

7.0 Clinical nutrition

7.1 Adverse food reactions

Food allergies and intolerances are examples of adverse food reactions and describe adverse reactions to foods. Regardless of whether classified as either an allergy or intolerance, dietary management should be handled by a qualified dietitian/nutritionist (in conjunction with an allergist in the case of food allergies), since self imposed restrictions may lead to nutritional deficiencies. The area of food allergies and intolerances is not at all clear-cut. Accurate diagnosis is essential, and this usually requires a referral from a General Practitioner to an Allergist.

Understanding food allergies and intolerances

This section is kindly adapted from *Friendly Food*, Royal Prince Alfred Hospital Allergy Unit.

Understanding the difference between intolerance and other types of food reaction is an important starting point because the approach to dealing with them is quite different. Unlike allergies and coeliac disease, which are immune reactions to food proteins, intolerances don't involve the immune system at all. They are triggered by food chemicals which cause reactions by irritating nerve endings in different parts of the body, rather in the way that certain drugs can cause side-effects in sensitive people (2).

The chemicals involved in food intolerances are found in many different foods, so the approach involves identifying them and reducing your intake of *groups of foods*, all of which contain the same offending substances. By contrast protein allergens are unique to each food (for example, egg, milk and peanut), and dealing with a food allergy involves identifying and avoiding all traces of *that particular food*. Similarly gluten, the protein involved in coeliac disease, is only found in certain grains (wheat, barley, rye) and their elimination is the basis of a gluten-free diet (2).

If food allergy is suspected, refer patient to an allergist or immunologist for assessment.

Understanding food allergies

A food allergy is an abnormal immune reaction to a food that is harmless for most people. Antibodies against the food are produced so that when the allergic individual eats the food, histamine and other defensive chemicals are released causing inflammation. These chemicals trigger allergic symptoms that can affect the respiratory system, gastrointestinal tract, skin or cardiovascular system (5).

A rather short list of foods accounts for 85-90% of significant reactions, although any food can provoke a reaction. Foods responsible for the majority of significant food allergy in infants, children and adults are as follows:

- infants: cow's milk, soy
- children: cow's milk, egg, peanut, soy, wheat, tree nuts (walnuts, hazelnuts etc), fish, shellfish
- adults: peanut, tree nuts, fish, shellfish (9)

Fortunately, most children grow out of their egg and milk allergies before they reach school age, or during the early school years, but allergies to nuts and seafoods can persist. Wheat and soy can cause allergies, but they tend to be mild and transient (2).

Common food allergens (2, 3, 5)

- Peanut and other nuts
- Egg
- Milk
- Seafood
- Sesame
- Wheat
- Soy

Children born into atopic families are more likely to develop allergic diseases (50-80% risk) compared to those with no family history of atopy (20% risk) The risk appears to be higher if both parents are allergic.. and if the mother (rather than the father) has allergic disease (8)

Symptoms usually begin in the first 2 years of life, often after the first known exposure to the food... It is estimated that up to 6% of children under 3 years of age are affected by food allergies (3).



For more information, the handouts below can be accessed at the Royal Prince Alfred Hospital website:

www.cs.nsw.gov.au/rpa/Allergy/default.htm

- [Egg Allergy](#)
- [Frequently Asked Questions about Food Allergies \(includes Advice for Schools\)](#)
- [Latex Allergy](#)
- [Milk Allergy](#)
- [Peanut Allergy](#)
- [Food Allergy Prevention](#)
- [Upper Airway](#)
- [Wheat Allergy](#)

Food allergy reactions (2)

Food allergy reactions vary in severity, depending on how sensitive the person is and how much of the food they've eaten.

Food allergy is mainly a problem of infants, toddlers and young children. Over 90% of cases are associated with atopic eczema - an intensely itchy chronic skin rash affecting the face, arms, legs, and other parts of the body (2).

More severe reactions are usually obvious and occur consistently, every time the person has the food. Contact with the mouth and tongue can cause an immediate burning sensation, with hives and redness around the face and if the food is swallowed, an immediate feeling of being unwell can be followed by vomiting, cramps and diarrhoea. The face, mouth and eyes can swell dramatically, and hives on the body can join into large, rapidly spreading welts (2).

The most severe type of reaction – anaphylaxis - can progress rapidly with breathing difficulty (from swelling of the throat or severe asthma), allergic shock and collapse, and can be life-threatening if not treated immediately with adrenaline (epinephrine) by injection. In the most sensitive people with a food allergy, tiny amounts of the food (pin-head sized) can be enough to provoke a severe reaction (2).

Minimising the risk of allergy in high-risk infants (1, 8)

Pregnancy

- Do not smoke during pregnancy, and provide a smoke-free environment for your child after birth.
- Dietary restrictions in pregnancy are not recommended.

Breastfeeding, formula feeding

- Exclusively breastfeed your child for at least 6 months, and preferably longer.
- If breastfeeding is discontinued for any reason, seek professional advice: hydrolysed protein formula may be recommended.
- Soy milk and goat's milk formulas do not reduce allergies, and should not be used as an alternative to cow's milk formulas.
- Maternal dietary restrictions during breastfeeding are not recommended for prevention (8)
- If an infant is breastfeeding and showing signs of allergies, refer to local general practitioner or specialist (eg paediatrician, allergist).

Introducing solids

- Solid foods should not be introduced until about 6 months of age.
- Start with low-allergenic foods such as rice and rice based cereals, followed by vegetables (eg. potato, pumpkin) and fruits (pear, apple, banana), then meats.
- Add only one food at a time. Wait several days (ideally 5 to 10 days) before introducing a new food.



Management

Dietary Guidelines for Children and Adolescents in Australia **recommendation**

Encourage exclusive breastfeeding for 6 months to decrease the risk of allergy in infants with a positive family history.

If there is a strong family history of allergy, delay introducing some or all of the highly allergenic foods during the first year; among these foods are cow's milk and other dairy products, soy, eggs, nuts, peanuts and fish.

It is best to continue avoiding eggs, nuts and shellfish until the age of 3 years.

When food choices are restricted, the advice of a dietitian should be sought to ensure that the dietary intake continues to meet nutrient and energy needs.

Best Practice management is essential; refer to paediatrician or an allergist.

Dietary intervention

The main principle of food allergy management is avoidance of the offending antigen. An incorrect diagnosis is likely to result in unnecessary dietary restrictions, which, if prolonged, may adversely affect the child's nutritional status and growth. For patients requiring prolonged restrictive diets, a formal dietetic evaluation is recommended to ensure that nutritional requirements are met (3).

Food Intolerances

Food intolerances are an adverse reaction to a food or substance that does not involve the immune system (5). Food intolerance reactions can be triggered by a range of natural substances or additives present in many different foods.

Some people are born with a sensitive constitution and react more readily to food chemicals than others. The tendency is probably inherited, but environmental triggers can bring on symptoms at any age by altering the way the body reacts to food chemicals. These triggers may include:

- a sudden change of diet
- a bad food or drug reaction
- a nasty viral infection; for example, gastroenteritis or glandular fever (2).

Natural food chemicals

Natural chemicals are found in the foods we eat. Food is composed of protein, carbohydrate, fat and various nutrients as well as a number of natural 'chemicals'. These naturally occurring molecules often add flavour and smell to food. Sometimes they will trigger symptoms in unlucky individuals. These chemicals include (6):

- salicylates
- amines
- glutamate.

These natural substances are the ones common to many different foods, and therefore consumed in greatest quantity in the daily diet. As a rule, the tastier a food is, the richer it's likely to be in natural chemicals.

It is important to realise that reactions to these substances are not due to allergy, and so allergy testing is of little use in helping us to decide what to avoid (6).

Chemical threshold

The small amounts of natural chemicals present in a particular food may not be enough to cause a reaction straightaway. However, because one substance may be common to many different foods it can accumulate in the body, causing a reaction when the threshold is finally exceeded (2).

Food intolerance reactions (2)

Symptoms triggered by food chemical intolerances vary from person to person. Common ones include:

- recurrent hives and swellings
- headaches
- sinus trouble
- mouth ulcers
- nausea
- stomach pains
- bowel irritation.

Some people feel vaguely unwell, with flu-like aches and pains, or get unusually tired, run-down or moody, often for no apparent reason.

Management of food intolerances

The chemicals involved in food intolerances are found in many different foods, so the approach involves identifying them and reducing the intake of *groups of foods*, all of which contain the same offending substances (2).

Elimination diets

Once a diagnosis is made, the history may help identify the role of dietary or other factors in making symptoms worse. The only reliable way to sort out whether diet is playing a role is by people being placed on a *temporary* elimination diet **under the supervision of a skilled dietitian and medical practitioner**. If the diet helps, this is followed by challenges under controlled conditions to identify dietary triggers so that they can be avoided in the future (6).

It is important to emphasise elimination diets must only be undertaken for a short term, under strict medical supervision and only for very good reasons. Prolonged restricted diets can lead to problems with nutrition, particularly in children (6).

Refer to a dietitian.

Parent handout can be found at

www.medeserv.com.au/ascia/aer/infobulletins/food_intolerance.htm



Coeliac disease

This section is kindly adapted from *Friendly Food*, Royal Prince Alfred Hospital Allergy Unit.

Coeliac disease is caused by an immune reaction to gluten, a protein found in wheat, barley and rye. The reaction causes inflammation and damage to the lining of the small bowel, which impairs its ability to absorb nutrients. Typical symptoms include mouth ulcers, fatigue, bloating, cramps and diarrhoea, but some people have no symptoms at all, and in others the only clue may be anaemia (due to iron or folic acid deficiency) or an unusual chronic skin rash (*dermatitis herpetiformis*). Coeliac disease should not be confused with wheat allergy, which rarely occurs beyond infancy, or the stomach and bowel irritation that gluten can sometimes cause in people with chemical intolerances.

Screening blood tests are available, but definite diagnosis requires a small bowel biopsy. These tests can become negative after a few weeks of gluten avoidance. Untreated coeliac disease carries a long-term risk of nutritional deficiency, osteoporosis and/or bowel malignancy. Currently, a life-long gluten-free diet is the only known treatment.



Useful websites and resources

Dietary Guidelines for Children and Adolescents in Australia

Clinical guidelines

Katrina J Allen, David J Hill, Ralf G Heine. Food Allergy in Childhood.
MJA 185(7) 394-400.



www.mjw.public/issues/182_09_020505/pre10874_fm.html

Susan L Prescott and Mimi LK Tang (2005). The Australasian Society of Clinical Immunology and Allergy position statement: summary of allergy prevention in children
MJA 182(9) 464-467.

www.mja.com.au/public/issues/185_07_021006/all10609_fm.pdf



Parent books, DVDs

Friendly Food (Murdoch Books) by Anne Swain, Velencia Soutter and Robert Loblay,
Royal Prince Alfred Hospital Allergy Unit.

Order form can be found at

www.cs.nsw.gov.au/rpa/Allergy/default.htm



“Dealing with Food Allergy” DVD and booklet – available from Royal Prince Alfred Hospital.

Parent handouts regarding food allergy and intolerance can be found at

www.foodauthority.nsw.gov.au/consumer/c-allergies.html

including translated information sheets in eight different languages.

A note on the Australasian Society of Clinical Immunology and Allergy (ASCIA)

ASCIA is a professional non profit organisation, comprised predominantly of Clinical Immunologists, Allergy Specialists and Immunology Scientists. The main roles of ASCIA are to: promote the highest standards of scientific and medical practice and education amongst its members..... and to coordinate education programmes for its members, other health professionals and the public.

Contact information:

Executive Officer
The Australasian Society of Clinical Immunology and Allergy (ASCIA)
PO Box 450
Balgowlah NSW 2093

Email: education@allergy.org.au

Website: www.allergy.org.au



Patient education resources can be found at
www.allergy.org.au/aer/infobulletins/index.htm

A note on the Royal Prince Alfred Hospital (RPAH)

The RPAH Allergy Unit is attached to the Department of Clinical Immunology, Royal Prince Alfred Hospital (RPAH), and is affiliated with the Discipline of Medicine at the University of Sydney. The staff at the Allergy Unit are committed to excellence in clinical care, research and teaching, and act as a centre of national expertise providing information and resource materials for health care providers as well as the wider community.

Contact information:

Email: allergy@email.cs.nsw.gov.au

Website: www.cs.nsw.gov.au/rpa/Allergy/default.htm



References

1. Dietary Guidelines for Children and Adolescents in Australia incorporating the Infant Feeding Guidelines for Health Workers, NHMRC, Canberra 2003.
2. Friendly Food (Murdoch Books) by Anne Swain, Velencia Soutter and Robert Loblay, Royal Prince Alfred Hospital Allergy Unit.
3. Allen KJ., Hill DJ., Heine RG., (2006) Food Allergy in Childhood. MJA Practice Essentials 185(7) 394-400
4. Food Allergy Prevention; RPA
www.cs.nsw.gov.au/rpa/Allergy/default.htm [online] 5th April, 2007
5. NSW Food Authority: Food Allergies and Intolerances Fact Sheet: 25th August 2005. [online 4th April]
www.foodauthority.nsw.gov.au
6. www.medeserv.com.au/ascia/aer/infobulletins/food_intolerance.htm [online 10th April]
7. Bischoff S., Crowe S.E., (2005) Gastrointestinal Food Allergy: New Insights Into Pathophysiology and Clinical Perspectives. Gastroenterology 2005;128:1089-1113
8. Susan L Prescott and Mimi LK Tang (2005) The Australasian Society of Clinical Immunology and Allergy position statement: summary of allergy prevention in children MJA 182(9) 464-467
9. American Gastroenterological Association medical position statement: guidelines for the evaluation of food allergies, Gastroenterology 2001 Mar; 120(4) 1023-5
10. Prescott S.L., Tang M., (2004) The Australasian Society of Clinical Immunology and Allergy position statement: Allergy prevention in children. [online] 10th April
www.allergy.org.au/pospapers/Allergy_prevention.htm

7.2 Colic

The word 'colicky' is used to describe a fussy baby who is otherwise a healthy, growing infant younger than 4 months. Whether colic exists as a separate entity or as a symptom of a maternal problem is often debated.

In a recent Australian study 60% of parents reported that their babies had suffered from colic. Even though colic is common it can be very distressing for the parents and other family members. Inconsolable, unexplained and incessant crying in a seemingly healthy infant gives rise to tired, frustrated and concerned parents (1).

Normal patterns of crying

All infants, whether or not they have colic, cry more during the first 3 months of life than at any other time. One study describes crying patterns – crying lasted approximately 2 hours per day at 2 weeks of age, increased to a peak of 3 hours a day at 6 weeks, and gradually decreased to about 1 hour by 3 months of age. The hypotheses for these findings were that the accumulated excitement caused by environmental stimuli during the day was discharged in the form of crying during late afternoon and evening (2).

Most of the features of crying in infants with colic also occur in normal infants but with less frequency and shorter duration.

A commonly used criterion for defining colic is the Wessel's rule of threes, which states that infantile colic involves crying lasting for at least 3 hours a day, for at least 3 days in any week, for at least 3 weeks in the first 3 or 4 months of life.

There have been many articles and research reports published, yet still little is known about the cause or what to do about it. Some studies suggest colic can be caused by food allergies, gastrointestinal problems, environmental and behavioural factors. Others suggest that it is normal for infants to fuss and have increasingly longer bouts of crying from birth to about 6 weeks, after which the crying decreases.

Recommendations from the *Dietary Guidelines for Children and Adolescents in Australia*

Changes in diets and restrictions on individual foods have had a very limited success in the treatment of colic. Ensure dietary modification or pharmacological intervention is safe and does not result in nutritional deficiencies.

Tips for practice

- Provide reassurance that the infant is healthy.
- A thorough examination and history should be conducted to eliminate other possible physiological problems.
- Establish if the infant is crying for other reasons such as hunger, temperature, boredom.
- Establish the infant's diet, indications of reflux, sleeping patterns, bowel and urination patterns.
- Ask about the general well being of the parents and the social situation of the infant.

Resources

www.raisingchildren.net.au/articles/colic:_what_to_do.html/context/255

www.raisingchildren.net.au/articles/colic:_what_is_it.html

www.cyh.com/HealthTopics/HealthTopicDetails.aspx?p=114&np=304&id=1735



www.gut.nsw.edu.au/pcinfo1.htm

www.gut.nsw.edu.au/free1.htm

www.healthinsite.gov.au/

www.healthinsite.gov.au/topics/Colic

References

1. JBI 2004, The Effectiveness of Interventions for Infant Colic, *Best Practice* 8(2) 1-6.
www.joannabriggs.edu.au/pdf/BPIScolic.pdf
2. Turner T.L., (2006) Clinical features and aetiology of colic: [online] 18th April 2007,
www.uptodateonline.com/utd/content/topic.do?topicKey=behaviour/2155

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7.3 Constipation – keeping things moving!



Recommendations from the *Dietary Guidelines for Children and Adolescents in Australia*

To avoid unnecessary intervention, parents need to be educated about the wide variation in normal bowel function in infants (particularly those who are breastfed) and toddlers.

There have been some recent changes in the way constipation is being managed. This section will give you an overview of management plans, and provide some detailed advice on when referrals are necessary.

A normal pattern of stool evacuation is thought to be a sign of health in children of all ages. Especially during the first months of life, parents pay close attention to the frequency and the characteristics of their children's defecation. Any deviation from what is thought by any family member to be normal for children may trigger a call to the nurse or a visit to the paediatrician (4).

Stool consistency and frequency can be very variable in infants and children. Healthy breast or formula fed infants may pass stools as regularly as after every feed or as seldom as once a week. As long as the stools are soft and easily passed and the infant is continuing to grow appropriately, there is generally no cause for concern. Some foods will change stools to a different colour, for example, spinach may cause dark green stools or beetroot may cause a reddish colour.

Chronic constipation is a source of anxiety for parents who worry that a serious disease may be causing the symptoms (4).

Constipation in childhood is common, with a reported prevalence ranging from 0.3 – 28%. Faecal soiling occurs in 1 – 3% of children aged 4 – 7 years (2).

Symptoms persist beyond puberty in about 30% of children with constipation and soiling (2)

Definition

An infant or child is considered constipated if there is pain associated with passing stools and the stools are hard or dry. Infrequency is insufficient grounds upon which to make a diagnosis of constipation. However, there is general acceptance that it is abnormal to have

- stool frequency of less than 3 times per week,
- hard painful defecation
- periodic passage of very large amounts of stool at least once every 7 – 30 days
- or a palpable abdominal or rectal mass on physical examination (2).

Normal bowel function

What is striking is the variance of normal frequency of bowel movements, particularly in infants; breastfed babies 0 – 3 months old, range from 5 – 40 bowel movements per week (4).

Normal bowel function (1, 2, 3)

- First bowel action consists of meconium, which is greenish-black
- 24 – 48 hours meconium changes; brown transitional stools
- Breastfed:
 - 3rd or 4th day, mustard coloured
 - May also be green or orange
 - Milk curds may be present
- 6 weeks to 3 months - number of bowel motions decrease; intervals of several days or more are common
- Babies older than 2 months may normally have infrequent stools, sometimes up to 1 – 2 weeks apart (1)
- Formula fed babies pass fewer stools, once a day or every second day, khaki coloured and plasticine like consistency

Meconium is passed within the first 24 hours in about 87% of infants and within 48 hours by 99%; this is not influenced by whether the infant is receiving breastmilk or formula (2).

Subsequently, however, the method of feeding has a significant impact on stool frequency, colour and consistency. Breast-fed infants pass softer, uniformly yellow stools up to 5 times a day. This is more frequent than in bottle-fed infants. However, breast-fed infants may occasionally have no bowel actions for 3 days or more, which is rare in bottle-fed infants. Within the first few weeks of life, 64% of breast-fed, but only 30% of bottle-fed, infants are having more than 3 bowel actions a day (2).

Stool frequency reduces progressively with age, so that by 16 weeks of age both breastfed and bottlefed infants are passing on average 2 stools a day.

Hard, dry motions are more likely to occur after formula or solids are introduced (1).

Please note: continued passage of meconium in the first couple of months may be a sign of inadequate milk intake and may be the first sign of an underfed baby (1).

See Failure to Thrive section.

Aetiology of constipation

The aetiology of constipation and soiling is multifactorial.

Functional constipation (2,4)

Constipation without objective evidence of a pathological condition. It is most commonly caused by painful bowel movements with resultant voluntary withholding of faeces by a child who wants to avoid unpleasant defecation (see Box 2). Withholding faeces can lead to prolonged faecal stasis in the colon, with reabsorption of fluids and an increase in size and consistency of the stools.

Up to 63% of children with constipation and faecal soiling will have a history of painful defecation beginning before 3 years of age and secondary withholding behaviour (2).

Events leading to painful defecation (4)

- toilet training
- changes in routine or diet
- stressful events
- intercurrent illness
- unavailability of toilets
- the child's postponing defecation because he or she is too busy.

Recognising the signs to prevent functional constipation: 'withholding'

The passage of large hard stools that painfully stretch the anus may frighten the child, resulting in a fearful determination to avoid all defecation. Such children respond to the urge to defecate by (2,4):

- contracting their anal sphincter and gluteal muscles, attempting to withhold stool
- rising on their toes and rocking back and forth while stiffening their buttocks and legs
- wriggling or fidgeting
- assuming unusual postures
- crossing their thighs
- walking on tiptoes to clench their buttocks
- performing these actions often while hiding in a corner

Often parents believe this behaviour is the child attempting to defecate (4)

Eventually the rectum habituates to the stimulus of the enlarging faecal mass, and the urge to defecate subsides. With time, such retentive behaviour becomes an automatic reaction. As the rectal wall stretches, faecal soiling may occur (4), during spontaneous relaxation of sphincters (2) angering the parents and frightening the child. After several days without a bowel movement irritability, abdominal distension, cramps, and decreased oral intake may result (4).

Fibre, fluid and exercise

Slowed colonic transit as a cause of constipation in childhood is also well recognised, as is the association of low fibre intake with hard, infrequent stools (2).

There is a strong correlation between dietary fibre intake and mean daily stool weight. Cereal fibre has been found to improve bowel function by increasing faecal bulk and reducing transit time, resulting in softer, larger stools and more frequent bowel action.

For children aged 1-3 years the average intake of fibre is 14g/day and 18g/day for 4-8 year olds. Diets rich in insoluble fibre—such as that present in wholegrain cereals and breads - are associated with a low prevalence of constipation and diverticular disease (1).

For children aged 1-3 years the average intake of fluid is 1 litre/day and for 4-8 year olds it is 1.2 litres/day.

Fibre content of foods

Food Group	Food Item	Fibre (grams)
Bread, cereal, rice, pasta, noodles	wholemeal bread (1 slice) white bread (3 slices) cooked rolled oats (½ cup) brown rice (1 cup)	2 g
	Bran Flakes (½ cup) muesli (2 Tbsp) Weetbix/Vitabrits (2)	4 g
	All Bran (⅓ cup) cooked wholemeal pasta (1 cup) Sultana Bran (1⅓ cups)	8 g
Fruit and Vegetables	4-5 medium prunes ½ medium apple/pear/orange 1 medium banana ½ punnet strawberries 30 g sultanas ½ cup tinned fruit 1 small potato, peeled 1 cup mushrooms 3 brussel sprouts	2-3g
Legumes and Pulses	½ cup baked beans ⅓ cup kidney beans	8 g
Nuts and Seeds	30 g almonds (shelled) 60 g peanuts (shelled) 2 Tbsp linseed 30 g sunflower seeds	5 g

Cow's milk protein allergy

It has recently been recognised that one of the manifestations of the spectrum of cow's milk protein allergy in early childhood is constipation (2).

In one study the "relationship between cow's milk protein intolerance and chronic constipation was observed. In 28% of the children, constipation disappeared during the CMP-free diet and reappeared after the challenge" (5).

These results suggest cow's milk protein intolerance must be considered in the differential diagnosis of chronic constipation' (5). 'In children unresponsive to conventional medical and behavioural management, consideration may be given to a time-limited trial of cow's milk-free diet (6).

In children between 1 – 4 years of age, a history of allergy, anal fissure or abdominal discomfort may suggest allergy to cow's milk protein, justifying a 2 week trial of restriction of cow's milk protein (2).

Refer to dietitian

Clinical presentation of constipation

Table 16 Clinical presentation of constipation (2)

First week of life	Delayed passage of meconium beyond the first 48 hours, suggests either an anatomical obstruction, such as anal atresia or stenosis, or Hirschsprung's disease
Before introducing solids	Formula fed infants pass harder stools May present with difficult passage of hard stools, occasionally a fissure Breastfed infants unlikely to present with hard stools, but stools may be infrequent. Breastmilk is so good there is nothing to waste (1)
Introducing solids	Common for both breast and bottle fed infants to change bowel functioning. Constipation may first present here
Toilet training	May be associated with development of withholding behaviour and functional faecal retention

Adapted from Catto-Smith et al (2005) (2)

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 does not indicate pain or constipation (1)

Management of children with constipation

Evidence Based Practice tip: A combination of behavioural therapy and laxatives is more effective than behavioural therapy used alone (2).

Education

Both parent and child need to understand that constipation and faecal soiling are common, and are likely to improve with age and simple therapies. The easiest way to explain soiling is to emphasise the loss of conscious awareness of the need to defecate that comes with chronic rectal distension with faeces (2). The emphasis on 'keeping the rectum empty' is likely to alleviate blame, and improve cooperation and compliance (2)

Maintenance therapy (2)

- Establishing a regular toileting regime, generally about 2 to 3 times per day for 5-10 minutes at a time after meals.
- Ensure appropriate toileting posture and comfortable foot support with feet flat.
- If dietary fibre is deficient, it should then be optimised. Dietary changes are unlikely to be helpful if the main mechanism of constipation is withholding behaviour.
- A diary is helpful, and can be linked to a reward chart. Encourage parents to record toileting frequency, successful passage of stool in the toilet, soiling free days, daily medications and episodes of soiling.

Stool reimpaction is less likely to occur if stools are being passed daily (2).

When to refer

Referral of a child for specialist advice should be considered when:

- 1 impaction is suspected – referral to general practitioner, hospital or paediatrician
- 2 symptoms of constipation do not respond to treatment in general practice after 3-6 months
- 3 there is frequent soiling and distress
- 4 in doubt about the cause of the symptoms
- 5 the condition is interfering with the child's schooling or social relationships

Relapse

A significant proportion (30-50%) of children will relapse after being successfully treated for constipation (2)

Long term relapse is more frequent in children under 4 years at the onset of symptoms and in whom there is a history of faecal soiling associated with constipation (2).

Initial review should be after 1-2 weeks, then monthly, and eventually at 3 monthly intervals. Maintenance therapy and follow up should be continued for at least 6 – 24 months. A trial of weaning from the use of laxatives should be attempted at 6 monthly intervals (2). It is imperative to stress to caregivers the importance of long term maintenance therapy, including the use of laxatives.

References

1. *Dietary Guidelines for Children and Adolescents in Australia incorporating the Infant Feeding Guidelines for Health Workers*, NHMRC, Canberra 2003.
2. Catto-Smith AG., (2005). Constipation and toilet issues in children. *MJA Practice essentials –Pediatrics* 182 (5) 242-246
3. *Breastfeeding management*, Australian Breastfeeding Association. 3rd edition (2004). Wendy Brodbirbb. Ligare
4. Baker SS, Liptak GS, Colletti RB., Croffie JM., Di Lorenze C., Ector W., Nurko S (1999) Constipation in Infants and Children: Evaluation and Treatment. *Journal of paediatric gastroenterology* vol 29(5) pp 612-626
5. Daher S., Tahan S., Sole D., Napitz CK., Patricio FRS., Fagundes-Neto U., Morris MB. Cows milk intolerance and chronic constipation in children. *Paedatric Allergy Immunology* 2001: 12: 339-342
6. 2006. Clinical Practice Guideline: Evaluation and Treatment of Constipation in Children: Summary of Updated Recommendation of the North American Society for Paediatric Gastroenterology, Hepatology and Nutrition. *Journal of Gastroenterology and Nutrition* 43: 405-407

7.4 Failure to Thrive (Slow weight gain and undernutrition)

Failure to Thrive (FTT) has been recognised as more of a clinical description of growth failure in infants and children, rather than a stand alone diagnosis. FTT continues to be used as a blanket term for children, especially infants with perceived growth abnormalities (1). Now it is accepted that FTT has a predominantly nutritional cause, it has been suggested slow weight gain or undernutrition are reasonable alternate terms.

The most serious consequences of an inappropriate food intake in infancy and early childhood are underweight and failure to thrive. In Australia, in recent years, concern about the prevalence of underweight and failure to thrive in infancy and childhood has largely focused on Indigenous communities, where the aetiology of the problem rests in a complex mix of social and economic factors (2).

Failure to thrive among other sections of the community is also most commonly a result of psychosocial factors, including poor living conditions (2).

The literature provides evidence that from time to time cases of failure to thrive also occur in more affluent sections of the community as a consequence of parents inappropriately restricting the dietary intake of young children because of fears about obesity and atherosclerosis or the development of 'unhealthy' dietary habits. Such cases are, however, relatively rare compared with the problem of dietary restriction in older children and adolescents (2).

Although it is now accepted that FTT has a predominantly nutritional cause, the implication of an association with emotional and physical deprivation persists (3).

There are a number of causes of failure to thrive and referral to a medical practitioner is recommended. If undernutrition is diagnosed, a dietitian/nutritionist will help in the management of this problem.

Definition

Failure to thrive is a condition characterised by **failure of expected growth** (usually weight) (3,4,5). Onset often occurs within weeks of birth and with hindsight growth faltering is clearly evident on growth charts by 6 months. Failure to thrive often persists up to the age of 5 years (5).

Currently, there are no nationally or internationally standardised guidelines for diagnosing FTT. In studies reviewed, chronic poor weight gain is the most commonly used feature for diagnosis failure to thrive. Chronic poor weight gain includes growth deviation from the expected weight percentiles, a trend, which may also be reflected in the height percentiles (6).

Chronic poor weight gain may include:

- inadequate weight gain
- static weight
- intermittent periods of poor growth.

An adequate assessment must be based on a series of accurate measurements of **both length and weight**. Long term length and weight changes are desirable (refer to growth chart section). **Head circumference** should also be monitored (7).

Growth

Normal growth (1)

Growth and development represent the end product of a multitude of factors both intrinsic and extrinsic to the infant or child. Normal growth is as much dependant on the genome of a particular individual as it is the external environment in which the individual thrives. Therefore, regular routine monitoring of growth indexes represents one of the most important responsibilities facing health professionals.

Although newborn size is dependant on intrauterine factors, growth during infancy is largely nutritionally driven. There is transition from the nutrition based growth of infancy to the growth hormone dependant childhood phase.

Factitious failure to thrive (1)

Normal growth is highly variable. Some physiological adjustments such as constitutional growth delay, familial short stature and intrauterine growth retardation do not represent true failure to thrive or paediatric undernutrition.

■ **Familial short stature:**

- infants have a decreased growth velocity between 6 and 18 months of age
- gradually these infants will fall into a new, genetically predetermined, percentile
- after this deceleration of growth, they have normal growth rate along their new centiles
- characteristics include normal birth weight and length, but frequently a family history of short stature
- infants with normal short stature have normal skeletal maturation

■ **Constitutional growth delay:**

- deceleration in growth velocity that occurs before 2 years of age, and can begin before 6 months of age
- also a decrease in weight for length caused by slow gaining of weight
- deceleration of growth usually ends by 3 years of age, followed by normalisation of growth rate, albeit below the 3rd centile
- family history of growth delay characterised by features such as delayed puberty or menarche in a parent
- boys are more commonly affected than girls
- increased growth potential during childhood

.....

- **Intrauterine growth retardation (IUGR):**

- infants who are small for their gestational age, and tend to have global growth retardation
- catch up growth usually occurs before 2 years of age
- those infants that fail to display catch up growth, typically remained small, and growth proceeds very slowly
- 28% to 70% are believed to be constitutionally small, displaying their genetic predisposition, with the remainder of the infants expressing IUGR caused by underlying pathological processes, and overlapping problems such as malnutrition or substance abuse are recognised contributors
- it is important to realise, by assessment of growth indexes, growth rate and history that iugr infants may be growing normally while not achieving catch up growth

Causes of failure to thrive (3)

“Traditionally, FTT has been subdivided into organic or non-organic in nature. Studies have found **5% or less have major organic** diseases, mostly diagnosable from other signs and symptoms” (5).

- **Abuse and neglect** – Two studies have found that between 5 - 10% of children with FTT have been registered for abuse or neglect. “However, the study of Skuse and colleagues found that children with FTT were four times more likely to be abused than controls” (3).
- **Emotional** – does not appear to be strongly linked to FTT (3,5)
- **Undernutrition** – Most children with FTT have been found to be substantially underweight for height

“Simply, there are inadequate calories for growth and development. The undernourished state occurs either by, or a combination of (1)

- inadequate supply of calories
- impaired or excessive utilisation of calories”

“It might seem puzzling that a healthy child in a loving affluent home can become undernourished. This is less so when one recognises the high energy needs of infants: approximately three times those of adults (for each kg body weight)” (3).

The fastest decline in weight gain occurs in the early weeks of life, when energy needs are the highest and the highest proportion is required for growth.

Catch up growth may then not occur for some time, if subsequent intake is merely sufficient for immediate needs. A wide range and combination of factors may contribute to either the decline or the failure for catch up. For example, at the age of 14 months, children with FTT have a relatively delayed progression on to solid foods, poorer appetites and eat a more narrow range of foods (3).

Consequences (1,3)

- Growth – the natural history of FTT is gradual improvement
- Cognition – evidence suggests that although FTT probably influences development in the short term, **a permanent effect on head circumference and brain growth is possible.**

Primary care management

A home visit might reveal obvious dietary issues and this input alone often results in improvement. It is crucial that parents are told at an early stage and in simple terms that under nutrition is the likely cause, while emphasising what a common phenomenon it is.

Weighing

Routine weight monitoring at birth, at 6-8 weeks and at 8-12 months as part of routine clinical care (3, 5). Weight monitoring (particularly if conducted frequently) can lead to parent anxiety if a baby is seen not to be gaining weight fast enough or too fast... (5)

Dietary assessment

“A fifth of the children showed an improvement in their growth pattern immediately after dietary advice” (3).

The purpose of the assessment is to identify potential areas for tailored intervention, not to diagnose dietary insufficiency.

A firm grasp of the energy balance equation is essential for the successful management of FTT. However much food a child appears to be consuming, if they are underweight for height and failing to gain weight at the expected rate, or failing to catch up, they are not consuming sufficient for their needs and advice on energy enhancement is required (3).

Toddlers with FTT often have a low intake of immature, low energy foods, with a high fluid intake. Thus the aim of management is to expedite their progression on to more energy dense solid foods. Liquid supplements or tube feeding merely delay this, whereas hospital admission exposes children to the risk of infection and further disruption to routines. The dramatic gains that can be made at home in response to advice and support alone are often not appreciated (3).

The role of the general practitioner / paediatrician

If medical causes are suspected, investigations should be undertaken. Most tests are undertaken to exclude pathology rather than to arrive at a diagnosis.

Improvement in growth should be evident approximately 1-3 months following initiation of treatment (5)

See Table 18 on following page.

Table 18 Possible strategies for increasing energy intake

Dietary	
✓	Small, frequent meals: aim for three meals and two to three snacks each day
✓	Increase number and variety of foods offered
✓	Increase energy density of usual foods (for example, add cheese, margarine, and cream)
✓	Decrease fluid intake, particularly carbonated drinks
Behavioural	
✓	Offer meals at regular times, eaten with other family members
✓	Praise when food is eaten
✓	Gently encourage child to eat, but avoid conflict
✓	Never force feed

Adapted from Wright, 2000 (3)

It must be stressed again that the introduction of solids and the rate at which acceptance and progression of solids occurs, is very much moderated by the individual child and his/her particular developmental patterns.

Checklist for failure to thrive (adapted from 6)

If the infant is breastfed

	YES	NO
Is he/she feeding well? (ie position and attachment)		
Is he/she feeding frequently (8-12 feeds per day)		
Is there adequate milk supply?		
Does the infant have <ul style="list-style-type: none"> ■ reflux ■ vomiting ■ diarrhoea 		
Does the infant have 'normal' bowel motions		
Is the infant passing adequate urine? (6-8 wet cloth nappies or 4 wet disposable nappies a day)?		

Adapted from *Tuckertalk* 2003

If the infant is bottlefed

	YES	NO
Is the infant formula being made up correctly?		
Is the correct (adequate) volume of formula being given?		
Does the infant have <ul style="list-style-type: none"> ■ reflux ■ vomiting ■ diarrhoea 		
Does the infant have 'normal' bowel motions		
Is the infant passing adequate urine? (6-8 wet cloth nappies or 4 wet disposable nappies a day)?		

Adapted from *Tuckertalk* 2003

If the infant is taking solids

(to be used in conjunction with either the breastfed or formula fed sections)

	YES	NO
Have solids been introduced at an appropriate age (around 6 months)		
Are the solids appropriate for the age of the infant <ul style="list-style-type: none"> ■ Cereal products ■ Meats ■ Fruits ■ Vegetables 		
Feeding schedule Number of solid feeds / day Solids offered before or after feeds		
Additional fluids offered? <ul style="list-style-type: none"> ■ Type _____ ■ Quantity _____ 		

Adapted from *Tuckertalk* 2003

Older children

	YES	NO
Are a variety of foods from the five food groups being eaten?		
Is the child being offered regular meals at structured times?		
Is food being displaced by cordials, fruit juices and carbonated drinks?		
Does the child have abnormal bowel motions (diarrhoea, fatty stools)? If yes, refer for a medical review		
Is food high in fibre but low in energy displacing other foods?		

Adapted from *Tuckertalk* 2003

It is often possible to troubleshoot and solve problems associated with nutrition by working through the checklist as above.

Tips for practice:

If an infant or child is not experiencing any difficulties with any of the previous checklist points and there is no medical reason for the failure to thrive according to medical examinations, but is still not gaining weight, it may simply be that the infant requires more food.

This is a special situation and requires additional thought. Extra energy can be added by offering a high energy/high protein meal plan using the recommendations in the next section.

If unsure refer to dietitian for assessment and advice.

References

1. Jolley C.D., Failure to Thrive *Curr Probl Pediatr Adolesc Health Care* 2003;33:183-206
2. *Dietary Guidelines for Children and Adolescents in Australia incorporating the Infant Feeding Guidelines for Health Workers*, NHMRC, Canberra 2003
3. Wright C.M., Identification and management of failure to thrive: a community perspective. *Arch Dis Child* 2000: 82:5-9
4. Olsen E.M., 2006 Failure to Thrive: Still a Problem of Definition. *Clinical Paediatrics* 45:1-6
5. Child Health Screening and Surveillance: 2002 A critical Review of the evidence. NHMRC [online] 13th April 2007 www.nhmrc.gov.au/publications/synopses/_files/ch42.pdf
6. Community Population and Rural Health (2003). *Tuckertalk (child nutrition) fully revised*. Tasmania,
7. Shaw V., Lawson M., *Clinical Paediatric Dietetics*, 1994. Blackwell Sciences, London

7.5 Fluoride

Fluoride is a naturally occurring compound found in water, plants, rocks, soil, air and most foods. It helps protect against tooth decay. Water fluoridation is the most effective way for everybody to access the benefits of fluoride. Less than 5% of Queensland water is currently fluoridated. Encourage parents/caregivers to check with their local council to determine if the water is fluoridated.

Tooth decay occurs when acid destroys the outer surface of the tooth. The acid is produced from sugar by bacteria in the mouth. Fluoride makes teeth more acid resistant and also helps repair damage before it becomes permanent.

Tooth decay is the single most common chronic childhood disease. Queensland children have significantly higher rates of tooth decay than the national average, not only higher than the national average, but worse than any other state.

Fluoride and breastfeeding

Breastmilk naturally contains 5 – 10 micrograms of fluoride per litre of milk (optimally fluoridated water contains 1000 micrograms per litre). The level of fluoride in breastmilk remains steady when a nursing mother drinks fluoridated water.

Fluoride and formula feeding

Reconstitution of infant formula with fluoridated water may pose a slight risk of very mild or mild dental fluorosis in children. Parents should weigh the balance between a child's risk for dental fluorosis and the benefit of fluoride for preventing tooth decay when making a decision on whether or not to use fluoridated water for such purposes.

Fluoride guidelines

Fluoride supplements should only be used when prescribed by a dental professional and are not recommended for general use. They do not provide the same benefit as fluoridated water and can be harmful if taken inappropriately.

Fluoride toothpaste should be used for tooth cleaning as below:

Table 19 Fluoride is important to healthy teeth

Water supply	Not fluoridated	Fluoridated
Birth – 6 months	As soon as teeth appear, clean them twice a day with a wet, child sized soft toothbrush without toothpaste.	
6 – 18 months	Clean teeth twice a day with a low fluoride paste.	Clean teeth twice a day with a wet, child sized soft toothbrush without toothpaste.
18 months – 5 years	Clean teeth twice a day with low fluoride paste.	
6 years and over	Clean teeth twice a day with standard fluoride paste.	

Adapted from Fluoride script pad.

For copies contact QH Oral Health Unit oral_health@health.qld.gov.au



r Useful websites and resources

Taking care of your baby's teeth – child health fact sheet
www.health.qld.gov.au/phs/documents/cyhu/28096.pdf,



QH Water Fluoridation Questions and Answers
www.health.qld.gov.au/oralhealth/documents/30265.pdf

Information Bulletin for community. Fluoridation of water supplies and your Health, Queensland Health: Oral Health Unit, 2005

www.health.qld.gov.au/phs/documents/ohu/30268.pdf

Queensland Health. Water fluoridation: helps protect teeth throughout life

Queensland Health: Oral Health Unit, 2005

www.health.qld.gov.au/oralhealth/documents/31293.pdf

Queensland Health Water fluoridation: information for health professionals. Queensland Health: Oral Health Unit, 2005

www.health.qld.gov.au/fluoride/health_professionals.pdf.

QH fluoride fact sheet

www.health.qld.gov.au/phs/Documents/ohu/21922.pdf.

The health of Queenslanders CHO report 2006

www.health.qld.gov.au/cho_report/documents/32048.pdf

For more information please email oral_health@health.qld.gov.au

7.6 Gastroenteritis

Gastroenteritis is the term used to describe acute, infective diarrhoea and is commonly caused by pathogens such as viruses, bacteria and parasites. The most common cause of gastroenteritis in children less than 2 years is Rotavirus; however, it is rarely seen in infants less than 6 months of age. An infant or child with gastroenteritis most often presents with vomiting and diarrhoea. Diarrhoea is defined as an increase in the frequency, fluidity and volume of stools. The gastrointestinal loss of water and electrolytes accompanying this is the most common cause of dehydration in infants and children. The more watery and frequent the diarrhoea, the greater the risk of dehydration (particularly if vomiting is also associated).

Management

A child who has diarrhoea and/or vomiting is at risk of dehydration and should be seen by a doctor. Do not give medicines to stop vomiting or diarrhoea.

Solely breastfed

- Continue breastfeeding (there is no need to cease feeding).
- Ensure fluid and electrolyte losses are recovered by either:
 - Increasing the frequency of breast feeds
 - Offering additional clear fluids such as cooled, boiled water between feeds

Formulafed

- Continue normal strength formula feeds.
- Ensure adequate hydration/rehydration by offering extra clear fluids.
- If formula feeding has been stopped reintroduce formula after 24 hours.

Solids

- Reintroduce food within 24 hours even if diarrhoea has not settled.
- Ensure adequate hydration/rehydration by offering extra clear fluids.
- Suitable foods include bread, potatoes, rice, noodles, vegetables, plain meats, fish and eggs.

Consult a doctor if one or more of the following applies:

- the infant is less than 6 months of age
- diarrhoea is profuse eg 8 – 10 watery stools
- diarrhoea or vomiting lasts longer than 24 hours
- the infant or child is vomiting and cannot keep fluids down, will not drink, or has not passed urine in 4 – 6 hours
- there is stomach pain or blood in the diarrhoea
- there is a persistent high fever > 39.5° C.

It is essential, when treating gastroenteritis to:

Ensure that the infant/child remains hydrated by correcting and preventing further losses of fluids and electrolytes.

Reintroduce foods as soon as possible in order to prevent prolonged nutritional deficit.

Research has shown that refeeding, sooner rather than later, reduces the duration of diarrhoeal disease.

Signs of dehydration (1)

Mild – 5% body weight loss, thirsty, alert, restless, otherwise normal

Moderate – 6 –9% body weight loss, thirsty, restless, lethargic but irritable, rapid pulse normal blood pressure, sunken eyes, sunken fontanelle, dry mucous membranes, absent tears, pinched skin retracts slowly, decreased urine output

Severe – 10% or more body weight loss, drowsy, limp, cold, sweaty cyanotic limbs, comatose, rapid feeble pulse, low blood pressure, sunken eyes and fontanelle, very dry mucous membranes, pinched skin retracts slowly, no urine output.

Recommended hydration strategies for the dehydrated child

If a child is dehydrated medical attention should be sought.

Oral Rehydration Solution (ORS):

Are the best clear drinks for babies (of any age) and children with gastroenteritis because:

- they have the right amounts of sugar, salt and water to be easily absorbed in the gut
- must be made exactly according to directions in the package
- include *Gastrolyte*, *Gastrolyte-R*, *Pedialyte*, *Repalyte (New Formulation)* and *Hydralyte*** (ice blocks)
- available from chemists in Australia. Always ask the pharmacist which one would be best
- these solutions are the fluid of choice for treating dehydration. The absorption of glucose and sodium is linked together and acts as a pump, promoting the absorption of water. They supply fluid, glucose, and help correct electrolyte imbalances. It is best to provide ORS in small, frequent doses 10 – 20ml every 10 minutes
- review child after 24 hours for rehydration status.

Please refer to:



Queensland Health, Southern Zone paediatrics parent information – gastroenteritis in children
qheps.health.qld.gov.au/twmba/Pdf/SZ_gastro_fact.pdf

Recommended hydration strategies for the non-dehydrated child

Usual maintenance fluids per hour is on a sliding scale:

First 10 kg 4 ml/kg/hr. Next 10 kg 2 ml/kg/hr.

Every kg over 20 - 1 ml/kg/hr.

For example- for a 30 kg child (40 ml + 20 ml + 10 ml) = 70ml per hour.

Give small amounts frequently.

Full strength fruit juice, lemonade, cordial and sports drinks should not be used. The high sugar content draws water into the bowel and can make diarrhoea worse.

Do not give low joule drinks.

Dilution rates for fluids for use in non-dehydrated children

Cordial 15 ml in 235 ml water

Soft drinks (not low joule) 50 ml soft drink in 200 ml water

Unsweetened fruit juice 50 ml fruit juice in 200 ml water

ORS reconstituted as directed

Sample meal plan

Breakfast

Cereal

Apple juice

White toast with scrape of margarine and *Vegemite*

Lunch

1 slice white bread with *Vegemite*

Tinned/stewed fruit

Jelly

Dinner

Lean meat

Mashed potato (no butter or milk added)

Mashed pumpkin (no butter or milk added)

Gravy

Tinned/stewed fruit

Jelly

Adapted from Westmead Children's Hospital, 2004 (2)



Useful webstes and resources

Fact sheets

When your child is sick – child health fact sheet [accessed 2007 April 27]

www.health.qld.gov.au/child&youth/factsheets/

Gastro fact sheet CYH SA [accessed 2007 April 27]

www.cyh.com/HealthTopics/HealthTopicDetails.aspx?p=114&np=303&id=1845#6

Gastro fact sheet Children's Hospital Westmead [accessed 2007 April 27]

www.chw.edu.au/parents/factsheets/gastroj.htm



Websites

Australian Gastroenterology Institute website [accessed 2007 April 27]

www.gesa.org.au/

References

1. Department of Health and Human Services. *TuckerTalk Manual: keeping abreast of nutrition*. Tasmania; 2003.
2. Westmead Children's Hospital; James Fairfax Institute of Paediatric Nutrition. *The feeding guide: a handbook on the nutritional composition of infant formula*. Sydney: Westmead Children's Hospital; 2001.
3. Department of Nutrition and Dietetics; Mater Children's Hospital. Gastro children's guidelines. Brisbane.
4. Gut Foundation. *Diarrhoea in children*. Randwick, Sydney: The Foundation.

7.7 Growth charts

Growth has been used as a tool to assess the health status of populations and individuals. Growth is a common measure of physical development and nutritional intake, and a change in growth may lead to nutritional intervention. The growth of an individual is compared with 'expected growth' and conclusions are drawn about the individual and interventions consequently planned.

Understanding the applicability and interpretation of the growth charts is essential in accurately assessing growth. This is important because the pattern of growth is different between a breastfed infant and a formula fed infant.

In the first 6 months breastfed babies are typically heavier than formula fed babies. Compared to breastfed babies of the same percentile, formula fed babies are lighter in the first 6 months and become increasingly heavier from 6 months to approximately 18 months. Because formula fed infants are heavier after 6 months, it is a common mistake to misdiagnose breastfed infants as having compromised growth.

Types of charts

There are currently a number of growth charts available for use in Australia. The table below describes them. At the time of printing, Queensland Health is reviewing the growth charts to be used. Currently the CDC 2000 charts are published in the personal health record.

Table 20 Comparison of CDC2000 and WHO growth charts

Chart	Presentation	Data source	Endorsement
CDC 2000	In Personal Health Record. Purple 'Pfizer' chart. Available for clinical chart or at www.cdc.gov/growthcharts/	A range of US studies including 3 cycles of NHANES from 1966 – 1994. All subjects from US but mix of race and ethnicity, breastfed and formulafed. For children 0 – 2 years.	Currently recommended for use. Endorsed by NHMRC, Australian Paediatric Endocrinology Group, Australian College of Paediatric and Child Health Nurses
WHO	Released April 2006. Available at www.who.int/childgrowth/standards/en/	Multicentre Growth Reference Study 1997 – 2003. Children from Brazil, Ghana, India, Norway, Oman and US. All exclusively breastfed for 4 – 6 months with continued breastfeeding to at least 12 months. For children 0 – 5 years, then use of CDC 2000 recommended.	WHO International Pediatric Association Australian Medical Association International Lactation Consultants Association Australian Breastfeeding Association

Using growth charts

Regular and consistent growth monitoring is more important than the chart used.

- The pattern of growth is more important than a single plot. It should follow the line of the curve, irrespective of its centile.
- Growth measurements must be accurately recorded on the growth chart.
- Refer children who, over a series of readings are not following the shape of the curve. Note the difference in patterns of growth between breastfed and formula fed infants.
- Ensure the correct stature chart is used. 'Length' refers to a child lying down. 'Height' refers to a child standing up. These values will differ.
- When taking weight measurements, ensure the same scales are used wherever possible, they are routinely calibrated and the infant is wearing minimal clothing.
- Encourage parents/caregivers to understand and interpret growth charts.
- Allowance for gestational age is made for children born under 37 weeks. Generally the allowance should be made until the child is 2 years of age and up to 5 years of age for extreme prematurity, for example, less than 28 weeks.
- For example, if an infant born at 32 weeks gestation visits the Child Health Centre at 8 weeks of age the weight will be plotted at the age of 40 weeks gestation.

Weight and length/height

Length/height is a mandatory component of the growth assessment; weight is meaningless unless a corresponding length/height is done simultaneously.

Action

For infants under 12 months of age, action will be required if the weight differs by 2 percentile lines or greater compared to the length.

Poor growth

While there is no standard 'cut off' for defining short or tall stature, traditionally it has been recommended that children falling below the 3rd centile be referred for further assessment.

FTT is often defined as an absolute weight criterion, for example, a drop below the 3rd centile for weight or the 5th centile or when growth deviates from an established growth curve for 3 consecutive months. This approach is likely to identify false positives, for example, naturally small children, while missing naturally tall children with a FTT issue. A judgement should be made according to a fall on a centile chart over a period of time/visits or where children's weight is 2 centile lines less, compared with their height.

NB: Weight gains in infants are often step-wise rather than a constant process; therefore the trend over time is more important than individual weights.

Overweight and obesity

Children less than 2 years

Young children whose weight is greater by 2 centile lines or more compared to their length may require intervention and referral.

Children over 2 years

BMI

To determine whether an older child is overweight or obese it is necessary to calculate Body Mass Index (BMI) and plot the result on an appropriate BMI percentile chart for the child's age and sex.

Calculation of BMI

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

For example :

A 2 year old child who was 87cm tall and weighed 13kg would have a BMI of 17

$$\text{BMI} = 13 / (0.87 \times 0.87\text{kg/m}^2)$$

$$\text{BMI} = 17$$

This would put the child just above the 50th percentile for BMI.

A child is overweight if their BMI is at or above the 85th percentile.

Such a child requires intervention and referral.

A child is obese if their BMI is at or above the 95th percentile.

Such a child requires intervention and referral.

It is important to note that discussion of children's weight and associated food and activity patterns can be a sensitive issue. Carers should understand that the growth chart is a screening tool. It is intended to be a guide of when to take small steps to make changes and when to seek further guidance from a doctor or a dietitian.

Head circumference

The child should be seen by a medical officer if the head circumference is:

- above the 95th percentile
- below the 5th percentile
- crossing the percentile lines, either upward or downwards, after measurement on two separate occasions
- small anterior fontanelle
- anterior fontanelle not closed.

Closure of the anterior fontanelle is variable but usually complete by 18 months.

Any suspected small anterior fontanelle with bossing of sutures, or split and separated sutures or anterior fontanelle that is not closed by 2 years should be seen by a medical officer.

References

1. CDC Growth Charts
www.cdc.gov/growthcharts
2. WHO Growth Standards
www.who.int/childgrowth/standards/en/
3. Victorian Health Department
www.health.vic.gov.au/childhealthrecord/growth_details/index.htm
4. NHMRC “Clinical Practice Guidelines for the Management of Overweight and Obesity in Children and Adolescents” and “Overweight and Obesity in Adults and in Children and Adolescents: A Guide for General Practitioners”.
www.dhac.gov.au/internet/wcms/Publishing.nsf/Content/obesityguidelines-guidelines-children.htm
5. NHMRC “Child Health Screening and Surveillance: A critical review of the evidence” (2002)
www.nhmrc.gov.au/publications/synopses/_files/ch42.pdf
6. For anthropometry technique standards:
depts.washington.edu/growth/module5/text/page5a.htm
7. Standard methods for the collection and collation of anthropometric data in children. PSW Davies, R Roodveldt and G Marks (2001) Commonwealth of Australia
8. Olsen EM. Failure to thrive: still a problem of definition. Clin Pediatr (Phila). 2006 Jan-Feb; 45 (1):1-6.
9. Batchelor JA. Has recognition of failure to thrive changed? Child Care Health Dev. 1996 Jul; 22 (4):235-240.

7.8 Healthy weight

Keeping Kids on Track

The wiry sun-bronzed Aussie is becoming a figure of the past. We are becoming a nation of fat couch potatoes. Obesity is bringing us lifelong health problems. A lifestyle disease requires a lifestyle solution. Fortunately, this is within the capabilities of all Australians (1).

This chapter explores tools you can use in your practice to help combat the rising epidemic of childhood obesity.

Overweight and obesity is already a serious problem in Queensland. While recent data is not available for Queensland, in Australia between 1985 and 1997 the population prevalence of overweight increased by 60-70%, obesity increased 2-4 fold (2). The problem has continued to worsen. There are now an estimated 1.5 million young people under the age of 18 in Australia who are overweight or obese (3).

“New data indicates that an additional 1% of children in Australia are becoming overweight each year, which is amongst the highest rates of increase in the world” (4).

Childhood overweight is associated with increased risk factors for heart disease such as raised blood pressure, blood cholesterol and blood sugar. Of great concern is the appearance of Type 2 diabetes in adolescents—even primary school children—with its potential for complications such as heart disease, stroke, limb amputation, kidney failure and blindness (3).

The most significant long term consequence of obesity in childhood is its persistence into adulthood. Overweight young people have a 50% chance of being overweight adults, and perhaps not surprisingly children of overweight parents have twice the risk of being overweight than those with healthy weight parents. Obese adults who were overweight as adolescents have higher levels of weight-related ill health and a higher risk of early death than those adults who only became obese in adulthood (3).

WHO has identified the underlying causes of the global obesity epidemic as (5):

- sedentary lifestyles
- high intake of energy-dense, micro-nutrient poor foods
- heavy marketing of fast food outlets and energy-dense, micronutrient-poor foods and beverages
- a high intake of sugar-sweetened drinks
- large portion sizes

Obese children are at increased risk of:

- hyperlipidemia
- hypertension
- abnormal glucose tolerance
- psychosocial problems
- adult obesity (6)

The 1995 Australian Nutrition Survey indicated that children aged 4-7 years had excessively high fat intakes, one third ate no fruit and one fifth ate no vegetables on the day of the survey (2)

One study found “consensus amongst parents that obesity prevention strategies needed to begin early in a child’s life, long before they reached the school setting. Parents recognized that behaviors are shaped early in life and were largely already entrenched by the time children reached school age” (8).

Defining overweight and obesity in children

An Australian expert working group identified body mass index (BMI) as the most appropriate clinical measure of excessive weight in children (9)

It is essential for height and weight to be accurately measured to determine if a child is overweight or obese. Visual assessment should be avoided.

About the BMI for children **BMI = $\frac{\text{weight (kg)}}{\text{height (m)}^2}$**

Although the BMI number is calculated the same way for children and adults, the criteria used to interpret the meaning of the BMI number for children and teens are different from those used for adults. For children and teens, BMI age- and sex-specific percentiles are used for two reasons:

- the amount of body fat changes with age
- the amount of body fat differs between girls and boys

The CDC BMI-for-age growth charts take into account these differences and allow translation of a BMI number into a percentile for a child’s sex and age. For adults, on the other hand, BMI is interpreted through categories that do not take into account sex or age (11).

Table 21 NHMRC current classifications for BMI percentile ranges (13)

Weight status category	Percentile range
Overweight	85 th to less than the 95 th percentile
Obese	Equal to or greater than the 95 th percentile

How is BMI calculated and interpreted for children and teens?

(adapted from Centers for Disease Control and Prevention)

Calculating and interpreting BMI involves the following steps:

- 1** Before calculating BMI, obtain accurate height and weight measurements.
- 2** Calculate the BMI; $\text{weight (kg)} / [\text{height (m)}]^2$
- 3** Plot the BMI on the appropriate chart to determine the percentile
- 4** Review the calculated BMI-for-age percentile and results
- 5** Find the weight status category for the calculated BMI-for-age percentile as shown in BMI table (see table 1). These categories are based on expert committee recommendations



A BMI calculator can be found at apps.nccd.cdc.gov/dnpabmi/Calculator.aspx

Nutrition strategies

Food language: everyday vs sometime foods

The language we use when communicating about food is very important. Often we describe high calorie food as very negative. Words like “junk/“bad” can be guilt inducing and may bring up feelings of negativity and failure. A more positive and helpful approach is to use terms such as “**sometimes**” foods and “**everyday/always**” foods. This describes foods more accurately and provides a basis for language around food choices (1). Encourage parents to use this form of language when discussing food choices with their family.

Energy balance

Offering a simple concept to explain energy imbalance as the cause of overweight is often ignored as more glamorous/novel ideas capture people’s attention and their money. Unfortunately, these explanations are often scientifically unfounded and cause considerably confusion but do sell a lot of books. We all know someone who is overweight. Upon reflection, this person may **not** seem to eat excessively. Many children we see for management of obesity eat only **slightly in excess** of their daily requirements.

So why is it that they are very obese when they only eat a small amount of extra calories per day? The answer is like getting interest in a bank account. Small amounts over time add up to large amounts in the end. For example, imagine if someone ate 2 level teaspoons of extra fat per day (10g). Over a year this adds up to 3.5 kg of excess weight (10g X 365 days). Keep this up for 5 years and all of a sudden you have a child who is **17.5kg** over their expected weight. Obesity results from small amounts of excess energy each day. Even if children lead very active lives, it is easier for them to collect more energy than they expend through exercise (1).

Sometimes the aim for children is to maintain their weight so that when they grow taller they will then be in proportion. However at times losing some excess weight is necessary. The quality of food we consume can have a large impact on our weight. It is important to understand that the building blocks of food, fat, protein and carbohydrate contain different amounts of kilojoules (1). These are:

- **Fat: 37 kilojoules per gram**
- **Protein: 17 kilojoules per gram**
- **Carbohydrate: 16 kilojoules per gram**

Satisfying appetite

Research has shown that the above nutrients do not satisfy our hunger in the same way. Fatty foods have only a weak effect on satisfying our appetite. In comparison, certain carbohydrate foods have been shown to have a more satisfying effect on the appetite (1). For more information, contact your local dietitian.

NB: It is important to remember that children do need **some** fats in their diet for good nutrition.

The *Australian Guide to Healthy Eating* has been developed to provide people with practical applications to achieve daily energy balances. Additionally, it maximises the amount of vitamins and minerals consumed. Use this as your evidence based tool when providing nutrition information to parents.

Energy in

Portion sizes

It is important to emphasise the correct portion sizes when discussing with parents healthy eating. Portion sizes have been increasing over the past decades, driven in part, by companies profiting from a person 'upsizing'. Plates, bowls and glasses are now bigger, requiring more food to fill them. Snack foods are available in a variety of increasing sizes. Utilise The Australian Guide to Health Eating as your evidence based tool to advise parents of correct portion sizes.

Every little bit extra contributes to energy in. Being more concise with portion sizes is a good place to start when looking at improving a child's diet.

Energy dense foods

Many foods are pre-packaged, ready to eat and loaded with calories for convenience and taste. Compare yourself to someone who may have lived many years ago. They might have had to work the field with a horse drawn plough, sow seeds by hand, harvest the seeds with a scythe, thresh the seeds by hand, mill the seeds into flour and then bake them in a wood fired oven. They would also have to chop and transport the wood and do other tasks in their *spare* time (1).

This person could eat 20 loaves of calorie dense bread in a day and still not become overweight because they burned more energy than they consumed. This energy balance has changed for us and produced an epidemic of obesity. We are now paying the price for the imbalance with our health (1).

92% of children less than five years of age consume takeaway food regularly (6).

One study found many Australian children "were generally well informed about the health value of different foods, could identify the healthy and unhealthy foods pictured, and were aware of the nutrients contributing to their perception of foods being more or less healthy" (8).

"Parents believed their children knew which foods were healthy, but suspected they did not fully comprehend the consequences of eating unhealthy foods.... They postulated that the inconsistent messages about unhealthy energy-dense foods, including attractive marketing and advertising strategies, confused children" (8).

Parents themselves, although generally well informed, requested more parent education... they did not feel well equipped to distinguish between more and less healthy pre-packaged snacks in light of the huge array available and marketed to children. "*There's so much deception in marketing, it's hard to know which snacks are healthy*" (8).

Food labels

By law, food labels in Australia must contain a nutrition information panel and an ingredients list. You can encourage families to do their own investigating when trying to ascertain whether foods are everyday foods or sometimes foods, by using the following information sheets.

Ingredient list

This lists the amount of ingredients by weight in descending order (highest to lowest). So if the first few ingredients listed are fat or sugar (see below for other names for these), then it is one of the major ingredients in the product and therefore likely to be high in energy.

Nutrition information panels

All manufactured foods need to carry a nutrition information panel. This shows the amount of energy (in kilojoules), and nutrient content including protein, total fat, saturated fat, carbohydrate and sugars, as well as any other nutrient that a claim has been made about (eg: iron, calcium, fibre) in measurements per serve and per 100 grams.

When comparing nutrition information panels it may be helpful to consider (1):

- Overall energy
- Fat content:
 - low fat means < 3 g per 100 g solid food or < 1.5 g per 100 ml liquid food.
- Sugar content:
 - aim for < 10 g sugar per 100 g
- Fibre:
 - aim for the highest fibre content.

It may be useful to compare products by using the “per 100 g” column as serve sizes can vary between products.

Parent fact sheets available

www.health.qld.gov.au/eatwellbeactive/documents/fact/reading_food_labels_fact_sheet.doc



High fat

Most children do not need low fat diets. However, snacks that are high in fat and low in other nutrients tend to take away children’s appetites for the more nutritious foods they need.

In some cases however, a high fat food will contain other nutrients essential for growth. These foods should still be included in children’s diets, eg. cheese, peanut butter and avocados.

The fat contents of various popular children’s foods are shown in the table below.

Table 22 Comparison of fat content of various foods

High fat food	Approx fat content (%)	Lower fat alternative	Approx fat content (%)
Potato crisps	30	<i>Vegemite on crackers</i>	3
Chocolate	30	Bread, bread roll, bun loaf, fruit toast	3-4
Most small savoury biscuits	25	Rice snacks, corn thins	3-4
Shortbreads, cream filled biscuits	20-25	English muffins	4
Cheerios, frankfurts, salami sticks	20	Lean mince, chicken breast, leg ham	2-7
Chocolate coated muesli bar	20	Wholemeal fruit bar	8
Fruit muesli bar	15	Fruit	0
Plain sweet biscuits	15	Scone, pikelet	10

Adapted from *What is Better Food? 2002*.

High sugar

Foods high in sugar can take away children's appetites for more nutritious foods and can contribute to tooth decay. It is not only the amount of sugar in foods that should be looked at when considering children's teeth. Foods that are sticky or that will cling to children's teeth are much more likely to contribute to tooth decay.

'No added sugar' does not indicate that a food is low in sugar. It just means no extra sugar is added to the product. It may be naturally high in sugar such as in no added sugar, 100 per cent fruit juice.

Table 23 Comparison of sugar content of various foods and drinks

	Food or drink	Actual serve size	Approximate amount of sugar consumed
Drink	Soft drink	1 can (375 ml)	40g = 10 teaspoons
	Cordial	1 cup (250 ml)	20g = 5 teaspoons
	100% fruit juice, no added sugar	1 cup (250 ml)	18g = 4½ teaspoons
	Water	1 cup (250 ml)	0
Food	Dried fruit bars Processed fruit straps	20g	13-15g = 3-4 teaspoons
	Muesli bars	35g bar	7-10g = 2 – 2½ teaspoons
	Chocolate	60g bar	33g = 8¼ teaspoons
	Fruit loaf	2 slices	9g = 2 teaspoons
	Bread	2 slices	2g = ½ teaspoon

Note 1 teaspoon sugar = 4 g

Adapted from *What is Better Food?*

The Infant and Child Nutrition in Queensland Report found “over half (55%) of all children under two years of age had ever been given sweet drinks regularly. In children less than one year, 15% had been given sweet drinks regularly” (6).

Snack food dilemmas

Adapted from *What is Better Food?*

Below is some nutrition information about food products that often appear in lunchboxes, or used as snacks. We generally know that foods such as chocolate and potato chips are not suitable to be regularly included in children's lunchboxes. However, there are many foods that children bring where it is harder to decide.

Dried fruit bars and fruit straps

These do contain some dried fruit but are generally very high in added sugar, low in fibre and cling to children's teeth. They are not comparable to fresh fruit, despite the advertising claims. They may reduce children's fruit intake, take away their appetites and contribute to tooth decay.

Recommendation: Not recommended.

Dried fruit

Dried fruit contains similar nutrient levels and fibre to fresh fruit. However, because water has been removed, dried fruit has more concentrated sugar and will cling to teeth. Dried fruit is recommended, but is best eaten just prior to brushing teeth or at meal times when other foods are being eaten. Giving dried fruit alone for morning tea means it will remain on children's teeth for some time before it is removed by brushing or by eating other foods.

Recommendation: Recommended at mealtimes or with other food.

Small oven baked savoury biscuits

Companies are now targeting children with these snacks and are providing these biscuits in small, convenient packets. Many parents think that small savoury biscuits are a healthier option than potato chips for their child. However they are often as high in fat and salt as regular potato chips and can easily take away children's appetites for the more nutritious foods they need.

Recommendation: Not recommended.

Noodle snacks

Two-minute are very high in fat as the noodles are usually deep fried in oil prior to packaging. The flavouring is also very high in salt.

Recommendation: Better alternatives include fat-free Asian or oriental noodles. These are very tasty when added to stirfry meat and vegetables, ie. leftovers. Check the ingredient list for fat or oil.

Muesli bars and breakfast bars

Muesli bars are popular with children and are often found in children's lunchboxes. They vary in flavour, texture and nutritional content. In general, chocolate coated or chocolate chip muesli bars are very high in fat and sugar. Chewy muesli bars cling to children's teeth and can contribute to tooth decay. Snack bars made from children's breakfast cereals are also very high in sugar and will cling to teeth.

Recommendation: Chocolate coated, chocolate chip and chewy muesli bars are not recommended. Children's breakfast cereal bars should also be limited. Adult breakfast cereal bars are a better alternative. If these foods are brought along they should be eaten with other foods and teeth brushed after eating.

Flavoured milk

Dairy foods have properties that help protect teeth against tooth decay. Flavoured milk has added sugar but is still desirable, as it is an important source of calcium. Some children will not drink plain milk. Children enjoy the variety that flavoured milk provides. It is important that children receive an adequate calcium intake and drinking milk is one of the easiest ways to achieve this.

Recommendation: All milk is recommended.

- For toddlers over 12 months of age plain, full cream milk is preferred and for children two to five years of age reduced fat milks (1.5 - 2.5 % fat) should be used.
- Skim milk (less than 0.5 % fat) should not be used until children are over five years. It is fine to have flavoured milk occasionally.
- Make sure milk consumption does not exceed recommendations for age.

Flavoured dairy desserts

Yoghurt is the ideal dairy dessert for children. It is moderate in sugar and fat and high in calcium and protein. Reduced fat varieties are recommended for children once they are over two years of age. There are many flavoured dairy desserts marketed for young children. These vary in their fat, sugar and calcium contents. Compared to yoghurt, desserts which have 'mix-ins' are, in general, much higher in sugar and sometimes higher in fat. This is also the case with the majority of chocolate mousse and crème caramel desserts. Popular custard based flavoured desserts are generally higher in sugar than yoghurt and they vary in their calcium content. These are not a bad choice if children will not eat yoghurt and can be a valuable way of improving calcium intakes.

Recommendation:

- encourage full cream flavoured or unflavoured yoghurt in preference to other products
- use the nutrition panel of yoghurt to compare the various products that appear in children's lunchboxes
- discourage yoghurt with mix-in lollies and high fat desserts, like chocolate mousse.

Cheese and biscuit snacks

These are popular in children's lunchboxes and are a good source of calcium. Rather than the pre-packaged varieties, wrapping up some crackers and a slice of cheese in plastic wrap for the lunchbox reduces cost and packaging.

Recommendation: Recommended.

Biscuit and dip packs

Many different types of biscuit and dip packs exist for children. Some dips are cheese-based and are a good source of calcium. The sweet flavoured dip snack packs are very high in sugar.

Recommendation: Cheese or cheddar dip packs are recommended but sweet flavoured dip snack packs are better left out.

Jam, honey or chocolate paste sandwiches

The bread is a healthy choice but jam, honey and chocolate paste provide sugar with few other nutrients. Children need a good source of iron each day. The filling on sandwiches is usually the easiest way to provide this.

Recommendation: Jam and honey are OK to have occasionally, but try to encourage high iron foods eg. roast meat, chicken, ham, tuna, egg, peanut butter or baked beans

Energy out

Kids sport and technology

Energy expenditure through physical activity is an important part of the energy balance equation that determines body weight. A decrease in energy expenditure through decreased physical activity is likely to be one of the major factors contributing to the global epidemic of overweight and obesity (5). Refer to physical activity section.

Children aged 5-12 years spend an average of 2.5 hours per day watching television (2).

How much physical activity is sufficient for children?

New physical activity guidelines from the Department of Health and Ageing 2004 (4):

- 1 Children and youth should participate in at least 60 minutes (and up to several hours) of moderate – to vigorous intensity physical activity every day
- 2 Children and youth should not spend more than 2 hours per day using electronic media for entertainment (eg television, computer games, internet), particularly during daylight hours.

Physical activity has decreased markedly over the last century (especially in the last 20 years). The advent of technology has encouraged children to pursue more sedentary activities such as playing video games, computers, VCRs, DVDs, CDs, and MP3s. Concerns about safety have discouraged parents from allowing their children to play unsupervised in parks, streets and neighbourhoods. Children don't ride or walk to school (1).

Young children spend more than 50% of their time in sedentary play (13).

One study found some children view any amount of body movement constituted physical activity; "playing piano or computer is a bit healthy because you're moving your fingers" (Grade Two) (8).

Media and peer conformity

Peer pressure and what other children are eating/doing directly impacts upon our thinking and expectations. Advertising companies have become very cunning in promoting their products. For example, product placement now occurs in movies where companies will pay to have their brand exclusively used in a movie. This is a sneaky and hidden way to promote and influence people to buy the product (1).

In the simplest terms, obesity results from an imbalance between calories eaten and calories expended through activity and exercise. Television (and media behaviour) upsets this balance through:

- reduced metabolic rate when watching TV and other media activities
- reduced activity because of what they are not doing whilst they are interacting with the media (children who watch more TV do less sport)
- increased food and calorie consumption (from advertising and snacking).

Children are vulnerable to food messages portrayed through television advertisements, with food advertising affecting the choices and amounts of foods consumed (17).

.....

One Australian study found ‘Confectionery’ and ‘fast food restaurants’ were the most advertised food categories during children’s TV viewing hours. Confectionery advertisements were three times as likely, and fast food restaurant advertisements twice as likely, to be broadcast during children’s programs than adults’ programs (17).

‘Foods most advertised during children’s viewing hours are not those foods that contribute to a healthy diet for children. Confectionery and fast food restaurant advertising appears to target children’ (17).

It is well recognized that childhood obesity is a worldwide problem. The heavy marketing of energy-dense, nutrient-poor foods influences food choices and contributes to the incidence of overweight and obesity in children (14).

Check

- ✓ reduce TV viewing for children and set specific limits
- ✓ remove TVs from bedrooms
- ✓ limit mobile phone usage
- ✓ cease cable TV
- ✓ reduce computer time especially chat rooms, emails, videos, video games
- ✓ remove electronic toys
- ✓ reduce and limit dvd’s movies
- ✓ look for product placements in media with your children ie turn sound off and guess what products have been placed in TV-movies

Adapted from *Kids on Track, 2004*

Meal time tips

- ✓ use smaller plates/ bowls
- ✓ do not over fill plate
- ✓ have water available with all meals
- ✓ allow children to leave food on their plates
- ✓ minimise distractions eg TV off
- ✓ encourage your children to eat slowly
- ✓ encourage mealtime conversation
- ✓ eat together as a family
- ✓ model all the above tips yourself during the meal
- ✓ try these during at least one meal per day
- ✓ a small amount of sugar and salt per day
- ✓ increase plant based unprocessed foods
- ✓ increase high fibre foods
- ✓ reduce family grazing between meals and limit it to fruit and water

Adapted from *Kids on Track, 2004*

Table 24 Possible causes of a child being above their natural body weight

	Question	Action
ENERGY IN	<p>Concerns with eating patterns?</p> <p>Are foods high in fat and sugar being consumed in large amounts or often throughout the day?</p>	<ul style="list-style-type: none"> ✓ Encourage parents to accept their child's ability to regulate energy intake ✓ Restrictive diets are not recommended ✓ Promote the intake of fruit and vegetables ✓ Restrict the intake of energy-dense, micronutrient-poor foods (eg. packaged snacks) ✓ Restrict the intake of sugars-sweetened soft drinks ✓ Assure the appropriate micronutrient intake needed to promote optimal linear growth
	<p>What is the child drinking?</p> <p>(eg cordials, soft drinks, fruit juices)</p>	<ul style="list-style-type: none"> ✓ Limit juice to ½ cup per day ✓ Provide milk in sufficient amounts for age ✓ Meet additional fluid requirements with water
ENERGY OUT	<p>Physical activity</p> <p>Is the child active?</p> <p>Sedentary behaviour</p> <p>How much TV and computer games does the child watch?</p>	<ul style="list-style-type: none"> ✓ Promote an active lifestyle ✓ Encourage planned exercise that the child enjoys as well as an increase in activities that involve more movement ✓ Limit television viewing ✓ Discuss the number of hours TV is watched as it can reduce exercise levels and exposes the child to considerable food advertising

Adapted from WHO (2002), *Tuckertalk* (2003)



Useful websites and resources

Further reading

1. *The Queensland Strategic Policy Framework for Children's and Young People's Health 2002 – 2007*. Queensland Health 2002
2. *Eat Well Queensland 2002-2012, Smart Eating for a Healthier State, Queensland Public Health Forum*. June 2002
3. *Eat Well, Be Active – Healthy Kids for Life: 2005-2008*. Queensland Government 2005
4. *Healthy Weight 2008, the National Action Agenda for Children and Young People and Their Families, Commonwealth of Australia*. 2003.
5. *Queensland Health, Enhanced Child Health Model of Care for Community Health Services (0-12 years)*
6. *Strategic Policy Framework for Aboriginal and Torres Strait Islander Children and Young People's Health 2005- 2010*



Growth charts

Centres for Disease Control and Prevention
www.cdc.gov/

World Health Organisation
www.who.int/childgrowth/en/



Parent resources

Eat Well, Be Active
www.health.qld.gov.au/eatwellbeactive

A note on *Kids on Track*

Kids on Track targets children three to ten years who do not have any medical conditions that might cause overweight. Its purpose is to examine the effect of a group parent intervention on the course and severity of overweight. It helps parents address their children's health problems via three key areas of nutrition, physical activity and family behaviour change. It also investigates if positive health outcomes can be maintained. These programs are currently being run on the Gold and Sunshine Coasts as well as Bayside.

For further information please contact

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PO Box 5699
GCMC Bundall QLD 9726
Phone: 07 5570 8553

References

1. Queensland Health: *'Kids on Track,'* Gold Coast, 2004
2. Booth, M. L., Wake, M., Armstrong, T., Chey, T., Hesketh, K., & Mathur, S. (2001). The epidemiology of overweight and obesity among Australian children and adolescents, 1995-97. *Australian and New Zealand Journal of Public Health*, 25(2), 162-169.
3. Commonwealth of Australia 2003 *Healthy Weight 2008, Australia's Future*, Canberra [online] 29th April www.healthyactive.gov.au/publications.htm
4. Queensland Government. Smart State healthy weight for children and young people. *Eat well, be active – healthy kids for life*. The Queensland Government's first action plan 2005-2008.
5. Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases (2002 : Geneva, Switzerland) Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation, Geneva, 28 January -- 1 February 2002. [online] 29th April www.who.int/hpr/NPH/docs/who_fao_expert_report.pdf
6. Queensland Health: Infant and Child Nutrition in Queensland 2003
7. *Best Practice Dietetic Management of Overweight and Obese Children and Adolescents*. Australian Centre for Evidence Based Nutrition and Dietetics. The Joanna Briggs Institute [online] 26th April
8. Healthy eating, activity and obesity prevention: a qualitative study of parent and child perceptions in Australia K. HESKETH, E. WATERS, J. GREEN, L. SALMON and J. WILLIAMS Health Promotion International, 2005, Vol. 20 No. 1 pp 19-26
9. Batch, J. A., & Baur, L. A. (2005). Management and prevention of obesity and its complications in children and adolescents. *MJA*, 182, 130-135.
10. National Health and Medical Research Council: *Dietary Guidelines for Children and Adolescents in Australia* incorporating the *Infant Feeding Guidelines for Health Workers*, Canberra 2003.
11. Centres for Disease Control and Prevention www.cdc.gov/nccdphp/dnpa/bmi/childrens_BMI/about_childrens_BMI.htm [online] 2nd May, 2007
12. Queensland Health: *What is better food?* Brisbane 2002
13. *Clinical Practice Guidelines for the Management of Overweight and Obesity in Children and Adolescents*, NHMRC. Canberra, 2003
14. How much food advertising is there on Australian television? Kathy Chapman, Penny Nicholas and Rajah Supramaniam. Health Promotion International 2006 21(3):172-180; doi:10.1093/heapro/dal021
15. Community Population and Rural Health *Tuckertalk*, Tasmania, 2003
16. online [2nd May] www.culturaldata.gov.au/publications/statistics_working_group/australias_culture_pamphlets/10_childrens_participation
17. Neville L., Thomas M., Bauman T., Food advertising on Australian television: the extent of children's exposure Health Promotion International 2005, Vol. 20 No. 2. pp 105-112
18. Borushek, A. *Pocket calorie, fat & carbohydrate counter*, 2007, Family Health Publications, Western Australia

7.9 Iron deficiency

Iron deficiency is the most common nutritional deficiency in children and adults in both developed and developing countries (1)

Those most at risk of Iron deficiency are:

- children particularly aged between 9-18 months
- women of child bearing age (1).

As many as 10% of Australian toddlers are iron deficient (2).

Iron deficiency in childhood differs in many ways from that in adults. In children, the most likely cause is an inadequate amount of iron in the diet, coupled with the extra requirement for iron because of growth (2).

The effects of anaemia and iron deficiency on brain development in infancy and very early childhood are well documented: “infancy is the critical period for brain growth, and nutrient deficiencies during this time may affect psychomotor development and neurocognition” (3). “There is some disturbing evidence which suggests that the intellectual and psychomotor impairment caused by iron deficiency may not always be completely reversible when iron status is corrected” (as cited in 2).

For these reasons, the Australian Iron Status Advisory panel strongly believes that iron deficiency should be regarded as a serious illness in the first years of life’ (2)

Iron deficiency is common, but it is preventable if suitable feeding choices are made. Exclusive breastfeeding to the age of 6 months will ensure that breastmilk is not replaced by food of lower nutrient density and will minimise the risk of iron deficiency (8). If formula feeding, it is imperative parents or caregivers choose an iron fortified cow’s milk formula.

The RDI for infants aged between 7 and 12 months is 11mg/day; for children 1- 3 years of age 9mg/day, and children aged 4-8 years is 10mg per day. Pregnancy and breastfeeding to 27mg/day and 9-10mg per day respectively.

An important aspect of prevention is educating parents about the changing dietary needs of their growing child and the types of foods that are rich in iron or which encourage iron absorption and also those that restrict iron absorption.

Informing parents of the two most common factors associated with iron deficiency may also be a useful preventative activity. These two factors are (1) being fed on cows’ milk prior to 12 months of age, and (2) continuing solely on milk (either breast or cows’ milk) after 12 months of age, without the introduction of solids.

If unsure of iron intake – refer to a dietitian for assessment and advice.



***The Dietary Guidelines for Children and Adolescents in Australia* recommendations**

- **Continue exclusive breastfeeding for about 6 months**
- **Introduce complementary foods containing iron at about 6 months of age**
- **Choose iron-containing formula for infants who are not breastfed and for infants receiving formulas as well as breastmilk**
- **Delay the introduction of whole cow’s milk until 12 months of age**
- **Continue to offer iron-fortified and meat containing foods beyond 12 months of age**

What is iron deficiency?

“Iron is present in all cells in the human body. Its functions include the transportation of oxygen around the body, the facilitation of oxygen use and storage in the muscles.... Most iron is found in the red blood cells as haemoglobin” (1).

Newborns receive their iron stores in the womb. “6 months of age has been identified as a time when iron stores are falling in both breast and formula fed infants” (4). “However, once newborn iron stores are depleted, the child must meet the body’s iron needs through dietary intake” (1).

The body’s ability to absorb iron from the diet is dependant on:

- the amount of iron already stored in the body (more iron is absorbed when the iron stores are low)
- the rate of red blood cell production
- the amount and kind of iron eaten in the diet eg iron in meat is more readily absorbed than iron in vegetables.
- the presence of absorption enhancers and inhibitors in the diet

“If there is insufficient iron in the diet or if other problems prevent dietary iron from being absorbed into the body, a child’s iron stores will become depleted” (1).

Iron deficiency occurs across a spectrum from iron depletion to anaemia.

Table 25 Definitions of impaired iron status

Iron depletion

- Plasma ferritin level $<10\mu\text{g/L}$
- No functional deficit (3)
- Normal haemoglobin

Iron deficiency

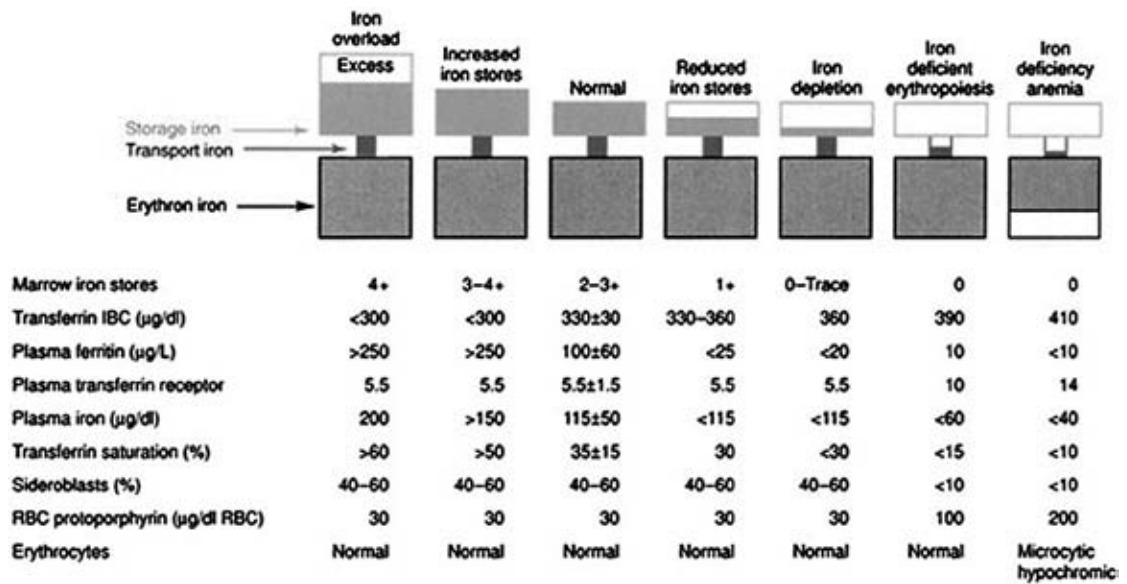
- Iron depletion plus
- Mean corpuscular volume $<70\text{fL}$ (age, 12-23 months) or $<73\text{fL}$ (age, 24-38 months) **plus**
- Mean corpuscular haemoglobin $<22\text{ pg}$
- Functional deficit (3)
- Normal haemoglobin (3)

Iron-deficiency anaemia

- Iron deficiency **plus**
- Haemoglobin level $<110\text{ g/L}$
- Normal functions compromised (1)

Adapted from Couper R et al (2001) (3)

Figure 6 Continuum of changes in iron stores and distribution in the presence of increased or decreased body iron content



Adapted from Herbert V: Anemias. In Paige DM [ed]: Clinical Nutrition. St. Louis, CV Mosby, 1988, p 593, with permission.

Symptoms of iron deficiency and iron deficiency anaemia (1)

Iron deficiency in children can be asymptomatic. Clinical indicators may include:

- behavioural changes (lethargy, irritability, lack of concentration)
- cognitive and psychomotor deficits,
- decreased immune function (recurrent infections)
- loss of appetite
- pica (the eating of dirt, clay or other strange 'foods')
- FTT, although not specific to iron deficiency, should always prompt consideration of iron status

Clinical indicators of anaemia include the above and

- pallor
- in extreme cases, heart failure

What causes iron deficiency?

Infants

The infant year is one of rapid growth. Dietary inadequacies during this period place the infant at risk of developing iron deficiency.

Risk factors for iron deficiency:

- uncorrected maternal iron deficiency during pregnancy
- prematurity, leading to inadequate accumulation of iron in the newborn's stores
- age less than 2 years
- introduction of cow's milk as the main source before 12 months of age
- cow's milk intake exceeding 600 ml per day (6)

Common feeding practices contributing to iron deficiency

Infants may be developing iron deficiency if any of the following feeding practices occur (6):

- use of cow's milk instead of infant formula or breastmilk, in infants under 12 months of age
- delayed introduction of solids
- displacement of solid food intake by milk
- prolonged bottle feeding with cow's milk
- low meat or haem iron intake
- bottle use in children over 12 months of age encourages excessive fluid intake that may displace other more nutritious solid foods

NB: Cow's milk not only has a low concentration of iron, but the iron is poorly absorbed (refer to toddler section).

NHMRC states health professionals should be vigilant with their clients and assess iron status based on the above risk factors (6)

Recommendation: Commercial infant cereal is the preferred first solid food because it is iron fortified (6).

Rice cereal was the first food given to the majority (70%) of children in the findings in the Infant and Child Nutrition in Queensland Report, 2003 (7).

Toddlers and preschoolers

The same basic scenario applies in the second year of life. The main problem with toddlers is the over reliance on milk: unfortunately, this low iron food ends up forming a large part of the total food intake. These comments apply to all forms of milk, not just cow's milk. Goat's milk is a particularly poor source of iron and soy milk is not satisfactory either (see toddler section).

Vegetarianism in infants and children

A vegetarian diet that is adequate for adults is not necessarily suitable for infants and young children, who face constraints such as limited stomach capacity and higher needs for nutrients per unit weight. Each diet must be assessed separately for its suitability for children; if the regimen is very restrictive in terms of the type and amount of animal proteins consumed, it is essential to plan a diet carefully so as to avoid deficiencies.

In general, lacto-vegetarian and lacto-ovovegetarian diets provide adequate nutrition if they are properly planned. Vegan diets pose a risk if care is not taken to ensure that the diet provides adequate energy, vitamin B12, protein and iron (8).

Referral to dietitian for assessment and advice

All ages:

Iron deficiency results from one or a combination of factors, which include:

- inadequate oral intake
- impaired absorption
- blood loss – including menstrual bleeding
- pregnancy (without adequate intake/oral supplementation)

Treatment

A dietary assessment is the first component of management. Following this, the health professional can advise parents on ways to increase their child's consumption of foods rich in iron and those that enhance iron absorption, whilst decreasing the consumption of foods that hamper iron absorption.

Initially children may also be prescribed iron supplements to replete their iron stores (1). Parents should be warned that bowel motions are often black and that this does not denote ill health.

Too much iron can be harmful

The body stores iron very efficiently, and too much iron can be toxic.

Haemochromatosis is a condition characterised by excessive iron stores (9)

Supplementation must never be given, unless under the supervision of a medical practitioner.

“Once children become iron deficient, they become very restricted in the range of foods they will accept. Appetite and tolerance of new or previously discarded foods improves with iron repletion” (3).

Referral to general practitioner / paediatrician and dietitian

Bioavailability of iron

Dietary iron comes in two forms:

Haem iron is found in flesh foods such as red meat, chicken and fish.

Non-haem iron is found in plant foods such as wholegrain breads and cereals and some vegetables.

The body absorbs:

- Just under one quarter of the iron contained in animal foods.
- Less than one tenth of the iron from plant sources

What are the best sources of iron? (10)

Foods which contain haem iron include:

- lean red meats such as beef, lamb and veal.
- offal meats such as liver and kidney.
- chicken, pork (including ham), fish and shellfish.
- pate or fish paste.

Foods which contain non-haem iron include:

- Iron-fortified breakfast cereals (check the label to see if iron is added).
- Wholemeal/wholegrain breads and cereals.
- Dried peas, beans and legumes eg. lentils, baked beans, soybeans, kidney beans, tofu.
- Leafy green vegetables eg. spinach, parsley, broccoli.
- Eggs.
- Dried fruit.
- Peanut butter and nuts (whole nuts are not recommended for children under 5).
- Tahini and hommus.

Dietary factors that boost iron absorption (9)

Certain foods and drinks help your body to absorb greater amounts of iron, including:

- Vitamin C (found in fruits and vegetables such as: citrus fruits, red capsicum, kiwi fruit) increase iron absorption from both haem and no haem iron sources.

Dietary factors that reduce iron absorption (9)

Certain foods and drinks reduce your body's ability to absorb iron, including:

- Tannins from tea, coffee and wine reduce iron absorption by binding to the iron and carrying it out of the body.
- The phytates and fibres in wholegrains such as bran can reduce the absorption of iron and other minerals.

Check

- ✓ eat foods high in haem iron
- ✓ eat foods high in non-haem iron, and where possible combine with haem iron to help absorption
- ✓ eat vitamin C rich foods (citrus and berry fruits, tomato, broccoli and capsicum) at each meal as this further increase iron absorption

Assessing the diet – asking about iron consumption for infants and toddlers

Adapted from the Australian Iron Status Advisory Panel 2,6

First year

- Was the child breastfed or formula fed (iron-fortified)?
- What age did you cease breastfeeding
- What drinks did you introduce? (iron-fortified formula or cow's milk)?

Solids

- At what age did you introduce solids?
- Were the foods iron fortified (or were supplements given)?
- When did the child start to eat red meat, chicken and fish? How much?

Current diet

- What does your child eat now?
- What about flesh foods (red meat, chicken, fish) and plant sources of iron (grains, legumes).
- How many vitamin C rich foods are eaten at the same time (eg. citrus fruits, cauliflower, broccoli, strawberries, melon)?

Cow's milk

- At what age did your child start on cow's milk and how much is consumed?

Other fluids

- What about the volume of other fluids - other animal milks, juices, cordials and soft drinks, tea and coffee? (Tannin inhibits iron absorption, juices displace iron rich foods from the child's diet)

Suggestions to prevent or treat iron deficiency in pregnant and breastfeeding mums (4, 9)

One and a half serves of meat, fish, poultry or alternatives each day are recommended in pregnancy and 2 during lactation. The Australian Guide to Healthy Eating recommends that red meat be eaten 3 to 4 times a week; less than this and high-iron replacement foods will be required.

Pregnancy

- Eat an iron-rich diet during pregnancy. Red meat is the best source of iron (see antenatal section). Choose iron-fortified breakfast cereals and breads.
- Tests to check for anaemia should be conducted during pregnancy. If your doctor prescribes iron supplements, take them according to instructions.
- Discuss any side effects causing concern with your doctor. It is normal to see changes in stools.

Breastfeeding

- When breastfeeding, ensure a healthy diet is consumed, with adequate amounts of iron (see breastfeeding section)
- Cut back on the amount of tea and coffee you drink, especially around mealtimes, since the tannins in tea and coffee bind to the iron and interfere with absorption.

Pregnancy / breastfeeding checklist

Mum includes red meat 3-4 times a week	
Iron levels have been checked whilst pregnant, and mum is aware of her iron status	
If iron supplement is required, it is taken as directed	
Encourage foods high in non haem iron to be eaten with haem iron foods	
Encourage foods high in vitamin C to be consumed with iron containing foods	
Limit intake of tea and coffee (around 3 a day)	
Limit excessive intake of bran	
If mum is a vegetarian refer to dietitian	

Suggestions to prevent or treat iron deficiency in infants (4,9)

Introducing solids

- Don't give your baby cow's milk or other fluids that may displace iron-rich solid foods before 12 months of age.
- Start giving your baby pureed foods when they are around 6 months of age. Fortified baby cereal made with iron-fortified formula or breastmilk, at first along with pureed vegetables and fruit. Gradually include finely minced meat at one mealtime from 6 months onwards.

Introducing solids with appropriate iron checklist (adapted from 4)

Babies are exclusively breastfed until 6 months of age If formula fed, iron fortified milk formula is chosen	
Iron fortified cereals have been introduced around 6 months	
Haem iron foods (eg red meat, chicken and fish) have been introduced around 7 months	
Cow's milk is delayed as the main milk drink until 12 months	
Once a variety of foods have been introduced, vitamin C rich foods (eg citrus, berries, tomatoes etc) are eaten with haem and non haem iron foods	
If mother and/or child are vegetarians refer to dietitian	

Suggestions to prevent or treat iron deficiency in toddlers and preschoolers (4,9)

- meat, poultry and fish are important sources of iron in your child's daily diet. include red meat 3 to 4 times per week (8)
- vitamin C helps the body to absorb more iron, so make sure your child has plenty of fruit and vegetables
- watch your child's fluid consumption; lots of milk and juice can take the edge off an already small appetite and therefore limit intake of iron rich foods
- chronic diarrhoea can deplete your child's iron stores, while intestinal parasites such as worms can cause iron deficiency. Referral to doctor for prompt diagnosis and treatment.

Practical ways to increase iron in the diet for young children

- include nutrient dense finger foods such as slices of roast meat, leftover mini meatballs, sandwiches with cold meat, cold cooked sausages, cold platter with cooked meat and raw vegetables with a dip
- offer meat alternatives including dried beans, lentils, chickpeas, canned beans, fish, eggs and small amounts of nuts and nut pastes.
- include foods rich in vitamin c like oranges, mandarins, berries and tomatoes.
- encourage young children, toddlers or fussy eaters to try minced meats, fortified breakfast cereals, eggs and smooth nut pastes.

Iron in toddlers and children checklist (adapted from 4)

Small portions of a variety of foods from all food groups are offered regularly	
Toddlers consuming up to 600ml milk per day (no more)	
Toddler consuming up to ½cup of juice per day (no more)	
High iron, nutrient dense finger foods are encouraged	
If concerns with fussy eating, refer to dietitian	
If mother and/or child are vegetarians refer to dietitian	

Adapted from *Tuckertalk*, 2003

Useful websites and resources

Key state and national documents for health workers:

Dietary Guidelines for Children and Adolescents in Australia and Infant Feeding Guidelines for Health Workers

Optimal Infant Nutrition: evidence based guidelines

Infant and Child Nutrition in Queensland 2003

National Breastfeeding Strategy

Report of the Chief Health Officer Queensland, 2006

Australian iron Status Advisory Panel

www.ironpanel.org.au/AIS/AISdocs/childdocs/Ccontents.html

Further professional development reading:

Sandoval C., Jayabose S., Eden A.N., (2004): Trends in diagnosis and management of iron deficiency during infancy and early childhood. *Haematology Oncol Clin N Am* 18 (2004) 1423-1438

Parent handouts:

Child Health Information Fact Sheets www.health.qld.gov.au/child&youth/factsheets/
www.health.qld.gov.au/cchs/Gen_Nutrition_Activity/whyiron.PDF

Better health Channel; Victorian Government

www.chw.edu.au/parents/factsheets/iron.htm

Growing Strong: Feeding you and your baby

References

1. Child Health Screening and Surveillance: 2002 A critical Review of the evidence. NHMRC [online] 13th April 2007
www.nhmrc.gov.au/publications/synopses/_files/ch42.pdf
2. [online April 2007]
www.ironpanel.org.au/AIS/AISdocs/childdocs/Ccontents.html
3. Couper R., and Simmer K. *Iron deficiency in children: Food for thought*. MJA 2001; 174:162
4. Tuckertalk: The Family Nutrition Education Manual. Department of Health and Community Services, Tasmania. 2004
5. Couper R., and Simmer K. *Iron deficiency in children: Food for thought*. MJA 2001; 174:162
6. Kruske S., Norberg M., Stewart L., Millen L. 2004. 'Feeding Practices and Iron Deficiency in Children under 2 years of age: Centre for Family Health and Midwifery, Sydney
7. Queensland Health: Ros Gabriel, Gayle Pollard, Ghazala Suleman, Terry Coyne and Helen Vidgen. *Infant and Child Nutrition in Queensland 2003*. Queensland Health. Brisbane 2005.
8. National Health and Medical Research Council: *Dietary Guidelines for Children and Adolescents in Australia* incorporating the *Infant Feeding Guidelines for Health Workers*, Canberra www.health.gov.au/pubhlth/strateg/childnutrition/index.htm
9. [online April 2007] www.betterhealthchannel.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Iron_explained?open
10. [online April 2007] www.chw.edu.au/parents/factsheets/iron.htm

7.10 Lactose intolerance

Lactose intolerance is a condition which results in an inability to digest lactose. Lactose is a sugar found in milk. Lactose must be broken down in the body in the small intestine by an enzyme called lactase, into its individual components - glucose and galactose - before it can be absorbed. An inability to digest lactose due to a decreased or absent lactase activity can result in symptoms of:

- diarrhoea
- nausea
- flatulence
- abdominal discomfort and distension after the ingestion of lactose

Dietary lactose elimination or clinical tests are available to detect lactose intolerance and it is important to have this correctly diagnosed by a doctor. These tests can include non-invasive hydrogen breath testing, stool acidity test or invasive intestinal biopsy determination of lactase concentrations (1).

Lactose intolerance is a distinct entity from cow's milk sensitivity, which involves the immune system and causes varying degrees of injury to the intestinal surface. Cow's milk protein intolerance is reported in 2% - 5% of infants within the first 1 to 3 months of life, typically resolves by 1 year of age (1).

Frequent runny stools do not mean a breastfed infant has diarrhoea or lactose intolerance: they are simply viewed as evidence of sufficient milk. Diarrhoea entails very frequent watery stools (2).

Causes of lactose intolerance

Congenital alactasia or hypolactasia

This condition is seen in infants from birth and results in the enzyme lactase either being absent or present in low levels. This condition is rare.

Primary lactose intolerance

This condition results in an absent or low lactase activity. It is rare before the age of 3 years. Decreased lactase activity is genetically inherited and is more common amongst near East and Mediterranean, Asian, African and North and South American ethnic groups. This condition generally persists throughout life and requires life-long adherence to a low lactose diet, at a level of restriction that eliminates symptoms.

Secondary lactose intolerance

This is usually only temporary and occurs as a result of damage to the intestinal mucosa, for example, coeliac disease, inflammatory bowel disease or gut surgery. It may also occur after gastroenteritis. Treatment requires a low lactose diet to be followed for a short period of time.

Developmental lactase deficiency

Relative lactase deficiency observed among pre term infants of less than 34 weeks of gestation.

Management

Breastfed Infants

Lactose is the sugar in all mammalian milks, it is produced in the breast and is independent of the mother's consumption of lactose (3). Breastmilk contains around 7% lactose.

It is uncommon for breastfed infants to exhibit signs of primary or secondary lactose intolerance. Breastmilk is usually well tolerated despite it containing lactose. Breastfed infants should be continued on human milk in all cases.

Ensuring the infant's correct attachment to the breast in order to allow effective drainage is important. Encouraging the infant to finish suckling one breast before offering the second may also be helpful for infants suffering from lactose intolerance. This results in the infant receiving a higher fat feed and tends to delay gastric emptying. It also slows the rate at which lactose is presented to the small intestine.

Although lactose free cow's milk protein based formulas are readily available no studies have documented that these formulas have any clinical impact on infant outcomes measure including colic, growth or development (4).

Lactase drops are an option in expressed breastmilk – but these are not always helpful.

In special cases breastfed infants may be required to change to a low lactose formula. Breastfeeding should only be ceased due to lactose intolerance after receiving medical advice.

Formula fed Infants

In developed countries enough lactose digestion and absorption are preserved so that low-lactose and lactose free formulas have no clinical advantages compared with standard lactose containing formulas. Infants with secondary lactose intolerance should only be given lactose free formulas for a short period of time as prescribed by a doctor.

Note Although soy milk formulae are low in lactose, they are not the feed of choice for the treatment of lactose intolerance. For infants, a cow's milk based low lactose formula should be recommended.

Low lactose solids

It is rare for young children less than 3 years of age to have primary lactose intolerance. Lactose intolerance in this age group usually exists due to an injury to the intestinal mucosa. Low lactose diets should usually only be required for short periods of time.

For children requiring long term adherence to a low lactose diet, advice from a dietitian should be sought. It is important that meals remain balanced and that nutrient requirements such as calcium are met. A more extensive list of low lactose foods can then be provided.

Children vary in the level of lactose they can tolerate and it is often not necessary to eliminate all dairy foods from the diet. Often levels of lactose equivalent to the amount in 1 glass of milk are tolerated each day. Some milk products such as yoghurt, buttermilk and hard cheeses (eg. swiss, cheddar) contain only small amounts of lactose and are usually well tolerated.

It is important to test a child's level of tolerance and provide the maximum amount of dairy food possible to ensure adequate calcium intakes. A calcium supplement may be required if intakes of low lactose milk or calcium fortified soy milk are low.

For secondary lactose intolerance, low lactose foods and fluids should be provided for 1-4 weeks depending on the severity of the symptoms. A normal diet should then be gradually introduced.

Table 26 Lactose content of common foods

Food	Lactose content (g)
Regular milk, 200 ml	9.4
Cheese, 35g slice (Edam, Swiss, Brie, Cheddar)	0.0
Processed cheddar, fetta	0.1
Cottage cheese, 100g	1.4
Cream cheese	3.2
Ice cream, 50g	2.8
Yoghurt, 200g*	7.8

* The lactose content in yoghurt decreases each day, even while it sits in the fridge, because its natural bacteria use lactose for energy.

Hidden sources of lactose

- Breads, biscuits, cakes and other baked goods
- Processed breakfast cereals
- Mixes for pancakes, biscuits and cookies
- Margarine
- Cheese studies, cream soups
- Custard
- Milk chocolate
- Salad dressings

Dairy foods are an important source of calcium. If these foods are eliminated from the diet it is essential to replace them with other calcium rich foods eg calcium fortified soy products.



Useful websites



- www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Lactose_intolerance?open
- www.breastfeeding.asn.au/bfinfo/lactose.html
- www.lactose.com.au/
- www.mayoclinic.com/health/lactose-intolerance/DS00530
- www.cyh.com/HealthTopics/HealthTopicDetails.aspx?p=114&np=302&id=1787
- www.chw.edu.au/parents/factsheets/pdf/low_lactose_diet.pdf

References

1. Heyman M 2006 Lactose Intolerance in Infants, Children and Adolescents Paediatrics 118 (3) 1279-86.
2. Dietary Guidelines for Children and Adolescents in Australia incorporating the Infant Feeding Guidelines for Health Workers, NHMRC, Canberra 2003.
3. Anderson J (2006) Lactose intolerance and the breastfed baby. Essence magazine 35(1).
4. Heubi J et al (2000) Randomised multicenter trial documenting the efficacy and safety of a lactose free and lactose containing formula for term infants J Am Diet Assoc 100; 212-217
5. The GUT Foundation: [online: May2007] www.gut.nsw.edu.au/free3.htm

7.11 Regurgitation and gastro-oesophageal reflux

The passage of gastric contents into the oesophagus is a normal physiological process that occurs in healthy infants and children. In fact, in healthy infants, gastric fluids may frequently erupt into the oesophagus, anywhere from 10 to 50 times a day (1). Many, but not all of these episodes result in regurgitation. *Regurgitation* describes reflux into the oropharynx. Regurgitation is most frequently reported between 1 and 3 months (50%) to around 4 months (61%). By the time the infant is 10 to 12 months old, only 5% of parents still report it as a problem (1).

Gastro-oesophageal reflux (GOR) is a condition of frequent regurgitation or vomiting, often beginning between 2 and 6 weeks of age (2).

The symptoms in young infants differ from those seen in older children and include:

- excessive crying
- irritability
- back arching
- breast refusal
- feeding difficulties (1,2)

Most infants with regurgitation or reflux remain healthy and thrive, and the symptoms settle down between 6 and 10 months of age, when the infant begins to spend more of the day in an upright posture (2). If severe, it can lead to *gastro-oesophageal reflux disease (GORD)*, when reflux leads to pathological consequences such as, oesophagitis (inflammation of the oesophagus) failure to thrive, recurrent aspiration (which may be associated with apnoea) and pneumonia.

Gastro-oesophageal reflux is significantly less common in breastfed infants than in those fed formula. This finding is unrelated to feed volume (2).

Diagnosis

The diagnosis of gastro-oesophageal reflux is made on clinical grounds. It is important to determine if symptoms are caused by an underlying pathological condition, or if there is evidence reflux is causing secondary complications such as failure to thrive.

In most cases reflux is uncomplicated and little intervention is required.

Investigation is required only when complications are present or if the infant does not respond to simple management measures (2).

Some warning signs of underlying pathology (1)

Does the infant have:

- Bilious and/ forceful vomiting
- Onset of vomiting after 6 months*
- GI bleeding*
- Constipation
- Diarrhoea
- Abdominal tenderness, distension
- Fever
- Lethargy
- Failure to thrive*

* may also be a symptom of GORD

Refer for medical intervention if the infant has one or more of these symptoms

Reflux and poor weight gain

Infants with recurrent vomiting and poor weight gain should undergo evaluation for the adequacy of caloric intake and the effectiveness of swallowing.

Poor weight gain despite an adequate intake of calories should prompt evaluation for causes of vomiting and weight loss other than GORD.

Referral to dietitian

Management

Reassurance

The majority of infants will have physiological regurgitation and will settle spontaneously. Provided the infant is thriving, no investigation or intervention is required. It is important not to label these children as having a condition such as gastro-oesophageal reflux (2).

Posture (2)

- Placing the infant in a more upright feeding position can be helpful for regurgitation.
- Keeping the infant upright for 15 to 30 minutes after feeding also helps; a baby sling is useful in this setting.
- The best position for reducing reflux is prone but, because this position has been associated with an increased incidence of sudden infant death syndrome, it is not generally recommended.
- No other lying position has been shown to be effective.

Food thickening

- When breastfeeding, liquid *Gaviscon* is sometimes effective, although it can cause constipation (2).
- Recently infant formulas containing a thickening agent (AR formulas) have become widely available..... They should be considered only for reducing regurgitation; they are not an anti-reflux formula (2).
- Thickening solid feeds with rice cereal can assist in regurgitation.

If an infant is placed on a thickened feed or is using a thickener, this should only occur under appropriate medical supervision.

Milk free diet

Some studies report up to 40% of infants with GOR has a cow's milk protein intolerance. This is important to investigate, particularly if the infant has poor weight gain, irritability and feeding refusal (3).

Referral to dietitian for assessment and advice

Drug therapy

Drug therapy should be given only under medical supervision.

There are two possible therapies: acid reduction and use of prokinetic agents. At present there is no drug available that is truly anti-reflux (2). In most cases they are not valuable treatment of infants with regurgitation (1).

Outcome

Active medical management controls symptoms leading to:

- 50 % of children needing no further therapy beyond 8 to 10 months of age
- 30 % beyond 18 months of age.

However, 17% of patients have ongoing symptoms or complications requiring anti-reflux surgery (2)

Surgical intervention

Surgical intervention is restricted to infants for whom medical management has failed and/or who have potentially life-threatening complications such as apnoea or aspiration. This is rare.

References

1. Winter H.S. (2007) Gastroesophageal reflux in Infants, www.uptodate.com/udt/content/topic.do?topicKey=pedigast/16818 [online] 18th April, 2007
2. Dietary Guidelines for Children and Adolescents in Australia incorporating the Infant Feeding Guidelines for Health Workers, NHMRC, Canberra 2003.
3. Salvatore S., Vandenplas Y., (2002) Gastroesophageal reflux and cow's milk allergy: Is there a link? *Pediatrics* Nov 2002. 110(5):972
4. Huang R-C., Forbes DA., Davies MW., (2003) Feed thickener for newborn infants with gastroesophageal reflux. *Cochrane Review Abstracts*