of the mother may be required (Messner, Lalakea et al. 2000; Ballard, Auer et al. 2002; Geddes, Kent et al. 2010). While surgical management of the tongue-tie has been tried (frenulotomy, frenectomy or frenuloplasty) further controlled trials are required.

4.17 Oropharyngeal dysphagia

The normal development of sucking and swallowing behaviour involves the progressive coordination of breathing, sucking and swallowing so that by 36 weeks gestation these activities are well coordinated. Much of the behaviour that facilitates infant feeding is reflex, including the rooting reflex (involuntary turning of the head towards the breast when the cheek is stroked), the suck-swallow reflex (in response to stimuli in the mouth) and the gag reflex (in newborn infants stimulation of the anterior three quarters of the tongue results in pharyngeal constriction and elevation) (Dusick 2003). A small number of infants are believed to be especially sensitive to oral stimulation, with induction of reflex responses, including tongue protrusion (Dusick 2003). There are no well established therapeutic approaches to these children, but generally patient attempts at establishing breastfeeding will be rewarded as the neurological components of sucking and swallowing mature.

5. Expressing and storing breastmilk

5.1 Expressing breastmilk

Almost all Australian mothers express breastmilk at some time before their infant is six months old. An online survey of Australian mothers who were members of the Australian Breastfeeding Association (ABA) found that 98% of respondents (n= 903) had expressed breastmilk (Clemons and Amir 2010). A similarly high proportion of US mothers also express and the US National Infant Feeding Practices Study found that 92% of breastfeeding women had expressed breastmilk at some time (Labiner-Wolfe, Fein et al. 2008). In the Perth Infant Feeding Study 76% of mothers at one month had expressed their breastmilk, increasing to 84% at five months (Win, Binns et al. 2006). Mothers who express breastmilk were more likely to breastfeed to six months (any breastfeeding).

Teaching mothers how to express and the appropriate use of expressed breast milk may be a means of helping mothers achieve six months of full breastfeeding while giving more lifestyle options.

Measurement of breastmilk quantity obtained by expression is not an appropriate way of measuring the adequacy of breastfeeding because of the variation in individual feeds. There are no published studies in the English language that have evaluated assessment of breastfeeding in this way, but there are a number of theoretical difficulties associated with this procedure:

- Mothers not familiar with expression may have difficulty with the procedure.
- There is no evidence that measurement of one or two breastmilk expressions is an assessment of breastmilk adequacy.
- It is beneficial to the infant for breastfeeding to continue.

Assessment of overall infant growth is the most appropriate way to assess breastfeeding adequacy.

5.1.1 Indications for mothers to express breastmilk

In the Perth Infant Feeding studies the most common reasons given by mothers to express breastmilk was to manage difficulties in breastfeeding, usually due to distended breasts or mastitis (Binns and Lee 2006; Win, Binns et al. 2006).

Other reasons given by mothers include:
- The infant is sick or premature
- Mother and baby are or will be temporarily separated
- The mother is returning to paid work

- The milk supply needs to be increased
- The mother's breasts are uncomfortably full.

In the USA most descriptive papers are in the context of mothers expressing breastmilk when returning to paid employment. The requirements for collecting breastmilk for sick or premature babies in hospital are more stringent than those applying to collecting milk for healthy babies at home. Midwives, lactation consultants, early childhood nurses and ABA counsellors are available to provide advice about expressing.

There are three methods of expressing: hand expressing and the use of a hand pump or an electric pump. The mother's choice will depend on her reason for expressing, cost, duration of expression and her personal preference. A Cochrane review has demonstrated that overall electrical or foot operated pumps are more efficient than hand expression (Becker, McCormick et al. 2008).

The Academy of Breastfeeding Medicine (ABM) has prepared a protocol for expression and storage of breastmilk (Eglash 2010). They state:

> *Women should wash their hands with soap and water, or a waterless hand cleanser if their hands don't appear dirty, before milk expression. Unclean hands may transmit viruses and bacteria, some of which can cause illness. Studies show that human milk containing fewer bacteria at the time of expression develops less bacterial growth during storage and has higher protein levels compared to milk that has an abundance of bacteria. As long as the appropriate steps are taken for hand cleansing and cleaning of pump parts as per the pump manufacturer, there does not seem to be a difference in milk contamination with pumping versus manual expression.*

The following general principles apply, regardless of the method chosen:
- Express in a comfortable, private place
- Disable the telephone
- Have a glass of water nearby
- Have all expressing equipment ready
- Relax! Music may help.

5.1.2 Hand expression

Every mother should be shown how to hand express her milk regardless as to whether she chooses other methods to use in the longer term (Philipp 2010). This method has many advantages: no equipment is required; it is convenient; and the skin-to-skin contact stimulates milk production. In spite of initial reservations, many women find hand expressing becomes easier with practice.

Here are the steps:
- Wash hands with soap and warm water.
- Gently massage the breast. Start from the top of the breast and stroke towards the nipple; massage the underside too. Do this several times to ensure that the whole breast is massaged.
- Hold a clean plastic dish under the breast to collect the milk. This may be difficult for some mothers to manage when they are learning: instead, a wide bowl can be held between the legs or placed on a low table, leaving both hands free; a towel may be needed to catch any spills.
- Place thumb and finger diagonally opposite each other on the edge of the areola.
- Gently press inward towards the centre of the breast, squeezing the finger and thumb together.
- Repeat with a rhythmic rolling movement, feeling for the milk sinuses. The fingers should not slide over or pinch the skin.
- Once the milk flow has stopped, move the fingers around the nipple and press again. This helps express more milk and empty all sectors of the breast.
- Repeat the process on the other breast.
- If more milk is required, the mother can change from breast to breast until she has the amount of milk needed or she can wait and try again later.

5.1.3 Hand pumps

Hand pumps are portable and relatively inexpensive. Many types are available; they should be used according to the manufacturers' instructions.

The following steps relate to piston hand pumps:
- Wash hands with soap and warm water.
- Have a clean, sterilised pump ready.
- Gently massage the breast. Start from the top of the breast and stroke towards the nipple; massage the underside too. Do this several times to ensure that the whole breast is massaged.
- Place the flat rim of the breast cup on the breast, centring the nipple.
- Gently work the pump with a smooth action, pulling the piston and releasing the suction rhythmically. By releasing the suction, the blood circulation to the areola and the nipple will be maintained.
- Continue working the pump until the breast is soft and about half the required amount of milk has been expressed.
- Change to the other breast and repeat the process, starting with the gentle massage.
- If more milk is required the mother can change from breast to breast until she has the amount needed or she can wait and try again later.

- Pour the collected milk into a storage container and put it in the refrigerator (see 'Storage of expressed breastmilk', below).

5.1.4 Electric pumps

Electric breast pumps may be preferable for longer term use. Here are the steps to follow when using an electric pump:
- Wash hands with soap and warm water.
- Have the sterilised pump equipment ready.
- Gently massage the breast. Start from the top of the breast and stroke towards the nipple; massage the underside too. Do this several times to ensure that the whole breast is massaged.
- Place the breast cup on the areola, centring on the nipple.
- Turn the suction strength to low, start the pump, and relax.
- Gradually increase the suction strength—as long as there is no discomfort. The strength should not be increased above the recommended level for the type of pump being used. High levels of suction do not increase milk production.
- Continue until the breast is soft and about half the required amount of milk is collected.
- Change the cup to the other breast, turning the suction to low, and repeat the process, beginning with the gentle breast massage.
- If more milk is required, the mother can change from breast to breast until she has the required amount or she can wait and try again later.
- Pour the collected milk into a storage container and put it in the refrigerator (see 'Storage of expressed breastmilk', below).

Electric breast pumps can be purchased or hired from many pharmacies or from the ABA.

5.2 Feeding with expressed breastmilk

Expressed breastmilk can be fed to an infant by bottle, cup or spoon. Whether a bottle, a cup or a spoon is used, the same procedures for sterilisation and storage apply.

5.3 Storage of expressed breastmilk

The requirements for storing breastmilk are more stringent for sick or premature babies in hospital than for healthy babies at home. The literature review identified evidence suggesting that the optimum maximum storage time of breastmilk under clean conditions in a refrigerator at 0-4°C is around 96 hours (Evidence Grade C) (Slutzah, Codipilly et al. 2010).

5.3.1 Storing breastmilk in hospital

Mothers and health workers should wash their hands thoroughly with soap and water before handling breastmilk.

- Breastmilk is best used when fresh. A mother should try to provide fresh breastmilk daily for her baby; if this is not possible, the milk can be stored in a refrigerator or freezer in sterilised plastic containers.
- Breastmilk refrigerated at 4°C for 48 hours suffers little loss of nutrients or immunological properties and the bacterial count is actually reduced (Sosa and Barness 1987).
- Refrigerated milk should be warmed by placing the container in a bath of warm water.
- Thaw frozen breastmilk by placing it in either cool or warm water. Shake the milk gently before using it if it has separated.
- Do not thaw or warm breastmilk in a microwave oven.
- Warmed milk should be given straight away and any amount left over should be discarded.
- Never refreeze or reheat breastmilk.
- If some milk in the bottle has thawed, all the milk in the bottle should be used with in24 hours and not refrozen.
- Label the container with surname, date, and time of expression.

Mothers should be given advice about cleaning, storing and sterilising equipment—see Section 8.3.3.

5.3.2 Storing breastmilk at home

Very little special handling of a mother's milk is necessary. Since it is already sterile when it comes from the breast, expressed breastmilk is safer to use than prepared infant formula. The ABM have recently updated their protocol for storing breastmilk for home use (Eglash 2010). The safety measures for storing breastmilk outlined in these guidelines are consistent with the recent ABM protocol. It can be stored in glass or plastic containers, including sealable plastic bags. Freshly expressed milk can be chilled in the refrigerator and added to frozen milk in the freezer.

The following is a simple guide for mothers storing expressed breastmilk at home (Barger J and Bull P 1987):

- Wash hands thoroughly with soap and water
- Refrigerate or freeze milk after expressing
- Use fresh milk whenever possible
- Freeze milk that will not be used within two days
- Use the oldest milk first; date the container at the time of collection.

Table V.1 Length of time breastmilk can be stored

Breastmilk status	Room temperature (260C or lower)	Refrigerator (40C or lower)	Freezer
Freshly expressed into container	6–8 hours If refrigeration is available store milk there	3–5 days Store at back, where it is coldest	2 weeks in freezer compartment inside refrigerator 3 months in freezer section of refrigerator with separate door 6- 12 months in deep freeze (-18°C or lower)
Previously frozen— 4 hours or less— that is, 24 hours Do not refreeze thawed in refrigerator the next feeding thawed in refrigerator but not warmed	4 hours or less— that is, the next feeding	24 hours	Do not refreeze
Thawed outside refrigerator in warm water	For completion of feeding	4 hours or until next feeding	Do not refreeze
Infant has begun feeding	Only for completion of feeding Discard Discarof feeding	Discard	Discard

Sources: Lawrence and Lawrence (2005), ABM (2010) and Slutzah (2010)

5.3.3 Transporting breastmilk

- Transport breastmilk in an insulated container—an Esky with a freezer brick.
- If some milk has thawed it should be used within 24 hours. Do not refreeze it.
- Place the milk in the refrigerator (or in the freezer if it is still frozen) immediately upon arrival.

6. Breastfeeding in specific situations

Recent reviews have identified some conditions in which breastfeeding is contra-indicated and other conditions which need to be considered on a case-by-case basis (WHO/UNICEF 2009; Philipp 2010). Infants with severe anatomical abnormalities should be treated on a case-by-case basis.

Infants who should not receive breastmilk or any other milk except specialised formula include:
- Infants with classic galactosemia: a special galactose-free formula is needed
- Infants with maple syrup urine disease: a special formula free of leucine, isoleucine and valine is needed
- Infants with phenylketonuria: a special phenylalanine-free formula is needed (some breastfeeding is possible, under careful monitoring).

Breastmilk remains the best feeding option for infants with the following conditions (they may need formula in addition to breastmilk for a limited period):
- Infants born weighing less than 1500 g (very low birth weight) (Note LBW infants are outside the scope of this Guide)
- Infants born at less than 32 weeks of gestational age (very pre-term) (Note LBW infants are outside the scope of this Guide)
- Newborn infants who are at risk of hypoglycaemia because of impaired metabolic adaptation or increased glucose demand (such as those who are preterm, small for gestational age or who have experienced significant intrapartum hypoxic/ischaemic stress, those who are ill and those whose mothers are diabetic) if their blood sugar fails to respond to optimal breastfeeding or breastmilk feeding.

Maternal conditions that may justify permanent avoidance of breastfeeding:
- Human immunodeficiency virus (HIV), if replacement feeding is acceptable, feasible, affordable, sustainable and safe.

Maternal conditions that may justify temporary avoidance of breastfeeding:
- Severe illness that prevents a mother from caring for her infant, for example sepsis.
- Herpes simplex virus type 1 (HSV-1): direct contact between lesions on the mother's breasts and the infant's mouth should be avoided until all active lesions have resolved.
- Maternal medication:
  - sedating psychotherapeutic drugs, anti-epileptic drugs and opioids and their combinations may cause side effects such as drowsiness and respiratory depression and are better avoided if a safer alternative is available

o   radioactive iodine-131 is better avoided given that safer alternatives are available—a mother can resume breastfeeding about two months after receiving this substance

o   excessive use of topical iodine or iodophors (e.g. povidone-iodine), especially on open wounds or mucous membranes, can result in thyroid suppression or electrolyte abnormalities in the breastfed infant and should be avoided

o   cytotoxic chemotherapy requires that a mother stops breastfeeding during therapy.

Maternal conditions during which breastfeeding can still continue, although health problems may be of concern:

- Breast abscess: breastfeeding should continue on the unaffected breast; feeding from the affected breast can resume once treatment has started
- Hepatitis B: infants should be given hepatitis B vaccine, within the first 24 hours or as soon as possible thereafter
- Hepatitis C
- Mastitis: if breastfeeding is very painful, milk must be removed by expression to prevent progression of the condition
- Tuberculosis: mother and baby should be managed according to national tuberculosis guidelines. Breastmilk does not contain tubercle bacilli, so women with inactive tuberculosis may breastfeed, however breastfeeding is contraindicated in some circumstances. Additional information is in Section 6.1.1 below.
- Substance use:
  o   maternal use of nicotine, alcohol, ecstasy, amphetamines, cocaine and related stimulants, has been demonstrated to have harmful effects on breastfed babies;
  o   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.

From the list above it can be seen that in Australia there are very few situations for which breastfeeding is absolutely contraindicated.

6.1 Absolute contraindications to breastfeeding

In a limited number of situations breastfeeding is absolutely contraindicated

6.1.1 Tuberculosis

Tuberculosis remains a public health problem in Australia particularly in our overseas-born population. The National Notifiable Diseases Surveillance System received 1135 tuberculosis notifications in 2007, of which 1086 were new cases and 49 were relapsed cases (Barry, Konstantinos et al. 2009). The

incidence of tuberculosis in Australia in 2007 was 5.4 cases per 100,000 people, similar to rates since 1986. In 2007, 86.4% of cases occurred in the overseas-born population (Barry, Konstantinos et al. 2009). Active pulmonary tuberculosis, that has not yet been treated, is a contraindication to breastfeeding. Any close contact with the infant, including breastfeeding, is not permitted to prevent respiratory transmission (regardless of mode of infant feeding) until the mother has finished two weeks of treatment. The infant is usually prescribed prophylactic treatment. Lactation is initiated and maintained by expressing breastmilk until contact is approved.

Breastmilk does not contain tubercle bacilli, so women with inactive tuberculosis may breastfeed (Pronczuk, Akre et al. 2002; Lawrence and Lawrence 2004; Aquilina and Winkelman 2008; Nhan-Chang and Jones 2010). Once treatment has been established and the mother has a negative sputum culture expressed breastmilk can be given safely to the infant, the only contraindication being when the mothers has an active breast lesion or tuberculosis mastitis. In this case, breastmilk cannot be fed to the infant until the lesion is healed or the mastitis is eliminated (Lawrence and Lawrence 2004; Aquilina and Winkelman 2008).

First line antituberculosis drugs are thought to be compatible with breastfeeding by paediatric groups such as the American Academy of Pediatrics (AAP) (American Academy of Pediatrics Committee on Drugs 2001; Briggs 2005) and also by respiratory organisations (Ormerod 2001; Singh, Golani et al. 2008).

6.1.2 Brucellosis

Brucella can be cultured from breastmilk (Tikare, Mantur et al. 2008). Brucellosis is very rare in Australia and in the unlikely event that a woman with brucellosis is diagnosed in Australia, breastfeeding should be suspended until treatment is complete (Department of Health and Ageing 2010).

6.1.3 Syphilis

In recently acquired maternal syphilis, mother-to-infant contact and breastfeeding can begin after 24 hours of therapy, provided there are no lesions around the breasts or nipples. If there are lesions around the breasts or nipples, feeding may begin or resume once treatment is complete and the lesions are healed.

In Australia there were 2835 cases of syphilis notified in 2009 (AIHW 2010). Most occur through male to male sexual transmission and syphilis remains uncommon in women of reproductive age. There is a routine screening and treatment program for syphilis in pregnant women in Australia (AIHW 2010).

6.1.4 Breast cancer

Breast cancer detected during pregnancy is a contraindication to breastfeeding if the mother is on chemotherapy. If a mother is not undergoing chemotherapy, the continuation of breastfeeding should be evaluated on an individual basis. In Australia there are 700 women under 40 years of age diagnosed annually with breast cancer which is about 6% of the total number of women annually diagnosed with breast cancer (National Breast and Ovarian Cancer Centre 2010).

6.1.5 HIV infection

In Australia, women who are HIV positive are advised not to breastfeed. Transmission of the HIV through breastfeeding is well documented. The US Centers for Disease Control and Prevention advise women with HIV infection not to breastfeed (CDC 2006). The AAP has issued a statement in support of this position (AAP Committee on Pediatric AIDS 2008).

6.1.6 Other Conditions

Rare metabolic disorders of infants such as galactosaemia and maple syrup urine disease, which severely limit or render impossible the infant's use of certain milk components.

6.2 Relative contraindications to breastfeeding

Some conditions may need to be considered on a case-by-case basis before advice is given to discontinue breastfeeding and to use of infant formula.

6.2.1 Phenylketonuria (PKU)

In Australia the incidence of Phenylketonuria (PKU) is one in every 10,000 to 14,000 births, 1 in 50 people carry the PKU gene, and approximately 2025 babies are diagnosed with PKU each year (Purnell 2001). The Australasian Society for Inborn Errors of Metabolism (ASIEM) developed a handbook for families of children with PKU and people with PKU, which provides a practical guide for management of infants with PKU (Australasian Society for Inborn Errors of Metabolism 2005). It is possible to breastfeed infants with PKU and maintain the plasma phenylalanine at a safe level. However careful monitoring by a paediatrician and a dietitian with expertise in metabolic disease is required.

6.2.2 Hepatitis B infection

Current Australian Recommendations are that all infants be vaccinated against hepatitis B within 24 hours of birth (Department of Health and Ageing 2008). In hepatitis B-positive mothers breastfeeding may begin or resume once the infant has been immunised. Extensive experience indicates that the birth dose of hepatitis B vaccine is very well tolerated by newborn infants. It does not interfere with either the establishment or maintenance of breastfeeding, and it is not associated with an increased risk of either fever or medical investigation for sepsis in the newborn.

6.2.3 Hepatitis C

The evidence suggests that there is no association between transmission of Hepatitis C and mode of infant feeding (Evidence Grade C) (Yeung, King et al. 2001; Bhola and McGuire 2007). The largest studies have been the retrospective analysis and the prospective study of the European Pediatric Hepatitis C Network (EPHN) which showed no effect among women with only HCV infection (Pembrey, Newell et al. 2005). Mothers who are both hepatitis C and HIV positive should be managed according to the HIV protocol. There is limited evidence showing hepatitis C mothers co-infected with HIV are at an increased risk of transmitting hepatitis C through breastmilk (Evidence Grade D) (European Pediatric Hepatitis C Network 2001; Pembrey, Newell et al. 2005; Airoldi and Berghella 2006).

6.2.4 Maternal medications

Most drugs are excreted into the breastmilk, usually in concentrations similar to blood levels. Typically this amounts to less than 1–2% of the maternal dose, which rarely poses a danger to the infant (AAP Committee on Drugs Ito 2000; 2001; Pharmacy Department Royal Women's Hospital 2004). Breastfeeding can be continued while the mother is on most of the medications commonly prescribed in Australia. Up-to-date information can be obtained from the National Library of Medicines (NLM) LactMed database (www.toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?LACT).

LactMed is a database of drugs and other chemicals to which breastfeeding mothers may be exposed. It includes information on the levels of such substances in breastmilk and infant blood, and the possible adverse effects in the nursing infant. Statements of the AAP concerning a drug's compatibility with breastfeeding are provided, as are suggested therapeutic alternatives to those drugs where appropriate. All data are derived from the scientific literature and fully referenced. Data are organised into substance-specific records, which provide a summary of the pertinent reported information and include links to other NLM databases. Supplemental links to breastfeeding resources from credible organizations are also provided.

6.2.5 Specific illnesses in the mother

Breastfeeding can continue in almost all other circumstances depending on the mother's overall state of health and her desire to continue. In severe maternal illness and malignancy, continuation of breastfeeding depends on the mother's health and the medications being used.

In cases of maternal psychiatric illness breastfeeding is not advisable if there is definite danger to the infant. A psychiatrist's advice should be sought. Postnatal depression is discussed separately in section 4.10.

6.3 Tobacco, alcohol and other drugs

6.3.1 Tobacco

There is convincing evidence that maternal and paternal smoking is negatively associated with breastfeeding outcomes, including initiation and duration (Evidence Grade A) (Horta, Bahl et al. 2007). Smoking was independently negatively associated with breastfeeding initiation in larger studies and with breastfeeding duration in almost all studies. In a meta-analysis Horta et al. reported a pooled odds ratio for 15 studies of 1.93 (95% CI 1.55-2.40) for the likelihood of cessation of breastfeeding before 13 weeks (Horta, Bahl et al. 2007). The findings of the two systematic literature reviews (Horta, Kramer et al. 2001; Amir and Donath 2002) were confirmed by the findings of studies published subsequent to these reviews (Kelly and Watt 2005; Giglia, Binns et al. 2006; Horta, Bahl et al. 2007; Cooklin, Donath et al. 2008; Baxter, Cooklin et al. 2009).

Whether the mechanism for the association is biological, psychological, behavioural and/or cultural remains unclear. Smoking can affect the mother's milk supply and may cause gastrointestinal upsets in the infant, so parents are advised to give up smoking.

If this is not possible, parents should reduce their smoking as much as possible, and they should completely avoid smoking in the hour before feeding, and during feeding, to reduce the harmful effects. No one should smoke in the same room as an infant because of the dangers of passive smoking (Fuentes-Leonarte, Tenias et al. 2009; Redding and Byrnes 2009). Smokers are less likely to breastfeed, but they should be encouraged to do so because of the modifying effect breastfeeding has on the ill-effects of smoking.

The two most commonly used drugs to assist smoking cessation in Australia are varenicline (Champix) and Bupropion (Zyban), these are not recommended during pregnancy or lactation. If these drugs are used by

women who are intending to become pregnant it is recommended that treatment is timed so that the course is completed before becoming pregnant.

Australian Aboriginal mothers have a very high rate of smoking and commonly smoke while breastfeeding (Binns, Gilchrist et al. 2004; Gilchrist, Woods et al. 2004). Health professionals should encourage cessation of smoking during pregnancy and lactation to minimize the exposure of infants to the detrimental effects of tobacco and to promote the continuation of breastfeeding.

6.3.2 Alcohol

The NHMRC has released revised Australian guidelines to reduce health risks from drinking alcohol (NHMRC 2009). The NHMRC recommendations for pregnancy and breastfeeding are:

> *Maternal alcohol consumption can harm the developing fetus or breastfeeding baby. For women who are pregnant or planning a pregnancy, not drinking is the safest option. For women who are breastfeeding, not drinking is the safest option.*

Alcohol enters the breastmilk and may persist in the milk for several hours after alcohol consumption (Giglia 2010). Alcohol adversely affects lactation, infant behaviour (e.g. feeding, arousal) and psychomotor development of the breastfed baby (Giglia 2010). Analysis of the 2001 National Health Survey found that, although most breastfeeding women drink at low levels (up to two standard drinks per week), 17% were drinking more than seven standard drinks per week. This proportion was significantly higher than in the 1995 survey (13%) (Giglia and Binns 2008). Qualitative research has shown that breastfeeding mothers are generally unaware of the effects of alcohol on breastfeeding performance and development of the infant (Giglia and Binns 2007). Women who consumed alcohol at levels of more than two standard drinks per day were almost twice as likely to discontinue breastfeeding before the infant was six months old than women who drank below this level (Giglia and Binns 2008; Giglia, Binns et al. 2008).

The effect of alcohol consumption by breastfeeding mothers on milk production (lactogenesis), breastmilk and infant blood alcohol concentrations, and the breastfeeding infant, have been described in a thorough systematic review of research from 1990–2005 by Giglia and Binns (Giglia 2010). This review of both animal and human studies found that consumption of two standard drinks or more a day during lactation was associated with:

- decreased lactational performance (in terms of the milk ejection reflex, milk production by the mother and milk consumption by the baby)
- earlier cessation of breastfeeding
- deficits in infant psychomotor development

- disrupted infant sleep-wake behavioural patterns.

Based on the comprehensive review by Giglia and Binns (2010), and a narrative review by Haber and Allnutt (2005), the literature review for the dietary guidelines found probable evidence that consumption of alcohol by lactating women in the range of 0.3-0.8 g/kg body weight per session is associated with increased risk of adverse infant outcomes (Evidence Grade B).

Practical advice

Breastfeeding mothers should be advised that not drinking is the safest option and, specifically, to consider not drinking alcohol during the first month after delivery until breastfeeding is well established. For women who choose to drink after this time, advice should be provided on a recommended maximum level of consumption (e.g. two standard drinks or less in any one day), the length of time that alcohol is excreted in the breastmilk and the optimal timing of breastfeeding in relation to intake. The option of expressing prior to consuming alcohol could also be discussed (Giglia 2010).

6.3.3 Other drugs

Breastfeeding mothers should not smoke marijuana. Use of other mood-altering substances, including illicit drugs, is also contraindicated: these substances may be excreted in the breastmilk. In addition to the effects such drugs may have on a breastfeeding infant, a mother who is not fully alert can be a hazard to herself and her infant while breastfeeding or preparing infant formula.

There is a lack of studies on the most appropriate ways to manage breastfeeding by mothers who use drugs of addiction. The Academy of Breastfeeding Medicine (ABM) has prepared a protocol based on best clinical practice (Jansson 2009). The ABM protocol suggests that women who meet all of the following criteria should be supported in their decision to breastfeed their infants (Jansson 2009):
- women engaged in substance abuse treatment who have provided their consent to discuss progress in treatment and plans for postpartum treatment with a substance abuse treatment counsellor
- women whose counsellors endorse their ability to achieve and maintain sobriety prenatally; counsellor approves of client's plan for breastfeeding
- women who plan to continue in substance abuse treatment in the postpartum period
- women who have been abstinent from illicit drug use or illicit drug abuse for 90 days prior to delivery and have demonstrated the ability to maintain sobriety in an outpatient setting

- women who have a negative maternal urine toxicology testing at delivery except for prescribed medications
- women who received consistent prenatal care
- women who do not have a medical contraindication to breastfeeding (such as HIV)
- women who are not taking a psychiatric medication that is contraindicated during lactation
- stable methadone-maintained women wishing to breastfeed should be encouraged to do so regardless of maternal methadone dose.

The management of breastfeeding by mothers using addictive drugs requires the use of integrated services from a drug addiction service, paediatrician and lactation consultant or other health professional with breastfeeding expertise.

6.4 Caffeinated beverages

There are subjective reports from breastfeeding women that infants become unsettled and irritable following maternal consumption of large volumes of caffeinated beverages such as tea and coffee. There have been no controlled trials of early caffeine exposure on infant behaviour.

The amount of caffeine transferred to breastmilk, after a known quantity is ingested, will depend on an individual's ability to absorb and metabolize caffeine. The caffeine content of a cup of tea or coffee will also vary due to the different methods of preparation and size of cups used; on average percolated coffee has 60-120 mg per 250mL cup, instant coffee (one teaspoon/cup) has 60-80 mg per 250 mL cup and tea has 10-50 mg per 250 mL cup (Food Standards Australia New Zealand 2011). Peak levels of caffeine in breastmilk are achieved at approximately one hour after consumption of caffeine containing beverages (Berlin, Denson et al. 1984; Liston 1998).

A small trial including 15 lactating women, reported that the amount of caffeine available for infant absorption after a single caffeinated beverage was consumed ranged from 0.06% to 1.5% of the maternal dose. Lawrence and Lawrence (2005, p 369) reaffirmed this, stating that approximately 1% of the maternal amount consumed is excreted in breastmilk. It appears that a given dose of caffeine that is comparable to that in a cup of coffee by a breastfeeding woman does not cause significant amounts of caffeine to be transferred to the infant (Berlin, Denson et al. 1984). However, mothers are still encouraged to moderate their intake of tea and coffee as caffeine can accumulate in the newborn infant (Lawrence and Lawrence 2005) as newborn infants metabolise caffeine at a very slow rate. For most adults the elimination half-life of caffeine varies between three and seven hours (Nawrot, Jordan et al. 2003). In newborn infants the half-life ranges from 50 to 100 hours, but by three to four months of age most infants have developed

the ability to metabolise caffeine (Le Guennec and Billon 1987; Lawrence and Lawrence 2005). The reduced rate of elimination by the newborn infant could potentially lead to an accumulation of considerable amounts of caffeine and cause adverse effects.

Cigarette smoking may compound the effects of caffeine in breastfed infants (Lawrence and Lawrence 2005). It is advised that mother who choose to continue smoking during lactation limit their consumption of caffeinated beverages.

For non-smoking women, the La Leche league state that the amount of caffeine in five or fewer cups of coffee (less than 750 ml) will not pose a risk to the breastfed infant (La Leche League International 2010, p 225). While the modest use of caffeine is compatible with breastfeeding, women who are large consumers of tea and coffee may require specific advice on moderating their caffeine intake (Nawrot, Jordan et al. 2003).

6.5 Women and paid work

The literature review found probable evidence that intention to work or return to paid employment is negatively associated with both the initiation of breastfeeding and breastfeeding duration (Evidence Grade B) (Kelly and Watt 2005; Cooklin, Donath et al. 2008; Baxter, Cooklin et al. 2009). Returning to paid work or the anticipation of return to employment has a significant impact on the experience of breastfeeding and is commonly cited as a reason for ceasing to breastfeed. Studies were identified in Australia, New Zealand and China that contributed to this assessment (Leung, Lam et al. 2002; Butler, Williams et al. 2004; Baxter, Cooklin et al. 2009).

Data from the Longitudinal Study of Australian Children (LSAC) with a sample size of 5090 found that women who returned to work full-time were less likely to be still full breastfeeding at one and two months (Baxter, Cooklin et al. 2009). In the Perth Infant Feeding Study II return to work before 12 months was negatively associated with the duration of full and any breastfeeding (Scott, Binns et al. 2006).

Among the factors that have limited mothers' ability to continue breastfeeding are the relative brevity of maternity leave, inflexible hours of work, and the lack of paid breastfeeding (or expressing) breaks while at work (Scott, Binns et al. 2006).

Many women, for economic or personal reasons, return to paid work before they want to stop breastfeeding. They commonly find that their workplace lacks the flexibility and facilities, such as work-based child care, time off work, and a suitable place to express and store milk, that would allow them to combine breastfeeding and their job. Because of this, some women who

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intend to return to work may be discouraged from initiating breastfeeding and others may feel that breastfeeding has to stop once paid work starts.

To manage this perception by some mothers, health workers need to be well informed and positive when advising parents about combining breastfeeding and paid work. When it is not possible for the mother to go to her baby during working hours, several options are available:

- replacing breastfeeds during work hours with expressed breastmilk fed from a cup or a bottle.
- for babies aged six months and over, replacing breastfeeds during work hours with formula and food from a spoon and a cup.
- replacing breastfeeds during work hours with infant formula fed from a cup or a bottle.

Mothers should be assured that while exclusive breastfeeding is ideal, continued partial breastfeeding is still beneficial to the infant and mother.

A study of professional women in Nairobi, Kenya has documented how almost 100% are able to successfully continue breastfeeding, even when they have to use a substitute formula feeding while at work (Lakati, Binns et al. 2002). When formula is used during working hours, breastfeeding can still continue before and after work and during weekends. A combination of both expressed breastmilk and formula can be given to a baby when there is not enough expressed milk.

It is important that in the first six weeks to three months of a baby's life, health workers give the mother as much assistance as possible to establish breastfeeding successfully; that way, the mother has a greater range of options if she returns to work. Accurate advice on expressing, storing and using frozen breastmilk, as well as on bottle feeding and using formula, is also necessary.

Where a breastfeeding mother returns to work there are a number of ways that the employer can facilitate continued breastfeeding. Health workers should become advocates for workplace adoption of policies that enable women to breastfeed. Such policies entail flexible working hours, work-based child care, and provision of rooms for expressing breastmilk or breastfeeding and provision of refrigerators for storing expressed milk. A number of jurisdictions have introduced breastfeeding and work policies during the last few years (Department of Health 2008; Department of Premier and Cabinet 2010; Primary Industries and Resources SA 2010; Public Service Commision 2010). The ABA has developed the Breastfeeding Friendly Workplace Accreditation (BFWA) program that includes the provision of lactation breaks (Eldridge and Croker 2005). Employers are also required to provide a clean, hygienic and private area to express breastmilk or feed babies, a fridge/freezer to store breastmilk, and storage space for related equipment.

On 1 January 2011 Australia introduced a Paid Parental Leave Scheme with income support for a maximum of 18 weeks (www.familyassist.gov.au/payments/family-assistance-payments/paid-parental-leave-scheme/). This has the potential to increase Australia's breastfeeding rates.

The International Labour Organisation's Convention 103 on Maternity Protection (1952) calls on member nations to provide, by national legislation, an entitlement of at least 12 weeks' maternity leave. The convention also calls for nursing breaks for women in the workplace (www.ilo.org/ilolex/cgi-lex/convde.pl?C103).

6.6. Low-birth weight infants

Management of low birth weight infants is beyond the scope of this document. Infants weighing less than 2000 g at birth have relatively higher requirements for nutrients, such as protein, calcium, phosphorus and zinc, and often need breastmilk that has been fortified. Feeding infants of low or very low birth weight with breastmilk reduces the incidence of infection, including septicaemia, meningitis and necrotising enterocolitis. Expressed breastmilk is a factor in reducing the incidence of necrotizing enterocolitis in NICUs (James and Lessen 2009; Renfrew, Craig et al. 2009; Bartick and Reinhold 2010).
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7. Informed use of supplementary feeds in hospital

In Australia there is no clear differentiation between the terms 'supplementary feeding' and 'complementary feeding'. In this document supplementary feeding is defined as 'additional liquids given to the infant during the first seven days after birth, including glucose solutions, water, and commercial infant formula'. Complementary feeding is defined as the process starting when breastmilk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk (Dewey and PAHO/WHO 2003).
Prelacteal feeds

Prelacteal feeds are defined as any feeds given before the onset of lactogenesis II, which is the onset of copious lactation that occurs within four days of birth (Neville and Morton 2001). Prelacteal feeds are not recommended because of their influence on the onset of lactation and on perinatal morbidity and mortality (Duong, Binns et al. 2004; Qiu, Xie et al. 2007; Xu, Binns et al. 2007). In some cultures prelacteal feeds are very common. In Hangzou, PR China the rate was 26% and in Xinjiang Province was 52% (Qiu, Xie et al. 2007; Xu, Binns et al. 2007). In Australia the rate of prelacteal feeds is estimated to be around 15% (Scott, Binns et al. 2006). Other reports suggest that the rate could be much higher. In a cross sectional study in Adelaide 45% of mothers answered yes to the question: was your baby given a bottle feed while in the postnatal ward? (Pincombe, Baghurst et al. 2008). This would include prelacteal and supplementary feeds. Since this study did not detail the reason why the bottle feed was offered these results need to be interpreted with caution. By definition, an infant who receives prelacteal feeds is not exclusively breastfed.

The Baby-friendly Hospital Initiative framework's sixth step states: 'Give newborn infants no food or drink other than breastmilk unless medically indicated' (WHO/UNICEF 2008).

If an infant has become dehydrated, rehydration may enable him or her to begin breastfeeding successfully. The infant's condition should be discussed with the mother, and a paediatric assessment should be made before seeking the mother's consent for rehydration. It should be emphasised, however, that such a situation is uncommon, even in the Australian climate. The implications of supplementary feeding for establishing and maintaining successful breastfeeding should be the subject of discussion between health worker and mother.

8. Infant Formula

Breastmilk is a living tissue that includes many living cells including leucocytes and stem cells. Compared with unmodified cow's milk and early efforts to manufacture infant feeds, all modern infant formulas contain reduced protein and electrolytes levels and have added iron and vitamins (including A, B group, C, D, E and K) and other nutrients. The protein in the formula is either casein or whey dominated and, since its amino acid content is not the same as that in human milk, a higher protein content is required in formula than breastmilk to meet the amino acid requirements.

Although human milk constituents are used as a reference point for the development of infant formula, it is not possible to duplicate human milk. Infant formula lacks many factors present in human milk, including numerous types of living cells, cholesterol, polyamines, free amino acids, enzymes and a wide range of other bioactive substances. Furthermore, the sterilisation (pasteurisation) processes used in manufacturing formula slightly modify the structure of the cow's milk proteins, with a consequent loss of any cross-species protection against infection. The processing does, however, reduce the allergenicity of the cow's milk protein. Although research into the development of formulas is continuing, it is unlikely that these products could duplicate the variety of nutrient and active factors present in human milk or the changing nature of the milk during the course of a feed. In spite of this, when a baby is not breastfed, use of an infant formula offers the only way of meeting their primary nutritional needs.

Standards for the quality, composition and labelling of infant formulas sold in Australia are regulated through Standard 2.9.1, Infant Formula, of the Australia New Zealand Food Standards Code (FSANZ, 2011). For the purposes of the standard, an infant is defined as being a person aged up to 12 months.

Although there is a range of cow's milk–based formulas on the market, there is little evidence that one is better than another for normal-term infants. Almost all infant formulas sold in Australia are imported and meet international and Australian nutritional and quality-control standards. The prices of different infant formulas and the types of retail outlets that sell the formulas are not related to quality or nutritional value. Use of a particular formula by a hospital does not mean that formula is the 'best' one. Interchange between formulas within the same generic group is optional and can be decided on the basis of cost.

Standard formulas labelled 'suitable from birth' are for infants from birth to 12 months. 'Follow-on' formulas are labelled 'suitable only for babies over six months' and are for infants aged from six to 12 months, but their use is

not considered necessary for most older infants and there have been no studies showing advantages over the infant formula they are already having.

By 12 months of age infants should be eating a wide variety of family foods, and cow's milk should be introduced at this time. Toddler's formula milks are not necessary.

8.1 Protein Levels in Infant Formula

Formula fed infants grow at a different rate to breastfed infants and are heavier at 12 months of age and have a slightly increased risk of obesity in later life (WHO European Region 2007). For this reason, a major trial of lower protein formula was undertaken in Europe (Koletzko, von Kries et al. 2009; Koletzko, von Kries et al. 2009). In this well-conducted randomised controlled trial the authors concluded that a 'higher protein content of infant formula is associated with higher weight in the first two years of life but has no effect on length. Lower protein intake in infancy might diminish the later risk of overweight and obesity'. Subsequent to this study many brands of infant formula in Europe have improved the quality of the protein they contain enabling the overall protein levels to be reduced.

Human breastmilk contains protein levels of 1-1.1 grams per 100 ml compared to cow's milk of 3.3 grams per 100 ml (Prentice 1996). The infant formulas available in Australia contain amounts of protein that vary from 1.3 to 1.7 grams of protein. Reduction in protein levels is limited by the need to meet minimum amounts of specified amino acids, especially tryptophan.

Under Australian food regulations (Standard 2.9.1) the protein content of infant formula must be between 0.45 and 0.7 grams per 100 kJ, and must also meet specific amino acid requirements. It is anticipated that infant formula manufacturers will work towards improving the quality of protein.

8.2 Health workers and infant formula

The International Code of Marketing of Breast-milk Substitutes (the Code) promotes breastfeeding for all infants as providing optimal nutrition. However the Code recognises that this ideal is sometimes not achieved and includes the following statements related to the use of infant formula:

> **Article 1**. 'The aim of this Code is to contribute to the provision of safe and adequate nutrition for infants, by the protection and promotion of breast-feeding, and by ensuring the proper use of breast-milk substitutes, when these are necessary, on the basis of adequate information and through appropriate marketing and distribution'.

Article 4. 'Governments should have the responsibility to ensure that objective and consistent information is provided on infant and young child feeding for use by families and those involved in the field of infant and young child nutrition.
Article 4. (e) where needed, the proper use of infant formula'.

Article 6.5. 'Feeding with infant formula, whether manufactured or home-prepared, should be demonstrated only by health workers, or other community workers if necessary; and only to the mothers or family members who need to use it; and the information given should include a clear explanation of the hazards of improper use'.

The primary objective of the Code is to ensure safe and adequate nutrition for all infants. Health workers have a responsibility to promote breastfeeding first, but where needed, to educate parents on formula feeding. Infant formula requires accurate and sterile reconstitution to ensure its safety compared to breastmilk which comes already premixed, warmed in a sterile container.

8.3 Preparation of infant formula

8.3.1 Risks associated with incorrect preparation of infant formula

Many parents and carers do not prepare infant formula correctly. A systematic literature review identified many problems with formula feeding (Lakshman, Ogilvie et al. 2009). These authors identified 11 studies that documented errors in the preparation of formula feeds and found that they were very common; including over-concentration, under-concentration and the addition of cereal to the bottle. Results from the Infant Feeding Practices Study II (USA) further illustrate the deficient education of parents in the use of infant formula (Labiner-Wolfe, Fein et al. 2008). Among the formula feeding mothers of the youngest infants analysed, 55% did not always wash their hands with soap before preparing infant formula, 32% did not adequately wash bottle teats between uses, 35% heated formula bottles in a microwave oven, and 6% did not always discard formula left standing for more than two hours. The authors concluded that many (the majority of) mothers do not follow safe practices when preparing infant formula. In Australia surveys have found similar rates of errors in formula preparation (Oates and Lilburne 1987; Lilburne, Oates et al. 1988).

The reports of incorrect preparation of formula highlight the difficulties mothers face with differing scoops and instructions for different brands of formula (Leung, Chang et al. 2009). It is important that health workers know how to demonstrate the reconstitution of infant formula and how to feed an infant with a bottle. While breastfeeding is the objective for all infants, if formula is to be used it is essential that health professionals demonstrate the correct methods and that the methods be regularly monitored.

Powdered infant formula is not a sterile product and there are occasional infections of infants with Enterobacter sakazakii, although the risk is higher in low birth weight infants and during the perinatal period. However in developed countries the risk is relatively low and the US Centre for Disease Control and Prevention (CDC) reported only 46 cases of this invasive disease (which has a high mortality rate) over a 40 year period (Bowen and Braden 2006). The FAO/WHO have developed a risk assessment model and advice on the control of contamination in powdered infant formulas (FAO/WHO 2007). A FAO/WHO review of documented E. sakazakii (Cronobacter spp.) infections worldwide identified roughly 120 individually documented cases among infants and young children up to three years of age. However globally, there appear to be very few surveillance data for E. sakazakii (Cronobacter spp.)-related illnesses (FAO/WHO 2008). The Codex Alimentarius Commission has now adopted a Code of Hygienic Practice for Powdered Formulae for Infants and Young Children to reduce the risk from E. sakazakii and Salmonellae sp. contamination (Codex Alimentarius Commission 2009)

In response to the risk identified above, the WHO has adopted guidelines for the preparation of powdered infant formulas (WHO/FAO 2007). This protocol advocates the use of water at 70°C for the preparation of formula. At this temperature bacteria will be destroyed, but the temperature will also destroy vitamins and nutrients (Agostoni, Axelsson et al. 2004). Further the use of water at this temperature brings the risk of serious burns. The following section is based on information provided by the Infant Nutrition Council (Infant Nutrition Council 2009).

In Australia the risk of infection from E. sakazakii in infant formula is negligible (there are no reported cases) if correct formula preparation techniques are followed. Current advice to parents is that water for use in infant formula be boiled and then cooled to 'lukewarm' before being used to prepare formula. It should then be tested on the back of the wrist to ensure it is an appropriate temperature for babies, it should feel just warm, but cool is better than too hot. This means the temperature of prepared formula offered to babies should be approximately body temperature, i.e. 37˚C. Feeding formula at this temperature poses no risk of scalding to the infant. For a bottle of formula, prepared at 70˚C to cool to a safe temperature of approximately 37˚C, it will need to sit for at least 30 minutes.

Infants are not at risk from E. sakazakii when formula is prepared with lukewarm (body temperature), previously boiled water and fed within one hour. Infants may be at risk when conditions allow the bacteria to multiply to harmful levels. This problem is encountered through poor storage practices of infant formula (not preparation).

8.3.2 Correct preparation of infant formula

Safe bottle feeding depends on a safe water supply, sufficient family income to meet the costs of continued purchase of adequate amounts of formula, effective refrigeration, clean surroundings, and satisfactory arrangements for sterilising and storing equipment. Health workers should be aware that parents without literacy skills or from a non–English speaking background might need extra help to make sure bottle feeding is done safely.

The Infant Nutrition Council suggests that infants are best protected from risks of harm due to E. sakazakii infection, scalding from hot formula and/or nutrient deficiency illnesses, through clear and consistent advice on the preparation, handling and storage of infant formula; noting the particular points below that effectively control growth of bacteria:

1. Always wash hands before preparing formula and ensure that the formula is prepared in a clean area.
2. Wash bottles, teats, caps, scoops and knifes. Sterilise by boiling for five minutes or using an approved sterilising agent.
3. Boil fresh water and allow it to cool until lukewarm.
4. Ideally prepare only one bottle of formula at a time, just prior to feeding.
5. Always read the instructions to check the correct amount of water and powder as shown on the feeding table on the back of the pack. This may vary between different formulas.
6. Add water to the bottle first, then powder.
7. Pour the correct amount of previously boiled (now cooled) water into a sterilised bottle.
8. Fill the measuring scoop with formula powder and level off, using the levelling device provided or the back of a sterilised knife. Take care to add the correct number of scoops to the water in the bottle. Always measure the amount of powder using the scoop provided in the can— scoop sizes vary between different formulas.
9. Place the teat and cap on the bottle and shake it until the powder dissolves.
10. Test the temperature of the milk with a few drops on the inside of your wrist. It should feel just warm, but cool is better than too hot. To cool a bottle of formula to a safe temperature after preparation allow it to sit for at least 30 minutes.
11. Feed baby. Any formula left at the end of the feed must be discarded.
12. A feed should take no longer than one hour. Any formula that has been at room temperature for longer than one hour should be discarded.
13. Note. The Infant Nutrition Council Ltd was established in 2009 and is an amalgamation of the Infant Formula Manufacturers' Association of Australia (IFMAA) and the New Zealand Infant Formula Marketers' Association (NZIFMA)

Preparing formula correctly according to the above instructions will ensure that baby gets the right amount of nutrients.

Preparing feeds in advance:

Ideally prepare only one bottle at a time. If you do need to prepare formula in advance (for example for a babysitter) it must be refrigerated (at 4°C or below) and used within 24 hours. Alternatively, refrigerate prepared sterilised bottles of boiled water and use as required, first warming by standing bottle in a container of warm water and then adding formula.

If using refrigerated prepared formula, before feeding baby, warm by standing bottle in a container of warm water. Using a microwave to heat infant formula is not recommended as heating can occur unevenly and burn the baby's mouth.

8.3.3 Sterilisation methods

Boiling

Boiling is the preferred option for sterilisation of bottles and other infant feeding equipment. It will give consistent and reliable results if the following steps are taken:
- Place utensils, including bottles, teats and caps in a large saucepan on the back burner of the stove.
- Cover utensils with water, making sure to eliminate all air bubbles from the bottle.
- Bring water to the boil and boil for five minutes. Turn off—don't allow it to boil dry.
- Care needs to be taken to avoid scalds, so allow the equipment to cool in the saucepan until it is hand hot and then remove it. Be extra careful if children are present.
- Store equipment that is not being used straight away in a clean container in the fridge.
- Boil all equipment every 24 hours, even if it has not been used during that time.

Sterilising using chemicals

A chemical sterilant is an antibacterial solution that comes in liquid or tablet form. Follow the manufacturer's instructions carefully when making up the solution to ensure the correct dilution. After 24 hours discard the used solution, thoroughly scrub the container and equipment in warm water with

detergent and make up a new solution. Make sure all equipment is made of plastic or glass: metal corrodes when left in chemical sterilant.

Completely submerge everything, making sure there are no air bubbles, and leave it in the solution for at least the recommended time. Equipment can be left in the solution until it is needed. Allow the equipment to drain; do not rinse the sterilising liquid off it or there will be a risk of re-contamination. Store the sterilising concentrate and solution well out of the reach of children.

Washing bottles with soap or detergent until visibly clean followed by submersion in 50 ppm hypochlorite solution for 30 minutes completely eliminates bacterial contamination (Ma, Zhang et al. 2009). Chemical sterilisation is not as effective as boiling unless bottles and other utensils are meticulously cleaned.

Steam sterilisers

Steam sterilisers are automatic units that raise the temperature quickly to the range that kills harmful bacteria. Place thoroughly cleaned equipment inside the unit, add water according to the manufacturer's instructions, and switch on. The unit switches itself off when the sterilisation process is complete.

Microwave steam sterilisers

Sterilising units designed for use in a microwave oven are available. The caveats that apply to chemical sterilisation also apply to microwave sterilisation.

8.4 Using infant formula

8.4.1 Important points for preparing formula

- Formula is designed to remain at a constant strength. As an infant grows it is the amount of formula that should increase, not the strength. Never add any more scoops than is stated in the instructions.
- Always use the scoop provided with the brand of formula being used as scoops are not interchangeable between brands. Every brand of formula uses a different sized scoop. All scoops used in Australia should be filled to the level: never use half scoops of powder. When a container of formula is finished, throw away the scoop with the container, to ensure that the correct scoop is used next time.
- It is important to use cooled boiled water: hot water can destroy vitamins and other nutrients.

8.4.2 Teats and flow rates

It can be difficult to get the milk to flow at just the right rate: several types of teats may have to be tried until a suitable one is found. To test the flow of a teat, hold the bottle upside down, when it is filled with a room-temperature milk mixture the milk should drip steadily. If the bottle has to be shaken vigorously, the teat is too 'slow' and the infant may go to sleep before drinking as much as he or she needs. The milk should drip easily at a steady rate, without pouring out in a great stream. A little leakage at the corners of the mouth while an infant feeds is nothing to worry about; it stops as he or she gets older. When the ideal teat cannot be found, a faster teat is usually preferable to a slower one. Teats need to be checked and replaced regularly. Silicone and rubber teats are prone to perishing and can become dangerous if they crack: they can harbour bacteria, and there is a risk of pieces coming off and being inhaled or ingested.

8.4.3 Reducing the risks of bottle feeding

Before giving the bottle to the infant, always check the temperature of the feed by shaking a little milk from the teat onto the inside of the wrist. It should feel warm, not hot. It is important to hold an infant while feeding him or her with a bottle. Feeding should be a pleasurable experience for both mother and infant, regardless of the feeding method. Not only is parent–infant contact extremely important, but leaving infants to feed on their own can place them at risk. It is dangerous for parents to 'prop up' a bottle and leave the infant to manage alone. The milk may flow too quickly and cause the baby to splutter, or even choke.

Infants should never be put to sleep while drinking from a bottle ('propping of bottles'). Apart from the risk of choking, they are at greater risk of ear infection and tooth decay (AAP & American Academy of Family Physicians Beauregard 1971; Brown and Magnuson 2000; 2004; Hallett and O'Rourke 2006; McNiel, Labbok et al. 2010). Infants need to be held, cuddled and talked to when they are fed.

8.4.4 How much milk?

As with breastfeeding, bottle feeding according to need is appropriate. Bottle fed young infants (up to six months) require about 150 ml/kg body weight each day to meet their nutrient needs. Some will require more (up to 200 ml/kg), others less. It is important for parents to be aware that there are many individual variations in the amount of formula and the number of bottles consumed each 24 hours. Information on formula packages recommending certain amounts for various ages is a guide only and does not necessarily suit every infant. Plenty of wet nappies, consistent (but not excessive) weight gain, and a thriving, active infant indicate that all is well.

Following are the approximate formula requirements for infants:
- day 1 to 4—commence at 30 ml/kg/day and increase over the next few days
- day 5 to 3 months—150 ml/kg/day. Some, especially premature, babies will require up to 180–200 ml/kg/day
- 3 to 6 months—120 ml/kg/day
- 6 to 12 months—100 ml/kg/day. Some may reduce to 90 ml/kg/day.

8.4.5 Using a feeding cup

A feeding cup can be used instead of a bottle for feeding infant formula or expressed breastmilk. For infants over the age of six months parents may choose to wean onto a cup rather than a feeding bottle. The technique used by an infant to suck on the teat of a bottle differs from that used on the breast, and use of a feeding cup instead of a bottle reduces the risk of nipple confusion (Righard and Alade 1992).

8.5 Special infant formulas

Cow's milk based formula is suitable for most normal-term infants and is recommended over formulas made from soy beans, goat's milk or modified lactose formula. Specialised formula designed for babies with nutritional problems should be used only in the case of medically diagnosed conditions on the advice of a paediatrician. Changing the type of formula because of minor rashes or irritability and infant or parent distress is usually of no benefit.

Allergies and food reactions in infants and children are common and may be associated with a variety of foods including adapted cow milk formula. Soy-based formulas have been used to treat infants with allergy or food intolerance. A Cochrane Review has been published on the use of soy-based infant formulas in the prevention of allergy and food intolerance in infants (Osborn and Sinn 2006). This review was updated in 2009 with no change to conclusions. The authors concluded that feeding with a soy formula cannot be recommended, on the basis of available evidence, for prevention of allergy or food intolerance in infants at high risk of allergy or food intolerance. Further research may be warranted to determine the role of soy formulas for prevention of allergy or food intolerance in infants unable to be breastfed with a strong family history of allergy or cow's milk protein intolerance.

A number of concerns have been raised about soy-based infant formulas, on the basis of possible physiological effects of the isoflavone compounds on the infant's developing neuro-endocrine system. There is no clear clinical or scientific evidence to support the position that these compounds are harmful,

although there have been no long-term studies that conclusively document the product's safety in infants.

The Royal Australasian College of Physicians (Paediatrics & Child Health Division) policy for the use of soy formula in infants (2006) is as follows:
1. Recommends exclusive breastfeeding to six months followed by introduction of complementary foods and continued breastfeeding until 12 months of age, and beyond if mother and infant wish.
2. Recommends that infants under one year who are not breastfed should be fed an infant formula, not a soy or dairy-based milk marketed for older children or adult consumption.
3. Notes that soy formula has not been shown to be effective at preventing the development of atopy in 'at-risk' children, and may worsen atopic illness with prolonged use.
4. Recommends the use of extensively hydrolysed infant formula in infants with proven cow's milk allergy or cow's milk protein intolerance (CMPI) who are not breastfed.
5. Recommends that soy infant formula should not be used for preterm infants.
6. Recommends that clinicians treating children for thyroid disorders consider the possible interaction of soy formula with thyroxin replacement therapy.
7. Notes that it is appropriate to use soy infant formula as part of the management of galactosemia.

A detailed review of the use of soy-based infant formula has also been published by the Canadian Paediatrics Society (CPS) (Canadian Paediatrics Society 2009). The CPS review reached similar conclusions to the Australasian College and stated:

> *Physicians should consider limiting the use of soy-based formulas to those infants with galactosemia or those who cannot consume dairy-based products for cultural or religious reasons.*

A number of infant formulas marketed in Australia make claims that they are suited for the management of minor conditions and symptoms. An extensive literature review has failed to find any evidence of their efficacy. Many infants who are allergic to cow's milk are also allergic to goat's milk and soy milk (Osborn and Sinn 2006; Basnet, Schneider et al. 2010). The use of goat's milk formula is not recommended.

8.6 Fluoride in infant feeding

Fluoride is an essential nutrient, being part of the structure of bones and teeth. If the fluoride levels exceed amounts stipulated by FSANZ, a statement about this is required on the label. The water supply in most metropolitan and many regional areas in Australia is fortified with approximately one

milligram per litre of fluoride and it is assumed that this water will be used in infant formula. Plain bottled water (but not natural or sparkling mineral water or soda water) may be used to prepare infant formulas. But all water used to prepare infant formulas should be boiled and cooled according to the instructions on the formula package label (Infant Nutrition Council 2009). In areas where the water supply is not fluoridated, an inadequate intake of fluoride by infants and the general community poses a public health problem that may need to be redressed by health professionals. Infants under six months do not require a fluoride supplement (CDC 2001). In Australia fluoridation policies and naturally occurring fluoride levels vary by region and further advice should be sought from health professionals relevant for the infant's location.

8.7 Contamination of infant formula

There have been several episodes of contamination of infant formula and product recalls due to quality issues in recent years. The largest recall was of formula in China contaminated with the industrial chemical melamine (Qiu, Binns et al. 2010). Because of rigorous standards and comprehensive testing regimes it is unlikely that such a problem could occur in Australia.

Several countries have banned the use of infant feeding bottles made of polycarbonate that contain small amounts of bisphenol A (BPA). Canada was the first country to initiate a mandatory ban, although it recognised that there was no problem (www.gazette.gc.ca/rp-pr/p2/2010/2010-03-31/html/sor-dors53-eng.html). The risk from BPA is very low and the European Food Safety Authority has not recommended a ban (www.efsa.europa.eu/en/press/news/cef100930.htm).

In Australia the manufacturers and importers of infant feeding bottles have implemented a voluntary ban on BPA in infant bottles as reported by FSANZ (www.foodstandards.gov.au/consumerinformation/bisphenolabpaandfood4945.cfm).

9. Introducing spoon (solid) foods

Infancy is the period of most rapid growth in weight, height and all of the developmental parameters. Breastmilk (or commercial infant formula) provides sufficient nutrients and energy for infants to grow for around the first six months of life. In round figures growth in the first four months of life is 150-175 grams per week and then 100-125 grams per week until six months. In the first six months the average infant doubles its birth weight and by one year typically weights 2½ times its birth weight. By around six months of age breastmilk no longer provides sufficient nutrients and energy and additional foods must be introduced. Maintenance of a positive energy and nutrient balance is critical in achieving and sustaining normal growth and development.

Continued growth and development through good nutrition, is important to protect the infant against morbidity and mortality (Howie 2002; Quigley, Kelly et al. 2007). Appropriate growth during infancy protects against stunting at one extreme and against obesity at the other extreme throughout childhood and into adult life (Ip, Chung et al. 2007). There is increasing evidence of the importance of growth and nutrition in relation to obesity rates and cognitive development (Ip, Chung et al. 2007; Kramer, Aboud et al. 2008; Kramer 2010). In the long term appropriate early growth and development provides protection against the development of chronic disease in adulthood; the developmental origins of adult disease (Waterland and Michels 2007; Waterland 2008; Barker, Gelow et al. 2010; Vaiserman 2011; Zhang and Ho 2011). In addition, growth during infancy also influences future bone mass (Ip, Chung et al. 2007) .

9.1 Weaning

The word 'weaning', is often used to describe the introduction of solid (spoon) foods. This can be confusing as this term is also used to describe the introduction of non-milk drinks or even commercial infant formula (that is the cessation of complete reliance upon breastmilk). Since the word 'weaning' is used in various contexts in the literature, in these Guidelines the term 'introduction of spoon foods or solids' is used instead. Since many of the first foods given to infants are semisolid the term 'spoon foods' may be more appropriate than solid foods.

In infants up to around the age of six months, breastmilk is the ideal food, meeting all nutritional requirements. There is no universal model of feeding for older infants (over six months) as different cultures introduce different foods at different ages and providing nutritional requirements are met, there are no adverse consequences. Nutrient requirements for the six to 12 months age group are detailed in the Nutrient Reference Values for Australians (NHMRC & MoH 2006). A range of dietary patterns providing these nutrient

requirements have been described in the new Modelling System for Australia to inform the revision of the Australian Guide to Healthy Eating.

A Cochrane review (and its 2009 revision) has shown that 'infants who are exclusively breastfed for six months experience less morbidity from gastrointestinal infection than those who are mixed breastfed as of three or four months, and no deficits have been demonstrated in growth among infants from either developing or developed countries who are exclusively breastfed for six months (Kramer and Kakuma 2002; Kramer and Kakuma 2009). Although infants should still be managed individually so that insufficient growth or other adverse outcomes are not ignored and appropriate interventions are provided, the available evidence demonstrates no apparent risks in recommending, as a general policy, exclusive breastfeeding for the first six months of life in both developing and developed-country settings' (Kramer and Kakuma 2009).

In 2001 the report of a WHO Expert Consultation recommended exclusive breastfeeding for about six months, with the introduction of complementary foods and continued breastfeeding thereafter (World Health Assembly Resolution 2001). The 2001 World Health Assembly brought together these various recommendations in one resolution recommending exclusive breastfeeding until six months of age (WHO 2001). Since that time this recommendation has been endorsed by many national authorities, which are included in Appendix J. In Australia the wording has been to recommend exclusive breastfeeding to 'around six months' of age (NHMRC 2003)

By around six months of age most infants are able to adapt to different foods, food textures and modes of feeding (WHO 2001; WHO 2002; WHO 2003). Six months of age has been identified as a time when:

- An infant's appetite and growth and nutritional requirements are generally no longer satisfied by breastmilk or infant formula alone. At this time stores of several nutrients—for example, iron and zinc—are often falling in exclusively milk-fed infants (both breast- and formula fed) (WHO 2002). Iron status is a particular concern after six months of age (Hokama, Yogi et al. 2011).
- The development of feeding behaviour has progressed from sucking to biting and, by seven to nine months, to chewing. By eight months most infants can manage finger foods (Anderson, Malley et al. 2009). This is attributable to the disappearance of the tongue-extrusion reflex and the infant's increasing ability to sit without support, which allows greater manipulation of food before swallowing, so that thicker foods can be handled (WHO 2002).
- The digestive system matures. An infant's digestive system cannot cope with foods other than milk in the early months after birth. Salivary amylases are present at birth, but it appears that pancreatic amylases are essentially absent up to at least three months of age and remain inadequate up to six months (Lebenthal and Lebenthal 1999).

As a result, the ability to digest starches is limited until the middle of the first year of life.

- Most infants have developed an interest in their environment, and this prompts a willingness to accept new textures and flavours. It is useful to exploit this exploratory phase by gradually introducing new food tastes and textures.

Cultural, social and medical factors also influence the age at which individual food groups are introduced. Different cultures have their own traditions about what food is most suitable to begin with, and culturally appropriate foods and preparation methods should be encouraged when they are nutritionally adequate.

The evidence that age of introduction of solid foods is associated with risk of overweight in children younger than age of seven years is inconclusive (Reilly, Armstrong et al. 2005; Hawkins and Law 2006; Hawkins, Cole et al. 2009). A subsequent study found no association in breastfed children but increased BMI at three years of age in formula fed infants who received solids before four months or at after six months of age compared to receiving solids at four to five months (Huh, Rifas-Shiman et al. 2011).

Introducing solid foods too soon can lead to several problems:

- If less time is spent on the breast, maternal milk production may decline because of reduced stimulation (Brodribb 2006). In extreme cases under-nutrition could result (Kalanda, Verhoeff et al. 2006).
- If solid foods are introduced before an infant is developmentally ready, while the tongue-extrusion reflex is still strong, the infant will reject the spoon (a hard object). The mother might then feel that the infant is rejecting the food, when in fact it is rejecting the object placed in its mouth.
- Several studies have shown that food allergies can be reduced by breastfeeding (exclusively) for at least six months (Oddy 2004; Warner 2007; Oddy 2009).
- Exposure to pathogens present in foods can cause increased rates of diarrhoeal diseases (Kramer and Kakuma 2009).

Introducing solid foods too late can also cause problems:

- Growth can falter because breastmilk alone is insufficient after six months.
- Immune protection can be compromised.
- Micronutrient deficiencies, especially of iron and zinc, can develop because of breastmilk's inability to meet requirements in the later half of infancy. If infants are exclusively breastfed after six months, iron stores are likely to become depleted if a bioavailable source of iron

from complementary foods is not provided (Christofides, Schauer et al. 2005).

- Optimal development of motor skills such as chewing can be delayed and the infant may be unwilling to accept new tastes and textures.

9.2 Food allergy and the introduction of spoon foods

Food allergies, particularly in western societies have become of concern in recent decades (Jennings and Prescott 2010; Prescott, Bouygue et al. 2010). Relevant questions relate to associations of food allergies with the length of exclusive breastfeeding, the timing of the introduction of solids (spoon foods), and the timing and exposure to new foods (and common allergens) in the period after the introduction of spoon foods.

The commissioned literature review concluded that there was suggestive evidence that breastfeeding is associated with a reduced risk of asthma and atopic disease (Evidence Grade C) (Ip, Chung et al. 2007; Oddy 2009). The evidence base included one systematic literature review and nine cohort studies (Oddy 2009).

There is inconclusive evidence that delay in the introduction of solid foods until after the age of six months is associated with increased risk of developing allergic syndromes (Evidence Grade D) (Becker, Watson et al. 2004; Fiocchi, Assa'ad et al. 2006; Kull, Bergstrm et al. 2006; Poole, Barriga et al. 2006; Filipiak, Zutavern et al. 2007; Snijders, Thijs et al. 2008; Zutavern, Brockow et al. 2008). In the general population and in atopic families, exclusive breastfeeding for around six months can protect against allergic rhinitis, wheezing, asthma and atopy in children (Oddy, Holt et al. 1999; Gdalevich, Mimouni et al. 2001).

It is hypothesised that there is a window of tolerance around six months of age when the introduction of foods decreases the prevalence of allergy. The current recommendations of the Australasian Society of Clinical Immunology and Allergy (Jennings and Prescott 2010) includes: 'There is little evidence that delaying the introduction of complementary solid foods beyond six months reduces the risk of allergy, and there have been some suggestions that delaying introduction of foods may actually increase (rather than decrease) allergy'. There is insufficient evidence to support previous advice to specifically delay or avoid potentially allergenic foods (such as egg, peanuts, nuts, wheat, cow's milk and fish) for the prevention of food allergy or eczema. This also applies to infants with siblings who already have allergies to these foods. They conclude that 'more research is needed to determine the optimal time to start complementary solid foods'.

A study in Melbourne with a sample of 2589 infants aged 11 to 15 months found that 231 (8.9%) had an egg allergy at the age of 12 months (Koplin,

Osborne et al. 2010). There was no association between the prevalence of egg allergy and the length of breastfeeding or whether solids were introduced before or after six months of age. The authors report that introducing egg after 12 months was associated with a significant increase in allergy in high risk children and after 10 months in low risk children.

Although exclusive breastfeeding to around six months of age is recommended, more experience is needed to identify any subgroups that require earlier introduction of solids (spoon foods). Around six months should be regarded as a population recommendation.

A longitudinal study of 506 Swedish infants showed how long it can take to introduce solid foods. Infants took a median of 28 days from the first introduction of solids to consumption of more than 10 millilitres daily; it was 46 days before the infants ate 100 millilitres of solids in one day for the first time. Most infants in this study were given solids at ages between four and six months. The younger the infant was at the time of introduction of solids, the longer it took to introduce them (Hornell, Hofvander et al. 2001). Delaying the introduction of solids (spoon foods) until around six months will considerably shorten this period of adjustment.

In a recent commentary, concerns were raised about possible risks of allergy in infants who are breastfed exclusively to six months in developed countries (Fewtrell, Wilson et al. 2011). Responses to the Fewtrell article have challenged the scientific basis of the article (Renfrew, McGuire et al. 2011; UNICEF UK 2011; Williams and Ann Prentice 2011). Recent major systematic reviews show the adequacy of breastfeeding to around six months and confirm that this is associated with optimum morbidity and mortality in the long and short term (Anderson, Malley et al. 2009; EFSA Panel on Dietetic Products & Nutrition and Allergies 2009; Kramer and Kakuma 2009; Fewtrell, McGuire et al. 2011). There is no evidence that introduction of solid (spoon) foods to infants aged less than the recommended age (around six months) is associated with lower rates of allergies. There is some evidence that exclusive breastfeeding is associated with lower rates of allergy. Breastfeeding should be continued while solids (allergens) are introduced to the infant and has many advantages to the health of the infant.

9.3 Current Australian practices

In a study of infants in Melbourne, Graham et al. found that the majority of mothers were following the four to six months recommendation current at the time of the study: the mean age for the introduction of solids was 4.3 months (Graham, Gibbons et al. 1998). The average age for the introduction of cow's milk was 10.3 months, although some culturally and linguistically diverse groups introduced it earlier. The groups most likely to introduce solids before four months were very young mothers, first-time mothers and

mothers speaking languages other than English. In Perth the median age of introduction of solid foods was 17.5 weeks (Scott, Binns et al. 2009). The data available suggests that all Australian infants are introduced to solid foods by six months or within a few weeks of this age.

9.4 Practical aspects of this guideline

9.4.1 What foods should be introduced?

The introduction of spoon foods at around six months (22-26 weeks) should start with iron containing foods, including iron-enriched infant cereals and other iron fortified or iron containing foods. Vegetables, fruits, meats, poultry and fish are then added gradually. There are no set rules about the order in which the food groups should be introduced. Nutrient content is the most important factor including adequate amounts of iron and zinc, fat, protein, vitamins and other essential minerals. The foods that are introduced should be of high nutrient density and include a variety of foods from all of the five food groups (Dewey 2005). Fruit and vegetable purees are of low energy density, and choices should be varied even at this early age to ensure adequate energy and nutrient supply. An increasing range and quantity of foods should be offered as the infant moves towards 12 months of age. Cooke (2007) found continued exposure and opportunity to sample a variety of healthy foods resulted in adequate nutrient intakes and healthy diets in childhood and through to adulthood (Cooke 2007). Suggestions for suitable foods and dietary patterns are included in the Australian Guide to Healthy Eating.

The texture of foods that are introduced should be suited to an infant's developmental stages. From six months of age, infants should be offered purees, mashes and then semi-solid foods in fairly rapid succession. By eight months most infants can manage 'finger foods' as they learn to chew and swallow foods with lumps and in greater quantities. By 12 months, it is expected infants are able to eat 'family foods', which are the types of foods eaten by the rest of the family. Salty foods or very sweet foods should be avoided as these are acquired tastes that may result in poor foods choices later in life (Mennella and Beauchamp 1998). Foods with a high risk of choking should be avoided for the first three years, e.g. whole peanuts, raw carrot and apple pieces.

Increasing and varying food texture is essential for oral motor development. Infants not introduced to 'lumpy' textured food until after 10 months of age had greater feeding difficulties at 15 months than those introduced to lumpy food before six months, or between six and nine months of age (Northstone, Emmett et al. 2001). The research indicated the presence of a 'critical window' of opportunity for introducing these textured foods to reduce the risk of later feeding difficulties.

Solid foods should provide an increasing proportion of the energy intake because infants continue to grow rapidly during this time. Offering a variety of nutritious foods is likely to help meet the need for most nutrients and provide a basis for healthy eating habits.

By the end of the first year of life, an infant should be consuming a wide variety of family foods, having progressed from pureed or mashed foods to foods that are chopped into small pieces.

Other than recommending the use of iron-rich first foods, there are no recommendations on the order of introduction of foods or the number of new foods that can be introduced at a time.

Once most family foods have been successfully introduced, the types of foods offered should be changed frequently. This helps to ensure that the infant receives a good balance of nutrients. It may also play a part in assisting them to choose a broader range of foods later in life. Using family foods will help the child become used to eating like the rest of the family. Care should be taken early on to choose foods of a texture that is suitable for the child's age and stage of development. Small, hard pieces of food, such as nuts and seeds, should be avoided because they can be inhaled and cause choking.

Table IX.1 Developmental stages and examples of foods

Adapted from the Feeding and Nutrition of Infants and Young Children Guidelines for the WHO European Region (Michaelsen, Weaver et al. 2003)

Age (months)	Reflexes and skills	Types of food	Examples of foods that can be consumed
0–around 6	Suckling, sucking and swallowing	Liquids	Breastmilk
Around 6 (21–30 weeks)*	Increased strength of suck Appearance of early chewing. Movement of gag reflex from mid to posterior third of tongue	Pureed foods	Fortified cereals (e.g. rice), vegetables (e.g. carrot), fruit (e.g. apple, banana) purees, mashed potato, well-cooked pureed liver and meat and poultry, toast fingers and rusks
8–12	Clearing spoon with lips, biting and chewing. Lateral movements of tongue and movement of food to teeth	Mashed or chopped foods and finger foods. Interested in an extended range of foods and textures	Well-cooked fish, minced liver, meat, mashed cooked vegetables and fruit, chopped raw fruit and vegetables (e.g. banana, melon, tomato) egg yolk, cereals (e.g. wheat, oats), bread, pasta, nut pastes, cheese, custards and yoghurt
From 12 months	Rotary chewing movement, jaw stability	Family foods (caution with hard foods with increased risk of choking such as nuts)	Plain pasteurised milk

*Note that, in Australia, around six months is defined as 22-26 weeks.

The first foods introduced should be soft and smooth-textured. An infant will quickly learn to cope with foods of different textures and will accept food that has been mashed with a fork or minced. It is important at this stage to encourage the infant to chew. Once they are able to hold things, 'finger foods' such as pieces of fruit, vegetables and bread can be offered. Other foods, such as meats, can be chopped into small pieces. Feeding bottles are best 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 liquids other than breastmilk or formula from six months of age.

Practical Points

A number of recommendations have been made to help parents meet the nutritional needs of infants and young children aged six months to two years:

- Continue to breastfeed as often as the infant desires and the mother is able: this helps to avoid displacement of breastmilk by complementary foods and to maximise nutrients and immunological benefits, particularly in the first 12 months..
- Infants who are formula fed should have complementary foods introduced in the same way as breastfed infants.
- Aim for a variety of complementary solid (spoon) foods: fruit, vegetables, meat, fish, poultry and eggs. Iron-fortified infant cereals are good sources of iron. Iron in meat is bioavailable, and meat is also a good source of zinc and vitamin B12.
- The best source of calcium for infants is breastmilk or infant formula. Cow's milk should generally be avoided as a main drink before 12 months of age.
- Seek advice if the infant's appetite, growth or developmental milestones are impaired and further assessment is required.
- Infants eating a balanced, varied diet do not usually require nutritional supplements. Low birth weight infants may be an exception to this and individual clinical advice should be sought.
- Meals are to be enjoyed. Parents who model enjoyment of nutritious dietary practices set the scene for good nutrition throughout childhood and beyond.
- Reduce the risk of infection. Attention to food hygiene is very important when preparing foods for infants and children. See the Dietary Guidelines for more details.

10. Foods not suitable for infants or that should be used with care

Until around six months of age breastmilk provides all the energy and nutrients required for infants. Formula fed infants also receive adequate nutrition until about six months. At around six months suitable complementary spoon foods can be introduced (see Section 9). There are a number of foods that are not suitable for infants that are discussed in this section.

10.1 Honey

Honey can contain the spores of Clostridium botulinum, and should not be given to children aged less than two years. More than 1500 cases of infant botulism have been confirmed in the USA since it was recognized in 1976 (Brook 2007). Ninety-five percent of all recognized cases have occurred in patients between six weeks and six months of age. While other foods may contain spores of Clostridium botulinum, the consumption of honey has been repeatedly associated with infant botulism. Pacifiers and teats should never be coated with honey before being given to infants.

10.2 Tea

Tea is the most widely used beverage in the world and is of great cultural importance in many societies. It is commonly given to infants, and sometimes as even a prelacteal feed (Xu, Binns et al. 2007). Tea contains tannins and other compounds that bind iron and other minerals, thereby reducing their bioavailability (Temme and Van Hoydonck 2002; van der Merwe, Kluyts et al. 2007). Furthermore, sugar is often added to tea, increasing the risk of dental caries.

10.3 Nuts

Nuts are a problem with small children as their size and consistency increases the risk of inhalation and choking. For this reason, they should not be given to children aged less than three years. However nut pastes can be offered to infants from around six months of age.

Peanuts, while technically legumes not nuts, are included in this discussion for convenience. In the USA peanut allergy, tree nut allergy, or both, are reported by more than 1% of the US population (e.g., >3 million subjects) and the prevalence has increased among children over the past decade (Greer, Sicherer et al. 2008; Sicherer, Munoz-Furlong et al. 2010). At the time of the previous edition of the NHMRC Children's Dietary Guidelines the expert consensus was that the introduction of allergenic foods should be delayed

(NHMRC 2003). However the evidence now supports treating peanuts the same as any other foods and introducing them around six months of age (note that this assumes that peanut is fed in a suitable physical form, such as a paste, and not as the whole nut). The American Academy of Pediatrics (AAP) and the European Food Safety Authority both concluded that there is no reason to delay the introduction of foods to prevent allergies, including nuts in suitable form (Greer, Sicherer et al. 2008; European Food Safety Authority 2009).

10.4 Fruit juices

Fruit juices should not be given to infants under six months of age. From around six months of age limited quantities of fruit juice can form part of a varied diet. However fruit juices should not be considered as a replacement for fruit at any age; juices made from compressed fruit contain many of the nutrients present in fruits but not the dietary fibre. They have historically been given to children to prevent vitamin C deficiency and scurvy because cow's milk is low in vitamin C. However both breastmilk and infant formulas contain adequate amounts of this nutrient. Vitamin C is also found in vegetables and fortified foods.

An Adelaide study found that, in addition to milk, fruit juice and water were the main fluids given to infants aged less than eight months (Retallack, Simmer et al. 1994). This was especially the case with non-breastfed infants. The study results suggest that inclusion of juice in infants' diets is common: 85% of the children on juice in the study had begun drinking juice by the age of six months. In the Perth Infant Feeding Study II, undertaken 15 years later, the rate of consumption of fruit juice by six months was 23% and by 12 months was 67% (Binns, Graham et al. 2005). For aboriginal infants the rates were higher, increasing to 89% by 12 months (Eades, Read et al. 2010).

For infants over six months of age, drinking water or milk and consuming whole fruit are preferable to fruit juices and fruit drinks (AAP 2001). Excess consumption of fruit juice by young children has been associated with gastrointestinal symptoms, failure to thrive, decreased appetite, loose stools, and failure to gain weight (Lifshitz, Ament et al. 1992). Fruit juice is also acidic and can increase the risk of dental caries and erosion.

The AAP summarised the evidence on fruit juice and infants in the following way (AAP 2001). This policy was reconfirmed in 2007.
1. Fruit juice offers no nutritional benefit for infants younger than six months.
2. Fruit juice offers no nutritional benefits over whole fruit for infants older than six months and children.
3. One hundred percent fruit juice or reconstituted juice can be a healthy part of the diet when consumed as part of a well-balanced diet. Fruit

drinks often contain only a small quantity of fruit juice and are not nutritionally equivalent to fruit juice (or fruit).

4. Juice is not appropriate in the treatment of dehydration or management of diarrhoea.

5. Excessive juice consumption may be associated with malnutrition (overnutrition and undernutrition) and with a variety of gastro-intestinal symptoms including diarrhoea, flatulence, abdominal distention, and tooth decay (AAP 2001).

The AAP recommends:

- Juice should not be introduced into the diet of infants before six months of age.
- Infants should not be given juice from bottles or easily transportable covered cups that allow them to consume juice easily throughout the day. Infants should not be given juice at bedtime.
- Children should be encouraged to eat whole fruits to meet their recommended daily fruit intake.
- The AAP recommends that fruit juice be limited to 120-180 mls per day for children aged over 12 months (AAP 2001).

A more recent systematic review has confirmed the strength of these recommendations (Stephens, Keville et al. 2009). Health professionals should routinely discuss the use of fruit juice and fruit drinks and should educate parents about differences between the two; relevant information is available in the revised Australian Guide to Healthy Eating.

10.5 Cow's milk (full cream cow's milk)

Cow's milk should not be given to infants under 12 months age as a main drink. From around six months of age small quantities may be given as part of foods, such as custards. Previous editions of the Dietary Guidelines have recommended that children under the age of 12 months not be given cow's milk as the main drink. Most of the evidence for this recommendation this relates to the association between cow's milk consumption and iron deficiency anaemia in the first 12 months of life. The American Academy of Pediatrics first recommended against the use of cow's milk under 12 months of age in 1992 (AAP Committee on Nutrition 1992). This position has been reconfirmed by more recent studies and reviews.

10.6 Goat's milk

Goat's milk is not recommended for infants under the age of 12 months for reasons similar to those given for whole cow's milk above and for the additional reasons below

Basnet et al. reports a death from the use of unmodified goat's milk in an infant under 12 months of age due to the parent's beliefs (Basnet, Schneider et al. 2010). An exclusive, whole goat's milk diet can cause severe morbidity and potentially mortality in infants, including electrolyte imbalances, metabolic acidosis, megaloblastic anaemia, and antigenicity. Information promoting this practice abounds on the internet with claims that goat's milk is less allergenic than cows' milk and is a suitable substitute for infants with cow's milk allergy. In vitro studies have revealed an extensive cross-reactivity between cow's milk and goat's milk protein (Basnet, Schneider et al. 2010).

Goat's milk has high electrolyte and protein concentrations giving it a high renal solute load. Goat's milk contains 50 mg of sodium and 3.56 g of protein per 100 ml, approximately three times the respective values in breast milk of 17 mg and 1.03 g per 100 ml. The recommended adequate intakes for sodium and protein for infants below six months of age are 120 mg per day and 10 g per day, respectively (NHMRC & MoH 2006). Newborn infants have immature kidneys putting them at substantive risk for hypernatremia and azotemia, especially if they are dehydrated. Metabolic acidosis has been described in infants fed whole goat's milk (Hendriksz and Walter 2004) which is likely the result of its high protein content.

Folate deficiency with anaemia is another risk in infants fed goat's milk. Goat's milk is low in vitamin B12 and very low in folate. Goat's milk has 6 µg of folate per litre compared with breast milk's 50 µg per litre. Due to its very low levels of folate and vitamin B12, consumption of goat's milk during infancy can result in severe megaloblastic anaemia (Ziegler, Russell et al. 2005). Infantile vitamin B12 deficiency is a medical emergency due to the potential for severe, irreversible neurological damage. Unpasteurized goat milk has additional infectious risks and has been associated with the development of infections such as Q fever, toxoplasmosis, brucellosis and Escherichia coli O157:H7–associated haemolytic uremic syndrome (Basnet, Schneider et al. 2010).

Systematic evaluation of feeding unmodified goat's milk to infants less than one year of age is lacking, but the current literature is consistent in advocating against this practice. Health professionals need to be aware of the prevalence of unhealthy alternative diets that promote feeding goat's milk to infants and inform parents of the potential dangers associated with this practice.

Goat's milk-based infant formula is available in Australia and meets the standard for infant formula. A randomised controlled trial has shown no differences in growth between cow's milk and goat milk based formula (Grant, Rotherham et al. 2005). It has no advantages over cow's milk based formula for the prevention of allergies and since there may be cross reactions with cow's milk and goat's milk protein, goat's milk-based formula should

not be recommended for infant's with cow's milk allergy (Grant, Rotherham et al. 2005).

10.7 Reduced fat milk

In Australia reduced fat milks are recommended for older children and for all adults as part of a healthy diet. They have fat contents of 0.1-2% compared to the usual 4% in full strength milks. Note the fat content of milk is commonly expressed as weight per volume. In nutritional terms the 4% of fat in milk contributes up to 50% of its energy content. Because of the lower energy and fat levels, reduced fat milks are not recommended for children aged less than two years. After two years of age children can drink reduced fat milks with the rest of the family.

11. INTERPRETATION OF THE WHO CODE FOR HEALTH WORKERS IN AUSTRALIA

The WHO International Code of Marketing of Breastmilk Substitutes (WHO Code) (WHO 1981), was formulated in response to concerns over the effects on infant health of unfettered promotion of infant formula throughout the world. The drive for the code came from recognition of the increased risks of morbidity and mortality in infants who are not breastfed. The Code itself, as approved by the World Health Assembly (WHA), is not legally binding unless individual nations enact specific legislation. The Code has not been updated, but a number of supplementary resolutions have been passed by the WHA (WHO 2008).

Australia made a statement at the WHA that endorsed the Code: 'in voting for the adoption of this Code, Australia made an international commitment to take action to give effect to its aims and principles and accepted responsibility for their implementation as appropriate to social and legislative frameworks in this country' (NHMRC 1985).

In 1984 the NHMRC established a working party on the implementation of the Code in Australia and then issued guidelines for the health care sector for implementing the WHO Code (NHMRC 1985). A revised agreement between manufacturers and importers of infant formula was signed in May 1992 when it was authorised under the Trade Practices Act (TPA) and included follow-on formulas, which are for infants aged six to 12 months. Subsequently the Advisory Panel on the Marketing in Australia of Infant Formula (APMAIF) was established. It has been located in a number of different departments including Treasury, Consumers Affairs and Health. The report of APMAIF is tabled annually in Parliament
(www.health.gov.au/internet/main/publishing.nsf/Content/phd-apmaif-brochure-cntapmaif).

While the WHO Code has never been revised, there have been supplementary resolutions and decisions by the WHA leading to the publication of a consolidated edition of the Code in 2008. As recently as In May 2010 the WHA passed a resolution (Sponsored by Norway) urging countries to strengthen their commitments to the WHO Code and the companion Baby-friendly Hospital Initiative
(www.who.int/mediacentre/events/2010/wha63/en/). The NHMRC Infant Feeding Guidelines for Health Workers were developed as a part of the Australian response to the Code and this aim was clearly stated in the first edition of the Guidelines: 'The guidelines aim to help all health workers understand how the WHO Code and Australian Agreement affect their work in both breastfeeding and using infant formula.'

All health workers in Australia have a responsibility to promote and support breastfeeding. This section outlines aspects of the WHO Code, and subsequent WHA resolutions that are relevant to health workers. Some aspects of the Code are the responsibility of other parties, such as government or industry, but it is important that health workers be aware of their responsibilities. The marketing in Australia of infant formula is monitored on a voluntary basis by the APMAIF, through the MAIF Agreement. All health professionals have an obligation to do their best to promote breastfeeding. The extracts that follow are taken from the Advisory Panel's Annual Reports (www.health.gov.au/internet/main/publishing.nsf/Content/phd-brfeed-apmaif_08apmaif).

The aim of the WHO Code is to contribute to the provision of safe and adequate nutrition for infants by protecting and promoting breastfeeding and by ensuring the proper use of breastmilk substitutes, when these are necessary, on the basis of adequate information and through appropriate marketing and distribution. (The Code is summarised below.)

The whole purpose of these Infant Feeding Guidelines, and of the WHO Code, is to protect the nutritional wellbeing of infants. Breastfeeding is to be encouraged and should be protected from practices that undermine it. Health workers are seen by the public as the source of advice on infant feeding. This advice is to be available to all mothers, regardless of the feeding option they have chosen for their infant. When mothers do not breastfeed, or do so only partially, they should use a suitable infant formula until their child is 12 months of age. They should be fully informed about the benefits of breastfeeding, the cost of formula, and the hazards of improper use.

11.1 The Marketing in Australia of Infant Formulas Agreement: Status

The MAIF Agreement is a voluntary agreement between the manufacturers and, importers and distributors of infant formula and is not law. The Agreement has been authorised by the Australian Competition and Consumer Commission under the TPA. An Agreement must be submitted for authorisation where it contains marketing restrictions and an authorisation is only granted where the public benefit is shown to outweigh any anti-competitive effect. The signatories can legally follow the provisions of the authorised Agreement, but could be in breach of the TPA if they agree to any further marketing restriction, which is not covered in the Agreement, even if it is recommended in the WHO Code. Similarly, for aspects of the WHO Code for which there is no authorised Agreement, agreements by companies to restrict marketing practices may result in penalties for breaching the TPA.

11.1.1 The Advisory Panel on the Marketing in Australia of Infant Formula

The Advisory Panel on the Marketing in Australia of Infant Formula (APMAIF) terms of reference are to:

- receive and investigate complaints regarding the marketing in Australia of infant formulas
- act as a liaison point for issues relating to the marketing in Australia of infant formulas
- develop guidelines on the interpretation and application of the MAIF Agreement
- provide advice on the operation of the MAIF Agreement to the Australian Government Minister for Health and Ageing.

11.1.2 The MAIF Agreement (1992)

Preamble

This document sets out the obligations of manufacturers in and importers to Australia of infant formulas and gives effect in Australia to the principles of the WHO Code.

Clause 1: Aim

The aim is to contribute to the provision of safe and adequate nutrition for infants, by the protection and promotion of breastfeeding and by ensuring the proper use of breast milk substitutes, when they are necessary, on the basis of adequate information and through appropriate marketing and distribution. (WHO Code Article 1)

Clause 2: Scope

This document applies to the marketing in Australia of infant formulas when such products are marketed or otherwise represented to be suitable, with or without modification, for use as a partial or total replacement for breast milk. It also applies to their quality and availability, and to information concerning their use. (WHO Code Article 2)

Clause 3: Definitions

'Breast milk substitute'—any food marketed or otherwise represented as a partial or total replacement for breast milk, whether or not suitable for that purpose.
'Container'—any form of packaging of infant formulas for sale as a normal retail unit, including wrappers.

'Health care system'—governmental, non-governmental or private institutions engaged, directly or indirectly, in health care for mothers, infants and pregnant women and nurseries or child-care institutions. It also includes health workers in private practice. For the purposes of this document, the health care system does not include pharmacies or other retail outlets.

'Health care professional'—a professional or other appropriately trained person working in a component of the health care system, including pharmacists and voluntary workers.

'Infant formula'—any food described or sold as an alternative for human milk for the feeding of infants up to the age of twelve months and formulated in accordance with Australian Food Standard R7—Infant Formula.

'Label'—any tag, brand, mark, pictorial or other descriptive matter written, printed, stencilled, marked, embossed or impressed on, or attached to, a container of infant formula.

'Marketing'—includes the promotion, distribution, selling, advertising, public relations and information services related to infant formulas.

'Marketing personnel'—any persons whose functions include the marketing of infant formulas.

'Samples'—single or small quantities of an infant formula provided without cost. (WHO Code Article 3)

Clause 4: Information and Education

4(a) Manufacturers and importers of infant formulas in Australia agree that informational and educational materials, whether written, audio or visual, dealing with the feeding of infants and intended to reach pregnant women and parents of infants and young children, should always include clear information on all the following points:

(i) the benefits and superiority of breastfeeding
(ii) maternal nutrition, and the preparation for and maintenance of breastfeeding
(iii) the negative effect on breastfeeding of introducing partial bottle-feeding
(iv) the difficulty of reversing the decision not to breastfeed
(v) where needed, the proper use of infant formula, whether manufactured industrially or home prepared. (WHO Code Article 4.2)

4(b) When such materials contain information about the use of infant formulas, they should include the social and financial implications of its use, the health hazards of inappropriate foods or feeding methods and, in particular, the health hazards of unnecessary or improper use of infant formulas. Such materials should not use any pictures or text which may idealise the use of infant formulas. (WHO Code Article 4.2)

4(c) Manufacturers and importers of infant formulas should not donate informational or educational equipment or materials unless it is at the

request of, and with the written approval of, the appropriate government authority or within guidelines given by the Commonwealth, State or Territory Governments for this purpose. Such equipment or materials may bear the donating company's name or logo, but should not refer to a proprietary infant formula, and should be distributed only through the health care system. (WHO Code Article 4.3)

Clause 5: The general public and mothers

5(a) Manufacturers and importers of infant formulas should not advertise or in any other way promote infant formulas to the general public. (WHO Code Article 5.1)

5(b) Manufacturers and importers of infant formulas should not provide samples of infant formulas to the general public, pregnant women, parents or members of their families. (WHO Code Article 5.2)

5(c) Manufacturers and importers of infant formulas should not distribute to pregnant women, or parents of infants and young children, any gifts of articles or utensils which may promote the use of breast milk substitutes or bottle-feeding. (WHO Code Article 5.4)

5(d) Marketing personnel, in their business capacity, should not seek direct or indirect contact with pregnant women or with parents of infants and young children. This does not prevent appropriately qualified personnel from responding to complaints or unsolicited requests for information. For these requests, parents should be referred to a health care professional whenever health advice is required. (WHO Code Article 5.5)

Clause 6: Health care system

6(a) Manufacturers and importers of infant formulas should not use any facility of the health care system for the purpose of promoting infant formulas. This does not, however, preclude the dissemination of information to health care professionals as provided in clause 7(a). (WHO Code Article 6.2)

6(b) Manufacturers and importers of infant formulas should be aware that facilities of health care systems should not be used for the display of products within the scope of this document, for placards or posters concerning such products, or for the distribution of material provided by a manufacturer or distributor other than that specified in clause 4(c) above. (WHO Code Article 6.3)

6(c) The use by the health care system of pharmacies or retail outlets, 'professional service representatives', 'mothercraft nurses', or similar personnel, provided or paid for by manufacturers or importers of infant formulas is not permitted. (WHO Code Article 6.4)

6(d) Manufacturers and importers of infant formulas should be aware that feeding with infant formulas, whether manufactured or home

prepared, should be demonstrated only by health care professionals. Such demonstrations should be made only to the parents or other persons who need to use it, and the information given should include a clear explanation of the hazards of improper use. (WHO Code Article 6.5)

6(e) Manufacturers and importers of infant formulas may make donations, or low-priced sales, of infant formulas to institutions or organisations, whether for use in the institutions or for distribution outside them. Such provisions should only be used or distributed for infants who have to be fed on breast milk substitutes. If these provisions are distributed for use outside the institutions, this should be done only by the institutions or organisations concerned. Manufacturers or importers should not use such donations or low-price sales as a sales inducement. (WHO Code Article 6.6)

6(f) Manufacturers and importers of infant formulas should note that, where donated infant formulas are distributed outside an institution, the institution or organisation should take steps to ensure that these provisions can be continued as long as the infants concerned need them. Donors, as well as the institutions or organisations concerned should bear in mind this responsibility. (WHO Code Article 6.7)

6(g) Equipment and materials, in addition to those referred to in clause 4(c), donated to a health care system may bear a company's name or logo, but should not refer to any proprietary infant formulas. (WHO Code Article 6.8)

Clause 7: Health Care Professionals

7(a) Manufacturers and importers of infant formulas providing information about the formulas to health care professionals should restrict the information to scientific and factual matters. Such information should not imply or create a belief that bottle-feeding is equivalent or superior to breastfeeding. It should also include the information specified in clause 4(a) above. (WHO Code Article 7.2)

7(b) Manufacturers and importers of infant formulas should provide members of the medical profession and related health care professionals with information about the products, and this information should accurately reflect current knowledge and responsible opinion. Such material should be clearly identified with the name of the manufacturer or importer, the brand names of the infant formulas, and the date of publication.

7(c) Manufacturers and importers of infant formulas should not offer any financial or material inducement to health care professionals or members of their families to promote infant formulas, nor should such inducements be accepted by health care professionals or members of their families. (WHO Code Article 7.3)

7(d) Manufacturers and importers of infant formulas should not provide samples of infant formulas, or of equipment or utensils for their

preparation or use, to health care professionals except when necessary for the purpose of professional evaluation or research at the institutional level. (WHO Code Article 7.4)

7(e) Manufacturers and importers of infant formulas should disclose to institutions, to which a recipient health care professional is affiliated, any contribution made to him/her, or on his/her behalf, for fellowships, study tours, research grants, attendance at professional conferences, or the like. (WHO Code Article 7.5)

Clause 8: Persons employed by manufacturers and importers

8(a) In systems of sales incentives for marketing personnel, the volume of sales of infant formulas should not be included in the calculation of bonuses, nor should quotas be set specifically for sales of these products. This should not be understood to prevent the payment of bonuses based on the overall sales by a company of other products marketed by it. (WHO Code Article 8.1)

8(b) Personnel employed in marketing infant formulas should not, as part of their job responsibilities, perform educational functions in relation to pregnant women or parents of infants and young children. This does not prevent such personnel from being used for other functions by the health care system. (WHO Code Article 8.2)

Clause 9: Quality and Labelling

9(a) Manufacturers and importers of infant formulas must ensure that infant formulas sold in Australia conform to Australian Food Standard R7—Infant Formula. (WHO Code Articles 9.2, 9.4, 10.1 and 10.2)

9(b) Manufacturers and importers of infant formulas must ensure that labels provide the information required to be provided by the Australian Food Standard A1—Labelling and Advertising and Standard R7—Infant Formula, and also provide the necessary information about the appropriate use of infant formula and should not discourage breastfeeding. (WHO Code Article 9.1)

Clause 10: Implementation and monitoring

10(a) Independently of any other measures taken to implement their obligations under this document, each manufacturer and importer of infant formulas should regard itself as responsible for monitoring its marketing practices according to the principles and aim of this document, and for taking steps to ensure that its conduct at every level conforms to those principles and aims. (WHO Code Article 11.3)

10(b) Manufacturers and importers of infant formulas agree to be represented on the APMAIF and to participate fully in the work of the Advisory Panel.

10(c) Each manufacturer and importer of infant formulas should apprise its personnel of the existence of this document and of their responsibilities under it. (WHO Code Article 11.5).

11.1.3 Interpretations of the Advisory Panel on the Marketing in Australia of Infant Formulas

From time to time the APMAIF has made interpretations of the MAIF agreement. These are recorded in the APMAIF Annual reports which can be accessed at (www.health.gov.au/internet/main/publishing.nsf/content/health-pubhlth-strateg-foodpolicy-apmaif.htm). In accordance with its terms of reference, the APMAIF occasionally develops guidelines on the interpretation and application of the MAIF Agreement. These guidelines are made available on the APMAIF website as a reference source for stakeholders (www.health.gov.au/apmaif).

11.1.4 Summary of the International Code of Marketing of Breast milk substitutes (WHO Code)

(www.ilca.org/files/events/ilca_conference/Exhibitor%20Resources/CodeSummary09.pdf).

1. Aim The Code aims to protect and promote breastfeeding by ensuring appropriate marketing and distribution of breastmilk substitutes.

2. Scope The Code applies to breastmilk substitutes, when marketed or otherwise represented as a partial or total replacement for breastmilk. These breastmilk substitutes can include food and beverages such as:
   * infant formula
   * other milk products
   * cereals for infants
   * vegetable mixes
   * baby teas and juices
   * follow-up milks.

The Code also applies to feeding bottles and teats. Some countries have expanded their interpretation of the Code to include foods or liquids used as breastmilk substitutes and pacifiers.

3. Advertising No advertising of above products to the public.

4. Samples No free samples to mothers, their families or health workers.

5. Health Care Facilities No promotion of products, i.e. no product displays, posters or distribution of promotional materials. No use of mothercraft nurses or similar company-paid personnel.

6. Health workers No gifts or samples to health workers. Product information must be factual and scientific.

7. Supplies No free or low-cost supplies of breastmilk substitutes to any part of the health care system.

8. Information Information and educational materials must explain the benefits of breastfeeding, the health hazards associated with bottle feeding, and the costs of using infant formula.

9. Labels Product labels must clearly state the superiority of breastfeeding, the need for the advice of a health worker and a warning about health hazards. No pictures of infants, or other pictures or text idealising the use of infant formula.

10. Products Unsuitable products, such as sweetened condensed milk, should not be promoted for babies. All products should be of a high quality (Codex Alimentarius standards), have expiration dates, and take account of the climatic and storage conditions of the country where they are used

11.1.5 Differences between the MAIF Agreement and the WHO Code

The MAIF Agreement is Australia's primary means of implementing the WHO Code. The Agreement only operates in Australia and does not implement all aspects of the WHO Code. It is part of Australia's response to becoming a signatory to the WHO Code. It applies only to manufacturers and importers of infant formulas and does not include other milk products, foods, beverages or feeding bottles and teats. Only manufacturers and importers are signatories to the MAIF agreement which therefore excludes retail activities.

The WHO Code applies to the marketing and related practices of the following products: breast milk substitutes including infant formula; other milk products, feeding bottles and teats and foods and beverages - including bottle fed complementary foods, when marketed to be suitable for use as a partial or total replacement of breastmilk. It also applies to their quality and availability and to information concerning their use.

The APMAIF Annual Report is available on the APMAIF website. The Annual Report includes full details of the MAIF Agreement along with APMAIF's interpretations of the MAIF Agreement and other associated guidelines information about the APMAIF's decisions and other activities.

11.1.6 Areas in which the WHO Code is out of date:

'Home-prepared formula'

> *'Infant formula' means a breast-milk substitute formulated industrially in accordance with applicable Codex Alimentarius standards, to satisfy the normal nutritional requirements of infants up to between four and six months of age, and adapted to their physiological characteristics. Infant formula may also be prepared at home, in which case it is described as "home-prepared".*

The WHO has been advocating exclusive breastfeeding for six months for almost two decades. A change in the Codex requirement from 'between four and six months' to 'six months' would be more consistent with the WHO principles.

The concept of "home-prepared" infant formula is no longer acceptable, as such products could not meet modern nutritional requirements for infants.

Who is a health worker?

Under the WHO Code the definition of health worker is broad, but exempts pharmacies.

'Health care system' means governmental, nongovernmental or private institutions or organizations engaged, directly or indirectly, in health care for mothers, infants and pregnant women; and nurseries or child-care institutions. It also includes health workers in private practice. For the purposes of this Code, the health care system does not include pharmacies or other established sales outlets.

'Health worker' means a person working in a component of such a health care system, whether professional or non-professional, including voluntary unpaid workers.

Both the Code and the Agreement excluded pharmacies. Yet in the modern health system pharmacies provide advice to their customers that could impact on breastfeeding rates. In this context staff of retail pharmacies perform duties consistent with being a health worker.

Distribution of Samples

The distribution of samples is another important area of difference:
The Code prohibits the distribution of samples to the general public.

The Agreement states:

> 5(b) Manufacturers and importers of infant formulas should not provide samples of infant formulas to the general public, pregnant women, parents or members of their families.
> 7(d) Manufacturers and importers of infant formulas should not provide samples of infant formulas, or of equipment or utensils for their preparation or use, to health care professionals except when necessary for the purpose of professional evaluation or research at the institutional level

The wording in the WHO Code:

> 7.4 Samples of infant formula or other products within the scope of this Code, or of equipment or utensils for their preparation or use, should not be provided to health workers except when necessary for the purpose of professional evaluation or research at the institutional level.

The Code and the Agreement are clear about the distribution of samples directly to the public by manufacturers or distributors. It is not permitted.

In Australia the omission of the words 'directly or indirectly' from the sampling clause in the Agreement has been applied to the distribution of samples to patients on the basis of professional evaluation. A reasonable interpretation of professional evaluation could be that the objective(s) of the evaluation is recorded in the patient's clinical notes and that the patient be asked to return to discuss the outcome with the health worker.

11.1.7 Practical Points

All health workers have a responsibility to:
- Promote optimal infant nutrition by promoting breastfeeding.
- Understand and apply the MAIF agreement, particularly in regard to gifts and samples from infant formula companies.
- Avoid the promotion of infant formula, and inform mothers of the benefits of breastfeeding.
- Only distribute samples of infant formula for the purpose of formal evaluation.
- Ensure that if commercial infant formula has to be used that it is prepared in a safe way to the correct strength.
- For additional information on the basis of the MAIF agreement health workers could read the Innocenti Declaration and the WHO Code on the Marketing of Breastmilk Substitutes (www.innocenti15.net/declaration.pdf.pdf) (www.who.int/nutrition/publications/infantfeeding/Frequently_ask_que stion_Internationalcode.pdf).

Information on the implementation of the Code internationally can be obtained from the IBFAN website (www.ibfan.org/art/298-11.pdf) .

APPENDIX A: INTERPRETING BREASTFEEDING RATES IN AUSTRALIA

Breastfeeding provides major public health benefits in Australia and hence it is important that they should be monitored accurately. Breastfeeding is a dynamic process that lasts for a long period of time, often for longer than 12 months. Measurement involves frequent measurements (for example interviews, records, diaries) or must rely on memory.

In comparing breastfeeding rates the following factors need to be considered:

1. Definitions used. The standard definitions are given on p. 2. While most studies acknowledge standard definitions in some cases they are not always used (Binns, Fraser et al. 2009). This particularly applies to 'exclusive breastfeeding'. Some reports have not included prelacteal feeds and supplementary feeds given in hospital. This can be important as these feeds can alter the human microbiome and future health. In other cases exclusive breastfeeding rates are calculated on the past 24 hours experience. This measures exactly what it says— breastfeeding status in the past 24 hours and should not be referred to as exclusive breastfeeding.

2. Recall of past events. Some events are remembered more accurately than others. Recall periods should be as short as possible. A cohort study, where questionnaires are answered approximately every month or diaries are completed, will provide the most accurate data.

3. Accuracy of duration. Some surveys ask the mother for the date that breastfeeding ceased or changed. Duration can then be ascertained and rounded to the nearest week. Other surveys are less accurate and record breastfeeding to the nearest month. The degree of accuracy of recording duration influences the way the data can be reported and compared to other breastfeeding data. Ideally breastfeeding events should be recorded to within a week of occurrence.

4. Sample selection. The same constraints on sample selection apply to all epidemiological studies. In assessing the study ask the question: what population does this sample represent?

5. Response rates. The same constraints on response rates apply to all epidemiological studies. Why do potential subjects not participate? Is it more likely that non-breastfeeding mothers will refuse to participate? Perhaps working mothers will be under–represented because they are too busy.

6. Sample size. How was the sample size calculated? Is it big enough?

7. Comparison of studies. Rates from studies using different methods should be compared with caution

The National Breastfeeding Strategy requires detailed data that is representative, accurate and reproducible for program development and monitoring using the standard definitions of categories of breastfeeding. To date all monitoring of breastfeeding in Australia has been done by cross sectional, retrospective or small regional cohort studies. While much useful data are available, many studies use different definitions and sampling methods that make comparisons difficult (Binns, Fraser et al. 2009). Problems with length of memory affect cross sectional and retrospective breastfeeding statistics. The proportion of infants ever breastfed is usually accurately reported. The duration of 'any breastfeeding' is less accurate and the exclusive breastfeeding rate is unreliable (Aarts, Kylberg et al. 2000; Li, Scanlon et al. 2005; Flaherman, Chien et al. 2011).

APPENDIX B: USING A GROWTH REFERENCE IN AUSTRALIA

Introduction

The early nutrition and growth of infants has an important effect on early morbidity and mortality and there is increasing evidence of the medium and long term effects on health. Infant growth is now recognised as one of the influences on health and longevity later in life and breastfeeding is the backbone of early nutrition. Evidence continues to accumulate about the role of early growth and breastfeeding in the development of adult disease (Smith and Harvey 2010). Monitoring of growth is the most common paediatric intervention and hence it is important to interpret the data correctly and to adjust where necessary for the use of different references, measurement and cut-off levels for categories of nutritional status.

Birth weight is an important public health indicator that is related to immediate and later outcomes. Classifications used are:
- Low Birth weight ≤2500 grams
- Normal Birth weight 2500-4500 grams
- Macrosomia >4500 grams

Risk associated with birth weight has a U-shaped distribution for both short and long term outcomes.

Growth charts contain a number of lines representing percentiles of the population. By definition 50% of the population will fall below the 50th percentile (median) and 5% of the population will be below the 5th percentile. Health workers need to remind parents of this basic fact and emphasise that the pattern of growth (trajectory) is more important than the position of one point on the reference chart.

Growth References in Australia

Currently in Australia, a number of different data sets and the associated growth reference charts are used in different settings for the assessment of growth (CDC, 2000; de Onis, Garza et al. 2007). In children and adolescents (2–17 years of age), BMI is used to represent underweight, overweight and obesity using age-related cut-off values as proposed by Cole et al. (2000; 2007) or Z-scores (or SD Scores) (de Onis, Garza et al. 2007). In 2003, NHMRC endorsed use of data from the Centers for Disease Control and Prevention (CDC) (CDC, 2000) for the assessment of growth and referenced the Cole table of BMI cut-off points (NHMRC, 2003). For children and adolescents, growth should approximately follow one of the lines on whichever growth reference is used. If the line of growth crosses a number of percentile lines or tends towards or crosses the 10th or 90th percentiles, the

advice of health professionals should be sought. Currently Australian health departments are considering the use of growth charts in Australia.

Summary

Growth is a most important determinant of health. The choice of which growth chart to use requires consideration of whether one chart promotes optimal health and breastfeeding rates above another. If the 2006 WHO growth chart is used in the first six months of life, the 2nd percentile of this chart corresponds to the 5th percentile of the CDC 2000 growth chart. Regardless of which growth chart is used, health worker education in the use of these charts will facilitate the correct application and interpretation of growth in children.

Practical Points

1. Health professionals should know which growth reference they are using.
2. Growth trajectory (growth pattern) is more important than the actual position on the growth reference chart.
3. If the new WHO growth reference is used it is important to note that the 2nd Percentile corresponds approximately to the 5th percentile on the older reference (CDC, 2000) and that lower positions on the growth reference chart are acceptable.
4. In determining whether breastmilk production is adequate, growth trajectory is more important than position on the growth reference chart.

APPENDIX C: INFANT FEEDING EVIDENCE STATEMENTS

The evidence grades below have been extracted from the infant feeding literature review and the NHMRC literature review for the dietary guidelines.

Question	Grade	Statement
What is the relationship between breastfeeding in the first hour after delivery and breastfeeding outcomes? (from NHMRC infant feeding literature review)	C	Breastfeeding in the first hour after delivery is associated with improved breastfeeding outcomes.
What is the effect of delivering by caesarean section on breastfeeding outcomes? (from NHMRC infant feeding literature review)	D	Delivery by caesarean section may be negatively associated with the initiation of breastfeeding, particularly exclusive breastfeeding, and to a lesser extent breastfeeding duration.
What is the association between rate of breastfeeding and birth weight? (from NHMRC infant feeding literature review)	No grade given	If the infant is not admitted to NICU, the rate of breastfeeding is not related to birth weight.
What is the impact of prelacteal feeds on breastfeeding outcomes? (from NHMRC infant feeding literature review)	C	The use of prelacteal feeds negatively affects breastfeeding duration.
What is the association between ethnicity and breastfeeding type and duration? (from NHMRC infant feeding literature review)	No grade given	Insufficient evidence to make a formal evidence statement. There appears to be no association between ethnicity and breastfeeding duration in Australia.
What is the association between fathers supporting the decision to breastfeeding and breastfeeding outcomes? (from NHMRC infant feeding literature review)	B	When the infant's father is supportive of breastfeeding, initiation of breastfeeding is more likely and the duration will be longer for any breastfeeding.
Social Support (other than fathers) and breastfeeding (from NHMRC infant feeding literature review)	No grade given	Insufficient evidence to support a statement.
What is the relationship between infant gender and breastfeeding initiation and duration? (from NHMRC infant	No grade given	Insufficient evidence to make a formal evidence statement. The available evidence suggests that infant gender is not an important

feeding literature review)		factor in breastfeeding initiation and breastfeeding duration.
What is the relationship between infant health status and breastfeeding initiation and duration? (from NHMRC infant feeding literature review)	No grade given	Insufficient evidence to make an evidence statement.
What is the relationship between location (rural vs. urban) and breastfeeding? (from NHMRC infant feeding literature review)	C	In Australia, there is no difference or a slight increase in rural areas in the smaller cohort studies. Cross sectional studies (e.g. ABS) show higher ever breastfed rates in rural areas.
What is the relationship between socioeconomic status and breastfeeding? (from NHMRC infant feeding literature review)	C	The 1995 National Health Survey shows higher socioeconomic status is associated with higher rates of breastfeeding in Australia.
What is the evidence that maternal obesity is negatively associated with breastfeeding outcomes? (from NHMRC infant feeding literature review)	B	Maternal obesity is negatively associated with the initiation of breastfeeding and breastfeeding duration.
What is the relationship between parity and breastfeeding? (from NHMRC infant feeding literature review)	No grade given	As parity has become a difficult variable to study no evidence statement has been developed.
What is the association between maternal age and breastfeeding outcomes? (from NHMRC infant feeding literature review)	B	Younger maternal age, particularly less than 20 years, may be negatively associated with both the initiation of breastfeeding and breastfeeding duration.
What is the association between maternal education and breastfeeding outcomes? (from NHMRC infant feeding literature review)	C	In Australia, and other Western countries, higher levels of education are associated with better breastfeeding outcomes. In Asian countries, such as China the reverse is the case.
What is the association between demand feeding and 'rooming in'? (from NHMRC infant feeding literature review)	No grade given	Demand feeding is now standard practice in Australian hospitals. Due to the lack of variation in exposure variable no evidence statement has been developed.
Does exercise by mothers in the	B	Exercise by mothers does not

postpartum period affect breastfeeding performance? (from NHMRC infant feeding literature review)		affect breastfeeding performance.
Is the implementation of the Baby-friendly Hospital Initiative (BFHI) associated with breastfeeding performance and duration? (from NHMRC infant feeding literature review)	B	Implementation of the BFHI improves breastfeeding outcomes.
What are the benefits of breastfeeding (partial and exclusive) and the risks of not breastfeeding (any and exclusive), to infants and mothers, both in the short term and long term? (update from the NHMRC dietary guidelines literature review)	C	Not breastfeeding is associated with an increased risk of Sudden Infant Death Syndrome (SIDS).
What is the impact of pacifier use on the prevention of SIDS? (from NHMRC infant feeding literature review)	B	The use of a pacifier reduces the risk of SIDS.
Is pacifier use negatively associated with breastfeeding duration? (from NHMRC infant feeding literature review)	C	The use of a pacifier before four weeks is associated with a reduced duration of breastfeeding (any, full and exclusive).
What are the best forms of treatment for women who experience nipple pain/trauma during lactation? (from NHMRC infant feeding literature review)	D	No single intervention offers a significant improvement in the symptoms or duration of nipple pain/trauma.
What interventions are recommended for the prevention of nipple pain/trauma during lactation? (from NHMRC infant feeding literature review)	D	No single intervention provides a significant effect in preventing nipple pain/trauma
What is the prevalence of nipple variation (at least one flat, inverted or non-protractile nipple) in lactating women? (from NHMRC infant feeding literature review)	D	Approximately 8-10% of lactating women have at least one flat, inverted or non-protractile nipple
What is the physiological	D	Nipple shield use is associated

response to nipple shield use? (from NHMRC infant feeding literature review)		with a decrease in milk transfer.
Management of eczema and dermatitis of the nipple (from NHMRC infant feeding literature review)	No grade given	Insufficient evidence to develop a body of evidence statement
Nipple piercings during breastfeeding (from NHMRC infant feeding literature review)	No grade given	Insufficient evidence to develop a body of evidence statement
Raynaud's phenomenon of the nipple (from NHMRC infant feeding literature review)	No grade given	Insufficient evidence to develop a body of evidence statement
How does a mother's perceived breastmilk insufficiency affect breastfeeding level and duration? (from NHMRC infant feeding literature review)	D	Approximately 25-35% of lactating women reduce breastfeeding duration or level due to perceived breastmilk insufficiency
What are the best forms of treatment for women who experience breast engorgement during lactation? (from NHMRC infant feeding literature review)	D	No pharmacological or non-pharmacological treatments for breast engorgement are associated with significant improvement in symptoms
What is the prevalence of breast engorgement in lactating women? (from NHMRC infant feeding literature review)	D	Approximately 40% of lactating women experience moderate-severe symptoms of breast engorgement
What is the prevalence of mastitis in lactating women? (from NHMRC infant feeding literature review)	D	Approximately 10-25% of lactating women experience at least one episode of mastitis
What preventative strategies are effective in reducing the incidence and recurrence of mastitis in lactating women? (from NHMRC infant feeding literature review)	D	No pharmacological or non-pharmacological preventative methods are associated with a reduced occurrence of mastitis in breastfeeding women
What is the prevalence of breast abscess in lactating women? (from NHMRC infant feeding literature review)	D	Approximately 0.1 – 0.5% of lactating women develop a breast abscess in developed countries, including Australia.
What is the incidence of breast abscess in lactating women with inflammatory symptoms of the breast?? (from NHMRC	D	Approximately 3-10% of lactating women with inflammatory symptoms of the breast later developed a breast abscess

infant feeding literature review)		
What is the prevalence of maternal postnatal depression? (from NHMRC infant feeding literature review)	B	Approximately 10-15% of women experience depression (EPDS score ≥ 12) within twelve months of delivery
What is the association between postnatal depression and shorter breastfeeding duration? (from NHMRC infant feeding literature review)	C	Postnatal depression is associated with a shorter breastfeeding duration
What is the relationship between infant breast refusal and breastfeeding duration? (from NHMRC infant feeding literature review)	No grade given	Evidence was not strong enough to develop a body of evidence statement.
Prevalence and management of infant crying (from NHMRC infant feeding literature review)	No grade given	Evidence was not strong enough to develop a body of evidence statement.
Regurgitation, gastro-oesophageal reflux and feeding related behaviours (from NHMRC infant feeding literature review)	No grade given	No evidence statement developed.
What is the prevalence of ankyloglossia in infants? (from NHMRC infant feeding literature review)	D	Approximately 4-10% of infants are born with ankyloglossia.
Does ankyloglossia affect breastfeeding outcomes? (from NHMRC infant feeding literature review)	D	Ankyloglossia is associated with an increased risk of breastfeeding difficulties.
How effective is frenotomy in the treatment of ankyloglossia? (from NHMRC infant feeding literature review)	D	Frenotomy is an effective treatment for ankyloglossia.
What impact does breastfeeding have on postpartum weight loss? (from NHMRC infant feeding literature review)	No grade given	Insufficient evidence to make a statement on the effects of breastfeeding alone on postpartum weight loss.
What is the optimum storage time of expressed breastmilk? (from NHMRC infant feeding literature review)	C	The optimum storage time of breastmilk under clean conditions in a refrigerator 0-4°C is around 96 hours.
What is the association between breastmilk expression and breastfeeding outcomes? (from	No grade given	An insufficient number of studies were available to make a formal evidence statement.

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NHMRC infant feeding literature review)		
What is the effect of maternal and paternal smoking on breastfeeding outcomes? (from NHMRC infant feeding literature review)	A	Maternal and paternal smoking is negatively associated with breastfeeding outcomes.
What is the association between mothers returning to work and breastfeeding outcomes? (from NHMRC infant feeding literature review)	B	Intention to work or return to paid employment is negatively associated with both the initiation of breastfeeding and breastfeeding duration.
What is the risk of mother-to-child-transmission of hepatitis C virus through breastfeeding? (from NHMRC infant feeding literature review)	C	There is no association between transmission of hepatitis C virus and mode of infant feeding.
What is the risk of mother-to-child-transmission of hepatitis C virus through breastfeeding in hepatitis C and HIV co-infected mothers? (from NHMRC infant feeding literature review)	D	Hepatitis C mothers co-infected with HIV are at an increased risk of transmitting hepatitis C virus through breastmilk.
How many infants are fed unmodified cow's milk before 12 months of age? (from NHMRC infant feeding literature review)	D	The majority of infants are given cow's milk before the recommended age of 12 months.
What factors are predictive of the introduction of cow's milk before 12 months of age? (from NHMRC infant feeding literature review)	C	Low maternal educational and low socioeconomic status are associated with the introduction of unmodified cow's milk to infants less than 12 months of age.
What are the risks associated with feeding unmodified cow's milk to infants less than 12 months of age? (from NHMRC infant feeding literature review)	D	Feeding infants with whole cow's milk before 12 months of age is associated with an increased incidence of iron deficiency.
What are the benefits of breastfeeding (partial and exclusive) and the risks of not breastfeeding (any and exclusive), to infants and mothers, both in the short term and long term? (from NHMRC	C	Breastfeeding is associated with a reduced risk of asthma and atopic disease.

infant feeding literature review)		
Is the age of solid food introduction in children associated with the development of overweight later in life? (from NHMRC infant feeding literature review)	C	Introducing solid foods before four months is associated with increasing risk of overweight in children.
Is the duration of breastfeeding associated with lower rates of development of inflammatory bowel disease and coeliac disease? (from NHMRC infant feeding literature review)	C	Breastfeeding is associated with lower rates of coeliac disease and inflammatory bowel disease (crohn's disease and ulcerative colitis).
Does a particular intake of sugars effect the risk of dental disease? (from NHMRC dietary guidelines literature review)	C	Frequent consumption of added sugars is associated with increased risk of dental caries.
Is breastfeeding associated with children adopting appropriate life course consumption and dietary patterns? (from NHMRC dietary guidelines literature review)	A	Compared to infants who are formula fed, being breastfed is associated with reduced risk of becoming obese in childhood, adolescence, and early adulthood.
What are the benefits of breastfeeding (partial and exclusive) and the risks of not breastfeeding (any and exclusive), to infants and mothers, both in the short term and long term? (from NHMRC dietary guidelines literature review)	C	Being breastfed initially, particularly exclusively breastfed is associated with lower blood cholesterol concentrations in adult life.
What are the benefits of breastfeeding (partial and exclusive) and the risks of not breastfeeding (any and exclusive), to infants and mothers, both in the short term and long term? (from NHMRC dietary guidelines literature review)	B	Being breastfed in infancy is associated with lower systolic and diastolic blood pressure up to adolescence.
What are the benefits of breastfeeding (partial and exclusive) and the risks of not breastfeeding (any and exclusive), to infants and	B	Infants who are exclusively breastfed for six months experience less morbidity from gastrointestinal infection than those who are mixed breastfed as

mothers, both in the short term and long term? (from NHMRC dietary guidelines literature review)		of three or four months.
What are the benefits of breastfeeding (partial and exclusive) and the risks of not breastfeeding (any and exclusive), to infants and mothers, both in the short term and long term? (from NHMRC dietary guidelines literature review)	B	Infants, from either developing or developed countries, who are exclusively breastfed for six months or longer do not have deficits in growth compared to those who are not exclusively breastfed.
What are the benefits of breastfeeding (partial and exclusive) and the risks of not breastfeeding (any and exclusive), to infants and mothers, both in the short term and long term? (from NHMRC dietary guidelines literature review)	B	There are no apparent risks in a general recommendation for exclusive breastfeeding for the first six months of life, in both developing and developed countries. However, infants should still be managed individually in order to achieve sufficient growth and minimise adverse outcomes.
What are the benefits of breastfeeding (partial and exclusive) and the risks of not breastfeeding (any and exclusive), to infants and mothers, both in the short term and long term? (from NHMRC dietary guidelines literature review)	B	Mothers of infants exclusively breastfed for six months or more have more prolonged lactational amenorrhea.
What nutritional factors are important in optimizing breastfeeding outcomes? (from NHMRC dietary guidelines literature review)	B	Consumption of alcohol by lactating women in the range of 0.3-0.8 g/kg body weight is associated with increased risk of adverse infant outcomes.
Is the age of solid food introduction in children associated with the development of overweight later in life? (from NHMRC Dietary guideline literature review)	D	Age of introduction of solid foods is associated with risk of overweight in children younger than age of seven years
Is age of introduction of solids associated with risk of developing allergic syndromes	D	Delay in the introduction of solid foods until after the age of six months is associated with

(from NHMRC Dietary guideline literature review)		increased risk of developing allergic syndromes
What nutritional factors are important in optimizing breastfeeding outcomes? (from NHMRC dietary guidelines literature review)	C	Breastfeeding is associated with higher infant selenium status compared to formula feeding.
What factors are important in optimizing breastfeeding outcomes? (from NHMRC dietary guidelines literature review)	A	Pre-natal and perinatal support for breastfeeding can increase the proportion of women breastfeeding (both exclusive and non-exclusive) up to age six months.
What factors are important in optimizing breastfeeding outcomes? (from NHMRC dietary guidelines literature review)	B	Breastfeeding support (any type) increases duration of both exclusive and non-exclusive breastfeeding both in the immediate post-natal period and at six months of age.
What factors are important in optimizing breastfeeding outcomes? (from NHMRC dietary guidelines literature review)	C	Maternal perceived insufficient milk (PIM) supply is associated with increased risk of early cessation of lactation.

APPENDIX D: ROYAL AUSTRALASIAN C OLLEGE OF PHYSICIANS, PEDIATRICS AND CHILD HEALTH DIVISION: BREASTFEEDING POSITION STATEMENT

The Royal Australasian College of Physicians (RACP) position statement on breastfeeding was endorsed in June 2007. It reads as follows.

The target audience for this policy document are Fellows and trainees of the College and other health care professionals, organisations and community groups in Australia and New Zealand involved in the promotion of breastfeeding.

The Paediatrics and Child Health Division (Division) of the RACP recognises the recent advances in the scientific knowledge and extensive research in epidemiological and physiological studies which document compelling advantages from breastfeeding and the use of human milk for infant feeding. The RACP policy recognises the role of paediatricians to protect, encourage, support and promote breastfeeding. Breastfeeding is the biological norm. Breastfed infants when compared to formula fed infants have improved neurodevelopmental outcomes[1,2,3,4] and a lower incidence of infections,[5,6,7] obesity[8] and diabetes.[9,10] Breastfed infants also have better feed tolerance, less physiological gastroesophageal reflux[11] and a lower incidence of necrotising enterocolitis.[12,13] Most of these benefits have been demonstrated in randomised clinical trials although there remains the possibility that some are due to factors associated with the choice to breastfeed rather than breast milk itself. Other benefits are social, economic and environmental and improved maternal health including some protection against breast cancer.[14]

The effect of breastfeeding on atopic disease is controversial.[7,15,16] There is considerable evidence that breastfeeding may have benefits in the prevention of atopic disease in early life during the preschool years, however it does not appear that the protective effect extends to the teenage years or adult life.[17]

Breast milk is superior to formula. The nutritional composition of breast milk is unique with narrow ranges for most nutrients, and many additional factors which are not in formula. The International Code of Marketing of Breast milk Substitutes18 endorsed by subsequent World Health Assembly Resolutions, aims to protect the well-being of all infants through the protection, promotion and support of breastfeeding.

Breastfeeding is almost universally successful when there is good management and no medical intervention or exposure to alternative feeding methods. The Baby-friendly Hospital Initiative supports practices, such as keeping mothers and babies together skin-to-skin, which promote successful breastfeeding.[19,20] There is evidence that offering a breastfeed within the first few hours of birth is good for mothers, infants and for ongoing

breastfeeding,[21,21] "Rooming-in", or keeping the infant with the mother for 24 hours a day, has been shown to facilitate breastfeeding and promote bonding.[23,24] Infants should be fed on demand in recognition that mothers have varying breast capacities and milk production rates. Offering complementary feeds, whether water, glucose or formula, when there is no medical reason, has been shown to adversely affect the establishment and maintenance of successful breastfeeding.[25,26] There is also a need to recognise the possible dangers associated with infant formula feeding such as possible contamination of feeds, infection and incorrect reconstitution.[27]

The early use of bottles and dummies/pacifiers can interfere with the establishment of breastfeeding altering the infant's sucking capacity and reducing stimulation of the breasts, with the likely result of poor establishment or maintenance of lactation.[28] Randomised trials have reported conflicting results on the use of dummies/pacifiers and duration of breastfeeding with some showing a decrease[29] and some no effect.[30] Dummies/pacifiers, if used, should be after breastfeeding is established. Mothers should be taught baby feeding cues of mouthing, searching, rooting, sucking fingers and fists and breastfeeds should be offered for early signs of hunger 8-12/day. Dummies/pacifiers may be appropriate for some preterm infants during tube-feeding in the special care nursery.

Co-sleeping or bed-sharing is common and associated with increased breastfeeding rates, longer and more restful sleep, and a protective posture and synchrony of mother with baby.[31,32] However, co-sleeping has been associated with infant death if mother is a smoker or when mother is fatigued or sedated with drugs or alcohol. Recommendations for preventing Sudden Infant Death Syndrome (SIDS) and endorsed by the RACP, caution parents that there is an increased risk of SIDS for infants co-sleeping with adults if they get caught under bedding or between the wall and bed, fall out of bed or are rolled on by someone who sleeps very deeply or is affected by drugs or alcohol, or their mothers smoke.[33] All parents should be informed about how to safely co-sleep with their infants. UNICEF UK Baby Friendly Initiative with the Foundation for the Study of Infant Deaths produce a useful document for breastfeeding mothers on bed-sharing.[34]

Promotion of successful breastfeeding increases breastfeeding rates and normal development and growth.[7] Promotion is hindered by existing barriers, such as community attitudes towards breastfeeding in public places, and lack of role models in our society. Breastfeeding is not always easy and therefore some mothers may need support and assistance. Inadequate milk supply is often given as a reason for ceasing breastfeeding, even if the infant is thriving when weight is plotted on growth curves. This perception of inadequate supply is especially common in the first six weeks, before the infant has established a pattern of feeding and sleeping, and when parents may have unrealistic expectations of normal infant behaviour and needs. There are good mother-to-mother support groups available in Australia and

New Zealand such as the Australian Breastfeeding Association[35] and La Leche League New Zealand.[36] Health professional support is available through midwives, lactation consultants and the Royal New Zealand Plunket Society.[37] Public interest groups such as the International Baby-food Action Network[38] and the World Alliance for Breastfeeding Action[39] work to protect promote and support breastfeeding and optimal infant feeding practices.

The weight percentiles and body composition of breastfed infants differ from those of infants who are formula fed. In general breastfed infants tend to grow rapidly in the first few months and then grow at a slower rate than current percentiles. Therefore their weight may appear to be faltering after three months when plotted on current growth charts even when they are healthy.[40] The World Health Organization (WHO) Multicentre Growth Reference Study plan to release international growth curves for breastfed infants in 2006. Current National Health & Medical Research Council (NHMRC) recommendations for weight gain in infancy are 150-200g/wk 0-3 months, 100-150g/wk 3-6 months and 70-90g/wk 6-12months.[41]

Healthy breastfed babies do not need other fluids. The NHMRC recommends exclusive breastfeeding to 6 months based upon WHO and Cochrane reviews that demonstrated no disadvantage to growth associated with exclusive breast feeding and evidence demonstrating some protection from gastrointestinal infection in exclusively breast fed infants. However the introduction of complementary foods between 4 and 6 months, for healthy infants who are developmentally ready has not proven deleterious.

All infants should receive vitamin K on the first day of life.[42] Breastfed infants whose mothers are exposed to little direct sunlight including cultures where mothers are veiled may require vitamin D supplements to prevent rickets. Preterm breastfed infants require iron supplements from 4-8 weeks of age. Those born <32 weeks gestation usually require fortification of breast milk with protein and calories in the preterm period to allow adequate growth.[43]

There are a few contraindications to breastfeeding and these include active tuberculosis and, in developed countries where there is a relatively safe alternative, HIV infection.[44] In many poorer countries, such as sub-Saharan countries, HIV may not be an absolute contraindication to breastfeeding as the morbidity and mortality associated with infant formula feeding may be much higher than that associated with the risk of HIV transmission.[45] The use of a small number of maternal medications prohibits breastfeeding (e.g. cytotoxic and immuno-suppressive drugs and gold salts). Almost all drugs will pass from the maternal blood to the breast milk but, for most, only about 1-2% of the maternal dose appears. The use of some drugs may require the concentrations in breast milk or infant blood to be monitored.[46] Antidepressants are generally not considered a contraindication to breastfeeding. Advice will vary depending on the dose and duration of

treatment and is readily available from Drug Information Centres at Women's and Children's Hospitals, online[47,48,49,50] or from standard texts.[51]

Recommendations

- The Division supports the International Code of Marketing of Breast Milk Substitutes (1981) and the Voluntary Agreement of the Marketing in Australia of Infant Formulae (1992).
- The Division supports the NHMRC Infant Feeding Guidelines for Health Workers. These guidelines outline methods for the encouragement and promotion of breastfeeding and the management of feeding difficulties in the Australian community. They include guidelines for safe bottle-feeding.
- Paediatricians should encourage the critical evaluation at each step in health care during pregnancy, the intra-partum and postnatal periods, to determine any factors which may benefit or hinder the establishment of successful breastfeeding and refer women to expert help as needed.
- Where appropriate, they should encourage the development of local practice guidelines, in particular the introduction of the Baby-friendly Hospital Initiative and the Baby Friendly Community Initiative, which increase the chance of successful breastfeeding.
- All paediatricians who treat children in the early years of life or teach about child health should know in detail the physiology and techniques of breastfeeding and should be able to discuss and assist the mother with any related clinical problems.
- Paediatricians should encourage the inclusion of the breastfeeding topics in the undergraduate medical curriculum, and in postgraduate courses for paediatricians, obstetricians, general practitioners, midwives, pharmacists, dietitians, maternal and child health nurses and relevant others.
- Paediatricians should be advocates in encouraging the community to value breastfeeding and to welcome breastfeeding in public places and the workplace. They should promote social and industrial changes that make it easier for working mothers to continue breastfeeding e.g. these might include work-based facilities for expressing breast milk or feeding, and encouragement or incentive for employers to provide work-based facilities for child care.
- Exclusive breastfeeding is recommended to 6 months with introduction of complementary foods and continued breastfeeding until 12 months of age, and beyond if mother and infant wish.
- As part of postnatal care, mothers should be taught how to hand express breast milk and the appropriate use of breast pumps. Information on how to safely clean any equipment and store their expressed breast milk should also be given.
- All infants should receive vitamin K on the first day of life.

- Breastfed preterm infants (<32 weeks) usually require fortification with protein and calories in the preterm period and with iron from 4-8 weeks of age.
- Infants weaned from the breast before 12 months should receive an iron-supplemented formula.
- Paediatricians should be able to assist in exploring barriers to breastfeeding. When a mother makes an informed decision not to breastfeed, paediatricians need to provide advice about appropriate use of formula.
- Paediatricians should encourage flexibility and maternal autonomy in breastfeeding. Where assistance is necessary, paediatricians should be aware of services that provide such support and where possible refer mothers for additional support from qualified advisers experienced in the management of lactation.
- Paediatricians should consult their local drug information centre before suggesting that breastfeeding be interrupted or ceased because of maternal medications.
- Any baby who is persistently unsettled and/or has inadequate weight gain should be seen by a medical practitioner and, if necessary, referred to a paediatrician for further assessment. If the problem is related to breastfeeding, the advice of a lactation consultant may be useful.

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APPENDIX E: Australian National Breastfeeding Strategy: Executive Summary 2010-2015

Available from:
(www.health.gov.au/internet/main/publishing.nsf/Content/aust-breastfeeding-strategy-2010-2015) .

The framework for the Australian National Breastfeeding Strategy includes the following vision, objective, and underlying principles:

Vision
Australia is a nation in which breastfeeding is protected, promoted, supported and valued by the whole of society.
Breastfeeding is viewed as the biological and social norm for infant and young child feeding.
Mothers, families, health professionals and other caregivers are fully informed about the value of breastfeeding.

Objective
To increase the percentage of babies who are fully breastfed from birth to six months of age, with continued breastfeeding and complementary foods to twelve months and beyond.

Principles
1. Mother and Child: The mother and child relationship is the heart and focal point of all breastfeeding related activities.
2. Ecological Context: Breastfeeding is influenced by a range of family, social, cultural and environmental factors that inform promotion and support activity across the breastfeeding continuum.
3. Access: All members of a community have universal access to appropriate information and affordable services that protect, promote and support breastfeeding.
4. Diversity: The diversity of Australian families is recognised through breastfeeding promotion and support activities that are sensitive and responsive to individual circumstances.
5. Collaborative Care: Services and health professionals work in collaborative partnership to provide holistic care to breastfeeding women and their families that strengthens and maintains existing support services
6. Continuity of Care: Continuity of support at key transition points between birthing and community services and into the broader community is seamless from the perspective of mothers and their families.
7. Evidence Based: Protection, promotion and support activities are consistently informed by the best available evidence, the percentage of babies breastfed is regularly monitored, and activities are evaluated.

8. Effective Governance: There is a clear accountability for breastfeeding protection, promotion, support and monitoring activities at state/territory and national levels, and appropriate consultation and collaboration with the community sector.

APPENDIX F: EDINBURGH POSTNATAL DEPRESSION SCALE1 (EPDS)

Name: _____ Address: _____

Your Date of Birth: _____

Baby's Date of Birth: _____ Phone: _____

As you are pregnant or have recently had a baby, we would like to know how you are feeling. Please check the answer that comes closest to how you have felt IN THE PAST 7 DAYS, not just how you feel today.

Here is an example, already completed.
I have felt happy:

☐   Yes, all the time

☒   Yes, most of the time   This would mean: "I have felt happy most of the
the time" during the past week.

☐   No, not very often

☐   No, not at all

Please complete the other questions in the same way

In the past 7 days:

1. I have been able to laugh and see the funny side of things
☐ As much as I always could
☐ Not quite so much now
☐ Definitely not so much now
☐ Not at all

*6. Things have been getting on top of me
☐ Yes, most of the time I haven't been able to cope at all
☐ Yes, sometimes I haven't been coping as well as usual
☐ No, most of the time I have coped quite well
☐ No, I have been coping as well as ever

2. I have looked forward with enjoyment to things
☐ As much as I ever did
☐ Rather less than I used to
☐ Definitely less than I used to
☐ Hardly at all

*7 I have been so unhappy that I have had difficulty sleeping
☐ Yes, most of the time
☐ Yes, sometimes
☐ Not very often
☐ No, not at all

*3. I have blamed myself unnecessarily when things went wrong
□ Yes, most of the time
□ Yes, some of the time
□ Not very often
□ No, never

4. I have been anxious or worried for no good reason
□ No, not at all
□ Hardly ever
□ Yes, sometimes
□ Yes, very often

*5 I have felt scared or panicky for no very good reason
□ Yes, quite a lot
□ Yes, sometimes
□ No, not much
□ No, not at all

*8 I have felt sad or miserable
□ Yes, most of the time
□ Yes, quite often
□ Not very often
□ No, not at all

*9 I have been so unhappy that I have been crying
□ Yes, most of the time
□ Yes, quite often
□ Only occasionally
□ No, never

*10 The thought of harming myself has occurred to me
□ Yes, quite often
□ Sometimes
□ Hardly ever
□ Never

Administered/Reviewed by _____ Date _____

Postpartum depression is the most common complication of childbearing.2 The 10-question Edinburgh Postnatal Depression Scale (EPDS) is a valuable and efficient way of identifying patients at risk for "perinatal" depression. The EPDS is easy to administer and has proven to be an effective screening tool.

Mothers who score above 13 are likely to be suffering from a depressive illness of varying severity. The EPDS score should not override clinical judgment. A careful clinical assessment should be carried out to confirm the diagnosis. The scale indicates how the mother has felt during the previous week. In doubtful cases it may be useful to repeat the tool after 2 weeks. The scale will not detect mothers with anxiety neuroses, phobias or personality disorders.

Women with postpartum depression need not feel alone. They may find useful information on the web sites of the National Women's Health Information Center (www.4women.gov) and from groups such as Postpartum Support International (www.chss.iup.edu/postpartum) and Depression after Delivery (www.depressionafterdelivery.com).

SCORING

QUESTIONS 1, 2, & 4 (without an *)
Are scored 0, 1, 2 or 3 with top box scored as 0 and the bottom box scored as 3.
QUESTIONS 3, 5-10 (marked with an *)
Are reverse scored, with the top box scored as a 3 and the bottom box scored as 0.

Maximum score: 30
Possible Depression: 10 or greater
Always look at item 10 (suicidal thoughts)

Users may reproduce the scale without further permission, providing they respect copyright by quoting the names of the authors, the title, and the source of the paper in all reproduced copies

Instructions for using the Edinburgh Postnatal Depression Scale:
1. The mother is asked to check the response that comes closest to how she has been feeling in the previous 7 days.
2. All the items must be completed.
3. Care should be taken to avoid the possibility of the mother discussing her answers with others. (Answers come from the mother or pregnant woman.)
4. The mother should complete the scale herself, unless she has limited English or has difficulty with reading.

1 Source: Cox, J.L., Holden, J.M., and Sagovsky, R. 1987. Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. British Journal of Psychiatry 150:782-786.
2 Source: K. L. Wisner, B. L. Parry, C. M. Piontek, Postpartum Depression N Engl J Med vol. 347, No 3, July 18, 2002, 194-199

APPENDIX G: State and Territory policies on informing parents about supplementation feeds.

New South Wales

NSW Department of Health 2006, Breastfeeding in NSW: Promotion, Protection and Support, NSW Government, Sydney:
www.health.nsw.gov.au/policies/pd/2006/PD2006_012.html

Action 15: Incorporate breastfeeding education and support services into routine hospital maternity care

15.6 Implement protocol whereby a mother's written permission is obtained, and discussion with an appropriate health professional occurs, prior to giving complementary feeds to her infant. Consultation with the attending medical officer is indicated in situations of doubt.

Queensland

Queensland Health 2010, Queensland Health Standard: Statewide Breastfeeding Policy, Queensland Government, Brisbane:
www.health.qld.gov.au/qhpolicy/docs/pol/qh-pol-073.pdf

Implementation of the Statewide Breastfeeding Policy is facilitated by the following minimum requirements.

5.4 Guide health care practices, health service infrastructure, workplaces and public places to create environments that protect, promote and support optimal infant and young child feeding

5.4.4 Complementary feeds will only be given for medical indications, such as, but not limited to, those listed in the World Health Organisation (WHO) Acceptable Medical Reasons for Breast milk Substitutes, or at the mother's informed request, and will be appropriately documented in the clinical record.

5.4.5 Where an infant is given a complementary feed by staff without informed consent a
PRIME report should be generated.

Western Australia

Department of Health Western Australia 2009, Baby Friendly Hospital Initiative: hospital breastfeeding policy, Health Networks Branch, Department of Health Western Australia, Perth:
www.health.wa.gov.au/circularsnew/attachments/411.pdf

5 Policy Principles

5.6 Step 6: Give newborn infants no food or drink other than breast milk, unless medically indicated

5.6.3. Parents must be consulted if formula is recommended and the reasons discussed in full. Any formula prescribed must be recorded in the baby's hospital notes or health record along with the reason for supplementation and accompanied by a consent signed by the parent.

South Australia, Victoria, Australian Capital Territory, Northern Territory, Tasmania

These states/territories all support the Australian Baby Friendly Initiative 7 Point Plan for the Protection, Promotion and Support of Breastfeeding in Community Health Services, which includes point 3: Inform women and their families about breastfeeding being the biologically normal way to feed a baby and about the risks associated with not breastfeeding.

APPENDIX H: Australian nutrition and breastfeeding resources and websites

The following websites provide relevant nutrition information in Australia.

National Health and Medical Research Council
- NHMRC nutrition & diet publications: www.nhmrc.gov.au/publications/subjects/nutrition.htm
- NHMRC clinical practice publications: www.nhmrc.gov.au/publications/subjects/clinical.htm

Australian Department of Health and Ageing population health strategies
- www.health.gov.au
- National Breastfeeding Strategy www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-strateg-brfeed-index.htm

Other government sites

NSW Health:
- www.health.nsw.gov.au

Breastfeeding in NSW: Promotion, Protection and Support
- www.health.nsw.gov.au/policies/pd/2006/pdf/PD2006_012.pdf

Victorian Department of Human Services:
- www.dhs.vic.gov.au/home
- www.education.vic.gov.au/healthwellbeing/childyouth/breastfeeding/default.htm

South Australian Department of Human Services:
- www.sahealth.sa.gov.au
- www.cyh.com/

ACT Health:
- www.health.act.gov.au
- www.health.act.gov.au/c/health?a=dlpubpoldoc&document=2169

WA Health Department:
- www.health.wa.gov.au
- www.public.health.wa.gov.au

NT Territory Health Services
- www.health.nt.gov.au
- www.health.nt.gov.au/Nutrition_and_Physical_Activity/index.aspx

Queensland Health:
- www.health.qld.gov.au
- www.health.qld.gov.au/breastfeeding

Tasmanian Department of Health and Human Services:
- www.dhhs.tas.gov.au
- www.breastfeedingtas.org/

Food Standards Australia New Zealand:
- www.foodstandards.gov.au

Australian Institute of Health and Welfare:
- www.aihw.gov.au

Australian Bureau of Statistics:
- www.abs.gov.au

Indigenous health and nutrition:
Office for Aboriginal and Torres Strait Islander Health:
- www.health.gov.au/oatsih

New Zealand Ministry of Health:
- www.moh.govt.nz/moh.nsf
- www.moh.govt.nz/moh.nsf/indexmh/breastfeeding

Breastfeeding
- Australian Breastfeeding Association: www.breastfeeding.asn.au
- Australian Lactation Consultants Association Ltd: www.alca.asn.au/
- Infant Nutrition Council (Sponsored by Infant Formula Manufacturers): www.infantnutritioncouncil.com/
- Royal Australian College of General Practitioners (RACGP): www.racgp.org.au/policy/Breastfeeding_Position_Statement.pdf
- UNICEF Innocenti Research Centre: http://innocenti15.net/declaration.pdf.pdf

International websites
- UNICEF: www.UNICEF.org
- The breastfeeding newsletter of the American Academy of Pediatrics: www.aap.org/breastfeeding/sectionOnBreastfeeding.html
- Academy of Breastfeeding Medicine: www.bfmed.org/
- La Leche League International: www.llli.org/
- The International Baby Food Action Network: www.ibfan.org/
- World Health Organization: www.who.int/en/

APPENDIX I: Interpretation of the WHO Code for Health Workers in Australia

DEFINITION OF A HEALTH WORKER

It is important to define the meaning of health worker. The International Code of Marketing of Breast-Milk Substitutes (the WHO Code), the WHO Code FAQ and the Marketing in Australia of Infant Formulas: Manufacturers and Importers Agreement (The MAIF Agreement) define 'health worker'. The relevant sections of these documents are printed below.

All documents refer to the extensive responsibilities of health workers under the Code and Agreement. The WHO Code defines health worker broadly, full-time and part-time, paid and unpaid. A reasonable interpretation of the Code's definition would be 'any person associated in any way with the health system, private of public, who gives, or is in a position to give, advice on infant feeding to another person'. The WHO Code specifically excludes 'pharmacies or other established sales outlets'.

In 2010 the World Health Assembly adopted the WHO Global Code of Practice on the International Recruitment of Health Personnel which included the flowing definition (WHO 2010):

Health workers are people engaged in actions whose primary intent is to enhance health. These include people who provide health services—such as doctors, nurses, midwives, pharmacists, laboratory technicians—as well as management and support workers—such as hospital managers, financial officers, cooks, drivers and cleaners.

Health Workforce Australia (www.hwa.gov.au/) does not appear to have its own definition of health worker, although they refer to the WHO definition above. The Commonwealth Code of Practice for the International Recruitment of Health Workers (www.thecommonwealth.org/) does not include a definition, but refers to the WHO document and to 'registration'.

While the MAIF agreement excludes pharmacies and retail outfits it includes the following definition:

Health care professional is a professional or other appropriately trained person working in a component of the health care system, including pharmacists and voluntary workers.

Taking the Code and the Agreement together it would seem the intended definition of health worker in the Australian context is:

any person associated in any way with the health system, private of public, who gives, or is in a position to give, advice on infant feeding

to another person, including pharmacists.

This would fit with the perceptions of many pharmacies who advertise themselves as a source of primary health care and health information.

The WHO Code and the MAIF agreement contain clauses on education for the general population and heath workers.

When Australia became a signatory to the WHO Code its response included the following:
- The development of the MAIF agreement
- The National Breastfeeding Strategy
- The Development of the Infant Feeding Guidelines for Health Workers to provide guidance on appropriate infant feeding strategies.

Extracts from the WHO Code (WHO 1981)

Pre-amble

Affirming that health care systems, and the health professionals and other health workers serving in them, have an essential role to play in guiding infant feeding practices, encouraging and facilitating breastfeeding, and providing objective and consistent advice to mothers and families about the superior value of breastfeeding, or, where needed, on the proper use of infant formula, whether manufactured industrially or home-prepared;
'Health care system' means governmental, nongovernmental or private institutions or organizations engaged, directly or indirectly, in health care for mothers, infants and pregnant women; and nurseries or child-care institutions. It also includes health workers in private practice. For the purposes of this Code, the health care system does not include pharmacies or other established sales outlets.

'Health worker' means a person working in a component of such a health care system, whether professional or non-professional, including voluntary unpaid workers.

Article 6. Health care systems
6.1 The health authorities in Member States should take appropriate measures to encourage and protect breastfeeding and promote the principles of this Code, and should give appropriate information and advice to health workers in regard to their responsibilities, including the information specified in Article 4.2

6.5 Feeding with infant formula, whether manufactured or home-prepared, should be demonstrated only by health workers, or other community workers if necessary; and only to the mothers or family members who need to use it;

and the information given should include a clear explanation of the hazards of improper use.

Article 7. Health workers

7.1 Health workers should encourage and protect breastfeeding; and those who are concerned in particular with maternal and infant nutrition should make themselves familiar with their responsibilities under this Code, including the information specified in Article 4.2.

7.2 Information provided by manufacturers and distributors to health professionals regarding products within the scope of this Code should be restricted to scientific and factual matters, and such information should not imply or create a belief that bottlefeeding is equivalent or superior to breastfeeding. It should also include the information specified in Article 4.2.

7.3. No financial or material inducements to promote products within the scope of this Code should be offered by manufacturers or distributors to health workers or members of their families, nor should these be accepted by health workers or members of their families.

7.4 Samples of infant formula or other products within the scope of this Code, or of equipment or utensils for their preparation or use, should not be provided to health workers except when necessary for the purpose of professional evaluation or research at the institutional level. Health workers should not give samples of infant formula to pregnant women, mothers of infants and young children, or members of their families.

7.5 Manufacturers and distributors of products within the scope of this Code should disclose to the institution to which a recipient health worker is affiliated any contribution made to him or on his behalf for fellowships, study tours, research grants, attendance at professional conferences, or the like. Similar disclosures should be made by the recipient.

9.2 Manufacturers and distributors of infant formula should ensure that each container has a clear, conspicuous, and easily readable and understandable message printed on it, or on a label which cannot readily become separated from it, in an appropriate language, which includes all the following points:
(a) the words "Important Notice" or their equivalent;
(b) a statement of the superiority of breastfeeding;
(c) a statement that the product should be used only on the advice of a health worker as to the need for its use and the proper method of use;
(d) instructions for appropriate preparation, and a warning against the health hazards of inappropriate preparation. Neither the container nor the label should have pictures of infants, nor should they have other pictures or text which may idealize the use of infant formula. They may, however, have graphics for easy identification of the product as a breastmilk substitute and for illustrating methods of preparation. The terms 'humanized',

'materialized' or similar terms should not be used. Inserts giving additional information about the product and its proper use, subject to the above conditions, may be included in the package or retail unit. When labels give instructions for modifying a product into infant formula, the above should apply.

WHO CODE Frequently Asked Questions 2008 edition (WHO 2008)

Q. What aspects does the code cover?

The Code sets out detailed provisions with regard to, inter alia:
1.   Information and education on infant feeding.
2.   Promotion of breast-milk substitutes and related products to the general public and mothers.
3.   Promotion of breast-milk substitutes and related products to health workers and in health care settings.
4.   Labelling and quality of breast-milk substitutes and related products.
5.   Implementation and monitoring of the Code.

Q. Does the code restrict promotional activities to health workers and in health care settings?

The Code and subsequent relevant WHA resolutions call for a total prohibition of any type of promotion of products that fall within their scope in the health services. Furthermore, donations of free or subsidized supplies of breast-milk substitutes or other products, as well as gifts or personal samples to health workers, are not allowed in any part of the health care system. Also, information provided by manufacturers and distributors to health professionals regarding products should be restricted to scientific and factual matters.

The MAIF agreement (Department of Health and Ageing 2003)

The MAIF agreement includes the following definitions:

> *Health care system: governmental, non-governmental or private institutions engaged, directly or indirectly, in health care for mothers, infants and pregnant women and nurseries or child-care institutions. It also includes health workers in private practice. For the purposes of this document, the health care system does not include pharmacies or other retail outlets.*
>
> *Health care professional: a professional or other appropriately trained person working in a component of the health care system, including pharmacists and voluntary workers.*

Summary

It appears that the intention of the WHO Code and the MAIF agreement was to regulate 'health workers' who are in a position to advise and influence mothers (parents) on the choice of an infant feeding method. In modern Australia this would include the recognised health workers and volunteers working in the health system. But it also includes pharmacists, pharmacy staff and any staff in supermarkets who may be required to provide information on infant feeding products.

APPENDIX J: National authorities' position statements on infant feeding

Canadian Pediatric Society

The Canadian Pediatric Society recognizes…. that promoting exclusive breastfeeding to six months has the potential to improve health for infants who are economically and socially disadvantaged. We must acknowledge the need to provide adequate social and nutritional support to lactating women (Boland 2005).

America Academy of Pediatrics

Pediatricians and parents should be aware that exclusive breastfeeding is sufficient to support optimal growth and development for approximately the first 6 months of life and provides continuing protection against diarrhea and respiratory tract infection. Breastfeeding should be continued for at least the first year of life and beyond for as long as mutually desired by mother and child (Gartner, Morton et al. 2005).

American Dietetic Association

It is the position of the American Dietetic Association that exclusive breastfeeding provides optimal nutrition and health protection for the first 6 months of life and breastfeeding with complementary foods from 6 months until at least 12 months of age is the ideal feeding pattern for infants (James and Lessen 2009).

Australian College of Midwifery

Breastfeeding provides the normal food of choice – breast milk - for infants in the first 6 months of life and requires no supplementation. Thereafter infants should receive appropriate complementary foods with continued breastfeeding for up to two years and beyond (Australian College of Midwives & Baby Friendly Health Initiative 2007).

Royal Australian College of General Practitioners

Encourage exclusive breastfeeding for the first 6 months and then gradual introduction of suitable foods. Breastfeeding should continue until the child is 12 months of age, and then as long as the mother and child wish to continue, and weaning should be gradual (Royal Australian College of General Practitioners 2007).

The Paediatrics and Child Health Division (Division) of The Royal Australasian College of Physicians (RACP)

Exclusive breastfeeding is recommended to 6 months with introduction of complementary foods and continued breastfeeding until 12 months of age, and beyond if mother and infant wish (The Royal Australasian College of Physicians: Paediatrics & Child Health Division 2007).

The Public Health Association of Australia

Whilst, exclusive breastfeeding for 6 months is optimal, breastfeeding for even a few weeks, or partially, is beneficial and has definite

advantages over not breastfeeding at all (Public Health Association of Australia 2002).

European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN)

Exclusive or full breast-feeding for about 6 months is a desirable goal. Complementary feeding should not be introduced in any infant before 17 weeks, and all infants should start complementary feeding by 26 weeks. Continuation of breast-feeding after the introduction of complementary feeding is to be encouraged as long as mutually desired by mother and child (Agostoni, Decsi et al. 2008; Agostoni, Braegger et al. 2009).

APPENDIX K: DEVELOPMENT OF THE INFANT FEEDING GUIDELINES FOR HEALTH WORKERS

The search and guideline development strategies used for the Infant Feeding Guidelines for Health Workers (IFGHW) is identical to that used for the Dietary Guidelines for Australians. The Guidelines were based on the 2003 edition.

Since the last set of guidelines were published in 2003, developments in infant feeding have required revision, updated references and consideration of the Australian context.

The Systematic Literature Reviews (SLRs) were commissioned by the NHMRC to guide the development of the Dietary Guidelines. Two literature reviews were undertaken, the SLR for the Dietary Guidelines (the *NHMRC dietary guidelines literature review*) and an additional SLR for the Infant Feeding Guidelines (NHMRC infant feeding literature review). The methodology for the literature review and the criteria for levels of evidence are described in detail in Appendix one of the Dietary Guidelines for Australia 2011 edition. Infant Feeding Guidelines from authoritative bodies in Australia and internationally were also obtained and are listed in the literature review. The countries included in the literature review are the birth countries of most Australian infants as detailed in the literature review. More details of the search strategy and the countries covered are in the literature review. The literature reviews are available on the NHMRC website.

The IFGHW were developed by the following team:
> Prof Colin Binns, Curtin University
> Assoc Prof Jane Scott, Flinders University
> Prof David Forbes, University of Western Australia
> Katie Hewitt (Research Officer)

The Infant Feeding subcommittee of the NHMRC Dietary Guidelines Working Committee provided oversight to the process and made many useful suggestions:
> Dr Amanda Lee, DGWC Chair, Queensland Health
> Prof Dorothy Mackerras, Food Standards Australia New Zealand
> Prof Peter Davies, University of Queensland
> Dr Rosemary Stanton, Nutrition Consultant

The developers are all practising health professionals in paediatrics, dietetics, general practice and public health. We would like to thank the countless thousands of mothers, fathers and infants that we have delivered and cared for during our careers. They have provided us with all kinds of

practical information and hints, and inspired us to research where the answers have not been clear.

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