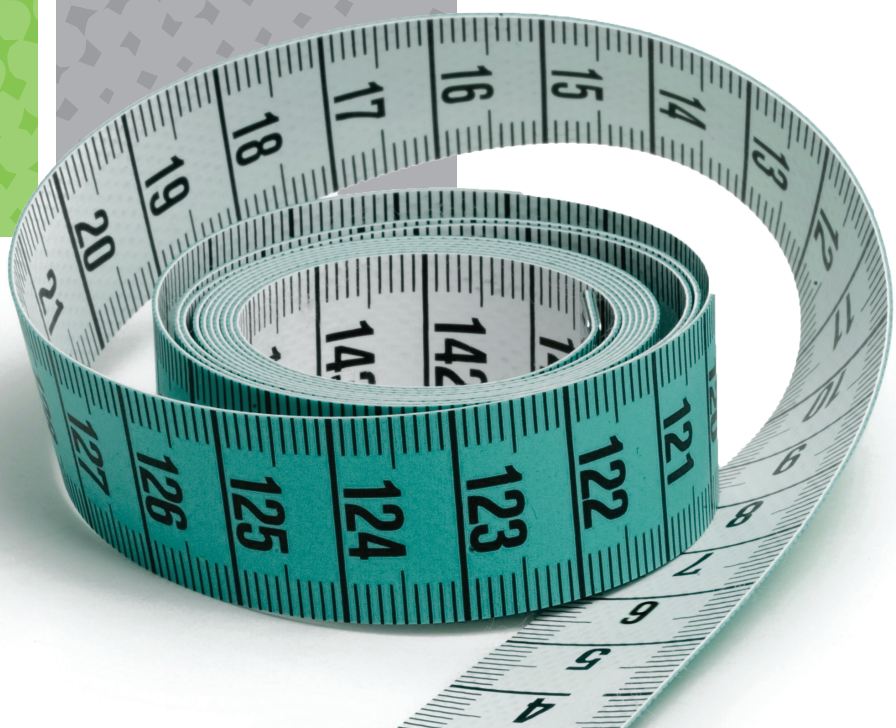
Australian Government
National Health and Medical Research Council
Department of Health

CLINICAL PRACTICE GUIDELINES FOR THE MANAGEMENT OF OVERWEIGHT AND OBESITY IN ADULTS, ADOLESCENTS AND CHILDREN IN AUSTRALIA



Australian Government
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Clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia

2013

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Disclaimer

This document is a general guide to appropriate practice, to be followed subject to the clinician's judgement and patient's preference in each individual case. The Guidelines are designed to provide information to assist decision-making and are based on the best available evidence at the time of development of this publication.

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Summary

The effects of overweight and obesity are widely recognised as one of Australia's leading health concerns, involving all age and socioeconomic groups. Physiologically, body weight is regulated through a complex system involving interactions between the various components of energy balance, together with feedback mechanisms that regulate appetite, energy intake and energy expenditure. In individuals, excess weight results from prolonged energy imbalance, with the excess energy stored as body fat. In overweight and obesity, 'excess body fat has accumulated to an extent that is likely to be detrimental to health' (WHO 2000). Being overweight or obese is strongly associated with several chronic diseases including type 2 diabetes, cardiovascular disease and some cancers, and with mental health and eating disorders.

The causes of overweight and obesity are complex. Diet and physical activity are central to energy balance, but are directly and indirectly influenced by a wide range of social, environmental, behavioural, genetic and physiological factors. For many individuals, weight gain is hard to avoid and very difficult to reverse. People often have unrealistic expectations of how much weight loss is feasible, which can be reinforced by media reports of weight loss 'success stories'.

These Guidelines are designed for use primarily at the level of the individual who is overweight or obese, while acknowledging that individual choices are shaped by the wider environmental and social context. The evidence-based recommendations and practice points focus on clinical and physical aspects of care. An underlying principle is that care is centred on the needs of the affected individual, that it is culturally appropriate, nondirective and nonjudgemental, and that it enables people to participate in informed decision-making at all stages.

Adults

Long-term management and regular monitoring is required for people who are overweight or obese. Weight management is primarily the individual's responsibility, with healthcare professionals recommending strategies and providing continuing support. All successful strategies involve some form of continuing lifestyle change. A tailored approach is likely to be the most effective, as success is highly dependent on personal variables. Goals should focus on behaviour change and improved health as well as weight loss. For most overweight and obese adults, weight loss of 5% of initial body weight is achievable and reduces health risks, including lowering blood pressure and reducing the risk of or delaying progression of type 2 diabetes. The benefits increase with further weight loss, particularly in people with obesity.

Multicomponent lifestyle intervention (healthy eating plan, increased physical activity and support for behavioural change) is the first approach and brings a range of health benefits. More intensive interventions such as very low-energy diets and medication can help some people to reduce weight further, and may assist motivation to continue with lifestyle change towards longer term weight loss goals. Bariatric surgery is currently the most effective intervention for severe obesity. The decision to use intensive interventions takes the individual's situation into account and may require referral to healthcare professionals with expertise in obesity management.

Long-term weight management is difficult, due to strong physiological responses that increase hunger and encourage weight regain. Regular support over the long term is essential, along with repeated lifestyle interventions and, if needed, more intensive treatments.

Children and adolescents

Most children and adolescents who are overweight or obese are identified through primary health care. Multicomponent lifestyle interventions are usually indicated, involving reduced energy intake, increased physical activity and less 'screen time', and measures to support behavioural change. Lifestyle interventions should engage the parents, carers and family. Frequent contact with a healthcare professional is beneficial.

Weight maintenance rather than weight loss is recommended for most children and many adolescents. Referral may be required for postpubertal adolescents who have severe obesity and obesity-related comorbidities. In these circumstances, the management goal is weight loss rather than weight maintenance, and additional interventions may be warranted.

Summary of recommendations

A number of guidelines on the management of overweight and obesity have been developed internationally in recent years. To avoid duplication of effort, these *Clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia* (the Guidelines) were developed using the most recent systematically developed guideline for clinical management of overweight and obesity—the Scottish Intercollegiate Guideline Network (SIGN) *Management of obesity: a national clinical guideline* (2010)—as reference guidelines. A systematic literature review was also conducted to examine those areas that were relevant for Australian practice and would benefit from an update of the literature. As a result, the Obesity Guidelines Development Committee (OGDC) (see Appendix A) developed three types of recommendation:

- Recommendations 1–3, 10 and 19 are based on evaluation of systematic reviews (2000–07) and randomised controlled trials (RCTs) (2003–08) conducted by SIGN to update evidence tables developed by the National Institute of Clinical Excellence (NICE) in 2006. They were graded by the 2010 SIGN guideline development group using the SIGN grading system (see Table C33). These have been adapted to suit the Australian context and to clearly describe the actions to be taken by users of the Guidelines (see Table C32)—however, the grading has not been changed from the original SIGN grading.
- Recommendation 11 was developed by the committee following a consensus-based process (outlined in Appendix C).
- The remaining recommendations are based on the systematic literature review of the available recent evidence (2007–11) and graded following the National Health and Medical Research Council (NHMRC) *Levels of evidence and grades for recommendations for developers of guidelines* (NHMRC 2009a) (see below).

For areas beyond the scope of the systematic review, practice points were developed by the OGDC.

The recommendations and practice points focus on clinical and physical aspects of care. This care follows principles that include taking an approach that is person-centred, culturally appropriate and enables people to participate in informed decision-making at all stages of their care.

Clinical guidance is staged according to the 5As approach: **Ask** and **Assess**, **Advise**, **Assist**, **Arrange**.

Definition of grades of recommendations

GRADE	DESCRIPTION
NHMRC recommendations	
A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
D	Body of evidence is weak and recommendation must be applied with caution
CBR	Consensus-based recommendation formulated in the absence of quality evidence
SIGN recommendations	
SIGN	Recommendation has been adapted for the Australian context from SIGN (2010). *SIGN gradings are outlined in Appendix C*

Source: *Adapted from NHMRC (2009a) Levels of evidence and grades for recommendations for developers of guidelines and NHMRC (2011) Procedures and requirements for meeting the 2011 NHMRC standard for clinical practice guidelines.*

Recommendations for weight management in adults

RECOMMENDATION		GRADE	SECTION
Ask about and assess weight			
1	Use BMI[a] to classify overweight or obesity in adults.	**B**	4.2
2	For adults, use waist circumference, in addition to BMI, to refine assessment of risk of obesity-related comorbidities.	**C**	4.3
3	For adults who are overweight or obese, discuss readiness to change lifestyle behaviours.	**D**	4.4.5
Advise adults about the health benefits of lifestyle change and weight loss			
4	Adults who are overweight or obese can be strongly advised that modest weight loss reduces cardiovascular risk factors.	**A**	5.1 Appendix C
5	Adults with prediabetes or diabetes can be strongly advised that the health benefits of modest weight loss include prevention, delayed progression or improved control of type 2 diabetes.	**A**	5.1 Appendix C
6	Adults with kidney disease or sleep apnoea can be advised that improvements in these conditions are associated with a 5% weight loss.	**B**	5.1 Appendix C
7	Adults with musculoskeletal problems, gastro-oesophageal reflux or urinary incontinence can be advised that weight loss of 5% or more may improve symptoms.	**C**	5.1 Appendix C
8	Adults who are overweight or obese can be advised that quality of life, self-esteem and depression may improve even with small amounts of weight loss.	**C**	5.1 Appendix C
Assist adults to lose weight through lifestyle interventions			
9	For adults who are overweight or obese, strongly recommend lifestyle change—including reduced energy intake, increased physical activity and measures to support behavioural change.	**A**	6.1 Appendix C
10	For adults who are overweight or obese, design dietary interventions that produce a 2500 kilojoule per day energy deficit and tailor programs to the dietary preferences of the individual.	**A**	6.1.1
11	For adults who are overweight or obese, prescribe approximately 300 minutes of moderate-intensity activity, or 150 minutes of vigorous activity, or an equivalent combination of moderate-intensity and vigorous activities each week combined with reduced dietary intake.	**CBR**	6.1.2 Appendix C
Assist adults who require additional intensive intervention			
12	For adults with BMI ≥ 30 kg/m^2, or adults with BMI ≥ 27 kg/m^2 and comorbidities, orlistat may be considered as an adjunct to lifestyle interventions, taking into account the individual situation.	**A**	6.2.2 Appendix C
13	For adults with BMI > 40 kg/m^2, or adults with BMI > 35 kg/m^2 and comorbidities that may improve with weight loss, bariatric surgery may be considered, taking into account the individual situation.	**A**	6.2.3 Appendix C
Develop an appropriate weight loss program			
14	For adults, include a self-management approach in weight management programs.	**C**	6.3.4 Appendix C
15	For active weight management in adults, arrange fortnightly review for the first 3 months and plan for continuing monitoring for at least 12 months, with additional intervention as required.	**B**	6.3.5 Appendix C
Long-term weight management			
16	For adults who achieve initial weight loss, strongly recommend the adoption of specific strategies, appropriate to their individual situation, to minimise weight regain.	**A**	7.2 Appendix C

Recommendations for weight management in children and adolescents

RECOMMENDATION		GRADE	SECTION
Assist			
17	For children and adolescents, focus lifestyle programs on parents, carers and families.	**C**	11.1 Appendix C
18	For children and adolescents, plan weight management programs that involve frequent contact with health professionals.	**B**	11.1 Appendix C
19	For children who are managing overweight or obesity, advise that weight maintenance is an acceptable approach in most situations.	**D**	11.2
20	For children and adolescents who are overweight or obese, recommend lifestyle change—including reduced energy intake and sedentary behaviour, increased physical activity and measures to support behavioural change.	**B**	11.3.1 Appendix C
21	For postpubertal adolescents with a BMI > 40 kg/m^2 (or > 35 kg/m^2 with obesity-related complications), laparoscopic adjustable gastric banding via specialist bariatric/paediatric teams may be considered if other interventions have been unsuccessful in producing weight loss.	**C**	11.3.2 Appendix C

BMI = body mass index

a A BMI of 25.0–29.9 is classified as overweight and a BMI > 30.0 is classified as obese. Calculation of BMI is discussed in Section 4.2.

Practice points for weight management in adults

Ask about and assess weight		**Section**
a	Current Australian guidelines should be used to guide assessment and management of absolute cardiovascular risk and type 2 diabetes in adults.	4.4.2
b	Current Australian guidelines should be used to guide assessment and management of physical comorbidities associated with excess weight in adults.	4.4.2
c	Weight history, including previous weight loss attempts, should be part of the assessment of people who are overweight or obese.	4.4.4
Assist adults to lose weight through lifestyle interventions		**Section**
d	Current Australian dietary guidelines should be used as the basis of advice on nutrition for adults.	6.1.1
e	Current Australian physical activity guidelines should be used as the basis of advice on preventing weight gain through physical activity.	6.1.2
f	For adults who are overweight or obese, particularly those who are older than 40 years, there should be an individualised approach to increasing physical activity.	6.1.2
g	Individual or group-based psychological interventions may improve the success of weight management programs.	6.1.3
h	There is very limited evidence on the potential benefits or harms of complementary therapies in treating overweight and obesity.	6.1.4
Assist adults who require additional intensive intervention		**Section**
i	Very low-energy diets are a useful intensive medical therapy that is effective in supporting weight loss when used under medical supervision. They may be a consideration in adults with BMI > 30 kg/m^2, or with BMI > 27 kg/m^2 and obesity-related comorbidities, taking into account the individual situation.	6.2.1
j	Bariatric surgery, when indicated, should be included as part of an overall clinical pathway for adult weight management that is delivered by a multidisciplinary team (including surgeons, dietitians, nurses, psychologists and physicians) and includes planning for continuing follow-up.	6.2.3
k	Bariatric surgery may be a consideration for people with a BMI > 30 kg/m^2 who have poorly controlled type 2 diabetes and are at increased cardiovascular risk, taking into account the individual situation.	6.2.3

Develop an appropriate weight loss program		Section
l	Encourage people to make goals for behavioural change.	6.3.2
m	Regular self-weighing (e.g. weekly) may be a useful component of self-management.	6.3.4
n	The weight loss plan should be reviewed after 2 weeks to determine its suitability for that individual and to assess whether it needs to be modified.	7.1.1
o	If there is no weight loss (less than 1% body weight or no change in waist circumference) after 3 months of active management, lifestyle behaviours and causes of weight gain should be reviewed. Intensive weight loss interventions may also be considered depending on degree of overweight or obesity and whether comorbidities are present.	7.1.2
Long-term weight management		**Section**
p	For long-term weight management, adults can be advised of the importance of taking action (e.g. seeing a health professional) when small amounts of weight (approximately 3 kg) have been regained. If there is weight regain, consideration should be given to reassessing energy intake and physical activity, and reintervening with weight loss strategies.	7.2.1
q	Long-term weight management may be more successful if it involves a self-management approach, continuing contact with health professionals and behavioural strategies for maintaining motivation.	7.2.1
r	Self-management strategies for long-term weight management may include maintaining a healthy lifestyle, identifying ways to manage hunger, setting and reviewing goals, and regular self-weighing.	7.2.1

Practice points for weight management in children and adolescents

Ask about and assess weight		Section
s	For children aged 2 to 18 years, use a BMI percentile chart to monitor growth, either US-CDC or WHO. Ensure that the same chart is used over time to allow for consistent monitoring of growth.	9.2.1
t	For children younger than 2 years of age, use WHO charts to monitor growth.	9.2.1
u	Waist:height ratio of ≥ 0.5 may be used to guide consideration of the need for further assessment of cardiovascular risk in children.	9.2.2
v	Assist children and adolescents to get help for disordered eating, poor body image, depression and anxiety and weight-related bullying where these are present.	9.3.1
w	Refer children and adolescents to hospital or paediatric services if: • they are aged between 2 and 18 years and have a BMI well above the 95th percentile on US-CDC growth charts or the 97th percentile on WHO charts • they are younger than 2 years, above the 97th percentile on WHO growth charts and gaining weight rapidly • they may have serious related comorbidities that require weight management (e.g. sleep apnoea, orthopaedic problems, risk factors for cardiovascular disease or type 2 diabetes, psychological distress) • an underlying medical or endocrine cause is suspected or there are concerns about height and development.	9.3.3
Advise		**Section**
x	Early weight management gives children and adolescents the opportunity to learn positive lifestyle behaviours, and reduce their risk of obesity, diabetes and cardiovascular disease in adulthood.	10.1

Assist children and adolescents to manage weight through lifestyle interventions		Section
y	More frequent contact with a health professional is generally more successful in the short term. In the longer term, the frequency of contact needs to be balanced against sustainability, cost and resources and the individual's needs.	11.1
z	Current Australian dietary and physical activity guidelines should be used as the basis of advice on dietary intake, physical activity and sedentary behaviour for children and adolescents.	11.3.1
Assist postpubertal adolescents who require specialist intervention		
aa	Bariatric surgery should only be undertaken by a highly specialised surgical team within the framework of a multidisciplinary approach.	11.3.2
Arrange monitoring and review		
bb	Regular monitoring of BMI (ideally 3 monthly or more frequently) may be an appropriate component of approaches to weight management.	12.1.1

BMI = body mass index; US-CDC = United States Centers for Disease Control and Prevention; WHO = World Health Organization

Introduction

The National Health and Medical Research Council (NHMRC) previously endorsed *Clinical practice guidelines for the management of overweight and obesity in children and adolescents* (NHMRC 2003a) and *Clinical practice guidelines for the management of overweight and obesity in adults* (NHMRC 2003b). In 2010, the Australian Government Department of Health and Ageing (DoHA) commissioned the NHMRC to review the existing guidelines and develop recommendations based on the most recent evidence.

These Guidelines are part of a suite of documents on weight management being funded by DoHA. The messages provided in these Guidelines will underpin advice that is being developed for other guidance documents targeted to primary health care and the Australian public.

The guideline development process followed the 2011 *NHMRC Standard for clinical practice guidelines* (NHMRC 2011a). This involved convening a multidisciplinary committee to oversee the guideline development process (see Appendix A), and using a systematic approach to identify and evaluate the evidence.

Systematic methods were used to identify existing guidelines on overweight and obesity (see Appendix B). Guidelines identified included those developed by the United Kingdom National Institute for Health and Clinical Excellence (NICE 2006), New Zealand Ministry of Health (2009a; 2009b), the Scottish Intercollegiate Guidelines Network (SIGN 2010) and the Institute for Clinical Systems Improvement (ICSI 2011). The SIGN guidelines were selected as reference guidelines, since they are recent and used development processes that are similar to that of the NHMRC.

A systematic literature review was conducted to examine the association between weight loss and the occurrence of chronic diseases and associated risk factors, and the effectiveness of interventions (see Appendix C). Given the amount of literature published on obesity and the number of recently published guidelines, it was decided that systematic reviews and randomised controlled trials (RCTs) from 2007 onwards would be reviewed for inclusion. Based on the identified evidence, recommendations were formulated by the Obesity Guidelines Development Committee (OGDC). For areas outside the scope of the literature review, practice points were developed by the OGDC.

A consultation draft was disseminated with the aim of gathering input from a wide range of experts, stakeholders and consumer representatives. These Guidelines were revised following comments from public consultation and the recent release of other national guidelines.

Need for the Guidelines

The prevalence of overweight and obesity among Australians has been steadily increasing for the past 30 years. In 2011–12, around 60% of Australian adults were classified as overweight or obese, and more than 25% of these fell into the obese category (ABS 2012). In 2007, around 25% of children aged 2–16 were overweight or obese, with 6% classified as obese (DoHA 2008).

A 2009 report by the Organisation for Economic Co-operation and Development predicts that there will be continued increases in overweight and obesity levels across all age groups during the next decade in Australia, to around 66% of the population (Sassi et al. 2009).

While overweight and obesity are prevalent in all population groups, variation exists in their distribution across the Australian population. Obesity is particularly prevalent among those in the most disadvantaged socioeconomic groups (ABS 2008), Aboriginal and Torres Strait Islander peoples (Penm 2008) and many people born overseas (ABS 2008; O'Dea 2008). Obesity is also more prevalent in rural and remote areas compared to urban areas (ABS 2008).

Health problems related to excess weight impose substantial economic burdens on individuals, families and communities. Data from the Australian Diabetes, Obesity and Lifestyle (AusDiab) study indicate that the total direct cost for overweight and obesity in 2005 was $21 billion ($6.5 billion for overweight and $14.5 billion for obesity). The same study estimated indirect costs of $35.6 billion per year, resulting in an overall total annual cost of $56.6 billion (Colagiuri et al. 2010).

Application of the Guidelines

Purpose of the Guidelines

The Guidelines provide detailed, evidence-based recommendations for assessing and managing overweight and obesity in adults, adolescents and children. The Guidelines also highlight the health benefits of reducing weight, and aim to improve health outcomes across a range of chronic diseases through evidence-based clinical practice.

Scope

The Guidelines provide guidance on assessing weight for all Australians and give specific advice on weight management for:

- adults and adolescents aged more than 18 years who have a body mass index (BMI) greater than 25 kg/m^2 and are at risk of, or have, one or more overweight or obesity-related comorbidities
- children and adolescents aged between 2 and 18 years who have a BMI greater than the 85th percentile according to the United States Centers for Disease Control and Prevention (US-CDC) or World Health Organization (WHO) percentile charts
- infants and children under 2 years of age who demonstrate rapid weight gain as assessed using WHO growth charts.

The Guidelines do **not** include:

- discussion of the broad public health aspects of obesity prevention, which are outside the scope of these clinically focused Guidelines—these broad aspects are being addressed by a range of government policies to embed preventative health within primary healthcare settings
- discussion of wider social issues associated with overweight and obesity, including societal norms of body shape and size, discrimination and stigma in the media and community, and how these affect lifestyle and behavioural change in individuals
- guidance on the management of risk factors and comorbidities associated with overweight and obesity—the need to assess and manage risk factors and comorbidities is highlighted, and a range of relevant Australian and other guidelines are listed in Part E.

Where do the Guidelines fit?

Organisation level	Role
National level (e.g. NHMRC, DoHA, Australian National Preventative Health Agency)	Sets national policy and frameworks Communicates healthy practices
State or regional level (e.g. state health departments, Medicare locals, regional primary healthcare organisations)	Delivers and coordinates services Develops and implements local policy
Secondary and tertiary health care (e.g. specialist services such as surgeons, endocrinologists, hospital clinics)	Assists in management Participates in multidisciplinary teams
Primary health care (e.g. general practice, community health centres, Aboriginal medical services, allied health)	Provides first point of care Identifies, assists and treats individuals Relays healthy messages
Individuals, family and carers	Undertakes self-care and management Undertakes healthy behaviours Seeks treatment

While all levels have been involved in the development and promotion of the Guidelines, they are intended to guide clinical management and referral of individuals in the primary healthcare sector.

Intended audience

The Guidelines are intended for use by primary healthcare professionals, including general practitioners (GPs), practice nurses, Aboriginal health workers and allied health professionals (e.g. dietitians, psychologists, exercise physiologists, diabetes educators, social workers, occupational therapists, physiotherapists, mental health nurses). They will also be of interest to other professionals who have contact with people requiring advice about managing overweight and obesity. The way in which different professionals use the Guidelines will vary depending on their knowledge, skills and role, as well as the setting in which care is provided.

The Guidelines are likely to be of interest and relevance to consumers.

The Guidelines may also be useful in policy development, evaluation and review of programs, and supporting funding applications.

Dissemination, implementation and review

In 2010, DoHA commissioned the NHMRC to review the existing guidelines and develop recommendations based on the most recent evidence. The NHMRC will disseminate these Guidelines and provide advice on further dissemination and implementation activities to DoHA based on consultation and information gathered during the development of these Guidelines.

Dissemination

Alongside the review of the Guidelines, DoHA is developing a 'healthy weight guide' to provide consumers with advice on how to achieve and maintain a healthy weight. The healthy weight guide will be based on qualitative research into healthy weight messages in the consumer environment and reviews of the available evidence in relation to healthy weight.

Where possible and/or appropriate, the dissemination and availability of the Guidelines will be linked to the healthy weight guide and/or with other associated DoHA guidelines currently being produced relating to clinical chronic disease management and associated risk factors within primary health care.

Implementation

To improve the implementation of the Guidelines in practice, the NHMRC has used a consultative approach to inform the structure, format and relevance of information for practice, including the assessment of likely barriers to the use of the Guidelines. This included:

- consulting professional groups on the relevance of the clinical questions
- conducting a survey of primary healthcare professionals to identify preferred formats and information that health professionals would likely seek from the Guidelines
- consulting with primary healthcare professionals at various conferences during the development of the Guidelines.

It is anticipated that DoHA will manage the Guidelines' implementation, with the associated chronic disease guidelines being developed by DoHA and scheduled for implementation within primary health care. DoHA will consult with relevant Australian professional associations on the promotion and implementation of the Guidelines.

Scheduled review of these Guidelines

NHMRC guidelines are usually scheduled for review every five years after initial publication. It is suggested that the OGDC be re-convened to review relevant sections of the Guidelines if any of the following occurs within five years:

- registration by the Therapeutic Goods Administration (TGA) of any new medications, devices or procedures for the management of overweight and obesity
- a change in the indications registered by the TGA of any medication or device included in these Guidelines
- publication of any new major RCTs or systematic reviews that potentially have a bearing on the recommendations in these Guidelines
- emergence of any major safety concerns relevant to these Guidelines
- major changes in policy within primary health care that may affect the ability of health professionals to provide appropriate care.

Funding

DoHA funded the development of these Guidelines.

Cost implications of the Guidelines

The high prevalence of overweight and obesity imposes a large burden on primary health care to manage both weight and the associated comorbidities for individuals, with the potential benefit of improving health outcomes and reducing further costs to the health system. The OGDC considered potential cost and resource implications of the recommendations for patients and practice. The potential effect of each recommendation on clinical practice is described in the text, and data are referenced where available.

The health and cost burdens of overweight and obesity follow a protracted time line (Wang et al. 2011), and much of the data available in Australia are more relevant to population and preventative health outcomes than to clinical management (Vos et al. 2010; Wang et al. 2011).

Structure of the Guidelines

The Guidelines include:

- a brief overview of trends in overweight and obesity in Australia, factors contributing to their development and approaches to weight management in primary health care (Part A)
- discussion of weight management in adults, including an outline of the process of assessment for overweight and obesity, and discussion of interventions to support weight loss (Part B)
- discussion of weight management in children and adolescents (Part C)
- discussion of areas for further research (Part D)
- a list of resources for further reading and information (Part E).

The appendixes provide additional information on the development of the Guidelines.

Overweight and obesity management model for adults

	Establish a therapeutic relationship, communicate and provide care in a way that is person-centred, culturally sensitive, nondirective and nonjudgemental		
	Use the body mass index (BMI)[1] to classify overweight or obesity		
	BMI < 25.0	**BMI 25.0–29.9**	**BMI 30.0–34.9 BMI 35.0–39.9 BMI > 40.0**
	STANDARD CARE		**ACTIVE MANAGEMENT**
ASK AND ASSESS	Routinely assess and monitor BMI	Routinely assess and monitor BMI Discuss if BMI is increasing Screen and manage comorbidities (Section 4.4.2)	**Routinely assess and monitor BMI** (Section 4.2) Discuss health issues Screen and manage comorbidities (Section 4.4.2) Assess other factors related to health risk (Sections 4.4.3 to 4.4.5)
ADVISE	Promote benefits of healthy lifestyle	Promote benefits of healthy lifestyle, including reduced energy intake, increased physical activity and behavioural change	Promote benefits of healthy lifestyle, including reduced energy intake, increased physical activity and behavioural change **Explain benefits of weight management** (Chapter 5)
ASSIST		Assist in identifying local programs that may be of benefit	**Assist in setting up weight loss program:** • Advise lifestyle interventions (Section 6.1) • Based on comorbidities, risk factors and weight history, consider adding intensive weight loss interventions[a] (Section 6.2) • Tailor the approach to the individual (Section 6.3)
ARRANGE			**Review and monitoring** (Section 7.1) **Long-term weight management** (Section 7.2)

a Intensive interventions include very low-energy diets, weight loss medications and bariatric surgery.

1 A BMI of 25.0–29.9 is classified as overweight and BMI >30.0 is classified as obese. BMI calculation is discussed in Section 4.2.

Overweight and obesity management model for children and adolescents

	Health professional has appropriate communication skills, is culturally responsive and is able to gain the trust of the young person and family	
	Use the body mass index (BMI) percentiles[2] to monitor growth in children and adolescents	
	BMI <85th percentile	**BMI 85-94th percentile (US–CDC)** **BMI 85–97th percentile (WHO)** **BMI>95th percentile (US–CDC)** **BMI>97th percentile (WHO)**
	STANDARD CARE	**ACTIVE MANAGEMENT**
ASK AND ASSESS	Routinely assess and monitor BMI (Section 9.2)	**Routinely assess and monitor BMI** (Section 9.2) History and clinical assessment (Section 9.3) Arrange referral for other assessments as required (Section 9.3.3)
ADVISE	Promote benefits of healthy lifestyle to parents and carers	Promote benefits of healthy lifestyle to parents, carers, with or without the child or adolescent **Explain benefits of weight management** (Section 10.1)
ASSIST		**Assist in setting up weight management program:** • Agree on goals (Section 11.1) • Agree on intervention(s) (Section 11.3)
ARRANGE		**Monitor and review** (Section 12.1) **Arrange referral** (Section 12.2)

2 For children aged between 2 and 18 years, the United States Centers for Disease Control and Prevention (US-CDC) categorises overweight as between the 85th and 95th percentiles in the BMI charts and obesity as above the 95th percentile (see Chapter 13). The World Health Organization (WHO) categorises overweight as between the 85th and 97th percentile and obesity as above the 97th percentile. For infants and children younger than 2 years, the World Health Organization growth charts are used to monitor for rapid weight gain.

Principles for providing effective care

When working with people to prevent or manage overweight and obesity, health professionals should follow the usual principles of person-centred care.

Principles for care
Advice, treatment and care should take into account individual needs and preferences.
People are likely to feel safer in healthcare interactions when mental, social, spiritual and cultural—as well as physical—aspects are considered.
Good communication between health professionals and consumers is essential. It should be supported by evidence-based written information that is tailored to the individual's needs.
People should have the opportunity to make informed decisions about their care and treatment, in partnership with their health professionals.
All forms of discrimination against individuals and groups on the basis of body weight should be avoided, from overt discrimination (e.g. unequal access to services) to more subtle discrimination (e.g. use of stigmatising language).
Health services and programs for people who are overweight or obese should be culturally appropriate.
Overweight and obesity prevention and treatment interventions should incorporate a balance between individual and societal responsibility.

Source: *Adapted from NICE (2006) and PHA (2007).*

While detailed discussion of care provision is beyond the scope of these Guidelines, the following resources provide guidance on providing effective person-centred care in the Australian context:

- AHMAC Standing Committee for Aboriginal and Torres Strait Islander Health Working Party (2004) *Cultural respect framework for Aboriginal and Torres Strait Islander health*, 2004–2009. Adelaide: South Australian Department of Health.
- NHMRC (2004a) *Communicating with patients. Advice for medical practitioners*. Canberra: National Health and Medical Research Council.
- NHMRC (2004b) *General guidelines for medical practitioners on providing information to patients*. Canberra: National Health and Medical Research Council.
- NHMRC (2005a) *Cultural competency in health: a guide for policy, partnerships and participation*. Canberra: National Health and Medical Research Council.

Part A

Overweight and obesity in Australia

1. Trends in overweight and obesity

Key messages

- The prevalence of overweight and obesity in Australia is high and continues to increase, affecting more than 60% of adults and nearly 25% of children and adolescents. This reflects a rise in factors contributing to overweight and obesity, particularly increased energy intake.
- Although overweight and obesity are common across all age groups and in both sexes, differences in prevalence exist among population groups. Obesity is particularly prevalent among those in the most disadvantaged socioeconomic groups, Aboriginal and Torres Strait Islander peoples and many people born overseas. The prevalence is higher in rural and remote areas compared to urban areas.

1.1 Adults

In 2011–12, 63% of Australian adults had a body mass index (BMI)[2] in either the overweight or the obese range (ABS 2012). Overweight was more prevalent among males than females (42% versus 35%) and obesity prevalence was similar among males and females (28%) (ABS 2012). The prevalence of overweight and obesity has increased since the National Nutrition Survey in 1995, rising from 64% to 70% among males and from 49% to 56% among females (ABS 2012).

In 2011–12, 60% of males and 66% of females had a waist circumference indicating increased risk of poor health (ABS 2012). The proportion of people at increased risk, as indicated by waist circumference, increased with age for both males and females.

National surveys have identified factors contributing to the increasing prevalence of overweight and obesity among adults:

- Comparison of the results of the 1995 National Nutrition Survey (McLennan & Podger 1998) with those of the 1983 National Dietary Survey of Adults showed a significant increase in energy intake (equivalent to 3–4%, 350 kilojoules or one slice of bread extra per day) (Cook et al. 2001).
- The 2007–08 National Health Survey showed that 37% of adults exercised sufficiently to obtain benefits to their health (AIHW 2010a). A further 8% exercised for sufficient time, but not for enough sessions, and another 10% had a sufficient number of sessions but not enough accumulated time. Slightly more males (39%) than females (36%) exercised at sufficient levels.

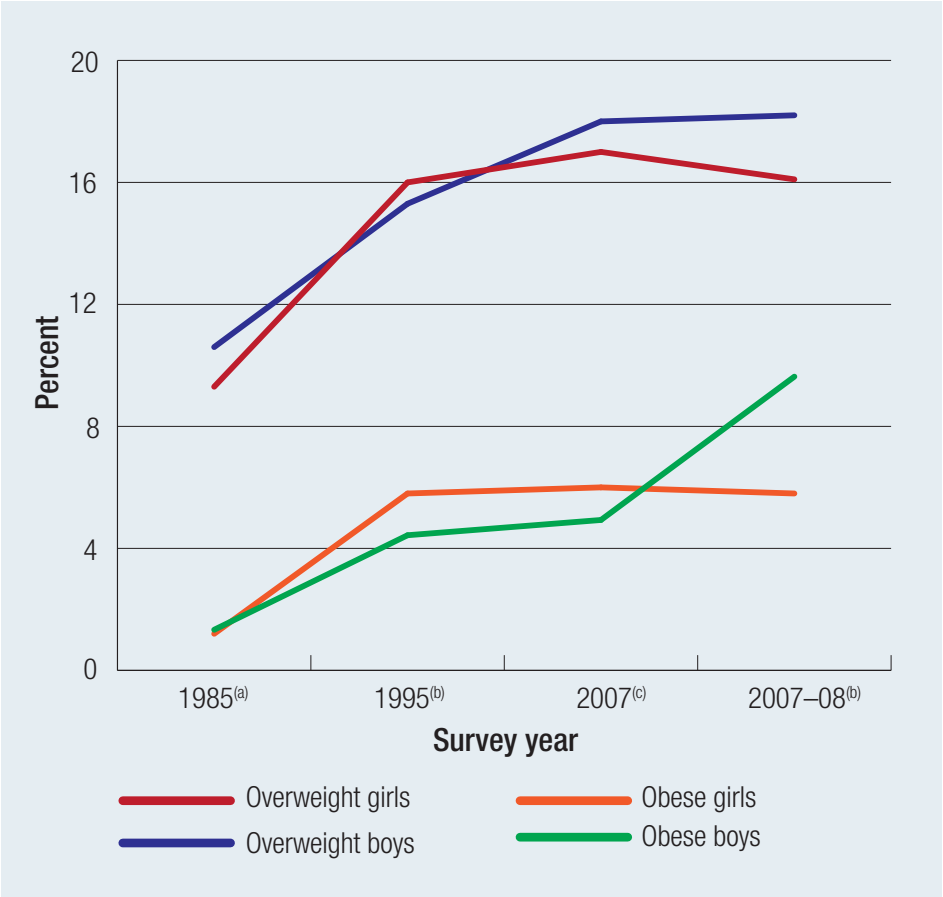
2 A BMI of 25.0–29.9 is classified as overweight and BMI > 30.0 as obese.

1.2 Children and adolescents

The 2007 Australian National Children's Nutrition and Physical Activity Survey found that among adolescents and children aged 2–16 years, 17% were classified as being overweight and 6% as being obese (DoHA 2008). The proportion with excess weight was similar in boys and girls, both peaking in the 9–13-year age group.

Between 1985 and 1995, the proportion of overweight and obese children nearly doubled (Magarey et al. 2001). Since 1995, these proportions have continued to increase, but not as rapidly (Figure 1.1) (AIHW 2010a). A longer period of data collection is required to identify national trends more comprehensively, but there was a clear trend towards overweight and obesity among boys and girls aged 7–15 years between 1985 and 2007 (NPHT 2009). Recent analyses of state-based data suggest that this trend may be levelling in children aged 2–18 years (Nichols et al. 2011; Olds et al. 2010).

Figure 1.1 Overweight and obesity in children, by year of survey



Surveys: *1985 Australian Health and Fitness Study; 1995 National Nutrition Survey; 2007 Australian National Children's Nutrition and Physical Activity Survey; 2007–08 National Health Survey*

Notes: *(a) Children aged 7–15 years; (b) Children aged 5–17 years; (c) Children aged 2–16 years*

Source: *AIHW (2010a)*

Some studies have shown that waist circumference in children is also increasing (Dollman & Olds 2006; Garnett et al. 2011). In 2007, about one child in six (aged between 5 and 16 years) had a waist circumference greater than the recommended ratio (waist circumference less than 50% of height) (DoHA 2008).

While population data on weight and health behaviours is limited, national surveys have identified factors relevant to overweight and obesity among adolescents and children:

- Comparison of the 1995 National Nutrition Survey with the 1985 National Dietary Survey of Schoolchildren revealed absolute increases in intake of 1400 kilojoules for boys and 900 kilojoules per day for girls, representing proportional increases of 15% and 11%, respectively, and equivalent to between three and four slices of bread per day (Cook et al. 2001).
- Comparison of the 1995 National Nutrition Survey and the 2007 Australian National Children's Nutrition and Physical Activity Survey revealed that, overall, reported dietary intake improved from 1995 to 2007 among Australian children, with an increase in the amounts of core foods consumed and healthier types of foods being chosen (Rangan et al. 2011).

A reduction in free play and its replacement by sedentary activities (e.g. screen-based activities) is likely to be the major contributor to changes in physical activity in recent years (NPHT 2009):

- In the 2007 Australian National Children's Nutrition and Physical Activity Survey (DoHA 2008), most children aged 9–16 years spent the recommended 60 minutes a day (DoHA 2004a) on moderate to vigorous physical activity, with a 69% chance that any child would have this level of activity on a given day. Girls met the recommendation less often than boys, and there was a drop-off with age, which was very marked in older girls.
- Levels of meeting the recommended maximum 120 minutes screen-based activities (e.g. watching television or DVDs or using a computer) per day (DoHA 2004b) were low, with 33% of children aged 9–16 years meeting the recommendation for electronic media use on a given day.

1.3 Groups with higher prevalence of overweight and obesity

While overweight and obesity are widely distributed among Australian adults and children, significant variations in its distribution exist across the population (NPHT 2009).

1.3.1 Aboriginal and Torres Strait Islander peoples

High body mass is the second highest contributor to disease burden (11.4%)—after tobacco use (12.1%)—among Aboriginal and Torres Strait Islander peoples (Vos et al. 2007). In 2004–05, approximately 60% of adults aged 18 years and over were overweight, of whom 31% were obese (Penm 2008). In 2004–05, Aboriginal and Torres Strait Islander adults were twice as likely to be obese, but less likely to be overweight than non-Indigenous adults after adjusting for differences in age structure (AIHW 2011a).

Both Aboriginal and Torres Strait Islander and non-Indigenous adults were most likely to be overweight or obese at ages 45–54 years (69% and 61%) and 55 years and over (74% and 59%) (AIHW 2011a).

There is evidence that the negative effects of overweight and obesity can occur at a relatively low BMI among Aboriginal children (Sellars et al. 2008). High levels of early onset diabetes (in the child-bearing years) among Aboriginal and Torres Strait Islander women (McDermott et al. 2009) also increase the risk of obesity and early onset type 2 diabetes in their children (Yogev & Visser 2009).

The prevalence of overweight and obesity varies between Torres Strait Islander and Aboriginal populations; results from the 2004–05 National Aboriginal and Torres Strait Islander Health Survey show higher proportions of Torres Strait Islander peoples than Aboriginal people in the overweight or obese categories (61% versus 56%) (ABS 2006). In addition, high proportions of obesity have been found among children and adolescents in the Torres Strait (Valery et al. 2009).

1.3.2 People from different regions of birth and cultural backgrounds

In 2004–05, on average, people born overseas who arrived in Australia before 1996 had a slightly lower age-standardised rate of obesity (15%), while the rate was even lower (11%) for more recent arrivals (between 1996 and 2006), compared to the adult obesity rate of 18% (ABS 2008). However, adults born in southern and eastern Europe, and the Oceania region (excluding Australia) were more likely to be overweight or obese (65% and 63% respectively), while adults born in South-East Asia were least likely to be overweight or obese (31%) (ABS 2008). The prevalence of overweight and obesity varies markedly among schoolchildren, with boys and girls of Pacific Islander or Middle Eastern/Arabic background most likely to be obese (O'Dea 2008). A cross-sectional survey of children aged 4–13 years found an independent effect of ethnicity on overweight and obesity, over and above the effect of socioeconomic status (Waters et al. 2008).

1.3.3 Socioeconomic disadvantage

In 2004–05, a higher proportion of adults living in areas with the greatest socioeconomic disadvantage were overweight or obese (56%) compared to those living in areas with the least disadvantage (48%). The proportion of adults living in areas with the greatest disadvantage who were obese (22%) was almost double that of adults living in areas with the least disadvantage (13%) (ABS 2008).

1.3.4 Geographical location

In 2004–05, the proportion of adults who were overweight or obese was lower among people living in major cities (52%) than among those living in inner regional (56%), and outer regional and other areas (60%) (ABS 2008). A high proportion of men living in outer regional areas (69%) were overweight or obese compared to inner regional areas (64%) and major cities (60%). The trend among women was similar with a prevalence of 50% in outer regional areas, 48% in inner regional areas and 43% in major cities. In 2004–05, the proportion of Aboriginal and Torres Strait Islander peoples who were overweight or obese did not vary by remoteness (AIHW 2011a).

2. Factors contributing to overweight and obesity

Key messages

- Regulation of body weight involves complicated feedback systems that result in changes in appetite, energy intake and energy expenditure.
- While excess weight in individuals usually results from a prolonged period of energy imbalance, the causes of overweight and obesity are complex.
- Diet and physical activity are central to the energy balance equation, but are directly and indirectly influenced by a wide range of social, environmental, behavioural, genetic and physiological factors—the relationships between which are not yet fully understood.
- Individuals may be at greater risk of weight gain at particular stages in their lives.

2.1 Physiology of weight gain

All components of energy balance, including energy intake and expenditure, interact with each other to affect body weight. The body attempts to maintain energy balance and protect existing body weight through a complex negative feedback system involving hormones that:

- increase hunger (e.g. ghrelin)
- inhibit food uptake in the short term (e.g. cholecystokinin, PYY, oxyntomodulin, amylin, GLP1)
- inhibit food intake in the long term (e.g. leptin and insulin)
- increase metabolic rate and energy expenditure (e.g. triiodothyronine [T3]).

This system responds to changes in body fat and other energy stores by modulating appetite, energy intake and energy expenditure, with the aim of maintaining body weight at a relatively constant level over time.

While this system defends against weight gain as well as weight loss under normal circumstances, energy balance cannot be maintained when an energy surplus is sufficiently large and sustained. Weight gain will begin and usually continue until a new weight results in increased energy expenditure and energy balance is re-established. The same physiological mechanisms then seek to maintain energy balance at the higher weight, and will defend against weight loss by increasing appetite (Sumithran et al. 2011) and reducing energy expenditure (Rosenbaum et al. 2008) if there is an energy deficit. As a result, most overweight and obesity results from upward resetting of the defended level of body weight, rather than the passive accumulation of excess body fat.

Factors that directly affect energy balance and challenge physiological control of body weight include:

- large intake of foods or drinks high in fat or sugar (e.g. snack, 'fast' or 'junk' foods, soft drinks) and low intake of low-energy foods (e.g. vegetables and fruit)
- high levels of sedentary behaviour and low levels of physical activity.

However, behaviours related to dietary intake and physical activity are not the only causes of overweight and obesity (see Section 2.2).

2.2 Drivers of weight gain

Physiological responses are directly and indirectly influenced by a wide range of factors, including inherited biological factors and early life experiences, as well as behavioural, environmental and social factors that influence individual behaviours. The relationships between these factors are complex and not yet fully understood.

2.2.1 Biology

Inherited biological factors and early life experience explain why some individuals are more at risk of becoming overweight and obese than others:

- *Inheritability*—one of the strongest predictors of a child's weight is the weight status of his or her parents. The shared family environment is important, but studies of adopted children and monozygotic twins suggest a strong role of genetics in weight status. The inheritance of obesity is thought to result from a large number of genetic variations leading to a series of small but important disruptions to the way the body regulates energy balance (Farooqi & O'Rahilly 2007). Genetic variation linked with obesity risk appears to operate, in part, through accelerated growth in early childhood (Belsky et al. 2012).
- *Epigenetic changes*—alterations in gene expression can be brought about by a range of factors that usually occur in association with intrauterine growth restriction. It is thought that these changes can predispose individuals to obesity by influencing the way energy balance is regulated (Campión et al. 2009), and that this predisposition may be expressed in subsequent generations without inheriting the direct genetic variation or continuing exposure to poor nutrition (Gluckman et al. 2007).
- *Early life experience*—the environment in utero and early in life has significant effects on how the body regulates energy balance and stores fat.
  - Poor maternal nutrition during pregnancy increases the risk that offspring will develop metabolic syndrome (a combination of cardiovascular risk factors, including obesity, glucose intolerance and insulin resistance, dyslipidaemia, microalbuminuria and hypertension) (Bruce & Hanson 2010).
  - Low birth weight infants have an increased tendency to develop abdominal obesity and early metabolic disease, especially when they are exposed to over-nutrition in childhood. Low birth weight is common among women who smoke during pregnancy and smoking is also associated with a 50% increase in the risk of childhood obesity (Oken et al. 2008).
  - Women who gain more than the recommended levels of weight during pregnancy are at greater risk of gestational diabetes and a high birth weight infant. Such children have a greater rate of obesity later in childhood (Gillman et al. 2003).
  - Accelerated weight gain during the first weeks or months of life is associated with higher BMI or obesity later in life. Infants with more rapid early growth have a higher risk of later obesity than infants with normal growth (Baird et al. 2005).
  - Exclusive breastfeeding for a period of at least six months is associated with a reduced level of obesity in childhood, adolescence and early adulthood (Harder et al. 2005; White House Task Force on Childhood Obesity 2010).

2.2.2 Environment

The social, political and economic environment greatly affects the way people live and behave. Every day, people interact with a range of services and processes in settings related to education, work, recreational activities and food. These settings are in turn influenced by laws, policies, economic imperatives and attitudes of governments, industry and society as a whole. Each feature of this complex system has the capacity to hinder or encourage appropriate dietary and physical activity patterns. On the whole, the environment in Australia today encourages energy imbalance and is seen as obesity promoting ('obesogenic') (Egger & Swinburn 1997). Examples of environmental factors include (Drewnowski 2004; Keith et al. 2006; Matthiessen 2003; Neilsen & Popkin 2003; NHPT 2009; Vandenbroeck 2007):

- Changes to the food supply have led to a wide availability of cheap processed foods that have levels of saturated fats, salt and sugar well above those recommended for good health and weight control, and provide excess kilojoules.
- The portion size of many packaged, restaurant and takeaway snacks and meals has increased, and their relative cost has decreased. Meanwhile the relative cost of fresh produce has increased.
- Cultural and social aspects of eating have changed, with increased consumption of alcohol as well as foods high in fat and sugar as part of workplace, family and other cultural activities.
- Urban design and the built environment discourage physical activity and active travel (e.g. walking or cycling), and influence the ease (or otherwise) of access to appropriate food. Changes to occupational structures and work environments have led to physically active workplaces being replaced with more sedentary occupations.
- Longer working hours and both partners being involved in the workforce leave less time for food preparation, family recreation and physical activity.
- Disrupted sleep, or too long or short periods of sleep can disturb metabolic processes and interfere with systems for appetite control.

2.2.3 Factors affecting individual behaviours

Individual factors

- *Lifestyle and habits*—individuals are not always in direct cognitive control of behaviours related to eating and physical activity. Particular behaviours can become habits if they are repeated often over time, so that they become almost an automatic response to certain cues or situations. Once habits are formed, they are difficult to change (Vandenbroeck 2007). Eating and activity habits are often related to increased energy intake, and as environments become more obesity promoting, the behaviours that contribute to overweight and obesity are progressively the default ones.
- *Psychological factors*—stress and underlying personal issues can lead to a lack of energy and motivation and increased food consumption (e.g. emotional or comfort eating), which may indirectly contribute to weight gain. There is a strong association between mood disorders and obesity; people with obesity are more likely to become depressed over time, and people with depression are more likely to become obese. Obesity may increase risk factors for depression such as body dissatisfaction and low self-esteem (Luppino et al. 2010). In turn, depression and poor body image can affect people's ability and willingness to eat healthily and exercise regularly. Disturbed eating patterns and eating disorders are also associated with increased risk of both obesity and depression (Luppino et al. 2010). People with serious mental health issues (bipolar disorder, schizophrenia) may also be at greater risk of developing obesity, particularly if they take antipsychotic medications (see Section 4.4.3).

- *Physical and developmental factors*—impaired mobility (e.g. due to physical disability, advanced age or obesity) can affect an individual's capacity to adopt a healthy lifestyle and undertake physical activity. People with intellectual or developmental disability are at greater risk of obesity and obesity tends to occur at a younger age among people in this group. If there is no underlying syndrome to explain obesity, then dietary habits, physical inactivity and socioeconomic factors are thought to contribute to the risk (Melville et al. 2007).

Sociodemographic factors

A range of social and demographic factors can affect the health behaviours of individuals:

- *Socioeconomic disadvantage*—the relationship between socioeconomic disadvantage and increased risk of overweight and obesity is complex. Evidence from developed countries (including Australia) suggests a socioeconomic gradient in diet, with those in higher socioeconomic groups more likely to be able to afford nutritious foods (McLaren 2007). Low household income is strongly associated with food insecurity, and there is evidence of a correlation between food insecurity and obesity, at least in women (Dinour et al. 2007). Additional risk factors associated with poverty may include reduced access to services and limited opportunities for physical activity.
- *Rural and remote*—the availability of better nutrition choices declines with remoteness (Queensland Health 2006) and cost has been identified as a key factor in purchasing choices (NT DHCS 2007). In addition, there is a lack of variety in sporting and community clubs, sports facilities (e.g. heated pools, commercial gymnasiums) and elements of the built environment that support physical activity, such as walking paths (NRHA 2011a).
- *Aboriginal and Torres Strait Islander peoples*—history and politics continue to shape the lives and health of Aboriginal and Torres Strait Islander peoples. Social disadvantage and family disruption are enduring effects of policies that have contributed to Aboriginal and Torres Strait Islander peoples having by far the worst health status of any identifiable group in Australia and the poorest access to services (Couzos & Murray 2008). As well as overweight and obesity, other risk factors that increase susceptibility to chronic disease are prevalent. While the diversity of circumstances and experiences is acknowledged, factors that may contribute to overweight and obesity among Aboriginal and Torres Strait Islander peoples include
  - the impact of moving from traditional to contemporary diets
  - continuing social disadvantage, stress, trauma and grief
  - significant barriers in accessing nutritious and affordable food, particularly for those living in rural and remote areas.
- *People from culturally and linguistically diverse backgrounds*—in general, many migrants are as healthy or healthier than the Australian-born population, due to selective immigration policies. This effect often diminishes over time, and in some groups the prevalence of overweight and obesity is greater than among the Australian-born population (AIHW 2010a). Other groups, such as some refugees, may have complex health needs from arrival, and often have little or no family support. Nutritional deficiencies are common, along with mental health issues (e.g. anxiety, depression and post-traumatic stress disorder) (Vic DHS 2005). Other factors contributing to the development of overweight and obesity among people from culturally and linguistically diverse backgrounds include (Renzaho 2004)
  - dietary acculturation
  - cultural beliefs and knowledge of food
  - exposure to advertising and the media
  - confusion over dietary guidelines
  - cost of food
  - preferences and lifestyle.

2.3 Life stages

In addition to the complex interactions of personal and environmental factors outlined above, there is evidence that at some life stages the risk of weight gain is likely to increase (WHO 2000; Gill 1997), with effects in the short and long term:

- *Prenatal*—as outlined in Section 2.2.1, there is evidence to suggest that in utero development has permanent effects on later growth and energy regulation.
- *Early childhood (0–4 years)*—early childhood is also increasingly considered to be a critical period for programming long-term energy regulation, with clear evidence about the role of the early life environment in the later risk of obesity (Dietz 1997; Reilly et al. 2005). The early years are vital for establishing patterns of healthy nutrition and physical activity. Young children may be at greater risk of developing overweight and obesity due to parental modelling of behaviours that predispose children to weight gain.
- *Adiposity rebound (5–7 years)*—at this age, BMI begins to increase rapidly, and food and activity patterns change as a result of exposure to other children and school. Early and rapid weight rebound often precedes obesity development.
- *Adolescence*—adolescence is a period of increased autonomy that is often associated with irregular meals, changed food habits (e.g. through a desire for social acceptance) and periods of inactivity during leisure. These factors are combined with physiological changes that promote increased fat deposition, particularly in girls. Perceptions of body image can have a profound effect on dietary habits—for example, blaming food for changes to appearance or body shape can lead to disordered eating patterns. Adolescent girls who report dieting and extreme weight-control techniques are at increased risk of obesity (Stice et al. 2005).
- *Early adulthood*—early adulthood usually correlates to a period of marked reduction in physical activity, and changes in diet and alcohol consumption. In women, this usually occurs between the ages of 15 and 19 years, but in men it may be as late as the early 30s.
- *Women planning pregnancy*—women with obesity are at greater risk of infertility compared with women in the healthy weight range, through direct effects on ovarian function and increased risk of polycystic ovary syndrome (Brewer & Balen 2010; Pasquali et al. 2007).
- *Pregnancy*—women with overweight or obesity during pregnancy are at increased risk of pregnancy complications and of developing insulin resistance and gestational diabetes. Excessive weight gain during pregnancy often results in retention of weight after delivery, particularly with early cessation of breastfeeding. This pattern is often repeated after each pregnancy. Weight management for women who have a prepregnancy BMI in the overweight or obese category has short- and long-term health benefits for the mother and baby.
- *Menopause*—in Western societies, weight generally increases with age, but it is not certain why menopausal women are particularly prone to rapid weight gain. The cessation of menstruation is associated with an increase in food intake and a slight reduction in spontaneous activity.
- *Older people*—the link between obesity and all-cause mortality lessens with increasing age, and is greatly reduced or absent by the time people reach their early 80s (McTigue et al. 2006). An association between obesity and reduced mortality has been found in older adults with heart failure (Curtis et al. 2005), following percutaneous coronary intervention (Lancefield et al. 2010) and having dialysis (Kalantar-Zadeh et al. 2005). However, quality of life is also an important consideration. Many older people already have limited mobility, and obesity is likely to aggravate the problem and increase the risk of further functional limitation (Bennett et al. 2004). Reduced mobility can affect people's social lives, increase dependence on others and affect mental health (Bennett et al. 2004). The effect of excess weight on comorbidities such as type 2 diabetes can also reduce the ability of older people to participate in social and physical activities (McLaughlin et al. 2011).

3. Approaches to weight management in primary health care

Key messages

- Health professionals in primary health care are the first line of intervention for weight management, and an important and trusted conduit for information surrounding weight loss and health benefits. Consistent messages across clinical and public health disciplines are fundamental to addressing overweight and obesity in Australia.
- A range of tools are available for healthcare professionals' use to provide individualised advice for people to address overweight and obesity, along with other lifestyle risk factors for chronic disease.
- Weight management programs may be more effectively provided if they are tailored to the local context, multifaceted and involve the expertise of other primary healthcare professionals and specialists as indicated for that individual.
- To improve the coordination and quality of care for individuals, healthcare facilities can be systematic and proactive in supporting healthcare professionals to provide effective care.

3.1 Prevention and management in individuals

Given the range and complexity of factors influencing overweight and obesity, it is necessary to take a broad approach when considering prevention and treatment of overweight and obesity in individuals, taking account of their individual needs and preferences.

Prevention is likely to be the most efficient and cost-effective approach for tackling overweight and obesity in children, adolescents and adults. However, many people already require treatment, may have comorbidities and are at risk of further weight gain (NPHT 2009). Given the extent of the problem in Australia, the National Preventative Health Strategy identifies preventing unhealthy weight gain as the most appropriate target (NPHT 2009). Prevention of weight gain is addressed by strategies that focus on weight maintenance, diet and physical activity.

It is clear that preventing unhealthy weight gain and managing overweight and obesity require individuals to adopt healthy dietary and physical activity behaviours over the long term. However, it is important to acknowledge that some individuals will be physiologically less able to modify their behaviours, and changes to the physical, social and economic environment will be necessary to encourage and support such modification and the maintenance of new healthier habits. Each person's mental health status should also be taken into account when assessing risk factors for overweight and obesity, and developing a tailored management plan.

Useful tools include Lifescripts and several Royal Australian College of General Practitioners (RACGP) resources—such as SNAP (Smoking, Nutrition, Alcohol, Physical activity) (RACGP 2004), the Red Book (RACGP 2012) and the Green Book (RACGP 2006). All of these tools describe opportunistic and planned brief interventions within the 5As approach (see Box 3.1).

Primary healthcare professionals have an important role in informing people about the purpose and efficacy of referral, especially to dietitians and lifestyle programs, and discussing issues such as cost and transport that may deter them from attending appointments. Primary health care is also central to follow-up, maintenance and relapse management over the long term.

Box 3.1

THE 5As APPROACH TO WEIGHT MANAGEMENT

ASK AND ASSESS—current lifestyle behaviours and body mass index, comorbidities and other factors related to health risk

ADVISE—promote the benefits of a healthy lifestyle and explain the benefits of weight management

ASSIST—develop a weight management program that includes lifestyle interventions tailored to the individual (e.g. based on severity of obesity, risk factors, comorbidities), and plan for review and monitoring

ARRANGE—regular follow-up visits, referral as required (e.g. to a dietitian, exercise physiologist or psychologist) and support for long-term weight management

3.2 Health professionals involved in weight management

A range of medical and allied health professionals can be involved in the development and delivery of successful weight management programs for all age groups (DeMattia et al. 2007; Flodgren et al. 2010; Kelly et al. 2008; Parikh et al. 2010; Paul-Ebhohimhen et al. 2008; Sargent et al. 2011; Schmitz et al. 2007; ter Bogt et al. 2009; Tsai & Wadden 2009). Group-based, individual and mixed approaches can be effective in managing weight in adults (Paul-Ebhohimhen et al. 2008; Seo & Sa et al. 2008). The involvement of parents/carers is important in the care of children and adolescents who are overweight or obese (Golley et al. 2007; Hughes et al. 2008; Kalarchian et al. 2009; Kelly et al. 2008; McGovern et al. 2008; Oude Luttikhuis 2009; Sargent et al. 2011; Shrewsbury et al. 2011).

3.2.1 Usual healthcare provider

The usual healthcare provider is most often the GP or practice nurse, who is likely to be involved in:

- promoting and providing advice about the benefits of a healthy lifestyle
- assessing weight, height, BMI and health risks, and recording these in the individual's records (routinely during standard care and regularly during active management)
- initiating discussion about intervention when weight management is needed and/or other risk factors warrant intervention
- providing assistance in developing a weight management program, or referring to a health professional who can provide more specific advice on elements of a weight management program (e.g. nutrition, physical activity, behavioural intervention)

- arranging referral to specialist weight management teams, community-based programs (e.g. commercial providers that have been evaluated for their efficacy, peer-support groups), and specialist health providers based on discussion with the individual and/or family about goals, and potential interventions likely to achieve specified goals
- monitoring and reviewing progress, and providing continuing support and encouragement.

3.2.2 Multidisciplinary care

During active weight management, multicomponent interventions that are delivered through multidisciplinary care may be more effective than interventions delivered by individual health professionals (DeMattia et al. 2007; Flodgren et al. 2010; Savoye et al. 2007; Tsai & Wadden 2009). Multidisciplinary care can be delivered to groups or individuals face-to-face, by telephone or mail, and/or via internet-based technologies. While it is not possible to discern the independent contribution of multidisciplinary versus individually delivered care in assisting individuals to manage weight, it seems that generally:

- expertise in, and understanding of, the medical and psychosocial needs of adults, young people and their families are required
- the effectiveness of multidisciplinary care improves when the usual healthcare provider is involved.

In Australia, multidisciplinary care may include health professionals from a range of areas, such as a GP, practice nurse, dietitian, exercise physiologist and psychologist (Yates et al. 2007). Other allied health professionals may also be involved (e.g. diabetes educators, mental health nurses, physiotherapists, social workers and occupational therapists). A multidisciplinary approach typically involves:

- managing comorbidities
- identifying factors or behaviours contributing to the development or maintenance of overweight or obesity (e.g. emotional eating, misconceptions about food, physical disability, food insecurity)
- setting goals and monitoring changes against agreed goals
- advising whether more intensive interventions may be required to achieve weight loss goals
- assessing the individual's suitability for particular interventions, including whether they are actively trying to lose weight or maintain a reduced weight
- monitoring the individual (depending on the intervention)
- providing follow-up care, particularly after surgical intervention.

While general practice is ideally suited to initiation and coordination of weight management for individuals, other expertise or support is likely to be required, which may not be available within the practice. The 5As approach provides a framework for referral to allied health professionals, community-based programs (e.g. peer support group) and specialist services (e.g. specialist weight management clinic), depending on the individual's situation and needs. The roles and responsibilities of different healthcare professionals will vary depending on the local context, including geography, workforce availability and skills. Medicare Locals can assist in their role of creating networks of local healthcare professionals, and facilitating integrated multidisciplinary health care and other support (see Table 3.1).

Table 3.1 Examples of primary healthcare professionals involved in a team approach to the 5As

Examples of actions	Examples of health professionals
Ask and assess	
Current lifestyle behaviours	GP, practice nurse, Aboriginal health worker, multicultural health worker
BMI and waist circumference	GP, practice nurse, Aboriginal health worker, multicultural health worker
Comorbidities	GP
Advise	
Promote healthy lifestyle	GP, practice nurse, Aboriginal health worker, multicultural health worker
Assist	
Develop weight management program	GP, practice nurse
Support behavioural change	GP, psychologist, social worker
Provide specific dietary advice	Dietitian, community-based program
Support physical activity	Exercise physiologist, physiotherapist, community-based program
Manage comorbidities	GP, diabetes educator, psychologist, mental health worker
Arrange	
Regular review of weight management	GP, practice nurse
Regular review of comorbidities	GP

BMI = body mass index; GP = general practitioner

3.3 Approaches for specific population groups

Research has identified approaches that may improve the experience of primary health care for a range of groups, including Aboriginal and Torres Strait Islander peoples, people from culturally and linguistically diverse backgrounds, and people living in rural and remote areas. While the diversity of circumstances and experiences is acknowledged, this section outlines key components in providing primary healthcare services for these population groups.

3.3.1 Aboriginal and Torres Strait Islander peoples

As Aboriginal and Torres Strait Islander peoples live in urban, rural and remote locations, primary healthcare services that are accessible, culturally appropriate and relevant to people in each of these areas need to be available (see Box 3.2). In settings where availability of health professionals is limited, follow-up by health professionals such as Aboriginal health workers or practice nurses, and use of telehealth may assist in increasing access to care (NACCHO/RACGP 2012).

Box 3.2

COMPONENTS OF CULTURALLY RESPONSIVE CARE FOR ABORIGINAL AND TORRES STRAIT ISLANDER PEOPLES

There is evidence that Aboriginal and Torres Strait Islander peoples are welcome at the health service, such as local artwork in the waiting room and Aboriginal staff at reception

Aboriginal and Torres Strait Islander healthcare professionals and/or Aboriginal health workers are involved in providing care

Non-Indigenous health professionals are supported in gaining cultural competence

People have the opportunity to involve extended family and kin (community) in decision-making

Interpreters are available

Internal roles and kinship systems within the community are not compromised (e.g. family members may not be appropriate interpreters)

Culturally appropriate resources are provided; this may include local adaptation of written materials (booklets, posters) or using other media (such as video)

Attention is given to including Aboriginal and/or Torres Strait Islander peoples status in medical records

Providing support for lifestyle change

Evaluated health promotion programs for Aboriginal and Torres Strait Islander peoples have generally been conducted in rural and remote areas and few have included weight loss as a study outcome (Dunn & Dewis 2001; Egger et al. 1999; Rowley et al. 2000). However, most programs have successfully raised community awareness of health issues and achieved changes in eating habits and improvements in levels of physical activity (Dunn & Dewis 2001; Field et al. 2001; Egger et al. 1999; Lee et al. 1994, 1995; Lorraine et al. 2001; Rowley et al. 2000; Smith et al. 2002).

The involvement of family or community in programs for lifestyle change is the underlying theme for most Aboriginal and Torres Strait Islander peoples' health promotion strategies, as this provides a framework for sustainable changes in nutrition and physical activity (NACCHO 2005). Advocacy for multifactorial community-based interventions to increase access to nutritious food (e.g. subsidised healthy food in stores), and for increased availability of sports and recreational facilities in remote communities may assist in improving environmental factors affecting lifestyle (NACCHO/RACGP 2012).

A systematic approach to improving the nutritional status of infants, improved maternal and child health, and health promotion are also advocated (O'Dea et al. 2007). These actions need to be underpinned by initiatives to address social disadvantage (O'Dea et al. 2007).

3.3.2 People from culturally and linguistically diverse backgrounds

People's fluency in English, their attitudes and beliefs about health, and their familiarity with the Australian health system can influence their access to and use of health services (AIHW 2010a). Box 3.3 details some components of culturally responsive care.

Box 3.3

COMPONENTS OF CULTURALLY RESPONSIVE CARE FOR PEOPLE FROM CULTURALLY AND LINGUISTICALLY DIVERSE BACKGROUNDS

Healthcare professionals have knowledge of cultural traditions and practices relating to nutrition and activity of groups in the local community

Multicultural health workers are involved in providing care

Interpreters are available

Culturally appropriate resources are provided, including materials in relevant languages and resources in spoken format for people who lack literacy in their own language

3.3.3 Rural and remote settings

In rural and remote settings, care is largely provided by the local primary healthcare professionals—GPs, nurses, Aboriginal health workers or a combination of these. The limited availability of specialist healthcare professionals and weight management clinics to support lifestyle and intensive interventions increases the chance of a person being referred to a higher level of care, possibly away from their community (NRHA 2011b).

Given the limited healthcare services, primary healthcare professionals in rural and remote areas are likely to have a significant role in weight management, and in monitoring and follow-up of people who have had an intensive intervention (particularly bariatric surgery). Use of teleconferencing or videoconferencing, telehealth, and outreach visits (including visiting multidisciplinary teams) may assist in accessing specialist expertise and delivering interventions (see Box 3.4).

Box 3.4

COMPONENTS OF INTEGRATED CARE IN RURAL AND REMOTE AREAS

Local primary healthcare professionals—GPs, practice nurses, Aboriginal health workers—have access to specialist advice and support

Telehealth, support lines, online services and specialist outreach services are used to expand possibilities to have care provided as close to home as possible

Healthcare professionals use family and community networks where possible, and explore community initiatives and existing programs to improve pathways to care for people in their region

3.4 Supporting effective weight management in primary health care

To improve the coordination and quality of care for individuals, healthcare facilities can be systematic and proactive in managing care. Box 3.5 lists factors that may support healthcare professionals in identifying, monitoring and managing individuals who are overweight and obese.

Box 3.5

MEASURES TO SUPPORT EFFECTIVE WEIGHT MANAGEMENT IN PRIMARY HEALTH CARE

Policies to ensure routine measurement and encourage sensitive discussion of weight and the benefits of a healthy lifestyle

Standardised equipment for weight measurement (e.g. height-measuring device, measuring tape, scales)

Suitable equipment to allow accurate measurement of people who are obese (e.g. bariatric scales, large blood-pressure cuffs)

Electronic systems that track weight, height and BMI for adults or growth for children, and monitor other clinical indicators for obesity-related comorbidities

A system to support documentation of weight, height and BMI in clinical records and regular recall of people with a BMI > 30 kg/m^2 (e.g. reminder letters for six-monthly follow-up)

Identification of key local providers, and clinical and community-based programs (e.g. peer support groups, walking groups) for referral

Support for healthcare professionals to access relevant continuing education

Alignment of care planning for a particular disease group with promotion events for that disease run by organisations including local health services, newspapers, national bodies

Regular meetings with allied health professionals employed/contracted to the facility to support communication and integration

Templates in clinical software that include the goals/recommendations of national guidelines (see Part E)

Nomination of staff members to take responsibility for establishing and maintaining these activities

Part B

Weight management in adults

4. Ask and assess

Key messages

- Assessing adults for overweight or obesity enables identification of people who may benefit from advice about weight management and/or intervention.
- Routine assessment of body mass index (BMI) and waist circumference is used to identify overweight and obesity.
- Assessing for risk or presence of comorbidities that may be influenced by overweight and obesity allows for overall risk to be estimated and for conditions to be managed together.
- Asking about other contributors to weight gain (certain medications, quitting smoking) and weight history (including previous weight loss attempts) should also be part of the assessment of people who are overweight or obese.
- Discussing a person's readiness for behavioural change involves talking about the person's interest and confidence in making changes, as well as the benefits and difficulties of weight management.

4.1 Discussing weight assessment

Social or personal attitudes to weight may influence an individual's willingness to have his or her weight assessed. People who are overweight or obese often have a history of dealing with a frustrating and visible problem and may have experienced discrimination. However, many individuals are comfortable discussing weight with a healthcare professional. Setting an effective tone for communication and establishing rapport are essential. Box 4.1 provides some tips for initiating discussion about assessment.

Box 4.1

TIPS FOR DISCUSSING WEIGHT ASSESSMENT

Explain that assessing weight is standard practice in primary health care, and involves measuring weight, height and waist circumference

Explain that weight and height are used to calculate BMI and waist circumference to assist in assessing risk of cardiovascular disease and diabetes

Ask whether the individual would be comfortable with having his or her weight measured

Communicate a nonjudgemental attitude that recognises the influences of social context on health behaviours

Avoid language that is discriminatory or stigmatising

Consider involvement of other professionals (e.g. Aboriginal health worker, multicultural health worker, interpreter) to facilitate communication

4.2 Body mass index in adults

BMI is a weight-for-height index that is commonly used to classify underweight, overweight and obesity in adults. It is the main measure used in international obesity guidelines (Lau et al. 2006; NHLBI 2000; NICE 2006; NZ MOH 2009a) and is recommended by the World Health Organization (WHO) (WHO 2000). BMI thresholds are the same for both sexes. Box 4.2 describes how to measure an adult's height and weight.

RECOMMENDATION	GRADE
1. Use BMI to classify overweight or obesity in adults.	**B**
Cost and resource implications Measurement of weight and height, and calculation of BMI are currently considered to be standard practice at an individual and population level, as recommended by current Australian guidelines (See Part E). Interpreting the BMI as outlined in Section 4.2.2 may affect consultation times for some individuals.	

Box 4.2

MEASURING WEIGHT AND HEIGHT

Weight

Use a regularly calibrated scale on a hard, level surface

Ask the person to remove shoes and heavy outer garments (coat, jacket)

Ask the person to stand centred on the scale with weight evenly on both feet

Record the weight

If the person weighs more than the scale can measure, note this and the upper limit of the scale

Height

Use a height rule taped vertically to a hard, flat wall, with the base at floor level

Ask the person to remove their shoes, heavy outer garments, and hair ornaments

Ask the person to stand with his or her back to the height rule. The back of the head, back, buttocks, calves and heels should be touching the wall, and the person's feet together. Ask the person to look straight ahead

Press hair flat and record height

If the person is taller than the measurer, the measurer should use a platform to avoid parallax error

Source: *Adapted from Tolonen et al. (2002)*

4.2.1 Classifying the BMI

An adult's BMI can be compared to thresholds that define whether a person is underweight, of healthy weight, overweight or obese based on the WHO classifications (see Table 4.1). BMI is calculated by dividing weight by the square of height as follows:

$$\textbf{Weight (kg)/Height (m)}^2$$

A number of electronic tools that calculate BMI are available (see Part E).

Table 4.1 BMI classification in adults

BMI (kg/m²)	Classification
< 18.5	Underweight
18.5–24.9	Healthy weight range
25.0–29.9	Overweight
30.0–34.9	Obesity I
35.0–39.9	Obesity II
≥ 40.0	Obesity III

BMI = body mass index; kg/m² = kilograms per metres squared

Source: *WHO (2000).*

4.2.2 Interpreting the BMI

The BMI can be less accurate for assessing healthy weight in certain groups where there are variations in muscle and fat mass (see Box 4.3). At a population level, increased mortality and higher incidence of disease related to increased fat mass are seen most markedly when BMI rises above 30 kg/m².

Box 4.3

CONSIDERATIONS IN INTERPRETING BMIs IN ADULTS

Individuals with the same BMI may have different ratios of body fat to lean mass

People with high muscle mass (e.g. athletes) may have a lower proportion of body fat than less muscular people, so a higher BMI threshold can be considered

Women have more body fat than men at equivalent BMIs

People lose lean tissue with age so an older person will have more body fat than a younger one at the same BMI

South Asian, Chinese and Japanese population groups may have more body fat at lower weights and be at greater risk of ill-health than people from other population groups, so a lower BMI threshold (e.g. > 23 kg/m²) may be considered

Pacific Islander populations (including Torres Strait Islander peoples and Maori) tend to have a higher proportion of lean body mass, so a higher BMI threshold may be considered

Aboriginal peoples have a relatively high limb to trunk ratio, so a lower BMI threshold may be considered

Central (or abdominal) fat distribution increases health risk (see Section 4.3)

Central deposition of fat and decreased muscle mass with age may lead to no overall change in weight or BMI, but an increase in health risk

Many Aboriginal people have proportionately more body fat and it is deposited centrally, so even modest levels of overweight are associated with increased risk of type 2 diabetes

Some ethnic groups may also be more prone to visceral or subcutaneous fat accumulation at any given BMI

Sources: *Bambrick (2005); Deurenberg et al. (2002); James et al. (2004); NHMRC (2000a); NICE (2006); Rush et al. (2004); WHO Expert Consultation (2004); WHO/IASO/IOTF (2000)*

4.3 Waist circumference

Waist circumference is a good indicator of total body fat and is also a useful predictor of visceral fat (Han et al. 1996). Compared to BMI, waist circumference is a better predictor of cardiovascular risk (NVDPA 2012), type 2 diabetes (in women, but not in men) (Carey et al. 1997; Schulze et al. 2006; Wang et al. 2005) and metabolic syndrome (IDF 2006). Box 4.4 describes how to measure an adult's waist circumference.

RECOMMENDATION	GRADE
2. For adults, use waist circumference, in addition to BMI, to refine assessment of risk of obesity-related comorbidities.	**C**
Cost and resource implications Measurement of waist circumference is recommended as part of assessment for absolute cardiovascular and type 2 diabetes risk as outlined in current Australian guidelines to improve prediction of some chronic diseases. (RACGP 2012, NVDPA 2009, RACGP 2011).	

Box 4.4

MEASURING WAIST CIRCUMFERENCE

1. Use a measuring tape that is checked monthly for stretching (replace if stretched)
2. Ask the person to remove heavy outer garments, loosen any belt and empty pockets
3. Ask the person to stand with their feet fairly close together (about 12–15 cm) with their weight equally distributed and to breathe normally
4. Holding the measuring tape firmly, wrap it horizontally at a level midway between the lower rib margin and iliac crest (approximately in line with the umbilicus). The tape should be loose enough to allow the measurer to place one finger between the tape and the person's body
5. Record the measurement taken on an exhalation

Source: *Adapted from Tolonen et al. (2002)*

4.3.1 Identifying risk level associated with waist circumference

In general, the threshold at which waist circumference indicates increased or high disease risk differs depending on gender and ethnicity:

- risk is increased at ≥ 80 cm and high at ≥ 88 cm for women, and increased at ≥ 94 cm and high at ≥ 102 cm for men (SIGN 2010)
- for Aboriginal peoples, the risk of cardiovascular events is related to waist circumference independently of other cardiovascular risk factors, although additional analyses are needed to establish health-related thresholds (Wang & Hoy 2004)
- for South Asian, Chinese and Japanese adults, thresholds of ≥ 90 cm for men and ≥ 80 cm for women are associated with a substantially increased risk of metabolic complications (IDF 2006)
- thresholds for other ethnic groups, such as Pacific Islanders and African–Americans, are likely to be higher than those for people of European descent, although they have not yet been determined (WHO/IASO/IOTF 2000).

Waist circumference is not an accurate measure of body fat in some situations (e.g. pregnancy or medical conditions where there is distension of the abdomen).

4.4 Other factors in assessment of health risk in adults

The role of factors that increase predisposition to overweight and obesity (genetic factors, family history and life stage) is discussed in Chapter 2. Other factors relevant to assessment of health risk include:

- dietary intake and physical activity, and factors that may influence these behaviours (see Section 4.4.1)
- comorbidities that may be influenced by overweight and obesity (see Section 4.4.2)
- factors that may contribute to weight gain (e.g. certain medications and stopping smoking (see Section 4.4.3)
- the person's weight history (see Section 4.4.4)
- an individual's readiness to change health behaviours (see Section 4.4.5).

4.4.1 Current health behaviours

Assessing health behaviours and their effect on weight can be complex. Consideration needs to be given to the interaction of eating and physical activity patterns (e.g. being physically active but binge eating regularly) and factors that influence an individual's capacity to follow health advice. Tables 4.2 and 4.3 provide examples of questions to ask when assessing health behaviours.

Table 4.2 Asking about and assessing eating and physical activity patterns

Activity	Examples of questions
Dietary behaviour	Does the person consume healthy foods (as per Australian Dietary Guidelines)? Does the person consume high-energy foods or soft drinks? What are the person's eating patterns (regular meals, snacking, restriction, binge eating)? What is the person's attitude to dietary behaviour?
Physical activity	What is the person's level of: – sedentary activity? – incidental activity? – moderate-intensity activity (frequency, duration)? – vigorous activity (frequency, duration)? What is the person's attitude towards physical activity?

Table 4.3 Asking about and assessing factors influencing health behaviours

Factor	Examples of questions
Social influences on health behaviours	
Cultural background	Are attitudes to health behaviours influenced by cultural values?
Access to healthy foods	Are healthy foods locally available and affordable? Does the person have means to store foods appropriately?
Education	Does the person have an understanding of healthy behaviours (e.g. high-energy versus low-energy foods, recommended levels of activity)?
Opportunities for physical activity	Does the person have time and support (e.g. child care)? Does the local environment support physical activity (e.g. walking tracks)?
Psychosocial support	Are the person's family and/or friends supportive of healthy behaviours?
Physical and developmental factors	
Comorbidities	Is the person on medications associated with weight gain (see Table 4.4)?
Fitness	Is fitness level sufficient for moderate-intensity activity?
Mobility	Is mobility impaired (e.g. due to age, obesity or comorbidities)?
Physical disability	Is activity impeded by disability?
Intellectual disability	Is lifestyle change impeded by disability?
Psychological factors	
Life stressors	Has the person experienced life stressors (e.g. abuse, trauma, grief)?
Mood disorders	Is the person experiencing symptoms of depression (see Box 4.6)?
Disordered eating	Is the person experiencing or at risk of an eating disorder (see Box 4.7)?
Serious mental illness	Is the person on medications associated with weight gain (see Table 4.4)?
Lifestyle	Does the person wish to change other behaviours (e.g. alcohol, smoking)?

4.4.2 Risk or presence of comorbidities

Physical comorbidities

The greatest health risks for individuals who are overweight or obese are cardiovascular diseases with their associated risk factors (elevated blood pressure and lipids), type 2 diabetes and some cancers (see Box 4.5). When comorbidities are present, the need for weight management is heightened. As discussed, obesity is associated with increased cardiovascular mortality (Guh et al. 2009; Romero-Corral et al. 2006). Being overweight can also affect an individual's ability to manage chronic conditions (e.g. type 2 diabetes and arthritis) (AIHW 2011b) as well as contributing to continuing development of disease.

Box 4.5

CURRENT AUSTRALIAN RECOMMENDATIONS ON ASSESSING ABSOLUTE CARDIOVASCULAR RISK AND DIABETES

Assess absolute cardiovascular risk in adults aged 45 years and over and not known to be at increased cardiovascular risk (NVDPA 2012)

Assess absolute cardiovascular risk in Aboriginal and Torres Strait Islander peoples aged 35 years and over and not known to be at increased cardiovascular risk (NACCHO/RACGP 2012; NVDPA 2012)

Screen for undiagnosed diabetes in Aboriginal and Torres Strait Islander peoples aged 18 and over (NACCHO/RACGP 2012)

Screen for undiagnosed diabetes in individuals at high risk (RACGP 2011):

- people with impaired glucose tolerance or impaired fasting glucose
- people originating from the Pacific Islands, Indian subcontinent or China aged 35 and over
- people aged 40 years and over with BMI ≥ 30 kg/m^2 or hypertension
- adults with clinical cardiovascular disease (myocardial infarction, angina, stroke or peripheral vascular disease)
- women with polycystic ovary syndrome who are obese
- people on antipsychotic medications

Guidelines on the assessment and management of cardiovascular risk and diabetes are listed in Part E.

▶ Practice point

a	Current Australian guidelines should be used to guide assessment and management of absolute cardiovascular risk and type 2 diabetes in adults.

Assessment should also include other physical comorbidities associated with excess weight, including:

- symptoms of sleep apnoea (snoring, frequent waking, daytime hypersomnolence)
- signs of arthritis, especially in the hip and knee joints
- symptoms of gastro-oesophageal reflux disease (GORD)
- assessment of right-heart function for evidence of pulmonary hypertension or right-heart failure
- polycystic ovary syndrome.

Guidelines on the assessment and management of these conditions are listed in Part E.

▶ Practice point

b	Current Australian guidelines should be used to guide assessment and management of physical comorbidities associated with excess weight in adults.

Mental health comorbidities

Depressive disorders and eating disorders are associated with overweight and obesity. If these disorders are suspected, referral to a psychologist for mental health assessment is advisable.

Depressive disorders

The checklist provided in Box 4.6 may assist in assessing for symptoms of depression.

Box 4.6

DEPRESSION SYMPTOM CHECKLIST
Depressed mood most of the day
Loss of interest or pleasure in usual activities
Weight loss or gain (when unintended)
Insomnia or hypersomnia
Slowed or agitated movements
Fatigue or loss of energy
Feelings of worthlessness or guilt
Diminished ability to concentrate or indecisiveness
Recurrent thoughts of death, suicidal thoughts

Source: *APA (2000)*

Eating disorders

The following questions may assist in assessing if an adult has or is at high risk of an eating disorder:

- Do you think you have an eating disorder?
- Do you worry about your shape and weight?

Box 4.7 provides a screening tool that has been shown to be effective in screening for eating disorders in adults (Mond et al. 2008).

Box 4.7

THE SCOFF SCREENING-TOOL QUESTIONS	
S	Do you make yourself **Sick** because you feel uncomfortably full?
C	Do you worry you have lost **Control** over how much you eat?
O	Have you recently lost more than 6 kg in a 3-month period?[a]
F	Do you believe yourself to be **Fat** when others say you are too thin?
F	Would you say that **Food** dominates your life?

a The original question was 'Have you recently lost more than One stone in a 3-month period?'

Note: *To score answers, a 'yes' receives 1 point; a score of ≥ 2 indicates that further questioning is warranted.*

Source: *Morgan et al. (1999)*

4.4.3 Factors that may contribute to weight gain

Medications

Some medications may cause considerable amounts of weight gain in relatively short amounts of time (Leslie et al. 2007) (see Table 4.4). Conversely, some medications that have been associated with weight gain—combined contraceptives (Gallo et al. 2006) and hormone replacement therapy (Kongnyuy et al. 1999)—appear not to result in weight gain.

When medications associated with weight gain are required to treat comorbidities, specific advice and support for weight loss should be provided. Substitution with an alternative medication or a change in dosage can be considered.

Table 4.4 Common medications associated with weight gain at 12 weeks from commencement

Medication	Common uses
Atypical antipsychotics, including clozapine, olanzapine	Bipolar disorder
Beta-adrenergic blockers, particularly propranolol	Hypertension, anxiety
Insulin	Diabetes mellitus
Lithium	Bipolar disorder
Pizotifen	Migraine, cluster headache
Sodium valproate	Epilepsy, psychosis
Sulphonylureas, including chlorpropamide, glibenclamide, glimepiride and glipizide	Type 2 diabetes
Thiazolidinediones, including pioglitazone	Type 2 diabetes
Tricyclic antidepressants, including amitriptyline	Depression
Anabolic steroids	Various endocrine disorders

Source: *Leslie et al. (2007)*

Quitting smoking

People who quit smoking for at least one year experience greater weight gain and increased waist circumference than those who continue to smoke (Pisinger & Jorgensen 2007; SIGN 2010). The amount of weight gained after smoking cessation may differ by age, social status and certain behaviours (NICE 2006).

A Cochrane review of interventions to prevent weight gain after smoking cessation (Parsons et al. 2009) found that individualised interventions, very low-energy diets and cognitive behavioural therapy may reduce weight gain associated with smoking cessation, without affecting quit rates. Additionally, exercise interventions may be effective in the longer term (12 months). General advice to avoid weight gain has not been found to be effective and may reduce quit rates.

The health benefits of smoking cessation are broad and are likely to outweigh risks of weight gain (Novello 1990).

4.4.4 Weight history

Advice on weight management will differ depending on the number of previous weight loss attempts and the degree of overweight or obesity. Some relevant areas for discussion are included in Box 4.8.

Box 4.8

ASSESSING WEIGHT HISTORY

Age of onset of overweight or obesity?

Family history of obesity?

Any history of eating disorders, symptoms of eating disorders (e.g. binge eating) or unhealthy weight loss methods (e.g. misuse of laxatives, self-induced vomiting)?

Is weight stable and for how long has the person been this present weight?

What have been the maximum and minimum weights?

What attempts at weight loss have been made in the past? Have any worked?

If not, why does the person think they were unsuccessful?

If so, what attempts were made to maintain the new lower weight? Did these work and for how long?

What is the person's understanding of the reasons or triggers for weight gain/regain?

Has weight loss medication been tried?

Has the person had weight loss surgery?

Has the person seen other professionals or organisations for weight loss?

The weight history may indicate previous weight cycling—that is, repeated intentional loss and subsequent regain of weight (usually around 4.5 kg). There is debate about whether weight cycling promotes obesity and/or increases cardiovascular risk (Montani et al. 2006; Field et al. 2009).

Concerns about the possible harms of weight cycling do not outweigh the benefits of losing weight (see Section 5.2). A focus on sustainable (rather than restrictive) changes in dietary behaviour may support motivation and reduce the likelihood of continuing weight cycling and other potential health effects (e.g. eating disorders).

▶ Practice point

c	Weight history, including previous weight loss attempts, should be part of the assessment of people who are overweight or obese.

4.4.5 Readiness to change

To target interventions appropriately, healthcare professionals need to consider a person's willingness to undertake the behavioural change required for effective weight management (Verheijden et al. 2005). Algorithms that attempt to stage readiness to change may be more effective if tied explicitly to the specific behaviours (Boudreaux et al. 2003; Sutton et al. 2003; Vallis et al. 2003).

Rather than simply asking whether the person is ready to change health behaviours, it may be helpful to begin by assessing his or her interest and confidence in change. This can be followed by a discussion of the benefits and difficulties of making lifestyle changes, and whether the person is interested in looking at ways to improve health. Some sample questions that can be used to assist people to identify their readiness to change are given in Box 4.9.

Box 4.9

DISCUSSING READINESS TO CHANGE—SAMPLE QUESTIONS

Intention to change—how important do you think it is for you to make changes at the moment?

Skills and self-confidence—how confident are you that you can change your eating patterns and increase your physical activity to improve health?

Obstacles to change—are there any stressful events in your life now that might get in the way?

Positive feelings about change—do you feel you can succeed in changing health behaviours, and how much do you believe it is worth the effort?

Self-image and group norms—can you picture yourself changing health behaviours? How do you think your friends and family will react to your efforts?

Encouragement and support—are there people who can support you to change health behaviours? Do you think they will help you in your efforts?

Source: *American Medical Association (2003)*

RECOMMENDATION	GRADE
3. For adults who are overweight or obese, discuss readiness to change lifestyle behaviours.	**D**

Cost and resource implications

Readiness to change lifestyle behaviours may be identified during routine consultation—however, it is unclear whether available tools for assessing readiness to change are helpful in predicting change or weight loss.

While health professionals make judgements based on an individual's answers to a series of questions, there may be time and cost implications from longer consultations. Active management of an individual who may not be ready to engage may also have cost and resource implications.

While referral and follow-up appointments to discuss weight management options have cost implications for individuals, referral could be made directly to practice nurses or other providers if there are no additional perceived comorbidities.

Techniques for motivational interviewing and discussing readiness to change could also be an identified training need for healthcare professionals.

5. Advise

Key messages

- Even small amounts of weight loss bring health benefits, including lowered cardiovascular risk, prevention, delayed progression or improved control of type 2 diabetes, and improvements in other health conditions.
- Lifestyle change that includes reduced energy intake and increased physical activity has health benefits that are independent of weight loss.
- Overweight and obesity are associated with a wide range of other conditions, particularly cardiovascular disease, type 2 diabetes and some cancers. The risk of comorbidity appears to rise with increasing BMI.

5.1 Explaining the benefits of lifestyle change and weight loss

Weight loss, even if modest, has a range of health benefits (see Table 5.1).

Table 5.1 Summary of health benefits associated with weight loss in adults

Benefit	References	Grade
Reduced cardiovascular risk		
Reduced systolic blood pressure with weight loss of at least 2 kg	Aucott et al. 2009; Azadbakht et al. 2007; Galani & Schneider 2007; Groeneveld et al. 2010; Shaw et al. 2006; Witham & Avenell 2010	A
Small improvements in lipid profiles with sustained weight loss	Aucott et al. 2009; Galani & Schneider 2007; Norris et al. 2005a; Shaw et al. 2006; Witham & Avenell et al. 2010	A
Reduced cardiovascular and all-cause mortality	Shea et al. 2010; Siebenhofer et al. 2009; Pontiroli & Morabito 2011; Uusitupa et al. 2009	C
Prevention and improved control of type 2 diabetes		
Prevention or delayed progression of type 2 diabetes	Dale et al. 2008; Galani & Schneider 2007; Knowler et al. 2009; Norris et al. 2005a; Uusitupa et al. 2009	A
Improved glycaemic control with a sustained weight reduction of 5 kg in adults with type 2 diabetes	Belalcazar et al. 2010; Buchwald et al. 2009; Cheskin et al. 2008; Christian et al. 2008; Dixon et al. 2008; Fried et al. 2010; Huisman et al. 2009; Nield et al. 2007; Norris et al. 2005b,c; Pi Sunyer et al. 2007; Thomas et al. 2006; Wing 2010a	A

Table 5.1 (cont)

Benefit	References	Grade
Clinically meaningful reduction in systolic blood pressure with weight loss of 2–3 kg from lifestyle interventions in adults with a BMI <35 kg/m^2, prediabetes or hypertension	Cheskin et al. 2008; Christian et al. 2008; Dale et al. 2008; Dixon et al. 2008; Galani & Schneider 2007; Horvath et al. 2008; Norris et al. 2005a; Pi-Sunyer et al. 2007; ter Bogt et al. 2009; Uusitupa et al. 2009; Wing 2010a; Witham & Avenell 2010	A
Improvements in other conditions		
Improvements in markers of chronic kidney disease	Afshinnia et al. 2010; Navaneethan et al. 2009	B
Reduction in obstructive sleep apnoea	Foster et al. 2009; Greenburg et al. 2009; Tuomilehto et al. 2009	B
Improved symptoms of some conditions		
Improvements in symptoms of gastro-oesophageal reflux disorder	De Groot et al. 2009; De Jong et al. 2010	C
Reduced stress incontinence in women	Wing et al. 2010b	C
Reduced knee pain with moderate weight loss (6 kg) in adults with osteoarthritis	Christensen et al. 2007; Jenkinson et al. 2009	C
Improved functional mobility and physical performance in older people	Manini et al. 2010; Morey et al. 2009; Villareal et al. 2011	B
Improvements in quality of life, self-esteem and depression		
Improved quality of life, self-esteem and depression even if weight loss is not substantial	Blaine et al. 2007; Cooper et al. 2010; Morey et al. 2009; Picot et al. 2009; Villareal et al. 2011; Witham & Avenell 2010	C

BMI = body mass index; kg/m^2 = kilograms per square metre

Note: *The evidence statements on which this table is based are in Appendix C.*

RECOMMENDATIONS	GRADE	EVIDENCE SUMMARY
4. Adults who are overweight or obese can be strongly advised that modest weight loss reduces cardiovascular risk factors.	**A**	Tables C5, C6 Appendix C
5. Adults with prediabetes or diabetes can be strongly advised that the health benefits of modest weight loss include prevention, delayed progression or improved control of type 2 diabetes.	**A**	Tables C7, C9 Appendix C
6. Adults with kidney disease or sleep apnoea can be advised that improvements in these conditions are associated with a 5% weight loss	**B**	Tables C15, C21, C22 Appendix C
7. Adults with musculoskeletal problems, gastro-oesophageal reflux or urinary incontinence can be advised that weight loss of 5% or more may improve symptoms.	**C**	Tables C16, C17, C23 Appendix C
8. Adults who are overweight or obese can be advised that quality of life, self-esteem and depression may improve, even with small amounts of weight loss.	**C**	Table C24 Appendix C

Cost and resource implications

The benefits of weight loss should be discussed with people who are overweight or obese as part of routine care.

Referral, development of care plans and continued monitoring are likely to have cost and time implications for the individual and healthcare professional.

5.2 Explaining the health risks associated with overweight and obesity

Major conditions for which obesity predicts higher mortality and/or morbidity are type 2 diabetes, cardiovascular disease and some cancers. Obesity is also strongly associated with a wider range of conditions, including musculoskeletal, reproductive and mental health problems.

5.2.1 Life expectancy

Several studies point to a link between life expectancy and overweight and obesity (NPHT 2009):

- A large investigation into the effect of obesity on mortality (n = 900 000) found that people who were moderately obese (BMI 30–35 kg/m^2) died 2–4 years earlier than those with an ideal weight. A BMI of 40–45 kg/m^2 reduced life expectancy by 8–10 years, comparable with the effects of lifelong smoking (PSC 2009).
- Estimates based on Australian data indicate that, at age 20, life expectancy is about 1 year less for adults who are overweight than for adults within the healthy weight range, and an average of around 4 years less for adults who are obese (Holman & Smith 2008).
- Other research estimating the effect of obesity on life expectancy (from age 40) found a mean loss of 7 years associated with obesity, similar to the life expectancy loss from smoking (Vic DHS 2008).
- Work commissioned by the National Preventative Health Taskforce indicates that if current trends in overweight and obesity in Australia continue, there will be approximately 1.75 million deaths at ages 20 years and over, and 10.3 million premature years of life lost at ages 20–74 years caused by overweight or obesity in 2011–2050, with an average of 12 years of life lost before the age of 75 years (Gray & Holman 2009).

5.2.2 Comorbidities

There is increasing evidence that overweight and obesity are associated with the incidence of a range of comorbidities (Guh et al. 2009) (see Table 5.2). The association between BMI and many of these diseases appears to be continuous, starting from BMIs of about 20–21 kg/m^2 (NZ MOH 2009a). The association between BMI and cardiovascular risk factors (blood pressure, lipids, type 2 diabetes) contributes to the increased risk of cardiovascular disease experienced by people who are overweight or obese.

Table 5.2 Health risks associated with overweight and obesity in adults

Body system	Health risk	Reference
Cardiovascular	Stroke	Guh et al. 2009
	Coronary heart disease	Guh et al. 2009
	Hypertension	Guh et al. 2009
Endocrine	Type 2 diabetes	Franz et al. 2007; Guh et al. 2009
Gastrointestinal	Gallbladder disease	Guh et al. 2009
	Gastro-oesophageal reflux disease	Corley et al. 2006; El-Serag et al. 2005; Hampel et al. 2005
	Hepatic, biliary and pancreatic disease	John et al. 2006
	Cancers of the bowel, oesophagus (adenocarcinoma), gall bladder and pancreas	WCRF & AICR 2007
Genitourinary	Chronic kidney disease	Chen et al. 2004; 2006; Praga & Morales 2006; Srivastava 2006
	End-stage renal disease	Wang et al. 2008
	Kidney cancer	Guh et al. 2009; WCRF & AICR 2007
	Glomerulopathy	Navaneethan et al. 2009
	Kidney stones	Obligado & Goldfarb 2008
	Stress urinary incontinence (women)	Hunskaar, 2008
Pulmonary	Obstructive sleep apnoea	Epstein et al. 2009
	Asthma	Guh et al. 2009
Musculoskeletal	Osteoarthritis	Wearing et al. 2006
	Spinal disc disorders	Wearing et al. 2006
	Lower back pain	Wearing et al. 2006
	Disorders of soft-tissue structures such as tendons, fascia and cartilage	Wearing et al. 2006
	Mobility disability (particularly in older adults)	Vincent et al. 2010
	Impaired immune function	Karlsson & Beck 2010
Reproductive health	Menstrual disorders[a]	Pasquali et al. 2007
	Miscarriage and poor pregnancy outcome[a]	Pasquali et al. 2007
	Infertility/subfertility[a]	Hammoud et al. 2008; Pasquali et al. 2007
	Breast cancer (postmenopausal women)	WCRF & AICR 2007
	Endometrial cancer	WCRF & AICR 2007
	Ovarian cancer	Guh et al. 2009
Mental health	Depression	Herva et al. 2006; McElroy et al. 2004; Zhao et al. 2011
	Anxiety disorder	Petry et al. 2008
	Reduced health-related quality of life	Cameron et al. 2011
	Disordered eating	Darby et al. 2009; Luppino et al. 2010

a Evidence in populations with a BMI > 30 kg/m²

6. Assist

Key messages

- Multicomponent interventions that address all three lifestyle areas related to overweight and obesity—nutrition, physical activity and psychological approaches to behavioural change—are more effective than single component interventions.
- Lifestyle approaches should focus on creating an energy deficit. This can be achieved through reducing energy intake, increasing energy expenditure, or both. Creating an energy deficit needs to be supported by measures to assist behavioural change.
- For many overweight and most obese adults, achieving a 'healthy' weight is an unrealistic expectation—weight loss of 5% is achievable and will result in health benefits. Treatment goals should focus on behavioural change and improved health.
- More intensive weight management interventions—such as very low-energy diets, weight loss medication and bariatric surgery may need to be considered as adjuncts to lifestyle approaches, especially when a person is obese and/or has risk factors or comorbidities, or has been unsuccessful reducing weight using lifestyle approaches. The decision to use intensive weight loss interventions is made based on the individual situation.
- Individuals should be well informed and supported in changing health behaviours, and be assisted to manage overweight and obesity in partnership with one or more healthcare professionals. Interventions need to be individualised, and supported by self-management principles and regular review by a healthcare professional.
- Influences on health behaviours (e.g. social, physical and psychological factors) should be taken into account when planning interventions with individuals.

6.1 Lifestyle interventions

The three key lifestyle areas related to overweight and obesity are nutrition, physical activity and behavioural change. Multicomponent interventions—that is, interventions that address all three areas—are more effective than those that address only one or two of them (Kirk et al. 2011). However, evidence to identify what kind and how many interventions should be included in a multicomponent intervention for weight loss is difficult to generate. Each component may have evidence supporting its effectiveness and be appropriate for incorporation into a multicomponent intervention, depending on the setting, the individual and available resources for implementation. Lifestyle intervention may involve trialling different combinations of approaches to identify the most effective and sustainable approach for each individual.

Lifestyle approaches are well suited to delivery in primary health care. Referral to other services (e.g. dietitian, psychologist, exercise physiologist) may be required in some situations (see Section 6.3.6).

Lifestyle change that incorporates reduced energy intake and increased physical activity has a range of benefits that are independent of weight loss. For example, lifestyle changes may improve quality of life even if no weight is lost (Morey et al. 2009; Villareal et al. 2011). Increased physical activity without weight loss can reduce cardiovascular risk factors (Shaw et al. 2006; Witham & Avenell 2010), improve functional mobility in older people (Manini et al. 2010; Villareal et al. 2011) and reduce glycated haemoglobin (HbA1c) by approximately 0.6% in adults with type 2 diabetes (Thomas et al. 2006).

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
9. For adults who are overweight or obese, strongly recommend lifestyle change—including reduced energy intake, increased physical activity and measures to support behavioural change.	**A**	Table C27 Appendix C
Cost and resource implications Healthy lifestyle options should be discussed routinely with individuals who are overweight or obese. Referral and continued monitoring are likely to have cost and time implications for the individual and healthcare professional. Specific lifestyle changes and plans can be discussed and developed with GPs, practice nurses and other healthcare professionals. There may be cost implications, availability and access issues associated with each. Monitoring of any comorbidities should continue to be done by the GP or relevant member of a multidisciplinary approach. Programs such as Lifescripts are currently used extensively in Australian primary health care to support lifestyle changes. Similarly, brief lifestyle interventions delivered by practice nurses may be a more cost-effective option than delivery by GPs (Garrett et al. 2011; Trueman et al. 2010).		

6.1.1 Reducing energy intake

Several dietary interventions can produce weight loss, including low-carbohydrate diets and low-fat diets.[3] Very low-energy diets are a more intensive dietary intervention and are discussed in Section 6.2.1.

Healthy dietary patterns

The Australian Dietary Guidelines (see Part E) summarise the evidence underlying food, diet and health relationships that improve public health outcomes, and highlight dietary patterns that promote health and wellbeing as well as reducing the risk of chronic disease.

▶ Practice point

d	Current Australian Dietary Guidelines should be used as the basis of advice on nutrition for adults.

Dietary approaches to weight loss

Dietary interventions should be designed to create an energy deficit, suit the needs and preferences of individuals, and include a wide variety of nutritious foods as recommended in the current Australian Dietary Guidelines.

In some situations (e.g. when comorbidities are present), referral to a dietitian may be needed for guidance on developing an eating plan that is suitable to the individual's needs.

3 These Guidelines do not discuss specific dietary interventions as the evidence on their effectiveness was not considered in the systematic literature review.

RECOMMENDATION	GRADE
10. For adults who are overweight or obese, design dietary interventions for weight loss to produce a 2500 kilojoule per day energy deficit and tailor programs to the dietary preferences of the individual.	**A**

Cost and resource implications

While GPs can recommend broad dietary changes, development of a tailored program to create an energy deficit may be more cost-effective if delivered by an accredited practising dietitian (Vos et al. 2010). It is acknowledged that access to accredited dietitians may be limited in some areas. Approaches such as teleconferencing or videoconferencing may provide greater access to dietitian services.

Specific tools such as Lifescripts can assist in referral and management. Referral options may have cost implications for the individual and there may be implications regarding access to specific service providers. Additionally, there may be cost, equity and access issues for sourcing appropriate foods for the individual and family.

Discussing dietary approaches to weight loss

When discussing dietary approaches to weight loss and recommending a particular approach, consideration should be given to the individual context, including:

- degree of overweight or obesity (e.g. if there is a need for rapid weight loss, a very low-energy diet may be appropriate; see Section 6.2.1)
- dietary preferences of the individual and their family
- their food supply (taking into account availability, affordability and capacity for appropriate storage of healthy foods)
- benefits of finding an eating plan that can be sustained (e.g. gradually changing eating habits)
- history of or current eating disorder
- consideration that alcohol has a high kilojoule content and may contribute to fat storage.[4]

People who are making changes to dietary behaviours as part of a weight management program may benefit from advice on healthy foods and eating patterns. Box 6.1 provides some areas for discussion.

Box 6.1

PRACTICAL INFORMATION TO SUPPORT HEALTHY EATING

General advice on healthy eating as outlined in the Australian Dietary Guidelines

The energy content of commonly eaten foods and drinks (e.g. books or websites that list kilojoule content)

Recommended portion sizes, and strategies for controlling or reducing them (e.g. use smaller plates)

The need to reduce (rather than restrict) intake of foods that are high in energy (e.g. fats, sugar) and increase intake of foods that are low in energy but rich in other nutrients (e.g. vegetables, fruit)

Benefits of starting with small changes and avoiding situations that encourage unhealthy behaviours

Examples of healthy foods that are affordable and familiar, or suitable alternatives

Ways to identify and manage triggers for emotional eating

The importance of regular eating patterns and mindful eating

4 The *Australian guidelines to reduce health risk from alcohol* (NHMRC 2009b) provide advice on harms associated with alcohol.

6.1.2 Increasing physical activity

Physical activity is any bodily movement produced by skeletal muscles that expends energy. This includes activities that use one or more large muscle groups for movement in the following domains:

- occupation, including paid and unpaid work
- leisure, including organised activities such as sports, as well as exercise and recreational activities
- transport—for example walking, cycling or skating to get to or from places.

Table 6.1 describes the different intensities of physical activity.

Table 6.1 Levels of intensity of physical activity

Intensity	Description	Example
Sedentary	Activities that involve sitting or lying down, with little energy expenditure	Occupational (e.g. sitting at work) Leisure (watching TV, reading, sewing, computer use for games, social networking) Transport (e.g. sitting in a car, train, bus or tram)
Light	Activities that require standing up and moving around, in the home, workplace or community	Housework (hanging out washing, ironing, dusting) Working at a standing workstation
Moderate	Activities are at an intensity that requires some effort, but allow a conversation to be held.	Brisk walking, gentle swimming, social tennis
Vigorous	Activities that lead to harder breathing, or puffing and panting (depending on fitness)	Aerobics, jogging and some competitive sports

Sources: *Adapted from NZ MOH (2009a) and Norton et al. (2010)*

The Australian Physical Activity Guidelines (see Part E) provide recommendations on amounts of moderate-intensity and vigorous activities that provide health benefits for adults aged 18–64 years.

More recent evidence suggests that:

- in most cases, the relationship between physical activity and health benefits is direct and curvilinear, with greatest benefit seen in those who change from doing the least or no physical activity to doing more (Powell et al. 2011)
- the repeated physiological and metabolic adaptations, and energy expenditure associated with daily physical activity, make it likely that frequent activity is more beneficial than activity on only one or two days each week
- health benefits are achieved with around 150–300 minutes of moderate-intensity activity or 75–150 minutes of vigorous activity (or a combination of moderate-intensity and vigorous activity), each week (Powell et al. 2011)
- physical activity at the upper end of this range is required for the prevention of weight gain (Brown et al. 2011), and to reduce the risk of breast and colon cancer (US DHHS 2008)

- muscle-strengthening activities are important for metabolic and musculoskeletal health (including maintaining bone density), and for maintaining functional status and ability to conduct activities of daily living in older age, with significant benefits from muscle strengthening activities twice weekly on nonconsecutive days (US DHHS 2008)
- prolonged sitting time is associated with increased risk of premature death and a range of chronic health problems (Proper et al. 2011; Thorp et al. 2011; Van Uffelen et al. 2010).

▶ Practice point

e	Current Australian Physical Activity Guidelines should be used as the basis of advice on preventing weight gain through physical activity.

Physical activity as a component of weight management

This section discusses the evidence on the role of physical activity in weight loss and prevention of weight regain.

Although it is accepted that physical activity is integral to weight management, the evidence for a specified duration and intensity of exercise is unclear given high individual variability in baseline levels of activity, eating patterns, medication use, and other lifestyle factors and comorbidities.

Studies that focus on the association between physical activity and weight loss have found that:

- increasing physical activity has a range of health benefits even if no weight is lost (Manini et al. 2010; Shaw et al. 2006; Thomas et al. 2006; Villareal et al. 2011; Witham & Avenell 2010)
- physical activity has little effect on weight unless it is combined with dietary change (Shaw et al. 2006; Shea et al. 2010; Thomas et al. 2006; Witham & Avenell 2010)
- a dose response exists between amounts of activity and weight lost (ACSM 2009)
- maintaining high levels of physical activity (approximately 60 minutes per day) combined with other behavioural strategies may reduce weight regain (Wing & Phelan 2005).

Gradually increasing activity levels is associated with fewer injuries in inactive adults (US DHHS 2008). The degree of overweight or obesity, fitness level, comorbidities and age are other considerations in prescribing physical activity. Accredited exercise physiologists can provide screening and stratify risks to ensure the safety and appropriateness of physical activity interventions.

CONSENSUS-BASED RECOMMENDATION

11. For adults who are overweight or obese, prescribe approximately 300 minutes of moderate-intensity activity, or 150 minutes of vigorous activity, or an equivalent combination of moderate-intensity and vigorous activities each week combined with reduced dietary intake.

Cost and resource implications

Brief advice on physical activity, delivered through primary health care in person, or by phone or mail, for sedentary people at risk of developing disease has a small beneficial effect, and has been shown to be cost-effective (Garrett et al. 2011).

While tools such as Lifescripts can help with physical activity assessment and prescription, exercise referral schemes may also provide a cost-effective option if no in-house program is available (Pavey et al. 2011). Costs to the individual will vary depending on the selection of physical activity type that is appropriate, accessible and likely to be sustainable.

If functional mobility is an issue, referral to an exercise physiologist or physiotherapist may also incur costs to the individual and healthcare system.

▶ Practice point

f	For adults who are overweight or obese, particularly those who are older than 40 years, there should be an individualised approach to increasing physical activity.

Discussing physical activity

When discussing changes in physical activity, consider the following:

- the health benefits of an active lifestyle, many of which are independent of weight loss
- the counterbalance of reducing sedentary activities (e.g. watching television, using computers)
- the importance of avoiding prolonged periods of sitting (e.g. taking breaks from desk-based activities by standing or walking when on the telephone)
- appropriate forms of moderate-intensity activity for the person's current mobility (e.g. hydrotherapy may be more suitable for people experiencing weight-related joint pain)
- increasing incidental activity also contributes to health and weight management
- clear and realistic goals, and relevant support mechanisms to increase the likelihood of activity being maintained on a long-term basis (e.g. regular interactions with appropriately trained professionals, the opportunity to participate in group sessions, and support from family members and others undertaking the exercise program)
- the person's current fitness level and comorbidities (e.g. cardiovascular fitness may need to be improved before muscle-strengthening exercises are attempted, or a rehabilitation approach may be needed for people whose mobility is impeded)
- initial weight gain is associated with muscle-strengthening exercises as muscles increase in size.

People who are making changes to their health behaviours may benefit from advice on ways to introduce and sustain increased physical activity. Box 6.2 provides some discussion points to assist in identifying activities that are suitable and acceptable to the individual.

Box 6.2

PRACTICAL INFORMATION TO SUPPORT WEIGHT MANAGEMENT THROUGH PHYSICAL ACTIVITY

Ideas for increasing the amount of incidental activity (e.g. choosing the stairs, walking to do errands)

Ideas for low-impact/low-risk exercise options (e.g. brisk walking, swimming)

Ideas for exercising with others (e.g. bike riding with the children, joining a sports team)

Relative benefits of different types of exercise intensity (e.g. doing a vigorous activity in addition to regular moderate-intensity activity provides additional health benefits)

Practical ideas for maintaining motivation to exercise (e.g. starting with small changes in activity and avoiding situations that encourage long periods of sitting)

Suggestions for how to get involved in physical events and groups (e.g. joining local walking groups)

Advice on reducing sedentary activities (e.g. commuting by bicycle rather than car)

Affordable approaches to physical activity (e.g. walking or jogging rather than joining a gym)

6.1.3 Supporting behavioural change

Education regarding weight loss and lifestyle change, including specific weight management strategies, can support behavioural change if it is combined with other interventions (Belalcazar et al. 2010; Christian et al. 2008; Pi Sunyer et al. 2007; Schmitz et al. 2007; Silva et al. 2010; Teixeira et al. 2010; Wing 2010a). Information may be delivered face to face, individually or within groups, and should be reinforced by resources (e.g. written, web-based or audiovisual materials).

Behavioural change techniques

Initial approaches include discussing techniques to support behavioural change, which can be supported in primary health care (see Table 6.2).

Table 6.2 Examples of techniques to support behavioural change

Core strategies	Additional strategies
Goal setting	Assertiveness training
Self-monitoring of behaviour and progress	Slowing the rate of eating
Stimulus control (e.g. recognising and avoiding triggers that prompt unplanned eating)	Reinforcing changes
Cognitive restructuring (modifying unhelpful thoughts or thinking patterns)	Relapse prevention
Problem solving	

Psychological therapies

In the context of overweight and obesity, the goal of psychological therapies is to assist individuals to make long-term changes to their lifestyle. A range of psychological interventions (e.g. behavioural therapy, cognitive-behavioural therapy) can facilitate weight loss and have been shown to have a more beneficial effect when combined with other lifestyle approaches (Shaw et al. 2005).

▶ Practice point

g	Individual or group-based psychological interventions may improve the success of weight management programs.

Psychological and behavioural therapies should be tailored to the individual and his or her situation, such as:

- psychological therapies that can be delivered in primary health care by healthcare professionals trained in their use may significantly increase weight loss (Shaw et al. 2005)
- more intensive psychological intervention may be required if a person has difficulty achieving behavioural change, or has mental health comorbidities and referral to mental health specialists with relevant expertise may be required.

Other supports for behavioural change

Lifestyle interventions can also be augmented by measures to reinforce behavioural aspects of care or provide incentives for adherence. Internet-based information and programs are increasingly popular. Delivery of evidence-based weight management programs via the internet should be considered as part of a range of options for people with overweight and obesity (see Table 6.3).

Table 6.3 Effect of interventions to augment lifestyle interventions in adults

Intervention	Delivery	Effect	References
Technology	Internet-based information, goal setting and reminders Text messages in combination with internet lifestyle diary or pedometers	Successfully used, but not a replacement for face-to-face healthcare delivery	Haapala et al. 2009 McConnan et al. 2007 Richardson et al. 2008
Incentives	Financial rewards paid for achievement of program goals	Weight loss not improved, but trend towards increasing effectiveness as the size of the reward increases	Paul-Ebhohimhen & Avenell 2008

6.1.4 Complementary therapies and nutritional supplements

The use of complementary therapies is increasingly common in Australia (AMA 2012). However, there is little evidence from recent reviews or randomised trials to support their use in assisting weight loss (Cho et al. 2009; Hasani-Ranjbar et al. 2009; Jull et al. 2008; Phung et al. 2010; Pittler & Ernst 2004; Winzenberg et al. 2007; Yanovski et al. 2009; Yazaki et al. 2010).

▶ Practice point

h	There is very limited evidence on the potential benefits or harms of complementary therapies in treating overweight and obesity.

6.2 Intensive interventions

Intensive interventions to support weight loss include very low-energy diets, weight loss medication and bariatric surgery. These may be considered as an adjunct to lifestyle approaches, especially when an adult:

- has a BMI > 30 kg/m^2, or a BMI > 27 kg/m^2 with risk factors and/or comorbidities
- has been unsuccessful in reducing weight or preventing weight regain using lifestyle approaches.

The choice of intervention will depend on the individual situation, including the urgency and aims of intervention, accessibility and affordability. For example:

- the rapid weight loss associated with medically supervised very low-energy diets (see Section 6.2.1) may encourage people to continue with lifestyle change towards longer term weight loss goals, reduce obesity-related comorbidities (e.g. sleep apnoea, type 2 diabetes) and may also be necessary when bariatric surgery is conditional on weight loss (e.g. prognosis after surgery is worse if BMI > 50 kg/m^2)
- weight loss medications may be useful both in producing initial weight loss and in preventing weight regain in longer term management (see Section 6.2.2)
- the significant weight loss associated with bariatric surgery (see Section 6.2.3) provides improvements in some cardiovascular and metabolic risk factors, and type 2 diabetes.

These interventions are likely to be used sequentially—for example, starting with a very low-energy diet to achieve weight loss, then using medications to help counter the hormone changes and increased hunger that follow weight loss (see Section 7.2). Bariatric surgery is not generally an immediate consideration unless:

- other interventions have not been successful
- other interventions are contraindicated
- a person's BMI is > 50 kg/m^2.

New weight loss medications are being developed and trialled. It can be envisaged that in the future, the combination of a very low-energy diet followed by pharmacotherapy may be a reasonable alternative to bariatric surgical procedures.

Table 6.4 gives a summary of weight management interventions.

Table 6.4 Summary of effects of weight management interventions

Intervention	Summary of effect
Lifestyle change (see Tables C5–C9; Appendix C)	Least effective (>10% weight loss in few studies; weight loss not likely to be maintained in most participants) Dietary change—3–5 kg at 12 months; 0 kg at 5 years Dietary change and exercise—5–10 kg at 12 months; 0–3 kg at 5 years Exercise—0 kg at 12 months; 0–5 kg at 5 years Lifestyle change and psychological intervention—3–4 kg at 5 years
Combined lifestyle change and pharmacotherapy (see Tables C10 and C11)	Moderately effective (>10% weight loss across some but not all studies; weight loss maintained >5 years in some but not all participants) Medication (e.g. orlistat) and dietary change—6–10 kg at 12 months; 2–3 kg at 5 years
Bariatric surgery with maintained lifestyle changes (see Tables C18–C20)	Most effective (consistently >10% weight loss across studies; weight loss likely to be maintained >5 years) Laparoscopic adjustable gastric banding—20% at 12 months; 12% at 10 years Vertical banded gastroplasty—20% at 12 months; 15% at 10 years Roux-en-Y gastric bypass—33% at 12 months; 30% at 10 years

The role of primary health care in intensive weight management interventions depends on the severity of health risk and the expertise of the healthcare professional involved. Any interventions used should comply with the Therapeutic Goods Administration Advertising Code 2007. The following sections provide an overview of contraindications, adverse effects, treatment duration and requirements for follow-up. Key points for discussion with adults to ensure informed decision-making are also included.

Intensive interventions are contraindicated in children and prepubertal adolescents. Intensive interventions to support weight loss in postpubertal adolescents are discussed in Section 11.3.2.

6.2.1 Very low-energy diets

Very low-energy diets involve replacing one or more meals each day with foods or formulas providing a specified number of kilojoules (e.g. 1675–3350 kilojoules). Meal replacements are defined in the Australia New Zealand Food Standards Code as 'a single food or prepackaged selection of foods sold as a replacement for one or more of the daily meals, but not as a total diet replacement'.

Meal replacements are largely protein based, and contain essential fatty acids, vitamins and minerals, but very little carbohydrates. They reduce portion size and, consequently, energy intake. Food Standards Australia and New Zealand is currently reviewing the regulations surrounding meal replacement products for weight loss. More information about very low-energy diets may be obtained from the Dietitians Association of Australia (www.daa.asn.au).

Health benefits

Advantages of very low-energy diets include the motivating effect of rapid weight loss and a mild ketosis that may suppress hunger (Delbridge & Proietto 2006). Very low-energy diets have been associated with weight loss (Nield et al. 2007; Norris et al. 2005b; Tuomilehto et al. 2009), improvements in sleep apnoea (Tuomilehto et al. 2009) and improved glycaemic control in adults with type 2 diabetes (Nield et al. 2007; Norris et al. 2005b). They are commonly used in medically supervised weight reduction programs for people with BMI > 30 kg/m^2 (or > 27 kg/m^2 with obesity-related comorbidities), or for whom rapid weight loss is necessary (Sumithran & Proietto 2008).

▶ Practice point

i	Very low-energy diets are a useful intensive medical therapy that is effective in supporting weight loss when used under medical supervision. They may be a consideration in adults with BMI > 30 kg/m^2, or with BMI > 27 kg/m^2 and obesity-related comorbidities, taking into account the individual situation.

Cost and resource implications

Costs are associated with the use of very low-energy diets. Purchasing very low-energy diet items to replace meals may be costly for individuals and their use requires frequent monitoring by healthcare professionals. The relevant healthcare professional to monitor use may be a GP, dietitian or specialist nurse, depending on access to the type of provider.

Contraindications

Contraindications for very low-energy diets include (NHLBI 2000; NICE 2006):

- pregnancy or advanced age
- history of severe psychological disturbance, alcohol misuse or drug abuse
- the presence of porphyria, recent myocardial infarction or unstable angina.

A relative contraindication is the use of insulin or hypoglycaemics (except metformin), but very low-energy diets may be used if medication dosage is adjusted appropriately.

Adverse effects

Common adverse effects include cold intolerance, dry skin, hair loss, constipation, headaches, fatigue and dizziness. Other potential effects are gallstones, increased serum uric acid levels and precipitation of gout, and reduced bone mineral density (Sumithran & Proietto 2008). Although restrictive eating has been strongly associated with onset of binge eating (Polivy 1996), there is insufficient available evidence of an association between medically supervised very low-energy diets and new-onset eating disorders (Mustajoki & Pekkarinen 2001).

Treatment duration

Treatment length varies but is usually 8–16 weeks (Mustajoki & Pekkarinen 2001). There is evidence that in certain obese individuals and under close medical supervision, very low-energy diets may be used safely for 12 months (Sumithran & Proietto 2008).

Monitoring and review

Careful monitoring of people on very low-energy diets is required. Tests to be carried out when beginning a very low-energy diet include liver function tests, lipid profile measurements, a full blood count and iron studies, along with levels of electrolytes, creatinine and uric acid. Electrolyte and creatinine levels should be checked about 6 weeks after starting the diet, or earlier if more careful monitoring is required (e.g. in people who have renal impairment or are using diuretics) (Sumithran & Proietto 2008). Review of medications is also necessary (e.g. for people taking diabetes medication/insulin or warfarin). Psychological wellbeing should also be monitored during and after the very low-energy diet.

There must also be a program of nutrition education and support for long-term weight management (e.g. delivered in primary health care or through referral to a dietitian).

Discussing very low-energy diets

Discussion of very low-energy diets should cover:

- options in the food replacement regime (e.g. replace all three meals, or replace two meals and have one meal of protein, nonstarchy vegetables and salad)
- the need to select a nutritionally 'complete' product'
- the importance of reading the instructions carefully
- the importance of achieving ketosis to suppress hunger and of testing for ketosis (Delbridge & Proietto 2006)
- the importance of avoiding carbohydrate supplementation—nonstarchy vegetables or protein can be eaten when hungry
- the need for a small quantity of fat each day (e.g. 1 tablespoon olive oil on salad or vegetables) to contract the gall bladder and prevent gallstones
- the need to drink when thirsty
- the need for fibre supplementation
- the need for follow-up by healthcare professionals during the period of the diet (about 12 weeks) and gradual weaning off the diet (over a period of around 8 weeks)
- the fact that it is not necessary to achieve the goal weight with one period of diet use (there may be repeated periods of very low-energy diets separated by periods of weight maintenance)
- costs associated with very low-energy diets
- the need for continuing weight maintenance program to reduce weight regain.

Written materials explaining the diet and supporting adherence (e.g. giving examples of carbohydrates) should also be provided.

6.2.2 Weight loss medications

The use of weight loss medications in addition to lifestyle approaches has been found to increase weight reduction in adults who are overweight or obese (Franz et al. 2007). Medications that have been shown to increase weight loss include orlistat (Horvath et al. 2008), sibutramine (Horvath et al. 2008), rimonabant (Curioni & André 2006; Nissen et al. 2008; van Gaal et al. 2008), taranabant (Proietto et al. 2010), metformin (Knowler et al. 2009) and lorcaserin (Smith et al. 2010). However, many of these medications have been associated with adverse effects and have been withdrawn (e.g. sibutramine) or were never approved (e.g. rimonabant, taranabant) in Australia. The evidence on the effects of weight loss medications on health outcomes other than weight loss is limited.

Orlistat

Orlistat is currently the only medication registered for use in treating overweight (with comorbidities) and obesity that has been evaluated for long-term safety.

Health benefits

Orlistat reduces the absorption of energy-dense fat by inhibiting pancreatic and gastric lipases. In conjunction with lifestyle intervention, orlistat:

- is associated with modest additional reductions in body weight in adults (2.6–3.7 kg) (Horvath et al. 2008; Madsen et al. 2008; Padwal et al. 2003) and slight reductions in systolic and diastolic blood pressure (Padwal et al. 2003)
- increases weight loss in adults with comorbidities, including metabolic syndrome (Svendsen et al. 2009), hypertension (Siebenhofer et al. 2009) and type 2 diabetes (Jacob et al. 2009; Norris et al. 2005c)
- is associated with slight decreases in blood pressure (Jacob et al. 2009; Norris et al. 2005c), no adverse effects on lipid profile (Eliasson et al. 2007; Norris et al. 2005c) and slight improvements in glycaemic control (Jacob et al. 2009; Norris et al. 2005c) in adults with type 2 diabetes.

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
12. For adults with BMI ≥ 30 kg/m^2 or adults with BMI ≥ 27 kg/m^2 and comorbidities, orlistat may be considered as an adjunct to lifestyle interventions, taking into account the individual situation.	**A**	Table C10 Appendix C
Cost and resource implications Orlistat is currently the only medication approved specifically for the management of overweight and obesity in Australia. Although it is listed on the Repatriation Pharmaceutical Benefits Scheme, it is not listed on the Pharmaceutical Benefits Scheme (PBS). Cost-effectiveness studies of orlistat use show that it is not cost-effective for population-based outcomes (Vos et al. 2010), but other data suggest that it is more cost-effective in individuals who have numerous comorbidities (type 2 diabetes, hypertension, hypercholesterolaemia) (Lamotte et al. 2002).		

Contraindications

Orlistat is contraindicated in women who are pregnant or breastfeeding, and in adults with malabsorption or hypersensitivity to orlistat (Hauptman et al. 2000).

Reduced gallbladder function (e.g. after cholecystectomy) is a relative contraindication and caution is advised when there is obstructed bile duct, impaired liver function or pancreatic disease.

Adverse effects

Gastrointestinal side effects are common with orlistat use and include:

- steatorrhoea (oily, loose stools with excessive flatus due to unabsorbed fats reaching the large intestine)
- fatty faecal incontinence
- frequent or urgent bowel movements.

These effects can be controlled by adhering to a low-fat diet (see below).

Concentrations of fat-soluble vitamins (e.g. vitamins A, D, E and K) are reduced with orlistat use and, while they remain in the normal range (Torgerson et al. 2004), supplementation may be required if long-term use is contemplated (supplement taken at night before bed) (Caterson 2006).

Orlistat interacts with some medications and monitoring is required for people taking (MICROMEDEX 2004; PSA 2004):

- warfarin, as absorption of vitamin K may be reduced and international normalised ratio (INR) increased
- fat-soluble immunosuppressive medications (e.g. cyclosporine), as absorption may be reduced.

There is insufficient data regarding long-term orlistat use to determine its association with cardiovascular events, and cardiovascular or all-cause mortality (Siebenhofer et al. 2009).

Treatment duration

Therapy with orlistat should be continued beyond 12 weeks only if at least 5% of initial body weight has been lost since starting medication (SIGN 2010). Therapy should then be continued for as long as there are clinical benefits (e.g. prevention of significant weight regain). Continuing risks and benefits should be discussed.

Discussing orlistat

If the use of orlistat is considered, discussion should cover:

- the fact that orlistat is not a substitute for lifestyle change
- the need for continuing monitoring of the effect of treatment
- the likelihood of weight being regained when medication is stopped.

Information about dietary intake during treatment should also be provided. People who are considering taking orlistat should be advised that:

- taking orlistat results in gastrointestinal side effects if a low-fat diet is not followed
- the low intake of fat should be distributed over three main meals
- foods associated with an episode of diarrhoea or fat leakage should be avoided—this will lead to a change towards healthier dietary intake (Caterson 2006).

Other medications

Phentermine

Phentermine is registered for use as a short-term (e.g. 3-month) adjunct to dietary management of obesity, under medical supervision. It works by suppressing hunger and possibly stimulating energy expenditure. Phentermine should be used with caution as it is associated with a range of side effects (e.g. hypertension, tachycardia, insomnia) and a risk of tolerance, and its long-term safety has not been tested. It is not listed on the PBS.

Treatments for comorbidities with an effect on weight

A number of medications for the treatment of other conditions have been found to have an effect on weight (e.g. fluoxetine, topiramate, metformin, glucagon-like peptide agonists). When relevant comorbidities are present, these medications may also be beneficial for weight management.

Emerging treatments

The evidence for the physiological defence of body weight (see Section 7.2) suggests that individuals may be assisted in maintaining weight in the long term with the use of therapies that suppress hunger. There are a few studies suggesting improved weight maintenance with the use of combination therapies, although more research is required.

6.2.3 Bariatric surgery

Bariatric surgery (weight loss surgery) is an evolving subspecialty of gastrointestinal surgery. Various techniques are used to induce weight loss in people who have emphatically failed to achieve weight loss by other measures. Broadly speaking, bariatric surgery aims to reduce intake by restricting gastric capacity and/or reducing uptake by reducing exposure to the small bowel absorptive area. There are a number of different bariatric procedures, each with unique components that suit some people and not others. Procedures currently considered standard practice in Australia include the following:

- *Laparoscopic adjustable gastric banding (LAGB)* involves placing a band around the stomach near its upper end to create a small pouch. This restricts intake of food. The band can be tightened or loosened over time to change the extent of restriction.
- *Sleeve gastrectomy* involves removing the greater portion of the fundus and body of the stomach, reducing its volume from up to 2.5 L to about 200 mL. This procedure provides fixed restriction and does not require adjustment like LAGB.
- *Roux-en-Y gastric bypass* (RYGB) is a combination procedure in which a small stomach pouch is created to restrict food intake and the lower stomach, duodenum and first portion of the jejunum are bypassed to produce modest malabsorption of nutrients and thereby kilojoule intake.
- *Biliopancreatic diversion* is also a combination procedure that involves removing the lower part of the stomach, and bypassing the duodenum and jejunum to produce significant malabsorption. This procedure tends to be performed in subspecialty centres.

The choice of surgical technique is individualised and involves discussion between the surgeon and the person.

Vertical banded gastroplasty (VBG) is of historical significance but is no longer standard practice in Australia. Newer procedures, including endoscopic techniques such as ballooning and endoscopic sleeve, are evolving.

The choice of procedure takes into account factors such as age, access to services for follow-up and monitoring, preparedness to commit to frequent follow-up and continuing lifestyle interventions, previous interventions, and risk profile. For a range of reasons, different specialists offer some procedures but not others. There is consensus in the literature that better outcomes are achieved when a multidisciplinary team (e.g. including bariatric physician, bariatric nurse, dietitian, exercise physiologist and psychologist) is involved.

Bariatric surgery is more effective in achieving weight loss in adults with obesity than nonsurgical weight loss interventions (Buchwald et al. 2009; Colquitt et al. 2009; Dixon et al. 2008; Maggard 2005; Mingrone et al. 2002; O'Brien et al. 2006; Snow et al. 2005). The degree of weight loss—approximately 20–30% of body weight in people with a BMI > 35 kg/m^2—is high. Reductions in BMI in adults are influenced by the type of surgery and are greater following combination procedures (BMI reduction of 9.0–11.4 kg/m^2) than following purely restrictive procedures (BMI reduction of 2.4–10.1 kg/m^2) (Padwal et al. 2011).

Weight loss trajectories over time also differ depending on procedure. In the Swedish Obese Subjects (SOS) study (Sjöström et al. 2007), gastric bypass surgery produced the greatest long-term weight loss (25% ±11%), followed by vertical banded gastroplasty (17% ±11%), and fixed or variable banding procedures (13% ±13%) (Sjöström et al. 2007).

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
13. For adults with BMI > 40 kg/m^2 or adults with BMI > 35 kg/m^2 and comorbidities that may improve with weight loss, bariatric surgery may be considered, taking into account the individual situation.	**A**	Table C18–C23 Appendix C

Cost and resource implications

Numerous studies have reported that bariatric surgery is a cost-effective weight loss intervention compared with nonsurgical treatment of obesity, although the variability in estimates of costs and outcomes is large (Keating et al. 2009; Picot et al. 2009; Sjöström et al. 2007; Vos et al. 2010). In people with newly diagnosed type 2 diabetes compared to those with established diabetes (at least 2 years since diagnosis) surgery has been shown to be a cost-effective option (Keating et al. 2009).

Research reports access to surgery in Australian public health services can be limited and the majority of procedures are performed in private hospitals (Korda 2012; AIHW 2010b). Services for bariatric surgery and necessary follow-up may be more limited in rural and remote areas. The additional cost and resource implications to the individual and the health system include frequent follow-up and monitoring, transport issues in both urban and rural areas, and accessibility to services and providers. The sustained lifestyle changes and additional intensive interventions that may be required to ensure the effectiveness of surgery should also be factored in to individual and health system costs. Subsequent surgical procedures (for weight loss, complications or cosmetic procedures) should also be considered as a significant cost implication to the individual and health system.

▶ Practice point

j	Bariatric surgery, when indicated, should be included as part of an overall clinical pathway for adult weight management that is delivered by a multidisciplinary team (including surgeons, dietitians, nurses, psychologists and physicians) and includes planning for continuing follow-up.

Health benefits

Bariatric surgery is associated with significant short-term improvements in some cardiovascular and metabolic risk factors, and in short-term resolution of metabolic syndrome and newly developed (< 2 years since diagnosis) type 2 diabetes. Data from long-term follow-up (i.e. > 10 years) suggest that most (but not all) health benefits are maintained in the long term (Sjöström et al. 2007).

Cardiovascular risk

Bariatric surgery is associated with reductions in hypertension and improved lipid profiles (Picot et al. 2009). In the SOS study (Sjöström et al. 2007):

- the incidence of high triglycerides was lower and the recovery rate greater among participants in the surgical arm after 2 and 10 years
- the incidence of low levels of high-density lipoprotein (HDL) (< 2.17 mmol/L) was lower in the surgical group at 2 years but not after 10 years
- there was no significant difference between groups in the incidence of elevated total cholesterol at either 2 or 10 years.

After 10 years, participants in the SOS study who had gastric bypass had greater reductions in triglycerides (28.0% vs 18.0%) and total cholesterol (12.6% vs 5.0%) and greater increases in HDL levels (47.5% vs 20.4%) compared to those who had gastric banding.

The SOS study (Sjöström et al. 2012) also found that compared with usual care, bariatric surgery was associated with a reduced number of cardiovascular deaths and lower incidence of cardiovascular events in adults who were obese.

Type 2 diabetes

There is growing evidence that bariatric surgery is a possible treatment for some people with type 2 diabetes. Studies have demonstrated improved glycaemic control and medication use, or resolution of type 2 diabetes in many people who receive bariatric surgery (Buchwald et al. 2009; Dixon et al. 2008; Sjöström et al. 2007). The International Diabetes Federation recommends consideration of bariatric surgery for people who have type 2 diabetes and a BMI > 35 kg/m^2, and for those with a BMI 30–35 kg/m^2 when diabetes cannot be adequately controlled by an optimal medical regimen, especially in the presence of other cardiovascular disease risk factors (IDF 2011).

▶ Practice point

k	Bariatric surgery may be a consideration for people with a BMI > 30 kg/m^2 who have poorly controlled type 2 diabetes and are at increased cardiovascular risk, taking into account the individual situation.

The effect of surgery on glycaemic control and resolution of type 2 diabetes varies with the stage of diabetes, bariatric procedure and amount of weight lost. For example:

- bariatric surgery (gastric bypass or biliopancreatic diversion) resulted in better glucose control at 2 years than conventional medical therapy (Mingrone et al. 2012)
- 12 months of medical therapy plus bariatric surgery achieved glycaemic control in significantly more obese adults with uncontrolled type 2 diabetes than medical therapy alone (Schauer et al. 2012)
- sleeve gastrectomy in adults with type 2 diabetes improved glycaemic control and comorbidities (sleep apnoea, hypertension, dyslipidaemia) more than medical therapy (Leonetti et al. 2012)
- diabetes may be dramatically improved in adults with metabolic syndrome one year after bariatric surgery, but an adverse 90-day outcome is common (Inabnet et al. 2012)
- improvements in HbA1c (Buchwald et al. 2009) in mean blood glucose and insulin values at 10 years (Sjöström et al. 2007) were greater following gastric bypass than they are following gastric banding
- people with the shortest duration (< 5 years) and the mildest form (diet-controlled) of type 2 diabetes had the greatest likelihood of resolution of diabetes (Schauer et al. 2003)
- resolution was more likely following procedures that combine restriction and malabsorption (Buchwald et al. 2009).

After placement of an adjustable gastric band, improvements in glycaemic control are dependent on weight loss, and appreciable improvements in glycaemic control may not be evident for some time (Dixon et al. 2008). In contrast, people who receive RYGB may experience improved glycaemic control before any weight loss occurs (Nannipieri et al. 2011).

When bariatric surgery does result in resolution of type 2 diabetes, it is not clear what the duration of effectiveness is or what monitoring, if any, should be performed for recurrence of type 2 diabetes in people who have experienced disease resolution.

Mortality

The effect of bariatric surgery on long-term mortality is favourable, with lower rates of mortality among people who are obese who have had the surgery compared to those who have not had the surgery (Flum & Dellinger 2004; Pontiroli & Morabito 2011; Sjöström et al. 2007; Vlassov 2005). However, some caution is needed in interpreting results as outcomes from the general medical community may not be equal to those of surgical 'centres of excellence'.

Other conditions

- Indicators of abnormal renal function in adults with chronic kidney disease improve following bariatric surgery (Afshinnia et al. 2010; Navaneeethan et al. 2009).
- There are generally improvements in symptoms of gastro-oesophageal reflux disease (GORD), although the nature of some surgical interventions can affect its resolution (De Groot et al. 2009; De Jong et al. 2010).
- There is some evidence that markers of liver function and inflammation improve in obese adults with diagnosed nonalcoholic steatohepatitis (Chavez-Tapia et al. 2010).

Long-term weight loss

The mechanisms of long-term weight loss following bariatric surgery are yet to be determined. Evidence suggests that surgical manipulations (i.e. the small gastric pouch with or without bypass of duodenum and proximal jejunum) are insufficient to account for the resulting body weight lost alone (Cummings et al. 2004; Vincent et al. 2008). In fact, for some surgical procedures, post-operative changes in metabolic profile have been shown to occur before weight is actually lost, and changes in eating behaviour and appetite may be more related to altered responses to gut hormones than the anatomical changes the surgery creates (Batterham et al. 2003; LeRoux et al. 2007).

It is therefore difficult to establish whether improvement in comorbid conditions with bariatric surgery are due to the weight loss itself, or due to the different changes in hormone balance, metabolism, pressure dynamics and mechanics that each type of bariatric surgery produces.

Suitability for surgery

Bariatric surgery in adults is most effective and safest in younger men with lower BMIs (DeMaria et al. 2007). Appropriate monitoring is required to maximise safety and effectiveness of bariatric surgery in women, people older than 45 years and those with higher BMIs. Bariatric surgery should not be performed during pregnancy.

Medical comorbidities

Medical contraindications include (Vic DHS 2009b):

- severe gastrointestinal disease
- active cancer
- unstable heart or lung disease
- advanced liver disease with portal hypertension
- uncontrolled obstructive sleep apnoea with pulmonary hypertension
- serious blood or autoimmune disorders.

While not contraindications, careful monitoring of people with hypertension, high risk of pulmonary thromboembolism and diabetes is required (Vic DHS 2009b).

Psychological comorbidities

The effectiveness of bariatric surgery does not appear to be influenced by the presence of depression (Ma et al. 2006) or increased psychological dysfunction, dysfunctional eating behaviour, binge-eating disorder or a past history of intervention for substance misuse (Alger-Mayer et al. 2009; Burgmer et al. 2005; Busetto et al. 2005; Clark et al. 2003; Kalarchian et al. 2002; Latner et al. 2004; Malone & Alger-Mayer 2004; Sallet et al. 2007; Vallis et al. 2001). These comorbidities are therefore not considered absolute contraindications for surgery, but should be assessed and treatment started before surgery where possible.

Ability to give informed consent

People must be able to give fully informed consent to bariatric surgery, so it may be contraindicated if the person is unable to understand the nature of the intervention and the need to commit to post-operative care plans.

Adverse events

While bariatric surgery can achieve long-term weight loss, the surgery is not always successful and may require revision or reversal of bariatric procedure depending on the type of surgery. Complications affect a significant proportion of people who have bariatric surgery:

- the Longitudinal Assessment of Bariatric Surgery 1 study[5] (n = 4776) reported rates of major complications at 30 days (4.1%) and mortality (0.3%) following primary bariatric surgery—death, serious complications, re-intervention or prolonged hospitalisation were reported following LAGB (1.0%), laparoscopic gastric bypass (4.8%) and open gastric bypass (7.8%) (LABS Consortium 2009)
- a systematic review (Colquitt et al. 2009) reported operative re-intervention (13%), laparoscopic revision (10%), port infection (2.6%) and acute cholecystitis (2.6%) as the main complications affecting people following LAGB
- the SOS study[6] (Sjöström et al. 2007) reported perioperative complications (13%), pulmonary symptoms (6.2%), infection (2.1%), thromboembolism (0.8%), bleeding (0.9%) and operative death (0.25%).

Discussing bariatric surgery

Information that should be highlighted in discussing bariatric surgery includes the:

- types of procedure available, and the associated health benefits and risks (e.g. adverse events)
- likely time period before surgery can take place
- requirements before surgery (e.g. weight loss to reduce risk of adverse events, smoking cessation)
- follow-up requirements for the various procedures
- cost of the procedure and follow-up care
- potential for re-operation to be required at some stage, including the removal of the silicone band or the removal of the port with adjustable gastric banding
- need for strict eating plans and physical activity regimes to be continued
- need for lifelong vitamin and mineral supplementations to prevent nutritional deficiencies following procedures that reduce uptake
- likelihood that some weight will eventually be regained
- potential psychological effects of surgery
- need for continuing intervention to prevent additional weight gain.

5 Surgical case load (more than one procedure per month) also predicts successful outcome (Chevallier et al. 2007; Ma et al. 2006). As these results were achieved in surgical 'centres of excellence', the generalisability of findings to other surgical centres is unknown.

6 ibid.

Follow up postsurgery

Complications may occur following bariatric surgery, and may differ depending on the type of procedure used. Appropriate assessment is therefore necessary on a regular basis. If complications occur they will need to be followed up by the appropriate specialist team or surgeon.

Individual monitoring and follow-up protocols should be determined by the appropriate specialist team or surgeon, in consultation with the primary care health professionals involved. The role of primary care health professionals is to monitor the individual based on the specialist team or surgeon's advice, check on compliance where appropriate and refer as appropriate.

Primary healthcare professionals have a continuing role in the care of people who have had bariatric surgery, including:

- monitoring and treating comorbidities, including psychological distress and risk of suicide (de Zwann et al. 2011; Tindle et al. 2010)
- continuing to promote the benefits of physical activity and healthy eating
- assessing nutritional status, including for micronutrient and vitamin deficiencies that might develop over time
- providing support for behavioural change (e.g. brief intervention, referral for psychological therapy)
- providing support for healthy nutrition (e.g. developing an eating plan or providing referral to a dietitian) and sustained levels of physical activity (e.g. referral to an exercise program) (Evans et al. 2007)
- arranging re-assessment and re-intervention as required (e.g. regular review of laparoscopic adjustable gastric bands by a bariatric clinician is necessary for reassessment of the stability and integrity of the prosthesis).

Eventual weight regain after bariatric surgery occurs regardless of the bariatric surgical type.

Achieving long-term weight loss therefore requires weight management strategies to be continued after bariatric surgery has been performed. Also, resolution of comorbidities may not be sustained in the longer term and continuing monitoring of these is required.

6.3 Developing an appropriate weight management program

When planning a weight management program with an individual, consideration is given to the person's age, weight history, background, the presence of comorbidities and the costs and benefits of weight loss. It is also important to take the person's family, work and social context into account.

6.3.1 Therapeutic engagement

Weight loss and long-term weight management are challenging, and most people need continuing support to maintain their motivation to adhere to lifestyle changes and to not 'give up' if they lapse or relapse. While weight management is primarily each person's responsibility, healthcare professionals have a key role in suggesting strategies and providing continuing support. This is facilitated by a sustained relationship between one or more healthcare professionals and each person, which extends beyond individual consultations.

Establishing an honest, respectful therapeutic relationship is particularly important in managing chronic, relapsing conditions that require long-term support. Such a relationship involves healthcare professionals:

- building mutual knowledge, understanding and trust, to maximise the potential for healing, empowerment and beneficial change
- being nonjudgemental, patient and empathetic, and acknowledging the challenges people are facing
- taking a collaborative approach that facilitates people being open about their particular situation, whatever their background or circumstances
- in partnership, discussing strategies and developing goals that people would like to work on, rather than imposing 'solutions' on them
- ensuring that people continue to feel safe and supported, regardless of lapses and any changes in their circumstances.

6.3.2 Agreeing on treatment goals

As behavioural change is fundamental to weight management, it may be a more appropriate short-term goal than weight loss, particularly for people who find weight loss difficult. Examples of behavioural change goals include (Wadden et al. 1999):

- reduced intake of energy dense foods
- regular eating (including breakfast)
- reduction in 'non-hungry' eating (e.g. snacks)
- increased daily steps taken when walking
- increased days a week of planned physical activity.

Specific tools may be of use in assisting people to identify goals (e.g. SMART [specific, measurable, achievable, realistic and timely]).

Specific goals for individuals will depend on their situation but should be realistic and sustainable—for example, a person who is obese and has done no planned physical activity for some time may have a goal of a 5-minute walk each day in the first week, and build up slowly from there.

Treatment goals should also include health improvements (e.g. lowered blood pressure, blood lipids and blood sugars), which are likely with only small amounts of weight loss. Increased benefit will be gained from further weight loss, particularly in people who are obese.

Longer term weight loss goals should be practical. A realistic estimate is around 5–10% of initial weight (Anderson et al. 1999). However, even after education about realistic weight loss, people may have high expectations about the weight loss that it is possible for them to achieve (Womble et al. 2000). It is important to explain that even modest amounts of weight loss improve health, and that rates of weight gain and loss vary widely between individuals.

▶ Practice point

I	Encourage people to make goals for behavioural change.

6.3.3 Tailoring lifestyle approaches to the individual

All weight management programs will include lifestyle changes. Planning for lifestyle change needs to take into account factors that may influence an individual's ability to change behaviours, and his or her life stage. Availability and access also need to be considered when planning intensive interventions. Suitability of intensive interventions for individuals is discussed in Section 6.2.

Factors that influence behavioural change

Most individuals are faced by challenges when attempting to change lifestyle behaviours. Tables 6.5–6.7 highlight influences on behavioural change and possible approaches to providing support.

Table 6.5 Social factors that affect individual ability to change health behaviours

Factor	Example of approach to providing support
Cultural factors affecting lifestyle choices and behaviours	Acknowledge the cultural significance of certain food and activities Ensure health messages are culturally appropriate and provide culturally specific resources
Limited access to healthy foods	Provide examples of affordable healthy food choices available locally
Limited understanding of high-energy versus low-energy foods	Provide practical nutrition messages (e.g. cut fat off meat before cooking, reduce sugar intake, increase consumption of fruit and vegetables, grill or boil foods rather than fry)
Limited opportunities for physical activity	Provide advice on increasing incidental activity and moderate-intensity activity (e.g. choosing the stairs, walking to work)
Attitudes to physical activity	Provide advice on locally available resources to support physical activity (e.g. walking groups, culturally appropriate physical activity classes, women-only venues)
Limited access to psychological services (e.g. due to costs or distance)	Consider alternative approaches to psychological support (e.g. telephone or online resources)
Limited access to culturally appropriate health services for follow-up	Involve relevant healthcare professionals to assist in providing culturally appropriate care (e.g. Aboriginal health worker, multicultural health worker, interpreter)
Limited access to healthcare services for follow-up (e.g. due to distance)	Consider referral to community-based program (peer support groups, commercial providers)
Lack of support to change	Involve family or close others in decision-making and interventions

Table 6.6 Physical factors that affect individual ability to make lifestyle changes

Factor	Example of approach to providing support
Reduced fitness due to comorbidities	Promote the benefits of any improvements in fitness Provide advice on types of activity suitable to the individual's level of fitness Advise a gradual increase in activity as fitness improves Consider referral for management of comorbidities (e.g. to dietitian, sleep clinic), taking into account the individual situation
Reduced mobility (e.g. due to obesity or comorbidities)	Promote the benefits of any increase in activity Provide advice on types of activity suitable to the individual's level of mobility Consider referral to a physiotherapist or exercise physiologist
Physical disability	Consider severity of functional limitations, coexisting mental health characteristics and quality of social supports Consider involving relevant allied health professionals (e.g. exercise physiologist, physiotherapist, dietitian, social worker, occupational therapist)

Table 6.7 Psychological factors that affect individual ability to make lifestyle changes

Factor	Example of approach to providing support
Past or current life stressors (e.g. abuse, trauma, grief)	Consider referral to a psychologist
Additional health behaviours that individual wishes to change (e.g. smoking, alcohol intake)	Provide resources to support other lifestyle changes (e.g. referral to quit services, drug and alcohol services) Consider referral to a psychologist
Mood disorders (e.g. depression)	Explore the ways in which mental health affects health behaviours (e.g. lack of motivation) and provide practical advice on enabling change (e.g. healthy foods that are simply prepared) Offer advice on community-based supports Consider referral to a psychologist
Eating disorders (e.g. bulimia nervosa)	Involve relevant healthcare professionals (e.g. psychologist, dietitian)
Serious mental illness (e.g. bipolar disorder, schizophrenia, psychosis)	Involve relevant healthcare professionals (e.g. psychiatrist, psychologist, dietitian)
Intellectual and developmental disability	Provide advice that is suitable to the individual's understanding Involve family and/or carers in discussions about lifestyle change Consider coexisting functional limitations Consider involving relevant healthcare professionals (e.g. dietitian, social worker)

Lifestyle interventions at specific life stages

Pregnancy

Managing weight during pregnancy involves preventing excessive weight gain, while maintaining adequate fetal nutrition. Women should be advised to moderate weight gain depending on their prepregnancy BMI (IOM 2009). See Box 6.3 for advice on developing weight management plans with pregnant women.

Box 6.3

DEVELOPING WEIGHT MANAGEMENT PLANS WITH PREGNANT WOMEN

While weight loss diets are contraindicated during pregnancy, dietary and exercise interventions in pregnancy can reduce maternal weight gain and improve outcomes for both mother and baby

The 2009 US Institute of Medicine recommendations on weight gain in pregnancy are as follows:

BMI	**25.0–29.9 kg/m²**	**30.0–34.9 kg/m²**	**35.0–39.9 kg/m²**	**≥ 40.0 kg/m²**
Weight gain	6.8–11.3 kg	5–9 kg	5–9 kg	5–9 kg

Nutrition during pregnancy should be appropriate to good fetal development and follow the Australian Dietary Guidelines

Low- to moderate-intensity physical activity during pregnancy is associated with a range of health benefits and is not associated with adverse outcomes

Higher level activities may be possible for women who were involved in these before pregnancy and have the required level of fitness. Intensity of activity should be reduced in the third trimester

Lifestyle counselling may reduce maternal weight gain

Very low-energy diets, weight loss medications and bariatric surgery are contraindicated

After pregnancy, extended breastfeeding is recommended. Infants who are breastfed for at least 6 months are less likely to gain excessive weight and develop obesity later in life

Note: *The US IOM recommendations are currently under review.*

Sources: *Asbee et al. 2009; Barakat et al. 2009a,b,c; Barakat et al. 2011a; 2011b; Brown et al. 2002; Campbell et al. 2009; Cavalcante et al. 2009; Haakstad & Bø 2011; Hui et al. 2006; IOM 2009; Montoya Arizabaleta et al. 2010; Phelan et al. 2011; Streuling et al. 2011; Thangaratinam et al. 2012.*

Older people

The approach to lifestyle intervention in older adults is debated, partly because of concern that weight loss could worsen frailty by accelerating the usual age-related loss of muscle (Villareal et al. 2011). However, there is some evidence that the combination of weight loss and regular physical activity provides greater improvement in physical function and reduction in frailty than either intervention alone (Villareal et al. 2011). A recent analysis suggests that women may gain more benefit than men for the same level of physical activity, and that being sedentary is especially harmful for older women (McLaughlin et al. 2011). See Box 6.4 for information on developing weight management plans with older adults.

Box 6.4

DEVELOPING WEIGHT MANAGEMENT PLANS WITH OLDER ADULTS

Multicomponent lifestyle interventions are likely to be the most successful

Dietary advice should reflect evidence-based approaches for weight loss while emphasising good nutrition

Moderate physical activity is important because it can reduce the risk of bone density loss and lessen other adverse health effects of overweight and obesity

Physical activity should be tailored to accommodate chronic disease, sensory deficits or functional limitations

Innovative approaches may be needed to reduce barriers to lifestyle interventions in older adults (e.g. stigma, lack of evidence-based programs, high costs of existing programs)

Source: *McTigue et al. 2006.*

There is insufficient data to evaluate the safety or efficacy of weight loss medication or bariatric surgery in older adults. Rates of adverse surgical outcomes found in younger adults may not be generalisable to older people because chronic disease increases with age, and both age and comorbidity are linked with perioperative risk (McTigue et al. 2006). Limited observational data suggest that bariatric surgery can be safe in the short term in older adults (Sugerman et al. 2004).

6.3.4 Supporting self-management

A self-management approach may support lifestyle change and weight loss. Self-management approaches generally include lifestyle education, individualised approaches to care planning, emphasis on defining the person's goals and suitability for people at different stages of change (Daniels et al. 2009). Self-management techniques are used as part of a multicomponent intervention rather than as a stand-alone intervention.

Examples of self-management approaches associated with weight loss in recent studies include:

- peer-led education on improving self-efficacy in making changes (Parikh et al. 2010)
- intensive weight loss counselling based on self-management principles (Keranen et al. 2009)
- short-term goal setting or action planning and an adapted 'symptom cycle' (Pettmann et al. 2008).

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
14. For adults, include a self-management approach in weight management programs.	**C**	Table C27 Appendix C
Cost and resource implications Practical advice for self-management approaches could be delivered by various healthcare professionals and organisations. Resources such as Lifescripts and other health promotion activities are readily available on the internet. Assistance with developing skills for self-advocacy and self-management requires support and consultation by healthcare or support programs for the individuals. This component may have time and cost implications. Group approaches are similarly effective to individual approaches and may be a more cost-effective option for the healthcare system. Depending on local service providers and access to healthcare professionals, referral to community-based programs may be a cost-effective option for the individual and healthcare system to provide continuing self-management, lifestyle advice and peer support (Jebb et al. 2011; Jolly et al. 2011).		

Self-monitoring of weight is a useful self-management strategy—more frequent self-weighing is associated with greater weight loss and weight gain prevention (Box 6.5) (Vanwormer et al. 2008).

▶ Practice point

m	Regular self-weighing (e.g. weekly) may be a useful component of self-management.

Box 6.5

PRACTICAL ADVICE TO SUPPORT INDIVIDUAL SELF-MANAGEMENT

Identify which changes to work on first

Start by making small changes and work up to your targets

Involve family and friends if appropriate

Identify activities and healthy foods that you enjoy

Monitor your progress (e.g. keep a food and/or exercise diary)

Weigh yourself regularly (e.g. each week)

Reward yourself for meeting each goal (e.g. spend time with a friend)

Don't expect to meet all of your lifestyle change targets straight away

6.3.5 Planning for review and monitoring

The duration over which an intervention is provided and the frequency of contact with a health professional appear to influence the success of weight loss interventions in adults (Hemmingson et al. 2009; Keranen et al. 2009; Littman et al. 2007; Shaw et al. 2006; Tsai & Wadden 2009). The weight loss program should therefore include arrangements for regular review over the period of initial weight loss and continuing monitoring for at least 12 months (see Section 7.2).

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
15. For active weight management in adults, arrange fortnightly review for the first 3 months and plan for continuing monitoring for at least 12 months, with additional intervention as required.	**B**	Table C27 Appendix C

Cost and resource implications

Increased frequency of contact may have resource implications for the health system and the individual. Depending on level of obesity, comorbidities and type of intervention, frequent monitoring can be undertaken by various healthcare professionals, organisations or programs to reduce costs to the individual and healthcare system.

Sustained weight loss is unlikely to result from episodic care but needs to be actively managed and monitored. If the practice is unable to provide a program in-house then referral to a group program, or already established weight loss program to provide ongoing monitoring, structured education, self-management and peer support should be considered.

Discussion of cost and access considerations with the individual should also include provider attendance and availability, transport and suitability for specific activities based on age, life stage and gender.

6.3.6 Referral

Lifestyle interventions are well suited to delivery in primary health care. The role of primary health care in intensive weight loss interventions will depend on the severity of health risk (e.g. the degree of obesity and associated comorbidities), accessibility and cost, and the healthcare professional's availability and expertise in weight management. Referral may be appropriate in a range of situations (see Box 6.6). However, while it might be ideal to refer in these situations, the primary healthcare professional may need to continue overall management if waiting times are long or specialist support is not available. Primary healthcare professionals should maintain a role in monitoring and review of progress, even when the person is referred for specialist care.

Box 6.6

KNOWING WHEN TO REFER

Referral to an allied health professional

When individuals ask for specific information related to weight management or indicate interest in undertaking a specific weight loss program

When community-based programs are available, especially for people with a BMI < 35 and without major comorbidities who are ready for change

When specific health indicators demonstrate increased health risks (e.g. increased blood pressure, lipid profiles, blood glucose) and the individual would benefit from interventions related to weight loss

When the individual's eating patterns are not meeting nutritional requirements (e.g. to a dietitian)

When the individual might benefit from attending a structured group support program

When the individual is having difficulty achieving behavioural change and may benefit from a behavioural weight loss intervention (e.g. to a psychologist)

Referral to specialist support

When the individual has a BMI > 35 kg/m^2 or BMI > 30 kg/m^2 with comorbidities

When comorbidities need specialist management (e.g. musculoskeletal problems, sleep apnoea, fertility problems, type 2 diabetes, eating disorders, depression or other mental health comorbidities)

When a very low-energy diet or weight management medication is recommended (e.g. refer to a specialist weight management clinic)

When bariatric surgery is a consideration (e.g. refer to a specialised bariatric surgery centre)

When an endocrine or syndromic cause is suspected (e.g. refer to an endocrinologist)

Primary healthcare professionals (e.g. practice nurse, social worker) may also need to assist people to address barriers to referral and attendance, including providing information about the cost of programs or attending visits to healthcare professionals, transport, attitudes towards treatment, and time of day that the program or provider is available.

7. Arrange

Key messages

- Frequent review of the weight loss program in the first 3 months allows assessment of its suitability for the individual and support of program goals.
- Long-term weight management is challenging—people need to overcome potent physiological responses that increase hunger and encourage weight regain, as well as resisting a return to weight-promoting lifestyle habits.
- As with weight loss, lifestyle interventions underpin long-term weight management, whether or not more intensive interventions are also used to help prevent or to reverse weight regain.
- Weight regain is common after weight loss. However, the health benefits of weight loss persist even if some weight is regained.
- Long-term monitoring and support are important—longer term approaches to supporting weight management that include frequent contact with healthcare professionals achieve better results.
- Weight management may get easier over time. Once people have maintained a weight loss for 2–5 years, the chances of longer term success greatly increase.

7.1 Review and monitoring

The early stages of the weight loss program provide an opportunity for establishing a sustainable approach to lifestyle change. Frequent review at this time may also support more rapid weight loss. Continuing review for 12 months and more aims to ensure that the weight loss program remains appropriate, comorbidities are monitored and people are supported through the challenges associated with long-term weight management.

7.1.1 Early review of the suitability of the weight loss program

A weight loss program that is specific to the individual should achieve some weight loss in the first weeks of intervention. Early review includes assessing whether:

- the person is facing challenges in keeping to the eating plan (e.g. whether the plan is suitable in terms of individual preferences and includes foods that are available and affordable)
- the type of physical activity being undertaken is suitable to the person's level of fitness and opportunities are available to increase physical activity (e.g. walking groups, community facilities)
- psychosocial support, including psychological therapy, is available and accessible
- any negative occurrences have resulted from the weight loss program (e.g. weight gain, worsening of comorbidities).

This early review can be by a practice nurse, allied health professional or community-based program leader, and conducted individually or in a group.

▶ Practice point

n	The weight loss plan should be reviewed after 2 weeks to determine its suitability for that individual and to assess whether it needs to be modified.

7.1.2 Review in the first 3 months

Frequent (e.g. fortnightly) review should continue through the first 3 months of a weight loss program (Shaw et al. 2005; Littman et al. 2007; Hemmingsson et al. 2009; Keranen et al. 2009; Tsai & Wadden 2009). A 3-month medical review may include:

- calculating BMI and measuring waist circumference, and comparing these to baseline measurements and anticipated weight loss and targets
- tracking progress towards goals (e.g. whether health behaviours have changed)
- monitoring changes in risk factors and comorbidities
- reviewing the plan for care
- providing support and encouragement.

For adults who are overweight and have comorbidities or who are obese, and who do not lose weight in the initial stages of the weight loss program, additional intensive weight loss measures may be indicated, both for weight loss and to support motivation (see Section 6.2). Referral to healthcare professionals or services with expertise in obesity management should also be considered (see Section 6.3.6).

▶ Practice point

o	If there is no weight loss (less than 1% body weight or no change in waist circumference) after 3 months of active management, lifestyle behaviours and causes of weight gain should be reviewed. Intensive weight loss interventions may also be considered depending on degree of overweight or obesity and whether comorbidities are present.

7.1.3 Continuing support

While contact with and support for the person may decrease after the first, intensive 2–3 months, long-term monitoring and support are essential to weight management programs (Anderson et al. 2001).

The rate of weight loss can be expected to decrease or plateau after the initial stages as a result of physiological adaptation (see Section 7.2). The individual trying to lose weight may regard this is as failure of an intervention, because it can occur while they are still restricting energy intake and exercising regularly. Continuing support and encouragement are needed, including reiterating that even modest amounts of weight loss improve health, and that rates of weight gain and loss vary widely between individuals.

Where people continue to have difficulty losing weight or maintaining a new lower weight, healthcare professionals should be aware of the possibility of psychological issues, including eating disorders.

Continuing monitoring and support of weight management will also involve reviewing a range of health indicators (e.g. blood pressure, lipid profile), and managing the consequences and complications of overweight and obesity.

Referral to allied health professionals or specialists may be appropriate in a range of situations (see Box 6.6, Section 6.3.6).

7.2 Long-term weight management

When realistic treatment goals have been reached—for example, 5% of body weight lost or blood pressure lowered by a clinically significant amount—it is important to discuss strategies for managing weight in the longer term, including preventing weight regain.

Weight regain is common after weight loss achieved by lifestyle interventions, with studies finding (Cooper et al. 2010; Dansinger et al. 2007; Martin et al. 2008):

- weight lost is usually regained by 5 years of follow-up
- weight regain to pre-intervention weight occurs regardless of whether the participant has overweight or class I, II or III obesity, and in participants with normal blood sugar, prediabetes and type 2 diabetes.

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
16. For adults who achieve initial weight loss, strongly recommend the adoption of specific strategies, appropriate to their individual situation, to minimise weight regain.	**A**	Table C27 Appendix C
Cost and resource implications Discussing strategies with healthcare professionals may incur time and consultation costs. Various intensive interventions to manage weight in the long term may also be required incurring significant additional costs to the individual. Group programs that provide ongoing structured education, self-management skills and peer support may also be considered to offset some of the cost and resource issues to the individual and healthcare system. Evaluated commercial programs may also be appropriate for people who are 'ready for change', without major comorbidities and whose BMI is < 35 kg/m^2.		

Weight regain is not caused simply by people resuming former lifestyle habits—instead, it has a strong physiological basis. The adaptation that causes slowing of weight reduction in the weight loss phase also causes weight regain in the longer term. The changes in energy balance regulation in the body that lead to reduced energy expenditure persist for at least one year (Rosenbaum et al. 2008). Increasing evidence indicates that changes in appetite-regulating hormones also occur after diet-induced weight loss, including decreased levels of leptin, insulin, cholecystokinin, triiodothyronine (T3) and an increased level of ghrelin. Many of these changes would be expected to reduce feelings of fullness after eating (satiety) and increase hunger (Sumithran & Proietto 2008). Recent evidence suggests that the changes in hormones do not reverse for at least one year after initial weight loss (Sumithran et al. 2011).

These findings indicate that, for successful long-term weight management, people must overcome strong physiological responses that encourage weight regain, as well as resisting a return to weight-promoting lifestyle habits.

Disordered eating patterns (including binge eating and strict dietary restriction), body dissatisfaction, inflexible thinking style, and eating to regulate mood or avoid negative affect are all associated with greater likelihood of weight regain (Byrne et al. 2003; Foster et al. 1998; Kayman et al. 1990). People's social context, including their level of peer and family support, also influences their ability to manage their weight.

Despite the evidence highlighting the challenges, there is evidence that long-term weight management is possible when specific strategies are identified and followed (Wing & Phelan 2005). There is also evidence that the health benefits of weight loss (e.g. preventing type 2 diabetes) are maintained in the longer term, even if there are some relapses (Ilanne-Parikka et al. 2008; Uusitupa et al. 2009). Table 7.1 gives some examples of factors influencing long-term weight management.

Table 7.1 Examples of barriers to and predictors of successful long-term weight management

Barriers to successful long-term weight management	Predictors of successful long-term weight management
Physiological adaptation to energy deficit	Continued healthy eating plan
Waning motivation to sustain lifestyle change	High levels of regular physical activity
Resumption of old habits	Continued contact with health professional
Depressive symptoms	Self-monitoring of body weight
Negative peer and family influence	Peer and family support

Sources: *Butryn et al. (2007); Ulen et al. (2008); Wadden et al. (2011); West et al. (2011)*

7.2.1 Discussing long-term weight management

Preventing weight regain may be a more useful focus than trying to lose more weight, as being satisfied with the amount of weight that has been lost supports long-term weight management. Also, even when weight management is successful, modest weight regain and weight fluctuations are common (Phelan et al. 2003). Acting quickly is critical because of the difficulty of reversing even small weight regains (Wing et al. 2008).

Clear messages are needed, so the individual understands that:

- after weight loss, the body is 'hardwired' to encourage weight regain, so hunger may increase
- preventing weight regain can be even more challenging than losing weight, especially during the first year
- weight regain is very common and is not a sign of failure
- some benefits of weight loss persist even if a small amount of weight is subsequently regained
- it may be helpful to set a weight regain limit at which advice from a healthcare professional is sought
- if a weight regain limit is attained, it is important to continue to make sustainable lifestyle changes and possibly consider one or more intensive interventions.

▶ Practice point

p	For long-term weight management, adults can be advised of the importance of taking action (e.g. seeing a healthcare professional) when small amounts of weight (approximately 3 kg) have been regained. If there is weight regain, consideration should be given to reassessing energy intake and physical activity, and re-intervening with weight loss strategies.

Successful weight management strategies

An American national database of self-reported long-term weight management identified the following weight management strategies as being successful (Wing & Phelan 2005):

- maintaining high levels of physical activity and limiting sedentary activities (e.g. television viewing)
- eating a diet low in kilojoules
- regularly eating breakfast
- maintaining a consistent eating pattern throughout the week and year
- identifying triggers of emotional eating and developing alternative strategies for regulating mood
- frequently monitoring weight
- catching lapses before they become large-scale weight gains.

Some studies support the value of 200–300 minutes a week of physical activity to reduce weight gain after weight loss, and it appears that 'more is better' (ACSM 2009).

While there is overlap between weight loss and long-term weight management strategies, practices that lead to weight loss might differ from those that help people manage weight in the longer term. In a cross-sectional survey of American adults who were successful at maintaining weight loss for one year, the following practices were associated with maintaining weight loss but not with initial weight loss (Sciamanna et al. 2011):

- following a consistent exercise routine
- rewarding themselves for keeping to their eating or physical activity plan
- reminding themselves why they need to control their weight.

While most of these strategies involve self-management, healthcare professionals have an important role in continued monitoring (e.g. through regular visits) to review weight and behaviours, provide continuing support, reinforce lifestyle and behavioural advice, and discuss intensive interventions when needed.

Phone counselling and internet-based interventions can be used to augment long-term weight management (Cussler et al. 2008; Flogdren et al. 2010; Neve et al. 2010; Svetkey et al. 2008).

▶ Practice points

q	Long-term weight management may be more successful if it involves a self-management approach, continuing contact with healthcare professionals and behavioural strategies for maintaining motivation.
r	Self-management strategies for long-term weight management may include maintaining a healthy lifestyle, identifying ways to manage hunger, setting and reviewing goals, and regular self-weighing.

7.2.2 Developing a long-term weight management program

As with weight loss, the type and intensity of the long-term management program will depend on a range of individual characteristics. Given the complex interaction of factors causing weight regain, the program should be sensitive to individual needs and differences, and allow people to adopt behavioural changes that suit their lifestyle (Stubbs et al. 2011).

Although the ideal outcome is to stabilise at the new lower weight, this may not be possible. If this is the case, the aim should be to delay weight regain for as long as possible (Ulen et al. 2008).

Lifestyle interventions underpin long-term weight management and, for many people who regain weight, re-intervention with more intensive lifestyle changes is sufficient. Interventions to manage psychological issues may be required if the person has a mental health comorbidity (e.g. eating disorder, depression) or is continuing to find behavioural change difficult.

Weight management may get easier over time. Once people have maintained a weight loss for 2–5 years, the chances of longer term success greatly increase (Wing & Hill 2001).

Very low-energy diets, pharmacotherapy and bariatric surgery may be options where people are unable to manage the increased hunger that follows weight loss, and/or if obesity and/or comorbidities are causing health risks (see Section 6.2).

Lifestyle interventions that are combined with pharmacotherapy result in less weight regain than lifestyle interventions alone (Franz et al. 2007; Padwal et al. 2003; Ryan et al. 2010; Turk et al. 2009). However, by 10 years' follow-up, most weight that was lost has been regained, regardless of whether weight was lost by lifestyle intervention or pharmacotherapy (Knowler et al. 2009).

In people with Class III obesity, bariatric surgery is associated with less weight regain than lifestyle interventions or pharmacotherapy. Weight loss appears to be greatest in the first year after surgery but continues for 2–3 years (Buchwald et al. 2009; Padwal et al. 2011). After this, weight regain appears to occur. However, weight loss of at least 16% can be maintained at up to 10 years' follow-up (Picot et al. 2009).

7.2.3 Long-term review and monitoring

Studies involving long-term support have had some success in preventing regain to baseline weight (Wadden et al. 2011). Planning for review and monitoring should include discussion about:

- the intensity of the program and schedule of visits
- the scope of self-monitoring and what will be reviewed at regular visits
- the availability and benefits of participation in a weight management program in the community or person's workplace.

8. Practice guide

8.1 Assessment

Box 8.1

CHECKLIST FOR ASSESSMENT IN ADULTS

When—At all health visits (depending on interval between appointments).

Who—GPs, practice nurses, other primary healthcare professionals (e.g. allied health professionals).

Provide context for assessment—Explain that weight measurement is a routine part of health visits to assist people who may benefit from advice about weight management.

Assess for overweight or obesity—Measure height and weight, and calculate and classify the BMI. Also consider measuring waist circumference to inform assessment of health risk.

Assess health behaviours—Assess energy balance by asking about dietary behaviours and levels of physical activity, and factors that may influence these behaviours.

Assess for comorbidities—Follow current Australian guidelines to assess risk of cardiovascular disease and type 2 diabetes. Also assess for other physical and mental health comorbidities (e.g. mood or eating disorder).

Use clinical judgement—Take into consideration factors that influence the accuracy of measurements in predicting future health risk (e.g. body fat to lean mass ratio, age, ethnicity).

If weight management is required, discuss readiness to change—Questions about interest and confidence in changing health behaviours, and the benefits and difficulties of losing weight may assist the discussion.

Ask about weight history—Questions about previous weight loss attempts can assist in decision-making about current weight management.

Provide information—Give information about assessment and tests in a way that is appropriate and accessible to the individual, with particular attention to language and literacy.

Arrange intervention or referral if required—Discuss appropriate interventions and assist with arrangements for the chosen interventions to take place.

8.1.1 Case studies

The following case studies are examples of appropriate responses to assessments of adults in primary health care.

Case study 8.1

A 30-year-old woman visits her GP as she has been having trouble sleeping and is experiencing fatigue. Routine assessment of BMI during the consultation identifies that the woman is overweight (BMI 28.9). The assessment also includes waist circumference (82 cm), current medications (none) and smoking status (planning on quitting). The remainder of the consultation is concerned with the woman's sleeping problems.

Assessment: *Overweight with increased risk of comorbidities.*

Examples of appropriate action

Advise:

Promote the benefits of healthy lifestyle (e.g. use Lifescripts for physical activity, nutrition and weight management), including improving sleep and preventing weight gain.

Arrange:

A subsequent appointment within the next month where more detailed assessment—for example, risk of comorbidities such as depression, weight history and readiness to change—can be carried out and interventions discussed as appropriate.

Case study 8.2

A 22-year-old man visits his GP as he is worried about his recent weight gain. Since his last visit, the man has gained 4.5 kg, with a BMI change from 24.8 kg/m^2 to 26.5 kg/m^2. He is physically active and reports a balanced diet. However, at the last visit he was referred to the local mental health service for a mental health assessment, which led to a diagnosis of bipolar disorder. He has been taking sodium valproate for the past 15 weeks.

Assessment: *Overweight with risk of continuing weight gain due to sodium valproate.*

Examples of appropriate action

Advise:

Explain that weight gain is associated with use of sodium valproate, and provide advice on increasing physical activity and reducing dietary intake.

Discuss the need to keep taking sodium valproate as directed and to discuss medications at his next mental health visit.

Arrange:

Lifestyle interventions involving a range of healthcare professionals (e.g. dietitian, exercise physiologist).

Advice to mental health service on action taken.

Follow-up appointment in 2–4 weeks to review progress.

Assessment for hyperlipidaemia and type 2 diabetes.

Case study 8.3

A 35-year-old Aboriginal man has attempted to quit smoking a number of times and attends the Aboriginal medical service for advice on nicotine replacement therapy. He has gained 8 kg in the last few months, and has a BMI of 30 kg/m^2 and a waist circumference of 97 cm.

Assessment: *Obese with high risk of comorbidities.*

Examples of appropriate action

Advise:

Congratulate the man on attempting to quit and acknowledge that it often takes many attempts before success.

Explain the health benefits of weight management and the high risk of type 2 diabetes associated with being overweight.

Assist:

Discuss approaches to stopping smoking (e.g. using the smoking Lifescript for Aboriginal and Torres Strait Islander peoples).

Explain that giving up smoking may cause weight gain.

Provide information about local healthy lifestyle programs.

Arrange:

Another appointment in 2–4 weeks for further assessment and review of progress.

Involvement of family in the subsequent consultation (following the man's preferences).

Cardiovascular disease and type 2 diabetes risk assessment.

Referral to a dietitian for a diet assessment.

8.2 Supporting weight loss

Box 8.2

CHECKLIST FOR DEVELOPING WEIGHT LOSS PROGRAMS WITH ADULTS IN PRIMARY HEALTH CARE

When—At all health visits after weight loss goals have been agreed to.

Who—GPs, practice nurses, other primary healthcare professionals (e.g. allied health professionals).

Provide context for weight loss—Explain that the health benefits of lifestyle change go beyond weight loss and that even modest amounts of weight loss contribute to improved health.

Discuss lifestyle change—Identify lifestyle changes the person would like to start with. Encourage small changes initially to increase confidence and chance of successful change (e.g. for those not regularly active suggest they start with 5 or 10 minutes a day and work up to more time each week).

Agree goals—Explain that modest amounts of weight loss improve health, and that goals should include health improvements and behavioural change as well as weight loss.

Encourage self-management—Discuss the role of effective self-management in weight loss, along with continuing contact with healthcare professionals.

Provide information—Give information about weight loss in a way that is appropriate and accessible to the individual, with particular attention to language and literacy.

Arrange referral if required—Depending on the complexity of the case and your own expertise, consider referral to other services.

8.2.1 Case studies

The following case studies are examples of supporting weight management in adults in primary health care.

Case study 8.4[a]

A 42-year-old woman with a BMI of 42.1 kg/m^2, type 2 diabetes and a history of difficulty in managing her weight says she is struggling with her diet and physical activity regimen after 1 month, and her diabetes has not improved. She says that she has considered adjustable gastric banding but cannot afford it.

Assessment: *Obese with comorbidities.*

Examples of appropriate action

Advise:

Explain the importance of weight loss in diabetes control.

Discuss the limited availability of public sector health services that provide bariatric surgery and explain that weight loss now will not preclude her from having surgery later if it remains indicated.

Discuss alternative intensive interventions—a very low-energy diet will have an immediate effect on her diabetes and achieve weight loss, and may be followed by medication to assist with weight maintenance. If these interventions are not successful, bariatric surgery may be a consideration.

Assist:

Review insulin dose.

Agree on interventions and provide advice on risks and benefits.

Arrange:

Referral to specialist (e.g. dietitian, specialist weight management clinic, diabetes educator).

Another appointment in 2 weeks to review progress and monitor comorbidities.

3-monthly appointments in diabetes/lifestyle clinic with practice nurse.

a Adapted from Proietto & Baur 2004.

Case study 8.5

A pregnant woman sees a midwife at 12 weeks gestation for her first antenatal care visit. She reports a prepregnancy weight of 75 kg (BMI 29.3 kg/m^2) and has since gained 5 kg.

Assessment: *Overweight, requires weight management appropriate for pregnancy.*

Examples of appropriate action

Advise:

Discuss the importance of nutrition during pregnancy and the amount of weight gain that is considered healthy for a woman with her prepregnancy BMI.

Assist:

Explain that weight loss is not appropriate during pregnancy but that she should aim to moderate weight gain (e.g. to less than 11.5 kg—see Box 6.3).

Provide advice on appropriate physical activity and healthy eating during pregnancy.

Promote the benefits of a healthy lifestyle (e.g. use Lifescripts).

Arrange:

A follow-up appointment (with a midwife or the woman's GP) for assessment of risks associated with overweight in pregnancy (e.g. hypertension, gestational diabetes).

Review of weight at the next antenatal visit if this is likely to influence clinical management.

8.3 Review and continuing care

Box 8.3

TIMELINE OF WEIGHT LOSS IN ADULTS	
Person is ready to lose weight	Provide advice on health benefits Discuss and support lifestyle intervention
2 weeks	Review weight management program for suitability to individual
Fortnightly review	Behavioural change Weight change Change in risk factors or comorbidities
3 months **Regular review up to 12 months** **Continuing review until weight loss is achieved**	Review weight change and behavioural change Reassess energy intake and expenditure Review suitability of lifestyle approaches Consider need for intensive weight loss intervention Provide support and encouragement
Weight loss is achieved	Advise self-management strategies to prevent/minimise weight regain Consider re-intervention if approximately 3 kg is regained (see Section 7.2) Provide support and encouragement

Box 8.4

CHECKLIST FOR SUPPORTING LONG-TERM WEIGHT MANAGEMENT IN ADULTS

When—At all health visits after weight loss goals have been reached.

Who—GPs, practice nurses, other primary healthcare professionals (e.g. allied health professionals).

Provide context for long-term weight management—Explain that continuing weight management is a new phase of management that is just as important as reducing weight, and that weight regain should be minimised because even small amounts of regained weight are difficult to reverse.

Encourage self-management—Discuss the role of effective self-management in weight maintenance, along with continuing contact with healthcare professionals.

Discuss long-term weight management strategies—Encourage development of and adherence to routines, including regular self-weighing, healthy eating and regular physical activity, and monitoring situations or emotions that promote eating.

Provide information—Give information about weight maintenance in a way that is appropriate and accessible to the individual, with particular attention to language and literacy.

Arrange reintervention or referral if required—If the person regains about 3 kg, discuss appropriate re-intervention and assist with arrangements for the chosen intervention to take place.

8.3.1 Case studies

The following case studies are examples of supporting long-term weight management in adults in primary health care.

Case study 8.6

At an initial contact, a 62-year-old woman seeks assistance with weight loss having been unable to lose weight she put on after menopause (95 kg; BMI 33.6 kg/m^2). She has slightly elevated fasting glucose, hypertension and mild dyslipidaemia, and is referred to a dietitian, given an energy-restricted, low-fat eating plan and advised to take up regular walking. At 1-month review, she weighs 93 kg and at 3 months, 89 kg. At 6 months she weighs 85 kg and feels well, though hungry.

12 months later she attends again, having been overseas for 6 months. She has regained weight and now weighs 94 kg. The thought of restarting the eating plan does not appeal to her.

Assessment: *Obese with increased cardiovascular risk.*

Examples of appropriate action

Advise:

Explain that she should focus on healthy nutrition and maintaining her fitness as well as weight loss to reduce her risk of cardiovascular disease and diabetes.

Assist:

Discuss ways to reduce dietary fat intake and increase fitness (e.g. add regular swimming and gym sessions to her regular walking).

Arrange:

Review in 3 months to check blood pressure, fasting glucose and lipids.

Case study 8.7

A 53-year-old woman has had considerable success in reducing her weight through lifestyle interventions over the previous few years, but is finding it increasingly difficult to keep the weight off. This period coincided with her menopause and her children leaving home. She says she feels like a failure and is experiencing episodes of depression. Her BMI is currently 29 kg/m^2 and her health is good.

Assessment: *Overweight with comorbidity.*

Examples of appropriate action

Advise:

Explain that weight regain is common as the body 'protects' its weight and hunger increases.

Also explain that many women put on weight around menopause, often due to reduced physical activity.

Investigate reasons for eating (e.g. hunger, emotional reasons).

Identify the lifestyle changes that worked for her in the past, and explain that she might need to adopt these again and try some new approaches.

Assist:

Discuss self-management approaches (e.g. using a pedometer and weekly self-weighing to monitor weight).

Arrange:

Referral to an exercise physiologist.

Referral to a mental health professional.

Follow-up appointment in 2–4 weeks (after her specialist appointment and mental health assessment) to review progress (e.g. with practice nurse).

Case study 8.8

A 61-year-old man presents for a routine health check. He weighs 94 kg, has a BMI of 30.7 kg/m^2 and waist circumference of 112 cm. He is constantly tired and has a history of snoring. Assessment by the GP identifies elevated blood glucose and hypertension. He is then included in a lifestyle/ weight management program provided by the practice nurse. After almost 5 years involvement in the program, he has lost 10.5 kg, and has a BMI of 26.7 and waist circumference of 95 cm. His snoring has stopped, energy levels have increased and blood glucose is normal.

Assessment: *Obese with comorbidities self-managing with practice nurse support.*

Examples of appropriate action

Advise:

Continue to engage the man to assist motivation to sustain change.

Assist:

Support self-management (e.g. through SMART goal setting, self-monitoring).

Arrange:

Follow-up visit in 6 months for review of weight management and hypertension.

Case study 8.9

A 32-year-old woman with a BMI of 34 kg/m^2 was prescribed a very low-energy diet and lost 15 kg in 12 weeks. When she attends for review 8 weeks later, she has regained 2 kg although she has maintained increased physical activity levels.

Assessment: *Weight regain after very low-energy diet.*

Examples of appropriate action

Advise:

Explain that it is not uncommon to gain some weight after stopping the very low-energy diet, but that taking action to stop further weight regain is important because it is difficult to reverse.

Assist:

Discuss self-management approaches including continued healthy eating, regular physical activity, weekly self-weighing to monitor weight and regular contact with a healthcare professional.

Assess peer and family support points.

Discuss the use of medication to prevent weight regain.

Arrange:

Referral to a dietitian.

Follow-up appointment in 2–4 weeks.

Case study 8.10

A 65-year-old man in a rural area has visited his local GP for regular review since his gastric banding 2 years ago, and has been consistently losing weight during this time. When he does not attend his scheduled appointment, a reminder letter is sent and an appointment arranged. The man says he did not attend as he has had very little energy. He has stopped being physically active due to the fatigue, has been drinking high-kilojoule drinks when hungry and has started regaining weight.

Assessment: *Weight regain following gastric banding.*

Examples of appropriate action

Advise:

Emphasise the benefits of maintaining physical activity and reducing intake of high-energy foods.

Assist:

Discuss appropriate supplementation of vitamins and minerals, and review current supplements.

Arrange:

Assessment of calcium, vitamin B12, ferritin, folate and iron.

Follow-up appointment with practice nurse in 2–4 weeks.

Annual review by the surgeon who performed the procedure.

Part C

Children and adolescents

9. Ask and assess

Key messages

- For children and adolescents, body mass index (BMI) is not a fixed measure. It varies as body composition changes with normal growth and stage of puberty. It also differs between males and females.
- Interpretation of BMI values in children and adolescents aged 2–18 years is based on sex-specific BMI percentile charts. Adult BMI thresholds are used for adolescents older than 18 years of age.
- Growth of children less than 2 years of age is monitored using World Health Organization (WHO) growth charts.
- While waist circumference may not have a place in screening for overweight and obesity in children and adolescents, a waist circumference that is greater than half the height suggests a need for more thorough weight assessment.

9.1 Discussing weight with children, adolescents and parents

Weight may be a sensitive topic for children and adolescents, particularly if they have experienced weight-related teasing or bullying. Parents may not have an accurate understanding of what is considered overweight or obese, or may be reluctant to raise the topic with healthcare professionals. Communication should focus on the benefits of healthy lifestyle behaviours for the whole family rather than on the weight of the child or adolescent.

Box 9.1

TIPS FOR DISCUSSING WEIGHT ASSESSMENT WITH PARENTS AND CHILDREN

Ask permission from the parent or carer to discuss and assess the child's weight

Explain that assessing weight is standard practice in primary health care, and involves measuring weight, height and waist circumference

Explain how overweight and obesity are classified, and that if these are identified, changes to family health behaviours are the main goal

Avoid language that is discriminatory or stigmatising

Consider involvement of other professionals (e.g. Aboriginal health worker, multicultural health worker, interpreter) to facilitate communication

In adolescents, discussion is facilitated when a healthcare professional has appropriate communication skills, is culturally responsive and is able to gain the trust of the young person (WHO 2002).

Box 9.2

TIPS FOR FOSTERING ENGAGEMENT WITH ADOLESCENTS

Speak to the adolescent with and without his or her parent or carer

Treat him or her as responsible and capable of contributing to decision-making

Use language that is clear and easily understood, and avoid jargon

Check regularly that what you are saying has been understood

Avoid being judgemental by showing empathy and tolerance while still expressing concern for the young person's wellbeing

Engagement might wax and wane, and requires attention throughout care

***Source**: Adapted from Chanen & McCutcheon (2008)*

9.2 Identifying overweight and obesity

Community-based services may play a role in identifying children who are gaining weight quickly, but assessment for overweight or obesity generally takes place in a service that can provide more comprehensive assessment (e.g. general practice).

Children and adolescents often attend a primary healthcare facility with a parent or carer unless they are older adolescents. Assessment of overweight and obesity in children or adolescents is usually undertaken with the parent or carer present.

9.2.1 Assessing and monitoring weight

Weight status in children and adolescents (up to 18 years) needs to be assessed using age- and sex-specific reference values, as the appropriate ratio of weight to height varies during development. It is now widely accepted practice to use BMI-for-age reference values, rather than weight-for-age or weight-for-height, which have been widely used in the past. These reference values, which are often turned into growth charts, are usually derived from the distribution of observed normal values in a population presumed to be healthy. Reference values have been developed by WHO, the United States Centers for Disease Control and Prevention (US-CDC) and the International Obesity Taskforce.

The choice of reference values or charts depends both on the age of the children and the purpose of classification (e.g. clinical or epidemiological). For individuals, single measurements are unlikely to be sufficiently informative, and other factors (e.g. growth trajectory, centile crossing) should be considered.

Children and adolescents aged more than 2 years

There is widespread international support for the use of BMI to define overweight and obesity in children more than 2 years old (e.g. NICE 2006; NZ MOH 2009b; SIGN 2010). Recommendations based on the International Obesity Taskforce approach to defining childhood obesity are associated with lower sensitivity, and sensitivity differs between boys and girls (Reilly et al. 2000).

BMI in children and adolescents is calculated as for adults (see Box 9.3). As BMI varies with age due to changes in the rates of growth and weight gain, age- and sex-specific thresholds and clinical judgement of the individual situation are required. Interpretation of BMI values in children and adolescents depends on comparisons with population reference data. Use of the US-CDC BMI percentile charts is recommended in Canada and the United States (August et al. 2008; Lau et al. 2006) and has been previously recommended in Australia (NHMRC 2003a). In the United Kingdom, use of national charts is recommended (NICE 2006; SIGN 2010).

In 2012, the Australian Health Ministers' Advisory Council (AHMAC) agreed to adopt the WHO growth charts for children aged 0–2 years. At the time of publication of these Guidelines, AHMAC had not yet considered recommendations for growth reference cut-offs for children aged 2–18 years.

In the absence of nationally agreed growth charts to monitor children aged 2–18 years, either the US-CDC or the WHO charts are used in current (January 2013) Australian practice.

While the US-CDC BMI percentile charts are more commonly used in Australian practice, the important factor is that children and adolescents are consistently monitored against the same chart over time, and not across different charts. Caution should be taken to ensure that the same charts are used when comparing prevalence figures for overweight and obesity between different states and territories.

The US-CDC categorises overweight as BMI between the 85th and 95th percentiles, and obesity as above the 95th percentile. The WHO categorises overweight as between the 85th and 97th percentiles and obesity as above the 97th percentile. These categories are not diagnostic, but rather are intended to contribute to the overall clinical impression of the child being measured. The charts (see Chapter 13) were developed for monitoring growth in children and adolescents aged 2–19 years (WHO) or 2–20 years (US-CDC). In Australia, adult classification of BMI is used for adolescents older than 18 years.

▶ Practice point

S	For children aged 2 to 18 years, use a BMI percentile chart to monitor growth, either US-CDC or WHO. Ensure that the same chart is used over time to allow for consistent monitoring of growth.*

* *This practice point is made pending a decision by AHMAC on growth reference charts in Australia for children aged 2–18 years.*

Box 9.3

MEASURING WEIGHT AND HEIGHT IN CHILDREN MORE THAN 2 YEARS OF AGE

Weight

Use a regularly calibrated scale on a hard, level surface

Ask the child or adolescent to remove shoes and heavy outer garments (coat, jacket)

Ask the child to stand centred on the scale with weight evenly on both feet and without moving

Record the weight

Height

Use a height rule with attached headboard

Ask the child to remove shoes, heavy outer garments, and hair ornaments

Ask the child to stand with back to the stadiometer (or height rule) with attached headboard, stand straight and look directly ahead

Lower the headboard to lightly rest on the child's head and bend to child's height to avoid parallax error

Record height

***Source**: Adapted from Tolonen et al. (2002)*

Infants and children aged up to 2 years

For infants and children aged up to 2 years, growth is monitored based on age, length and weight. The US-CDC recommends the use of WHO charts to plot growth, recognising that patterns of growth may not always follow the curves (CDC 2010). The rapidity of weight gain and whether the infant is breast or formula fed are considerations. The WHO charts are included in Chapter 13.

▶ Practice point

t	For children younger than 2 years of age, use WHO charts to monitor growth.

9.2.2 Waist circumference

International guidelines do not recommend measuring waist circumference alone to identify overweight and obesity in children, because data are lacking on its effectiveness either combined with BMI (Katzmarzk et al. 2007; Reilly et al. 2010) or as an alternative to BMI (NICE 2006; Reilly et al. 2010).

As the relationship between waist measure and metabolic complications in children and adolescents also remains undefined, there are no universally accepted thresholds for increased risk. A waist-to-height ratio of ≥ 0.5 may be useful in predicting cardiovascular risk and is easy to calculate (Box 9.4) (Garnett et al. 2008). In children as young as 6 years old, measurement of waist circumference represents a simple, non-invasive screening tool to identify increased cardiovascular risk (Watts et al. 2008). Waist circumference may also be useful in longitudinal assessment of weight management.

▶ Practice point

u	Waist:height ratio of ≥ 0.5 may be used to guide consideration of the need for further assessment of cardiovascular risk in children.

Box 9.4

MEASURING WAIST CIRCUMFERENCE

Ask the child to remove heavy outer garments, loosen any belt and empty pockets

Ask the child to stand with their feet fairly close together (about 12–15 cm) with their weight equally distributed, and to breathe normally

Holding the measuring tape firmly, wrap it horizontally at a level midway between the lower rib margin and iliac crest (approximately in line with the umbilicus). The tape should be loose enough to allow the measurer to place one finger between the tape and the child's body at the navel

Record the measurement on an exhalation

***Source**: Adapted from Tolonen et al. (2002)*

9.3 Other factors in assessment

The likelihood that childhood overweight and obesity will persist into adulthood increases with the age of the child and with the presence of parental obesity. Initial assessment should determine current health problems and risks for future disease.

9.3.1 History

History taking in the context of weight assessment includes the child's or adolescent's developmental history, physical and mental health, and current health behaviours. A full history relevant to the assessment of overweight and obesity is outlined in Box 9.5.

Box 9.5

MAIN POINTS IN ASSESSING HISTORY OF CHILDREN AND ADOLESCENTS WHO ARE OVERWEIGHT OR OBESE

Developmental history

Age

Type of delivery, birth weight and length, gestational age at birth, maternal gestational diabetes

Infant feeding, including duration of breastfeeding

Growth and development (e.g. age at which the child walked, talked)

Schooling (e.g. need to repeat a year)

Physical and mental health

Weight history including precipitating events, previous weight management interventions, previous and current eating behaviours, recent weight loss or gain

Onset of obesity, previous weight management interventions

Physical conditions associated with overweight (e.g. constipation, joint problems)

Physical disability affecting mobility

Intellectual or developmental disability

Mental health (e.g. depression, anxiety, low self-esteem, eating disorder) and social experience (e.g. isolation, bullying)

Past medical history including any previous or present need for multidisciplinary treatment

Family history of obesity, type 2 diabetes, gestational diabetes, hypertension, dyslipidaemia, cardiovascular disease, sleep apnoea, polycystic ovary syndrome, bariatric surgery, eating disorders

Medications that may contribute to weight gain (e.g. glucocorticoids, psychoactive agents)

Sleeping routine and presence of snoring

Menstrual history for girls

Health behaviours

Dietary intake (especially high intake of sugar-containing drinks and high-energy foods, and low intake of fruit and vegetables)

Previous and current dietary behaviours—for example, recurrent episodes of dieting, signs of pathological hyperphagia (such as eating large portions very quickly, being difficult to distract from food) and signs of disordered eating (such as binge eating)

Dietary patterns—for example, eating breakfast and regular meals, snacking, eating prepared foods outside the home (eating out, take-away)

Levels of physical activity and sedentary activity (e.g. hours spent in screen-based activities per day)

Family capacity to make and sustain behavioural changes, and support behavioural change

▶ Practice point

✓	Assist children and adolescents to get help for disordered eating, poor body image, depression and anxiety, and weight-related bullying where these are present.

9.3.2 Clinical assessment

Clinical assessment aims to identify possible causes for overweight or obesity, and indicators of comorbidities (see Box 9.6).

Box 9.6

MAIN POINTS IN ASSESSING CHILDREN AND ADOLESCENTS WHO ARE OVERWEIGHT OR OBESE

Pubertal stage (e.g. using Tanner staging)

Acne and hirsutism

Blood pressure (with appropriate cuff size)

Morning headache and visual disturbance (potential benign intracranial hypertension)

Abnormal gait, problems with feet, hips and knees, difficulties with balance and coordination

Gastrointestinal symptoms (vomiting, abdominal pain, constipation, gastrointestinal reflux)

Nocturnal enuresis and daytime dribbling

Hip and knee joint pain

Presence of intertrigo

Presence of hepatomegaly

Signs of dysmorphism

Thyroid function (e.g. presence of goitre)

Acanthosis nigricans (velvety, light brown-to-black markings usually on the neck, under the arms or in the groin), which suggests significant insulin resistance

Short stature, a low growth velocity, or bruising or purple striae (may indicate an endocrine cause for weight gain)

Dental health

Underlying causes of overweight and obesity (e.g. hypothyroidism, Cushing syndrome, growth hormone deficiency, Prader–Willi syndrome) should also be considered (SIGN 2010). A more specialist assessment may include metacarpal length, scoliosis and visual fields, and blood tests and/or referral to a specialist centre may be indicated.

9.3.3 Need for referral before intervention

Following an initial assessment in primary health care, further assessment and lifestyle intervention are warranted in many children. When BMI is well above the 95th percentile (US-CDC) or 97th percentile (WHO), comorbidities are present or there are signs suggestive of endocrine or genetic disease, referral to a paediatrician or specialist clinic is required. If psychosocial disturbance is present, referral to a specialist child and adolescent psychiatric service may be necessary.

▶ Practice point

W	Refer children and adolescents to hospital or paediatric services if: • they are aged between 2 and 18 years, and have a BMI well above the 95th percentile on US-CDC growth charts or the 97th percentile on WHO growth charts • they are younger than 2 years, above the 97th percentile on WHO growth charts and gaining weight rapidly • they may have serious related comorbidities that require weight management (e.g. sleep apnoea, orthopaedic problems, risk factors for cardiovascular disease or type 2 diabetes, psychological distress) • an underlying medical or endocrine cause is suspected, or there are concerns about height and development.

10. Advise

Key messages

- While obesity during childhood and adolescence may be associated with some physical and mental health conditions in the short term, the long-term risk of diabetes and cardiovascular disease is not increased if a healthy weight is attained by adulthood.
- Effective weight management in childhood and adolescence minimises the risk of overweight or obesity persisting into adulthood.

10.1 Explaining the benefits of weight management

The most significant benefit of weight management in childhood and adolescence is in preventing overweight or obesity in adulthood. An elevated BMI in childhood is associated with a high risk of obesity in adulthood (Singh et al. 2008) and its associated comorbidities, including type 2 diabetes, hypertension and stroke, and polycystic ovary syndrome (Reilly & Kelly 2010) and depression in women (Sanderson et al. 2011). Older and more significantly overweight children and adolescents are more likely to remain overweight, to the same degree as an adult (Shaw et al. 2005). Although BMI does track over time, children and adolescents with a high BMI who become non-obese as adults reduce their risk of type 2 diabetes (Tirosh et al. 2011). Cardiovascular risk is also reduced (Juonala et al. 2011) but anatomical changes associated with high BMI in adolescence (e.g. atherosclerosis) may persist (Tirosh et al. 2011).

▶ Practice point

x	Early weight management gives children and adolescents the opportunity to learn positive lifestyle behaviours, and reduce their risk of obesity, diabetes and cardiovascular disease in adulthood.

For obese children and adolescents, weight management may also reduce the risk or symptoms of shorter term obesity-related comorbidities (see Table 10.1). For young people with comorbidities, the benefits of early weight management include improved blood pressure and lipid profiles (Janssen & LeBlanc 2010; Kelly & Melnyk 2008; Li et al. 2008; Reinehr et al. 2006; Savoye et al. 2007), fasting serum glucose (Savoye et al. 2007) and fasting insulin (Thomas et al. 2007), although the significance for definite long-term outcomes is still uncertain. For adolescents who are obese, there are significant reductions in sleep apnoea following weight loss (O'Brien et al. 2010).

Table 10.1 Short-term health risks associated with obesity in children and adolescents

Body system	Example of health risk	References
Cardiovascular	Hypertension, hyperlipidaemia, adverse changes in left ventricular mass, vascular endothelial dysfunction	Berenson et al. 1998; Gidding et al. 1995; Gutin et al. 1998; Meyer et al. 2006; Pena et al. 2006; Reilly et al. 2003
Endocrine	Type 2 diabetes, hyperinsulinaemia, early puberty, premature adrenarche, polycystic ovary syndrome	Diaz et al. 2008; Dietz et al. 1998; Freedman et al. 1987; Freemark 2010; Ibáñez et al. 2006; Reilly et al. 2003; Young et al. 2000
Gastrointestinal and hepatobiliary	Constipation, gallbladder disease, nonalcoholic fatty liver disease	Dietz 1998; Misra et al. 2006; Reilly et al. 2003
Pulmonary	Asthma, sleep apnoea, sleep disordered breathing, poor exercise tolerance	Carter et al. 2011; Ogden et al. 2007; Reilly et al. 2003
Musculoskeletal	Slipped capital femoral epiphysis, tibia vara, musculoskeletal pain, increased fracture risk	Chan & Chen 2009
Mental health	Low self-esteem, depression, eating disorders, impaired quality of life (e.g. bullying, isolation)	Walker & Hill 2009; Wang & Veugelers 2008; Williams et al. 2005

11. Assist

Key messages

- Family-focused lifestyle interventions that involve frequent contact with a healthcare professional may be effective for weight management in children and adolescents.
- Weight maintenance rather than weight loss is recommended for most children and many adolescents.
- Multicomponent lifestyle intervention is associated with successful outcomes, with no adverse effects reported in children and adolescents. Additional interventions may be required in postpubertal adolescents who are obese and have obesity-related comorbidities.

11.1 Family involvement

Internationally, clinical recommendations on weight management in children and adolescents promote the involvement of parents (Shrewsbury et al. 2011). When providing interventions for overweight and obesity in children and adolescents, a supportive and collaborative relationship between the healthcare professional and both the young person and the parents or carers, is likely to provide a stable context within which the intervention can take place.

In children (Golley et al. 2007; Hughes et al. 2008; Kalarchian et al. 2009; McGovern et al. 2008; Oude Luttikhuis 2009; Sargent et al. 2011) and adolescents (Kelly & Melnyk 2008), involving the parent or the parent and child appears more effective than focusing on the child or adolescent alone (Kalavainen et al. 2007; Okely et al. 2010). With adolescents, the level of family involvement will depend on age and maturity. A focus on family health behaviours rather than weight is a preferred approach (Shrewsbury et al. 2010).

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
17. For children and adolescents, focus lifestyle programs on parents, carers and families.	**C**	Table C28 Appendix C
Cost and resource implications While there may be considerable time and cost implications (including work absences) of involving one or more family members in weight loss programs, the benefits could be considered to be more cost-effective for the healthcare system by delivering the intervention to a greater number of people.		

Weight management interventions have better outcomes when contact with a healthcare professional is frequent (McCallum et al. 2007; Sargent et al. 2011; Whitlock et al. 2008, 2010). Due to the heterogeneity of studies, guidance on the frequency of contact cannot be provided. The frequency of contact will depend on whether the child requires active weight management (see Section 11.3), or monitoring of weight and weight-related comorbidities (see Section 12.1).

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
18. For children and adolescents, plan weight management programs that involve frequent contact with healthcare professionals.	**B**	Table C28 Appendix C
Cost and resource implications Increased frequency of contact may have resource implications for the healthcare system and the individual. Depending on comorbidities, frequent monitoring can be undertaken by various healthcare professionals to reduce costs to the individual and healthcare system.		

▶ Practice point

y	More frequent contact with a healthcare professional is generally more successful in the short term. In the longer term, the frequency of contact needs to be balanced against sustainability, cost and resources, and the individual's needs.

11.2 Weight management approach

In general, weight management in children and adolescents focuses on changes in health behaviours that influence weight—dietary behaviours and physical activity. Parental involvement and role modelling play an important role.

The approach to weight management varies with age and weight. Weight loss is not recommended for most children and many adolescents, as weight maintenance during growth will allow a gradual decline in BMI. This approach avoids potential adverse effects in children who have not completed their pubertal growth spurt, and overweight and obese children may 'grow into their weight' (Barlow 2007). Weight loss (as distinct from weight maintenance) should be limited to postpubertal adolescents who are obese (see Section 11.3.2).

RECOMMENDATION	GRADE
19. For children who are managing overweight or obesity, advise that weight maintenance is an acceptable approach in most situations.	**D**
Cost and resource implications Should be considered as part of routine discussion with families and carers with children who are overweight or obese.	

11.3 Weight management interventions

Lifestyle intervention is the first line of weight management in children and adolescents. Additional intensive interventions may also be required for severely obese adolescents. If required, this should involve referral to specialist hospital-based services.

11.3.1 Lifestyle interventions

The use of multicomponent lifestyle interventions for the management of obesity in children and adolescents is well supported in the literature (ADA 2006; Boon & Clydesdale 2005; Flynn et al. 2006; Jelalian & Saelens 1999; Stice et al. 2006; Summerbell et al. 2005). More recent publications (i.e. 2007 and later) continue to support this approach (see Table 11.1). A systematic review of lifestyle interventions (Oude Luttikhuis et al. 2009) found that only 18 out of 54 lifestyle studies examined measures of harm. In these studies, no adverse effects on linear growth, eating behaviours or psychological wellbeing were noted. Due to the heterogeneity of studies, guidance on the setting, duration or mode of lifestyle interventions cannot be provided.

Table 11.1 Effect of lifestyle interventions in children and adolescents

Intervention	Effect	References
Dietary modification	Effective in reducing BMI in children when program is parent-centred and combined with a physical activity program	Okely et al. 2010
Physical activity	Substantive health benefits from moderate intensity physical activity. Vigorous activities may provide even greater benefit, but must be balanced with any potential adverse effects on growth.	Janssen & LeBlanc 2010
Behavioural intervention	The use of behavioural modification techniques (e.g. goal setting, self-monitoring) as part of a multicomponent intervention has been shown to be effective.	NICE 2006; Oude Luttikhuis et al. 2009
Family behavioural intervention	Interventions with a parent-focused behavioural component are effective in improving weight management.	Golley et al. 2007; Hughes et al. 2008; Kalarchian et al. 2009; Kalavainen et al. 2007; Kelly et al. 2008; Okely et al. 2010
Multicomponent intervention	Small-to-moderate effect (mean 2.4 kg/m^2) from programs that include support for healthy eating, physical activity and behavioural change.	McGovern et al. 2008; Oude Luttikhuis et al. 2009; Whitlock et al. 2008, 2010

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
20. For children and adolescents who are overweight or obese, recommend lifestyle change—including reduced energy intake and sedentary behaviour, increased physical activity and measures to support behavioural change.	**B**	Table C28 Appendix C

Cost and resource implications

Referral and continued monitoring are likely to have cost and time implications for the individual and healthcare professional. Specific lifestyle changes and plans can be discussed and developed with practice nurses, and other healthcare professionals and care providers, but there are cost, availability and access issues associated with each visit. Monitoring of any comorbidities should be continued by the GP or multidisciplinary team if available.

▶ Practice point

Z	Current Australian dietary and physical activity guidelines should be used as the basis of advice on dietary intake, physical activity and sedentary behaviour for children and adolescents.

Possible approaches to implementing behavioural change include encouraging (SIGN 2010):

- children and their families to make small, sustainable changes in behaviour, a few at a time
- family awareness of eating, activity levels and parenting behaviours
- all family members to improve monitoring of their eating and activity habits
- family-based goal setting for behavioural change, including making plans for overcoming barriers.

Specific tools may be of use in assisting families to identify goals—for example, the SMART (specific, measurable, achievable, realistic and timely) tool.

Boxes 11.1 and 11.2 give some advice for parents or carers on how to support weight management strategies in children.

Box 11.1

ADVICE TO SUPPORT HEALTHY EATING IN CHILDREN

Take a family approach to improving nutrition and be a good role model

Ensure children have regular meals, including breakfast and snacks, in a sociable atmosphere

Whenever possible, eat meals as a family

Separate eating from other activities such as watching television or using the computer

Encourage children to listen to internal hunger cues and to eat to appetite

Have healthy foods readily available

Avoid being restrictive or controlling of your child's food intake

Explain the concept of foods that are appropriate 'often' or 'sometimes'

Avoid using foods as treats or rewards

Comfort children with attention, listening and affection instead of food

Encourage children to develop healthy ways of regulating emotions (i.e. that don't involve food)

Box 11.2

ADVICE TO SUPPORT PHYSICAL ACTIVITY AND REDUCE SEDENTARY BEHAVIOUR IN CHILDREN

Explain that being active is good for overall health as well as being fun

Encourage both moderate and vigorous activities every day

Be active with children (e.g. playing games with balls, or walking or bike riding together)

Support children to include physical activity in daily activities (e.g. walking to school, household tasks)

Encourage children to be involved in team sports

Reduce inactive leisure time (e.g. limit screen-based activities)

Get the family involved in local activities (e.g. sports clubs)

Make use of local opportunities for physical activity (e.g. swimming pool, walking tracks)

Be a good role model by being physically active yourself

Augmenting lifestyle intervention

Lifestyle interventions can be augmented by measures to improve information provision, reinforce behavioural aspects of care or provide incentives for adherence. The evidence on the success of these interventions is limited (see Table 11.2).

Table 11.2 Effect of measures to augment lifestyle intervention

Intervention	Effect on weight	References
Patient education	Not usually associated with significant BMI reduction when directed at children and adolescents as a stand-alone intervention.	Collins et al. 2007; DeMattia et al. 2007; Li et al. 2008; McCallum et al. 2007; Plachta-Danielzik et al. 2007
Financial incentives	May improve weight loss in the short term (i.e. < 6 months) in adolescents with overweight and obesity.	Collins et al. 2007; Paul-Ebhohimhen & Avenell 2008
Technology	It is uncertain whether information and communication technology can successfully augment delivery of lifestyle interventions in children, adolescents and young people.	Nguyen et al. 2011; Oude Luttikhuis et al. 2009

11.3.2 Specialist interventions to support weight loss in postpubertal adolescents

For severe obesity and associated comorbidities in postpubertal adolescents, intensive interventions may be required. These interventions are delivered to this age group through specialist clinics, and should only be considered when lifestyle change alone has been unsuccessful and there is a reasonable expectation of benefit over risk. The role of primary healthcare professionals includes providing continuing support for lifestyle change.

Table 11.3 gives a summary of the effect of these interventions in adolescents. There is currently limited evidence on intensive interventions in this group, and decisions should be based on the individual situation. More detailed discussion of intensive interventions is included in Section 6.2.

Table 11.3 Effect of intensive interventions provided by specialist clinics to postpubertal adolescents

Intervention	Effect on weight	References
Very low-energy diet	May produce rapid weight loss but no evidence for long-term benefit After cessation of a very low-energy diet, there should be a continuing weight management plan	Tsai & Wadden 2006
Orlistat[a]	Slight improvements in weight loss compared to lifestyle change alone Increase in adverse events Insufficient evidence to assess effects on cardiovascular or diabetes risk factors	Czernichow et al. 2010; Viner et al. 2010; Whitlock et al. 2010
Metformin	May cause a small but statistically significant decrease in BMI when used for insulin resistance and abnormal glucose metabolism	Wilson et al. 2010
Surgery	Mean weight losses of 34.6 kg with LAGB compared with 3.0 kg from lifestyle intervention Emerging evidence that other procedures may also be effective	O'Brien et al. 2010
	Harms vary by procedure, with short-term severe complications reported in about 5% of procedures Limited data to determine either beneficial or harmful consequences more than 12 months after surgery	Whitlock et al. 2010

LAGB = laparoscopic adjustable gastric banding

[a] *The manufacturer advises against giving orlistat to people younger than 18 years as the safety and effectiveness have not been established. If orlistat is prescribed, adolescents should be advised to take a multivitamin last thing at night and be aware of side effects (see Section 6.2.2).*

RECOMMENDATION	GRADE	EVIDENCE SUMMARY
21. For postpubertal adolescents with a BMI > 40 kg/m^2 (or > 35 kg/m^2 with obesity-related complications), laparoscopic adjustable gastric banding via specialist bariatric/paediatric teams may be considered if other interventions have been unsuccessful in producing weight loss.	**C**	Table C26 Appendix C
Cost and resource implications See previous surgery consideration (i.e. for Recommendation 13). No evaluative data are available for procedures other than LAGB. Cost benefits for adolescents may be more significant than those for adults given the potential quality-adjusted life years gained by intervention in younger individuals. However, complication and revision rates are higher in adolescents (O'Brien et al. 2010).		

▶ Practice point

aa	Bariatric surgery should only be undertaken by a highly specialised surgical team within the framework of a multidisciplinary approach.

More detailed information on bariatric surgery in adolescents is given in a position paper issued jointly by the Royal Australasian College of Physicians, Australian and New Zealand Association of Paediatric Surgeons, and Obesity Surgery Society of Australia and New Zealand (Baur et al. 2010).

12. Arrange

Key messages

- Long-term monitoring involves regular assessment of BMI, monitoring of obesity-related comorbidities and continuing assessment of family health behaviours.
- Decision-making about interventions and the need for referral is informed by these assessments and clinical judgement.

12.1 Monitoring and review

Long-term monitoring of weight- and obesity-related comorbidities, and family and child health behaviours is essential in monitoring and promoting the success of weight management in children and adolescents (Lobstein et al. 2004; Summerbell et al. 2003). Recall systems support continuing monitoring.

12.1.1 Assessing changes in weight status

To monitor growth and the effect of the intervention on body composition, the length or height and weight of the child or adolescent should be measured every 3 months, and his or her growth plotted on the age- and sex-specific percentile chart.

A dramatic change in growth rate is cause for concern and further investigation is warranted. Both rapid increases and rapid decreases in BMI (even for children who are overweight or obese) can indicate a problem and relate to negative health outcomes. Acceptable increases or decreases in BMI depend on age, gender and pubertal stage. Modification of the intervention approach and/or referral for specialised assessment and treatment may be required. Once initial goals are achieved, less intensive monitoring may be appropriate.

▶ Practice point

bb	Regular monitoring of BMI (ideally 3 monthly or more frequently) may be an appropriate component of approaches to weight management.

12.1.2 Monitoring obesity-related comorbidities

Continuing monitoring of existing comorbidities and assessment for weight-related physical and mental health conditions is required throughout intervention and follow-up (see Section 9.3). Identification of new comorbidities could indicate a need for referral and/or modification to intervention approaches.

12.1.3 Assessing child and family eating, activity and weight control

Continuing review of behavioural change is needed so that the weight management program can be adapted accordingly and referral arranged if necessary (see Box 12.1).

Box 12.1

CONSIDERATIONS IN ASSESSING CHILD AND FAMILY HEALTH BEHAVIOURS

Eating behaviours

Dietary intake; frequency, portion size and quality of meals and snacks; fluid intake

Nonhungry or disordered eating (e.g. binge eating, night-time eating)

Family approach to meals (e.g. responsibility for provision, preparation and choices; involvement in and location of evening meals; consumption of food prepared outside the home)

Parental approach to nutrition (e.g. modelling of healthy eating, use of food as a reward or consequence)

Child and family's sedentary time and physical activity habits

Sedentary time in the child's day (e.g. sedentary transport, screen-based activities)

Incidental and planned activity (e.g. time spent being active, active transport, time spent outside, participation in structured exercise)

Family time spent being active and in sedentary behaviours

Parental modelling of healthy physical activity habits

Psychosocial factors

Weight control behaviours (e.g. exercise, dietary restriction, weight loss products, vomiting or laxative misuse, family talk and modelling related to weight control behaviours)

Family body-image behaviours (e.g. body perceptions, body checking and avoidant behaviours, body-related thoughts and beliefs, distress associated with body weight or shape, family talk and modelling related to body weight and shape)

Psychosocial factors (e.g. bullying, teasing)

Family functioning and capacity to make behavioural changes

***Source**: Adapted from Vic DHS 2009a*

12.2 Referral

Referral for specialist care may be a consideration when (Vic DHS 2009a):

- there is no change in BMI percentile although health behaviours have apparently changed
- there is a dramatic change in growth rate
- new comorbidities are identified or symptoms of existing conditions do not improve
- extreme weight loss behaviours, signs of eating disorders, high level of negative body image and/or negative social experiences are evident (e.g. refer to psychological services)
- parents feel unable to influence their child's eating habits or food choices (e.g. refer for parenting assistance)
- the child has a very restricted diet, or specific dietary restrictions (e.g. refer to a dietitian)
- parents feel unable to limit their child's sedentary time or influence their child's physical activity (e.g. refer for parenting assistance)
- when the components of a healthy lifestyle cannot be implemented due to complex family problems (e.g. refer to a psychologist).

12.3 Transitional care for adolescents

Transition of adolescents between paediatric and adult services has been the subject of research across a range of chronic conditions affecting adolescents. Transition to adult medical care is defined by the American Society of Adolescent Medicine as 'the purposeful, planned movement of adolescents and young adults with chronic physical and medical conditions from child-centred to adult-oriented health care systems' (ASAM 1993). The goals of transition are to provide health care that is coordinated, uninterrupted, developmentally appropriate and comprehensive.

Transitional care of adolescents with obesity has not been the subject of extensive study. As there are significant differences in the approach to care between children's and adult services, this gap is important in considering optimal delivery of multicomponent interventions to young people. Children's services are generally configured to focus on the whole family whereas adult services take an individual approach. Further, adult services expect a much greater degree of independence from young people and encourage communication without parents being present. Adolescents may experience difficulty adapting to this type of relationship, particularly when they have long-standing relationships with paediatric providers.

The Royal Australasian College of Physicians position statement (Baur et al. 2010) highlights the importance of:

- having a healthcare professional who takes responsibility for the transition to adult care
- having a service provider accept responsibility for active case management once the young adult has left the paediatric service.

13. Practice guide

13.1 Assessment

The following 10 pages contain the WHO and US-CDC BMI percentile charts to monitor growth for children and adolescents. See Section 9.2 for further information.

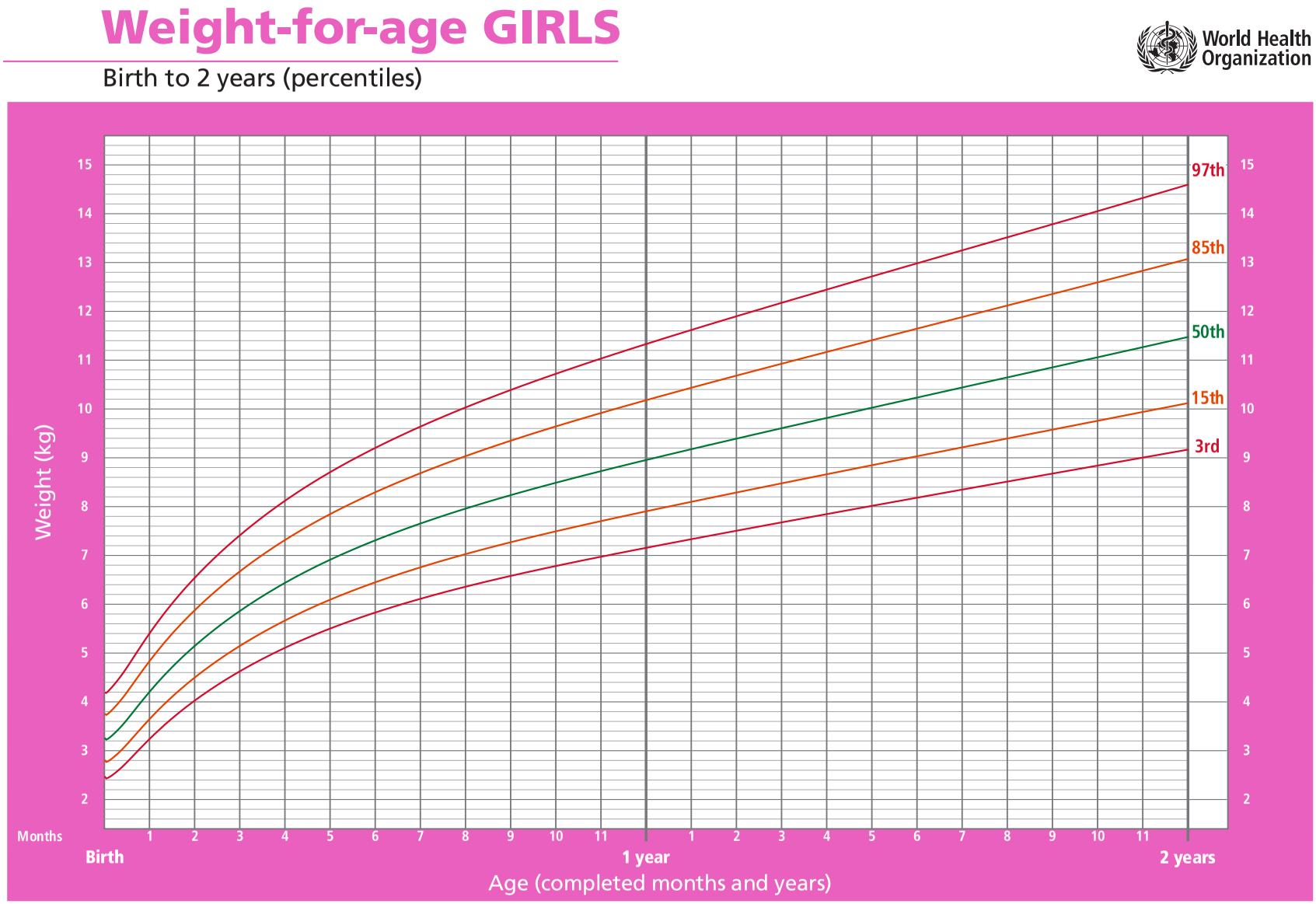


Figure 13.1 WHO weight-for-age percentiles for girls from birth to 2 years

Source: *WHO (2006) WHO child growth standards. Available at: http://www.who.int/childgrowth/standards/en/*

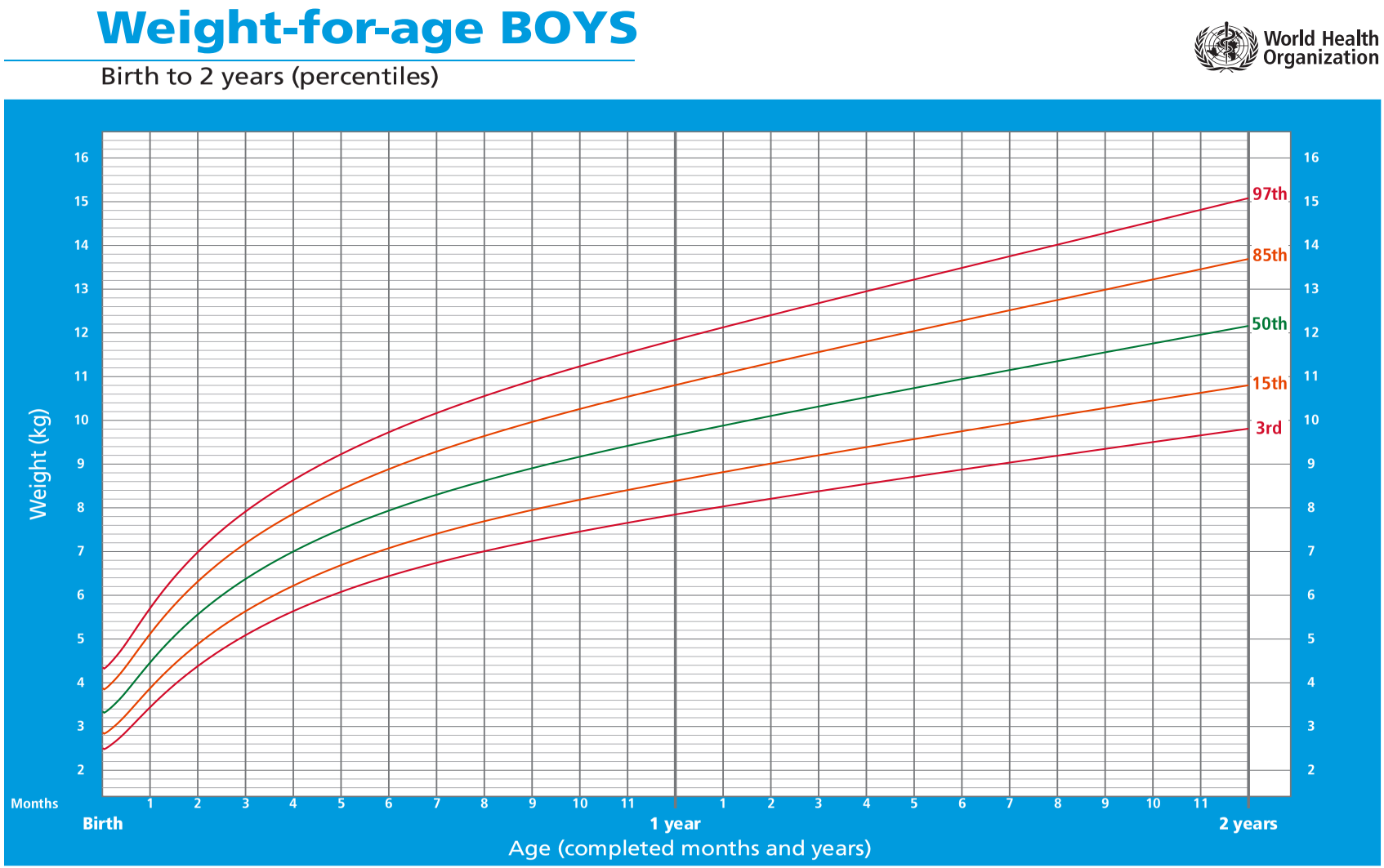


Figure 13.2 WHO weight-for-age percentiles for boys from birth to 2 years

WHO Child Growth Standards

Source: *WHO (2006) WHO child growth standards. Available at: http://www.who.int/childgrowth/standards/en/*

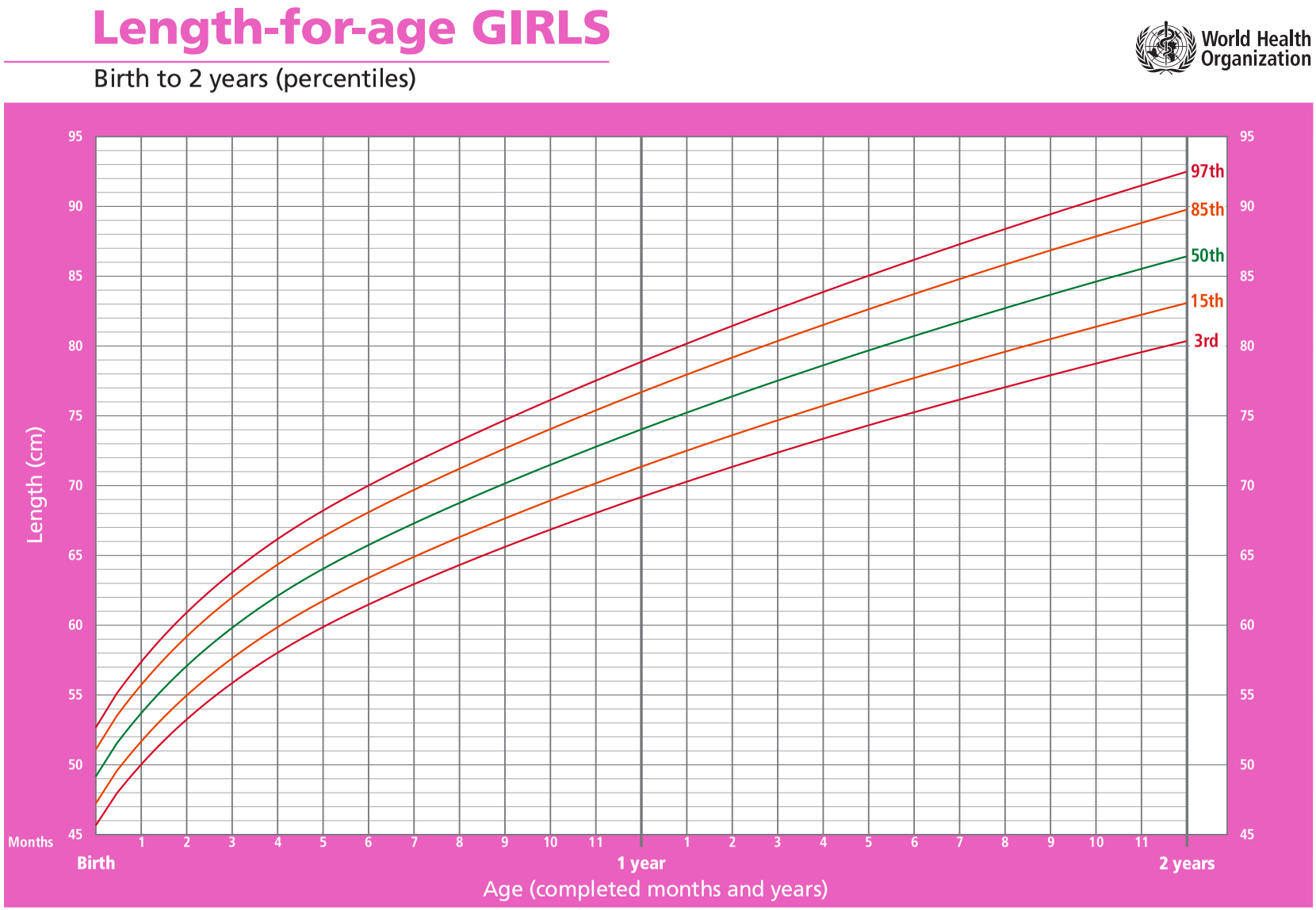


Figure 13.3 WHO length-for-age percentiles for girls from birth to 2 years

WHO Child Growth Standards

Source: *WHO (2006) WHO child growth standards. Available at: http://www.who.int/childgrowth/standards/en/*

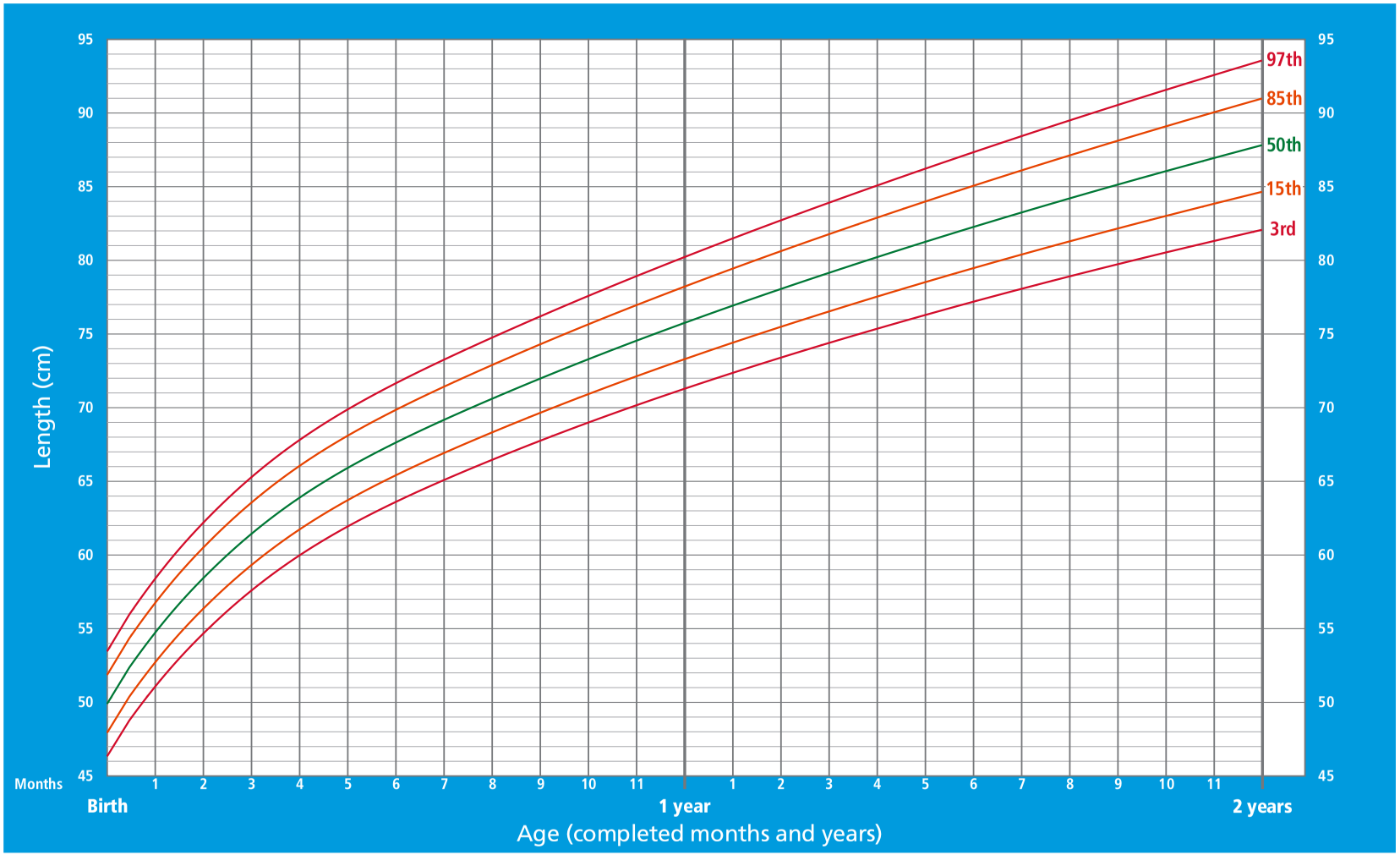


Figure 13.4 WHO length-for-age percentiles for boys from birth to 2 years

Source: *WHO (2006) WHO child growth standards. Available at: http://www.who.int/childgrowth/standards/en/*

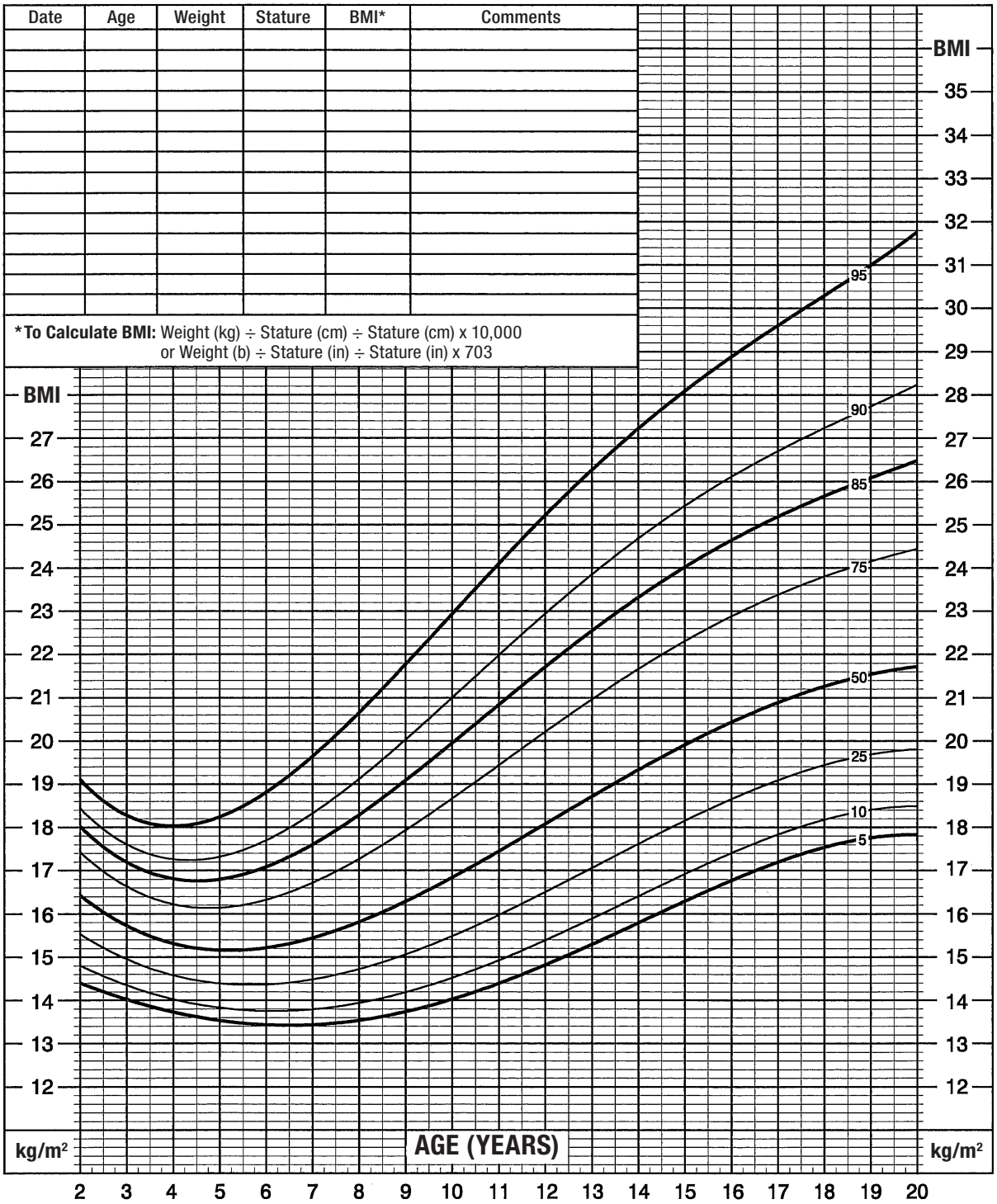
2 to 20 years: Girls
Body mass index-for-age percentiles

NAME .....

RECORD # .....

Date	Age	Weight	Stature	BMI*	Comments

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (b) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Diseases Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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Figure 13.5 US-CDC BMI percentile charts for children and adolescents—girls

Source: *CDC (2000). Developed by the National Center for Health Studies in collaboration with the National Center for Chronic Disease Prevention and Health Promotion.*

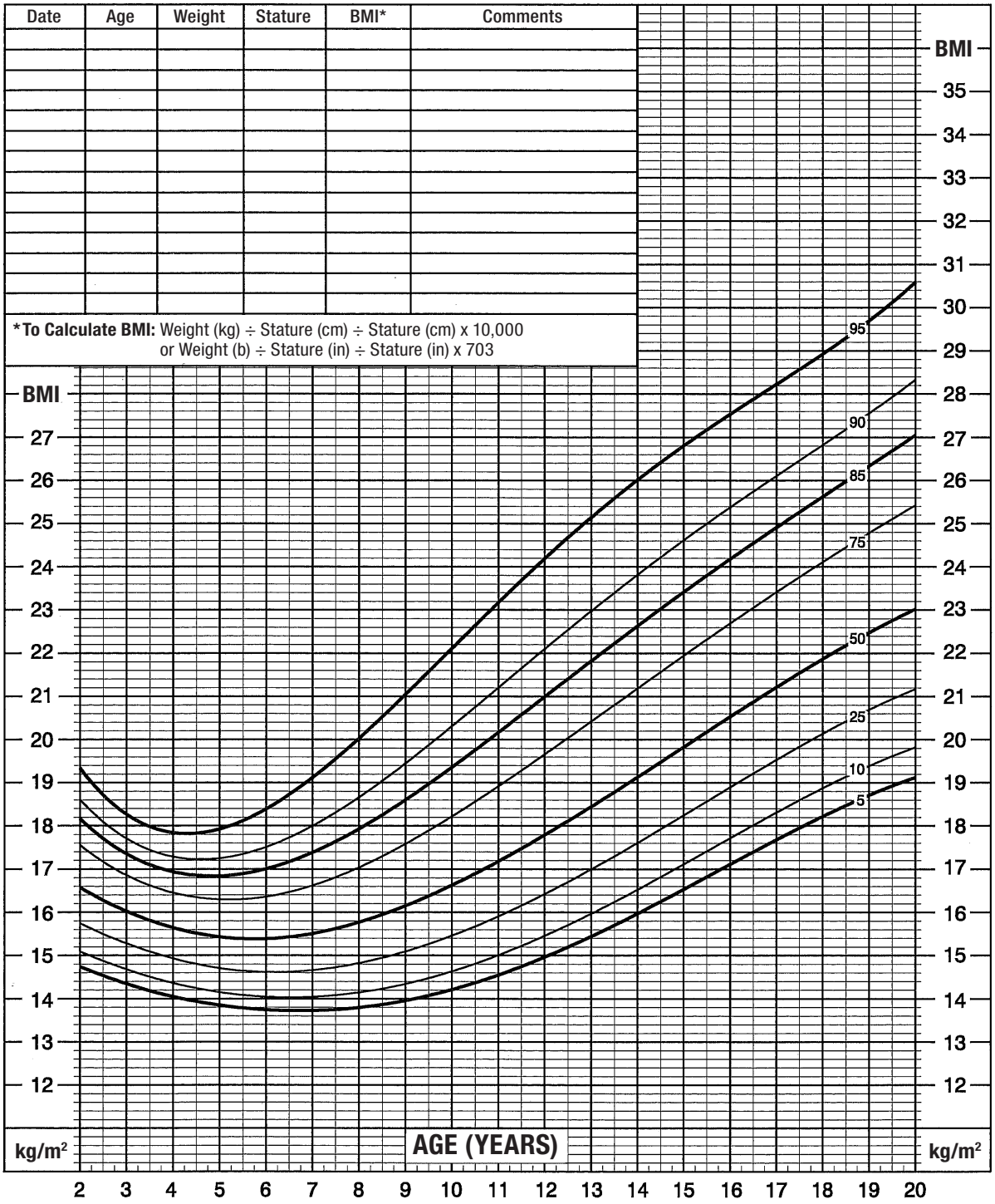
2 to 20 years: Boys
Body mass index-for-age percentiles

NAME .....

RECORD # .....

Date	Age	Weight	Stature	BMI*	Comments

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (b) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Diseases Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

CDC
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Figure 13.6 US-CDC BMI percentile charts for children and adolescents—boys

Source: *CDC (2000). Developed by the National Center for Health Studies in collaboration with the National Center for Chronic Disease Prevention and Health Promotion.*

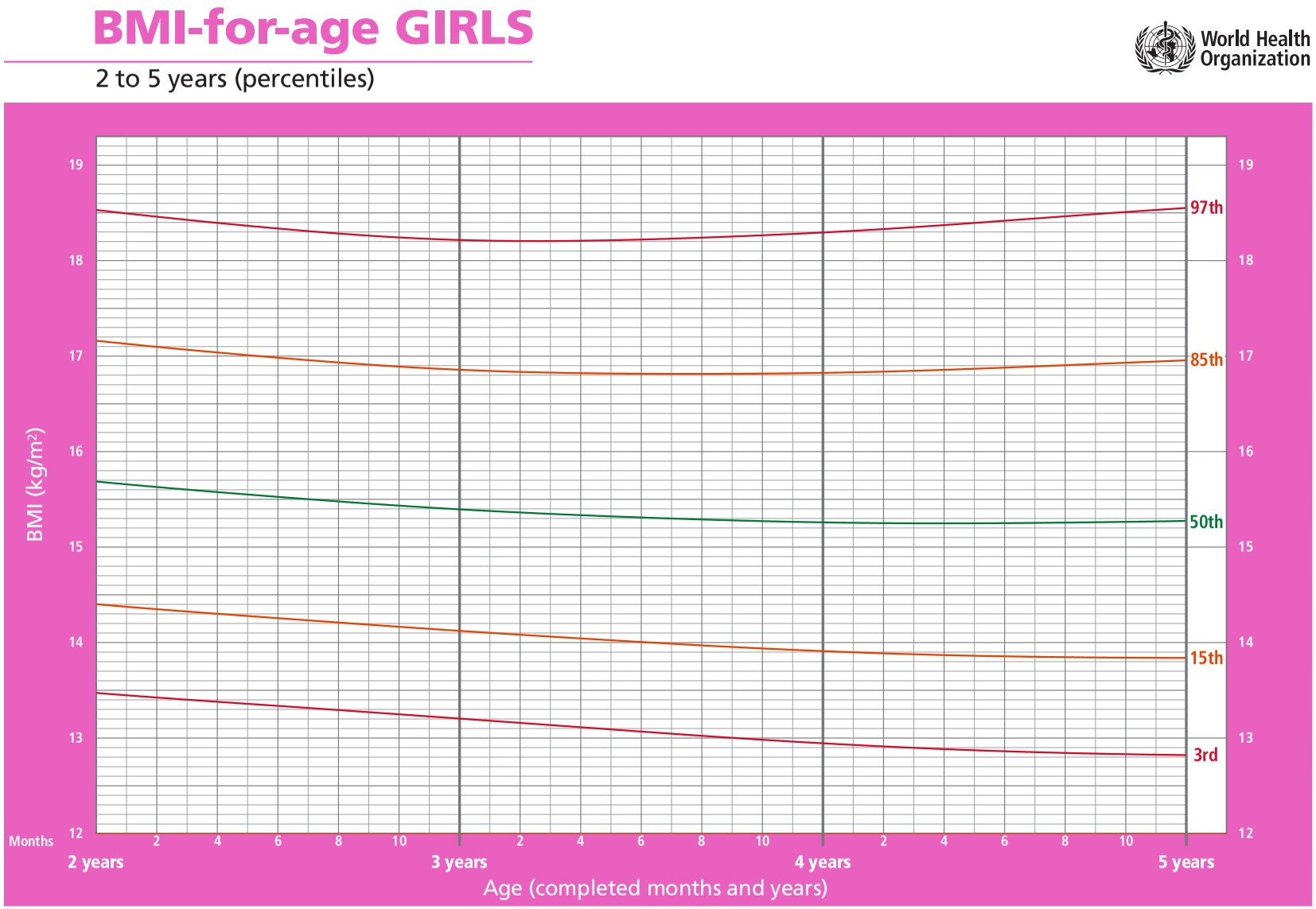

Figure 13.7 WHO BMI-for-age percentiles for girls from 2–5 years

Source: *WHO (2006) WHO child growth standards. Available at: http://www.who.int/childgrowth/standards/en/*

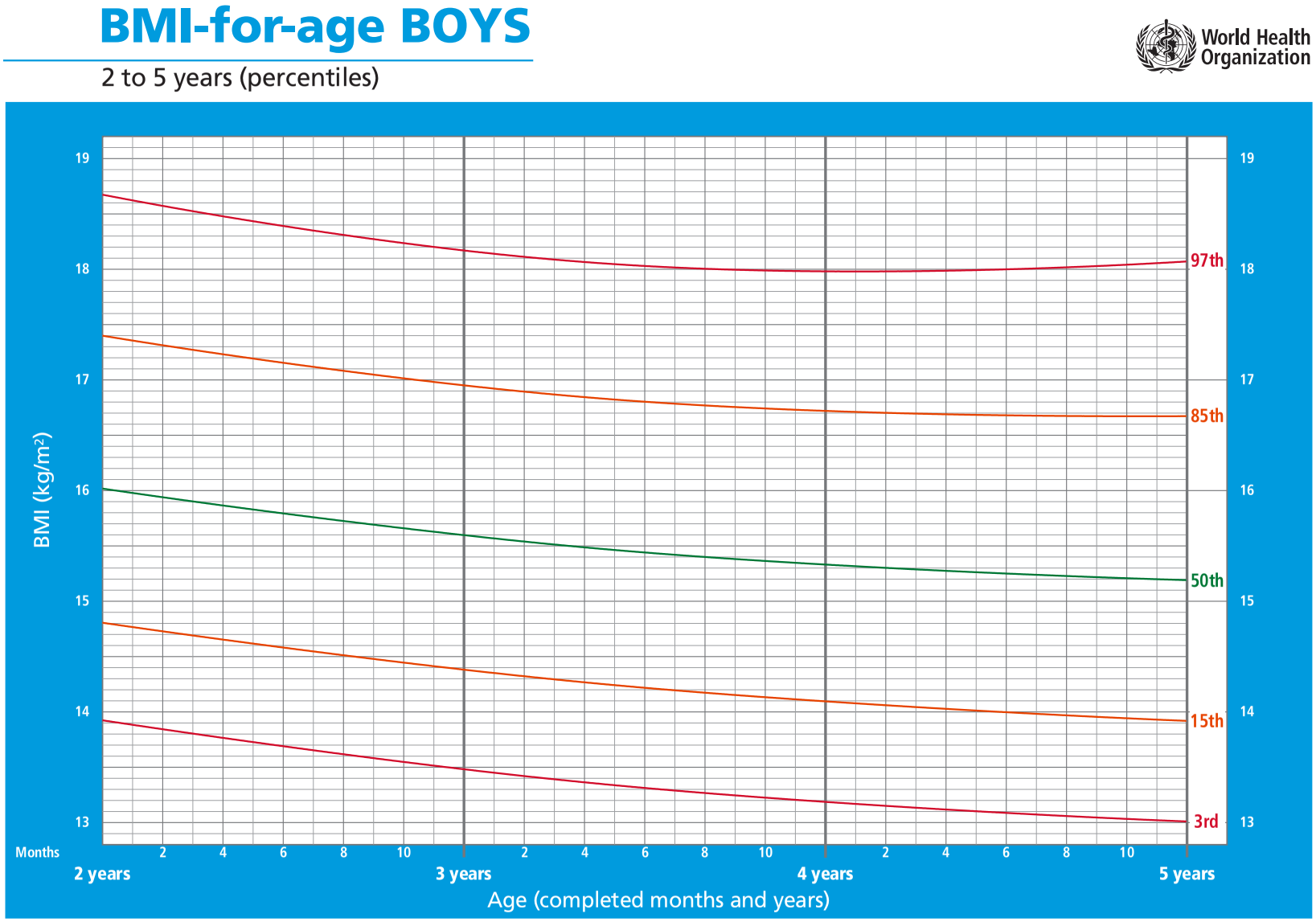

Figure 13.8 WHO BMI-for-age percentiles for boys from 2–5 years

Source: *WHO (2006) WHO child growth standards. Available at: http://www.who.int/childgrowth/standards/en/*

BMI-for-age GIRLS

5 to 19 years (percentiles)

World Health Organization

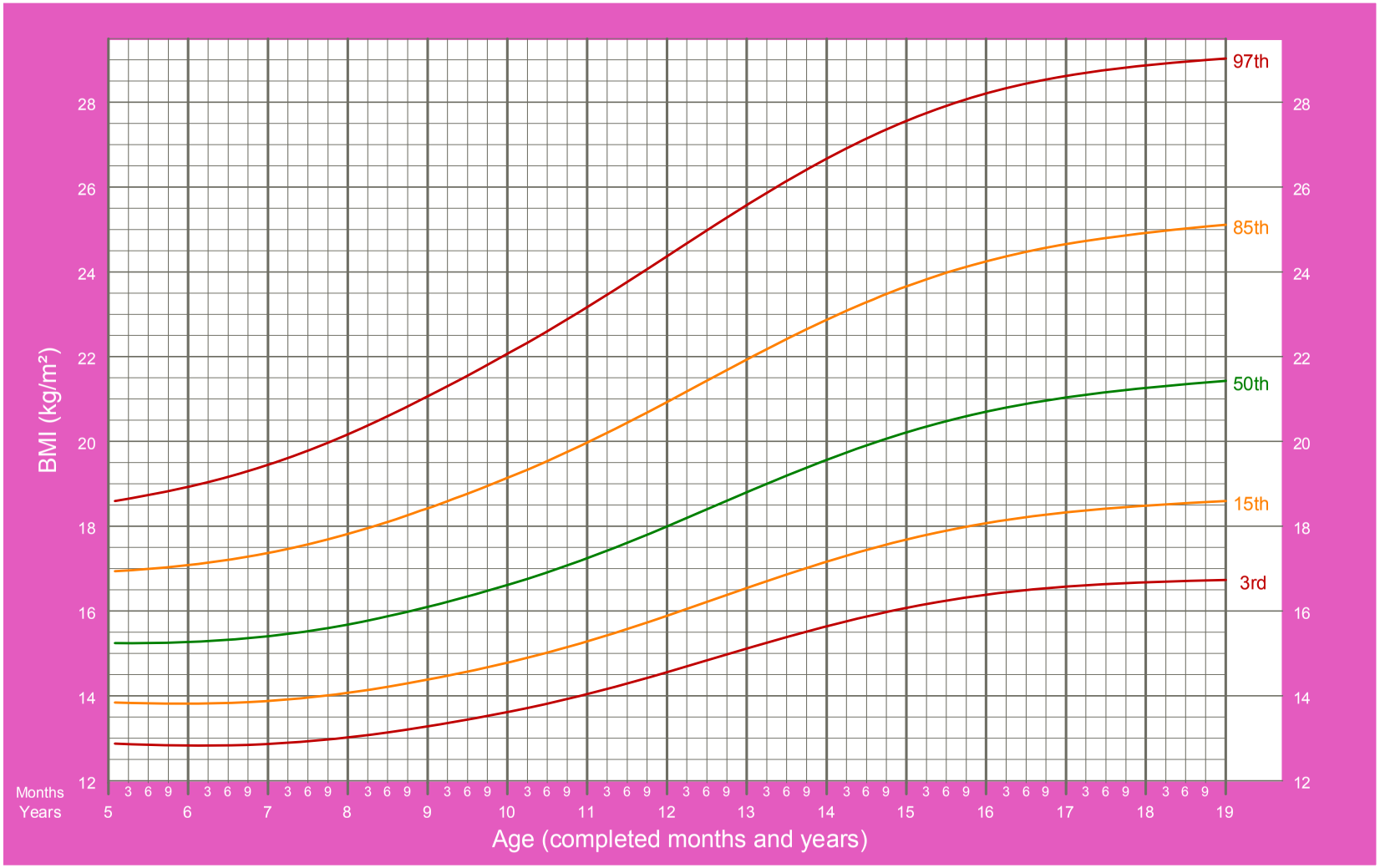

Figure 13.9 WHO BMI-for-age percentiles for girls from 5–19 years

2007 WHO Reference

Source: *WHO (2007) WHO growth reference data for 5–19 years. Available at: http://www.who.int/growthref/en/*

BMI-for-age BOYS

5 to 19 years (percentiles)

World Health Organization

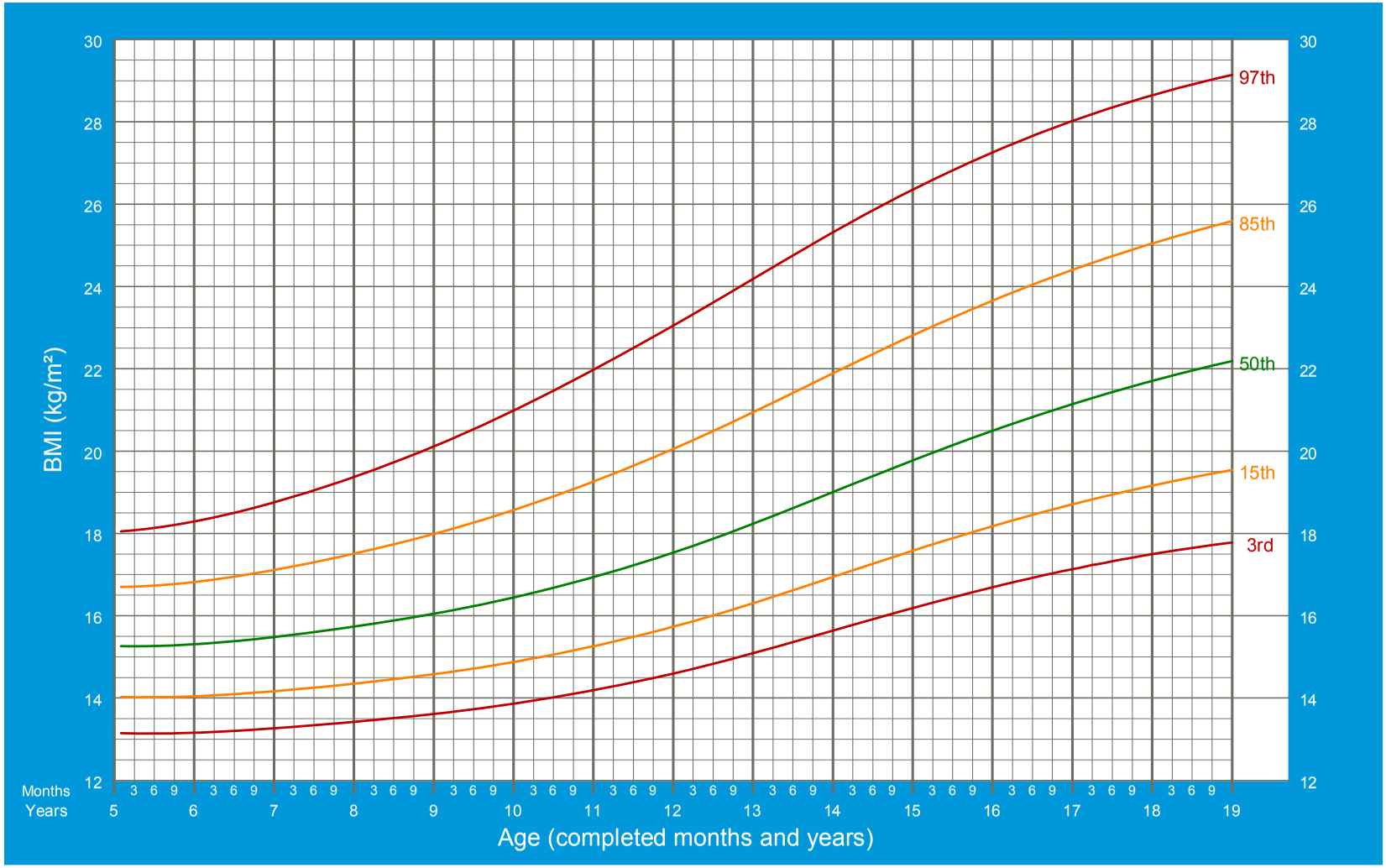

Figure 13.10 WHO BMI-for-age percentiles for boys from 5–19 years

2007 WHO Reference

Source: *WHO (2007) WHO growth reference data for 5–19 years. Available at: http://www.who.int/growthref/en/*

13.1.1 Case studies

The following case studies are examples of appropriate responses to assessments of children and adolescents in primary health care.

Case study 13.1

A 3½-year-old boy is brought into the practice as his parents are concerned about his prolific weight gain since birth. By 1 year of age, he weighed 14 kg and by the age of 3 he weighed 34 kg. He was late talking and walking, and his parents describe him as more like a 2-year-old in his behaviour. He is shorter than average for his age, although both parents are of average height.

Assessment: *Small but very obese boy.*

Examples of appropriate action

Advise:

Explain that there may be an underlying medical or genetic cause for the boy's obesity.

Arrange:

Testing for an underlying medical or genetic cause.

Referral to a specialist.

Case study 13.2

A 6-year-old boy with BMI of 18.7 kg/m^2 (> 95th percentile on the US-CDC growth chart) lives with his grandparents and stepsister, all of whom are above healthy weight. He has behavioural difficulties both at home and at school, and spends leisure time playing video games and watching television. He snores, is frequently tired and is falling asleep in class.

Assessment: *Obese with possible comorbidities.*

Examples of appropriate action

Advise:

Discuss health risks associated with the child's weight with grandparents and child.

Assist:

Agree on goals.

Arrange:

Family intervention to raise awareness of healthy eating, and levels of physical activity and sedentary behaviour.

Referral for assessment and treatment of comorbidities (e.g. to paediatrician, possible sleep study).

Regular review.

Case study 13.3

A 14-year-old boy has had a BMI well above the 95th percentile on the US-CDC growth chart for some time and is still gaining weight rapidly. His parents are concerned about his behaviour concerning food. The boy is the first to finish a meal in the family although he has an adult portion, wakes at night and takes food from the fridge, and is not easily distracted from food.

Assessment: *Obese with possible pathological hyperphagia.*

Examples of appropriate action

Advise:

Discuss the health risks associated with obesity and the likelihood of it persisting into adulthood with the boy and his parents.

Explain the health benefits of lifestyle change.

Assist:

Encourage the boy to set goals for food and activity change.

Support the family in healthy eating patterns.

Arrange:

Referral to a paediatrician or specialist clinic for assessment and further investigation.

13.2 Supporting weight management

13.2.1 Case studies

The following case studies are examples of supporting weight management in children and adolescents in primary health care.

Case study 13.4[a]

The mother of a 13-year-old girl comments that the girl is concerned about her weight and is being teased about this at school. There is a family history of obesity and the girl's main interests are sedentary activities, physical activity is limited, 'screen time' is 3 hours a day and dietary habits put her at risk of weight gain (skipping breakfast, snacking and consuming soft drinks). The girl is premenarchal and has a BMI well above the 95th percentile on the US-CDC growth chart, blood pressure of 110/60 mmHg, and normal lipid profile, liver function, glucose and insulin levels.

Assessment: *Obese with high risk of further weight gain.*

Examples of appropriate action

Advise:

Discuss lifestyle approaches to weight maintenance with the mother and girl.

Assist:

Encourage the girl to set her own goals for food and activity change.

Support the family in changing eating patterns and television use.

Arrange:

Consultations with mother and daughter, separately and together, initially every 3 weeks.

Referral if required (e.g. for psychological assessment).

Regular review and monitoring of BMI.

a Adapted from Proietto & Baur (2004)

Case study 13.5

A 14-year-old boy weighs 95 kg. His mother says he has been a healthy child with nothing in his past to suggest a medical reason for his continuing weight gain. His father died from a heart attack at 45 years and his maternal grandparents both had type 2 diabetes. The boy's blood pressure is raised and acanthosis nigricans is present on his neck and armpits.

Assessment: *Obese with high risk of comorbidities.*

Examples of appropriate action

Advise:

Explain that weight management is essential as the boy is at high risk of developing type 2 diabetes and already has risk factors for early heart disease.

Assist:

Encourage an increase in physical activity (e.g. walking the dog after school).

Discuss healthy eating, providing advice consistent with the Australian Dietary Guidelines.

Arrange:

Blood tests for lipid profile, insulin resistance, glucose metabolism and liver function.

Regular review by a dietitian.

Case study 13.6

A 15-year-old Torres Strait Islander girl weighs 125 kg and is above average height. Her parents were both diagnosed with diabetes in their 30s. The girl's blood pressure is raised, and blood tests show high cholesterol and abnormal liver function. She eats a lot of chocolate and has very infrequent meals consisting of large portions of energy-dense foods. Physical activity is minimal.

Assessment: *Obese with comorbidities.*

Examples of appropriate action

Advise:

Explain the benefits of weight loss in preventing diabetes.

Assist:

Provide information about local opportunities to increase physical activity and advice on integrating this into usual routines (e.g. walking to school, swimming regularly).

Provide information about healthy eating (e.g. having regular meals and healthy snacks, portion sizes).

Arrange:

Involvement of a Torres Strait Islander health worker.

Referral to specialist care (if necessary an internet-based consultation).

Regular review of weight and comorbidities.

13.3 Review and continuing care

13.3.1 Case studies

The following case studies are examples of supporting long-term weight management in children and adolescents in primary health care.

Case study 13.7

At her initial assessment, a 14-year-old girl had a BMI above the 85th percentile. During the previous 12 months, her BMI has increased even though the family has made changes to their eating habits. Review of the girl's eating patterns shows that, during the past 6 months, she has stopped having breakfast as she doesn't have time before school. This means she is hungry by recess so often buys a soft drink and a chocolate bar. Although she takes a healthy lunch to school she doesn't eat much of it because she thinks her friends will be watching what she is eating. She comes home hungry and eats until she goes to bed at 11:30. Although only healthy foods are provided at home, the quantity she eats is contributing to weight gain. She refuses to take part in physical activity although her parents encourage her to do so.

Assessment: *Overweight with continuing weight gain.*

Examples of appropriate action

Advise:

Discuss regular eating and sleeping patterns with the girl, and explain the benefits of physical activity.

Assist:

Assess for obesity-related comorbidities.

Provide advice on local options to be involved in physical activity.

Arrange:

School liaison.

Referral to allied health professional (dietitian or psychologist).

Regular review.

Case study 13.8

A 6-year-old girl was brought into the practice by her parents who were concerned about an increase in her weight. The girl was assessed as obese, and advice on healthy eating and physical activity provided. At a subsequent review, the girl's BMI has continued to increase although the family has changed health behaviours. Further inquiry reveals that the girl is being picked up from school and spending three afternoons a week at her grandparents' house where she has free access to chocolate, lollies and chips, and tends to sit and watch television.

Assessment: *Obese with continuing weight gain.*

Examples of appropriate action

Advise:

Discuss the need for all family members to be involved in the girl's weight management.

Assist:

Provide written information on healthy eating and physical activity in children that can be passed on to the grandparents.

Arrange:

A consultation involving the grandparents.

Regular review.

Part D

Areas for future research

Areas for future research

The following research gaps were identified through the guideline development process related to clinical questions.

Health system recommendations for research

- Detailed Australian study of the cost-effectiveness of models of care for management of overweight and obesity.
- Effective referral systems (from general practice) for individuals who are overweight or obese to other services for dietary, physical activity and psychological interventions including referral, attendance, completion and outcomes.
- Health system benefits (days at work, compensation, Medicare).

Health workforce training

- Examination of the separate and combined effects of techniques to improve motivation (e.g. motivational interviewing), and techniques to change eating and physical activity behaviour (behavioural change techniques).
- Identification of the effectiveness of customised weight management training for healthcare professionals to determine the approach and resources most likely to improve outcomes.
- Effectiveness of interventions that change healthcare professional behaviour related to obesity management.

Weight loss related to health benefits

Health outcomes associated with intentional weight loss in individuals who are overweight or obese related to:

- mortality
- type 2 diabetes and cardiovascular indicators in children and adolescents
- fertility in overweight and obese adults
- mental health issues and symptoms including depression, dementia, mood disorders in adults
- mental health in children and adolescents
- quality of life
- musculoskeletal issues
- cancer.

Effectiveness of weight loss and weight maintenance interventions

- Evaluation of emerging weight loss medications, types of surgery and other intensive interventions for use in Australia in terms of long-term clinical effectiveness, safety and cost effectiveness.
- The effectiveness of lifestyle interventions in the prevention of weight gain or maintenance compared with weight loss.

- Effectiveness of specialist weight management care versus community-based weight management intervention or care.
- Effectiveness of behavioural and pharmacological intervention (alone and in combination) on the maintenance of weight loss among initially obese individuals.
- Rapid versus gradual weight loss on long-term health outcomes for individuals.
- Barriers to weight loss maintenance and interventions that promote weight loss maintenance taking into consideration social and psychological contributors to weight management.
- Best practice in reducing the risk of complications for individuals who are overweight or obese, and in whom weight loss is unlikely.

Bariatric surgery

- Incidence, prevalence and implications of re-operation rates for bariatric surgery in Australia.
- Levels of physical activity required following surgery to help maintain weight loss and the most effective way to support individuals in achieving this.
- Effects of psychological therapies on the outcomes of bariatric surgery and which groups would benefit from these.
- Consideration of which groups have the greatest long-term benefits from bariatric surgery in terms of reduction of future comorbidity and mortality.
- Long-term outcomes related to bariatric surgery in adolescents and adults.

Specific populations

- High-quality, randomised controlled trials that investigate the effects of specific weight loss and maintenance interventions in Aboriginal and Torres Strait Islander peoples and other groups including Maori, Pacific Islander and South Asian populations, and newly arrived immigrants.
- Development of treatment approaches for obesity in people with learning or physical disabilities.
- Effectiveness and outcomes of appropriate weight management interventions for pregnant women.
- Effective interventions in specific situations (e.g. the workplace, postpregnancy, in rural and remote communities).

Children and adolescents

- The effectiveness of behavioural interventions in children who are overweight or obese.
- Long-term follow-up of interventions to assess maintenance of programs to assess risk and health outcomes at 1, 2 and 5 years.
- Comparing standard weight management approaches with dietary and pharmacological approaches in adolescents who are obese.
- Long-term health risks of childhood obesity.
- Effectiveness of specialist weight management care versus community-based weight management intervention or care.
- Effective treatments for extremely obese children and adolescents.

Part E

Resources

Resources*

Nutrition

- DoHA (2009) *Lifescript: nutrition and weight management.* Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- DoHA (2010) *Guidelines for healthy foods and drinks supplied in school canteens.* Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- DoHA (2011) *Get up and grow.* Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- Dietitians Association of Australia. http://daa.asn.au
- NHMRC (2005b) *Nutrient reference values for Australia and New Zealand.* Canberra: National Health and Medical Research Council. http://www.nhmrc.gov.au
- NHMRC (2012) *Australian dietary guidelines* and related companion resources. Canberra: National Health and Medical Research Council. http://eatforhealth.gov.au
- Nutrition Australia. http://www.nutritionaustralia.org
- Weight Management Council Australia. http://www.weightcouncil.org

Physical activity

- DoHA (1999) *An active way to better health: national physical activity guidelines for adults.* Canberra: Department of Health and Ageing. http://www.health.gov.au (Revised guidelines expected to be released in 2013).
- DoHA (2004a) *Active kids are healthy kids: national physical activity recommendations for 5–12 year olds.* Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- DoHA (2004b) *Get out and get active: national physical activity recommendations for 12–18 year olds.* Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- DoHA (2010) *Move and play every day: national physical activity recommendations for children 0–5 years.* Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- DoHA (2010) *Lifescript: physical activity.* Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- NHFA (2011) *Sitting less for adults.* Canberra: National Heart Foundation of Australia. http://www.heartfoundation.org.au

* Resources were viewed in November 2012 and were current at that time.

Management of chronic conditions

- AASM (2006) *Practice parameters for the medical therapy of obstructive sleep apnea: Standards of practice*. Darien, Illinois: Committee of the American Academy of Sleep Medicine.
- APA (2010) *Practice guideline for the treatment of patients with major depressive disorder*. 3rd edn, Arlington: American Psychiatric Association.
- Diabetes Australia (2009) *National evidence-based guideline for blood glucose control in type 2 diabetes*. Canberra: Diabetes Australia.
- Diabetes Australia (2009) *National evidence-based guideline for the primary prevention of type 2 diabetes*. Canberra: Diabetes Australia.
- GESA (2011) *Gastro-oesophageal reflux disease in adults. Reflux disease*. 5th edn, Melbourne: Gastroenterological Society of Australia and Gastroenterological Nurses College of Australia.
- NACA (2006) *Asthma management handbook*. Melbourne: National Asthma Council Australia.
- NACCHO/RACGP (2012) *National guide to a preventive health assessment in Aboriginal and Torres Strait Islander people*. 2nd edn, Melbourne: National Aboriginal Community Controlled Health Organisation & Royal Australian College of General Practitioners.
- National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand (2011). *Guidelines for the prevention, detection and management of chronic heart failure in Australia*. http://www.heartfoundation.org.au
- NEDC (2010) *Eating disorders: prevention, treatment and management—an evidence review*, Sydney: National Eating Disorders Collaboration. http://www.nedc.com.au/nedc-publications
- NEDC (2010) *Eating disorders: the way forward—an Australian national framework*. Sydney: National Eating Disorders Collaboration. http://www.nedc.com.au/nedc-publications
- NICE (1994) *Fertility: assessment and treatment for people with fertility problems*. London: National Institute for Health and Clinical Excellence (under review).
- NVDPA (2009) *Guidelines for the assessment of absolute cardiovascular disease risk*. National Vascular Disease Prevention Alliance. http://strokefoundation.com.au
- NVDPA (2012) *Guidelines for the management of absolute cardiovascular disease risk*. Melbourne: National Vascular Disease Prevention Alliance. http://strokefoundation.com.au
- PCOS Australian Alliance (2011) *Evidence-based guideline for the assessment and management of polycystic ovary syndrome*. Melbourne: Jean Hailes Foundation for Women's Health.
- RACGP (2011) *Diabetes management in general practice guidelines for type 2 diabetes* Melbourne: Diabetes Australia; Royal Australian College of General Practitioners. http://www.racgp.org.au
- RACGP (2012) *Guidelines for preventive activities in general practice. The Red Book*. 8th edn. East Melbourne. http://www.racgp.org.au
- WHO (2010) *Global recommendations on physical activity for health*. Geneva: World Health Organization. http://www.who.int/en/

Psychological support

- Mental Health First Aid. http://www.mhfa.com.au.
- National Suicide Prevention Strategy. http://www.livingisforeveryone.com.au

Government funding to receive treatment from psychiatrists, psychologists, appropriately trained GPs, social workers, occupational therapists and nurses can be accessed through initiatives including:

- Access to Allied Psychological Services (ATAPS). http://www.health.gov.au
- Better Access initiative (Medicare items). http://www.health.gov.au
- Better Outcomes in Mental Health Care. http://www.health.gov.au
- Mental Health Nurse Incentive Program. http://www.health.gov.au

Pregnancy

- CMACE & RCOG (2010) *CMACE & RCOG joint guideline: management of women with obesity in pregnancy*. London: Centre for Maternal and Child Enquiries & Royal College of Obstetricians and Gynaecologists.
- IOM (2009) *Nutrition during pregnancy.* National Academy of Sciences, Institute of Medicine, Food and Nutrition Board, Committee on Nutritional Status During Pregnancy and Lactation, Subcommittee on Dietary Intake and Nutrient Supplements During Pregnancy, Subcommittee on Nutritional Status and Weight Gain During Pregnancy. Washington DC: National Academy Press.
- NICE (2010) *Dietary interventions and physical activity interventions for weight management before, during and after pregnancy*, NICE Public Health Guidance 27. London: National Institute for Health and Clinical Excellence. http://www.nice.org.uk
- SOGC (2010) Obesity in pregnancy. Society of Obstetricians and Gynaecologists of Canada. *J Obstet Gynaecol Can* 32(2): 165–73.

Rural and remote areas

- Rural Health Education Foundation. http://www.rhef.com.au

Aboriginal and Torres Strait Islander peoples

- Australian Indigenous HealthInfoNet. http://www.healthinfonet.ecu.edu.au.
- Couzos S & Murray R (eds) (2007) *Aboriginal primary health care: an evidence-based approach*, 3rd edn, Melbourne: Oxford University Press.
- NACCHO/RACGP (2012) *National guide to a preventive health assessment for Aboriginal and Torres Strait Islander people*, 2nd edn, Melbourne: Royal Australian College of General Practitioners. http://www.racgp.org.au
- Queensland Health, *Aboriginal and Torres Strait Islander resources*. http://www.health.qld.gov.au
- Queensland Health, *Library module 8: cultural safety*. http://www.health.qld.gov.au
- RACGP (2011) *Cultural awareness education and cultural safety training*. The RACGP National Faculty of Aboriginal and Torres Strait Islander Health. Melbourne: Royal Australian College of General Practitioners. http://www.racgp.org.au/education

People from culturally and linguistically diverse backgrounds

- DoHA (2011) *Get up and grow*. Available in traditional Chinese, Vietnamese, Filipino (Tagalog), Korean, Indonesian, Malaysian, Arabic (standard), Turkish and Spanish. Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- NSW Health (2006) *Standard procedures for working with health care interpreters,* Sydney: NSW Health. www.health.nsw.gov.au

Online multicultural nutrition resources

- Association for Services to Torture and Trauma Survivors, *Good food for new arrivals.* http://goodfood.asetts.org.au
- NSW Multicultural Health Communication Service, *Nutrition*. http://www.mhcs.health.nsw.gov.au
- Victorian Refugee Health Network, *Nutrition*. http://www.refugeehealthnetwork.org.au

Smoking cessation

- National Quitline, telephone 137 848.
- RACGP (2011) *Supporting smoking cessation: a guide for health professionals*. Melbourne: Royal Australian College of General Practitioners. http://www.racgp.org.au

Alcohol

- DoHA (2007) *Alcohol treatment guidelines for Indigenous Australians.* Canberra: Australian Government Department of Health and Ageing. http://www.alcohol.gov.au
- DoHA (2009) *Guidelines for the treatment of alcohol problems*. Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au
- DoHA (2009) *Quick reference guide for the treatment of alcohol problems*. Canberra: Australian Government Department of Health and Ageing. http://alcohol.gov.au
- NHMRC (2009b) *Australian guidelines to reduce health risks from drinking alcohol*. Canberra: National Health and Medical Research Council. http://www.nhmrc.gov.au

Appendices

A Committee membership

Organising Committee

Name	Position and affiliation
Professor Louise Baur AM	Professor and Deputy Associate Dean Discipline of Paediatrics and Child Health Director Physical Activity, Nutrition and Obesity Research Group Paediatrics and Child Health, Children's Hospital, Westmead Boden Institute of Obesity, Nutrition, Exercise and Eating Disorders
Professor Michael Frommer	Associate Dean (Teaching and Learning) Professor, School of Public Health, University of Sydney
Professor Mark Harris	Professor of General Practice Centre for Primary Health Care and Equity, University of New South Wales Member Quality Committee, Royal Australian College of General Practice
Professor Joseph Proietto	Professor of Medicine Austin Health, University of Melbourne Director Weight Control Clinic, Austin Health
Ms Sandra King	Representative from the Australian Government Department of Health and Ageing
Ms Caroline Arthur	Representative from the Australian Government Department of Health and Ageing
Ms Sue Huckson	Program Director National Health and Medical Research Council

Obesity Guidelines Development Committee

Name	Organisation
Professor Michael Frommer *Committee Chair*	Associate Dean (Teaching and Learning) Professor, School of Public Health The University of Sydney
Assoc Professor Susan Byrne	Associate Professor School of Psychology, University of Western Australia
Professor Ian Caterson AM	Boden Professor of Human Nutrition Director Boden Institute of Obesity, Nutrition, Exercise and Eating Disorders, University of Sydney
Dr Dale Ford	Medical Director Otway Division of General Practice, Victoria Board Member Australian Primary Care Collaborative Advisory Committee
Professor Mark Harris	Professor of General Practice Centre for Primary Health Care and Equity University of New South Wales Member Quality Committee, Royal Australian College of General Practice
Dr George Hopkins	Laparoscopic, General and Obesity Surgeon Royal Brisbane and Women's Hospital, Queensland Obesity Surgery Society of Australia and New Zealand
Ms Kay Gibbons	Head of Nutrition Services Royal Children's Hospital, Victoria Fellow Dietitians Association of Australia
Mrs Marion Goodman	Practice Nurse Barton Lane Practice, New South Wales Member Australian Practice Nurses Association
Dr Tammy Kimpton	General Practitioner Scone Medical Practice, New South Wales Board Member Australian Indigenous Doctors' Association

Name	Organisation
Ms Helen Mikolaj	Consumer Representative Member Consumer Health Forum
Professor Joseph Proietto	Professor of Medicine Austin Health, University of Melbourne Director Weight Control Clinic, Austin Health
Dr Matt Sabin	Paediatric Endocrinologist Royal Children's Hospital, Murdoch Children's Research Institute, Victoria

NHMRC project team

Ms Stephanie Goodrick	November 2010 – October 2012
Ms Amy Goodwin	September 2011 – October 2012
Ms Sue Huckson	June 2010 – January 2012
Mr Luke Hurley	August 2010 – October 2011
Ms Shena Graham	December 2010 – June 2011
Ms Emma Lourey	January 2012 – April 2012
Ms Rosie Forster	May 2012 – August 2012

Systematic reviewer

Dr Kelly Shaw

Technical writers (Ampersand Health Science Writing)

Ms Elizabeth Hall, Ms Jenny Ramson

B Administrative report

Governance and stakeholder involvement

The National Health and Medical Research Council (NHMRC) previously endorsed the *Clinical practice guidelines for the management of overweight and obesity in children and adolescents* (NHMRC 2003a) and the *Clinical practice guidelines for the management of overweight and obesity in adults* (NHMRC 2003b). In 2010 the Australian Government Department of Health and Ageing commissioned the NHMRC to review the existing guidelines and develop recommendations based on the most recent evidence.

These Guidelines have been developed by the NHMRC and draw on the procedures and requirements for meeting the 2011 *NHMRC standard for clinical practice guidelines* (NHMRC 2011a).

Organising Committee

An Organising Committee was established to ensure that all necessary administrative set-up tasks were undertaken so that, once operational, the Obesity Guidelines Development Committee (OGDC) could immediately and exclusively begin developing the Guidelines. The role of the Organising Committee was to determine:

- the scope of the Guidelines
- the expertise and skills required on the working group for the development of clinical practice guidelines for the management of overweight and obesity in adults, children and adolescents
- the organisational and governance arrangements for developing the Guidelines.

Methodological support

Additional support was provided by NHMRC Health Advice Panel methodologist, Ms Catherine Marshall. Prior to the establishment of the OGDC, her advice was sought on development and adaptation processes and provided through teleconferences and email correspondence with NHMRC staff. Ms Marshall provided advice on guideline project set-up, resourcing, scope issues, and specific tools for guidelines assessment; feedback on activities; and contacts with other obesity-related guideline developers.

In November 2010, NHMRC staff consulted with members of guideline development groups from the Scottish Intercollegiate Guidelines Network (SIGN), the New Zealand Guideline Development Group and the National Institute of Clinical Excellence regarding their experience in managing:

- content issues that arose during the development of their respective guidelines
- methodological challenges during the guideline development process
- issues that arose during public consultation periods
- issues that have arisen since the publication of the guidelines.

The NHMRC also requested relevant evidence tables from each guideline developer to review and include. The SIGN evidence tables were distributed to the systematic reviewer.

Methodological support on the development and refinement of the clinical questions was sought from NHMRC Health Advice Panel methodologist and systematic reviewer, Ms Philippa Middleton. Ms Middleton attended an OGDC meeting on 17 December 2010 to assist in refining the clinical questions and PICO (population, intervention, comparator, outcomes) criteria to be considered by the OGDC at its meeting on 17 February 2011.

Multidisciplinary Obesity Guidelines Development Committee

Selection of committee members

The Chair was selected by the NHMRC on the basis of past experience in chairing NHMRC and other agency guideline development processes. The individual selected was deliberately chosen as someone who did not have specific expertise in the prevention and management of overweight and obesity, but had a broad knowledge of relevant issues in medicine and public health.

The NHMRC selected other members of the committee with advice from the Chair. The NHMRC invited the following organisations to nominate members:

- Australian Indigenous Doctors' Association (AIDA)
- Australian Primary Care Collaborative (APCC)
- Dietitians Association of Australia (DAA)
- Australian Practice Nurses Association (APNA)
- Royal Australian College of General Practitioners (RACGP)
- Royal Australian College of Surgeons (RACS).

The intent was to form an expert committee that would include the perspectives of medicine, surgery, nursing, psychology, nutrition and consumers. These perspectives encompassed current relevant research in physiology, biochemistry, Indigenous health, rural health, pharmacology, endocrinology, bariatric surgery and general practice.

Efforts were made to invite individuals who:

- were able to make the necessary time commitment
- were orientated towards a rigorous consideration of scientific evidence and its use in practice
- had relevant practical experience in the prevention and/or management of overweight and obesity in Australia
- were highly respected in their fields
- collectively gave a geographic spread across the nation.

Consumer representation

Consumer representation was sought through the Consumer Health Forum, who requested expressions of interest from their membership and associated organisations. The consumer representative was nominated based on personal experience in the management of obesity, contribution on previous guideline committees and recommendation from the state-based consumer organisation.

The consumer representative attended all committee meetings and was involved in developing the recommendations. She also participated in discussions that informed the development of the narrative to ensure that the consumer perspective was accurately reflected.

Role of the committee

The role of the OGDC was to:

- refine the scope of the Guidelines and the clinical areas for review
- select existing clinical practice guidelines to be adapted for an Australian context
- determine the clinical questions to review the evidence that are relevant to the Australian healthcare system
- review the evidence and develop recommendations
- refine and review the draft Guidelines before public consultation
- review public consultation comments and consider revising the Guidelines as necessary
- approve a final draft of the Guidelines to be submitted to the NHMRC Council and Chief Executive Officer to issue.

Declaration of conflict of interest process

Members of the OGDC were required to declare their conflicts of interest in writing, prior to appointment, as part of the process of the establishment of any NHMRC committee.

Committee members were required to inform the Chair of the OGDC and the NHMRC of any changes to their interests.

Declarations of conflicts of interest were called for and updates requested as a standing agenda item at the beginning of each committee meeting. While the evidence was being discussed, members were requested to declare any involvement in upcoming related publications, or involvement in any publications that had been included in the systematic review process. New information was recorded in a register of conflicts of interest.

Where committee members were identified as having a significant real or perceived conflict of interest, the Chair could decide that the member either leave the room, or remain present but not participate in the discussion or in decision-making on the specific area relating to the conflict. There were no instances in the development process where the Chair required a member to leave the room during the discussion of the evidence because of a significant perceived or real conflict of interest.

The process to manage conflicts of interest and consensus for decision making was in accordance with the NHMRC *Members' responsibility regarding disclosure of interest and confidentiality* document, which applies to all members of the Council of the NHMRC, Principal Committees and Working Committees (in accordance with the requirements of the *National Health and Medical Research Council Act 1992*).

Disclosures of conflicts of interest

Name	Committee	Interest declared
Professor Louise Baur	Organising Committee	No conflicts of interest to declare
Professor Mark Harris	Organising Committee Obesity Guidelines Development Committee	No conflicts of interest to declare
Professor Joseph Proietto	Organising Committee Obesity Guidelines Development Committee	Funding from NHMRC Funding for liraglutide drug trials (GLP-1) Funding from pharmaceutical companies Articles included in systematic review related to intensive interventions Worked on Nestle Medical Advisory Board until 2010 Resigned as Chair of Nestle Optifast Committee prior to Guideline commencement Authorship on some publications within the Guidelines
Professor Michael Frommer	Organising Committee Obesity Guidelines Development Committee	No conflicts of interest to declare
Professor Ian Caterson AM	Obesity Guidelines Development Committee	Funding from NHMRC Funding from Medical Research Council UK (from Weight Watchers) on multiregional study of commercial weight loss programs versus standard care Funded trials for weight loss medications and GLP-1 agonists for diabetes Board member for the SCOUT trial (included in the systematic review as James 2010) Clinical trials or research grants funded by Sanofi-Aventis, Allergan, Eli Lilly, NovoNordisk, Roche products, MSD and GlaxoSmithKline Articles included in systematic review related to weight loss interventions Authorship on some publications within the Guidelines Received payment for lectures from iNova Pharmaceuticals, Eisai Pharmaceuticals, Pfizer Australia and Servier Laboratories (Australia)

Disclosure of conflicts of interest (cont)

Name	Committee	Interest declared
Dr Dale Ford	Obesity Guidelines Development Committee	Partner, Hamilton Medical GP Visiting Medical Officer Western District Health Service Principal Clinical Advisor, Improvement Foundation Australia Board member: Southern GP Training Ltd Portland GP Super Clinic
Ms Helen Mikolaj	Obesity Guidelines Development Committee	Consumer representative on the South Australian Medicines Advisory Committee (SA Health) Member of the Consumer Advisory Group (National Prescribing Service) Review of the *Treatment guidelines for type 2 diabetes* (Baker IDI)
Ms Marion Goodman	Obesity Guidelines Development Committee	Declined offer to participate as a member of the Merck Sharp Dohme Health Assist Advisory Board Presented on obesity management at the Third Annual Lifestyle Medicine conference, Sydney, 4 November 2011; no payment received
Dr Tammy Kimpton	Obesity Guidelines Development Committee	No conflicts of interest to declare
Assoc Professor Sue Byrne	Obesity Guidelines Development Committee	Authorship on some publications within the Guidelines
Dr Matt Sabin	Obesity Guidelines Development Committee	Received speaker fees from pharmaceutical companies in the past for generic talks on childhood obesity Authorship on some publications within the Guidelines
Dr George Hopkins	Obesity Guidelines Development Committee	No conflicts of interest to declare
Ms Kay Gibbons	Obesity Guidelines Development Committee	No conflicts of interest to declare

When the committee had concerns about conflicts of interest related to particular studies, this was noted in the relevant evidence statement. Where the committee was made aware of potential conflicts of interest after the evidence review process, this is noted next to the reference to the relevant study in the Guidelines.

Targeted consultation

To aid implementation of the Guidelines in practice, the NHMRC consulted with relevant external groups and primary healthcare professionals at various stages of the guideline development process. Consultation activities included:

- consulting professional groups (members of the RACGP Quality Committee and the Australian Primary Care Collaborative GP Leadership Group) on the relevance of the clinical questions
- conducting a survey of primary healthcare professionals (medical, nursing and allied health) through professional associations to identify preferred formats and information that health professionals would be likely to seek from the guidelines
- consulting with primary healthcare professionals at various conferences, including GP11, a conference for general practitioners held in Hobart on 6–8 October 2011.

Feedback from these consultations indicated that primary healthcare professionals preferred that:

- the Guidelines be structured around the clinical consultation process, with recommendations by subgroup for age and body mass index (BMI)
- current evidence-based recommendations be included to provide advice on appropriate targets, measures and goals
- effective interventions and treatments for long-term weight management be included.

This feedback was considered by the OGDC and technical writers in developing the structure of the Guidelines and determining the level of detail to be included.

Public consultation

The draft Guidelines were released for a 30-day public consultation period, as required in the *National Health and Medical Research Council Act 1992*, on 29 March 2012. Submissions were received from health departments, nongovernment organisations, health services and individuals, with a total of 42 submissions. Key issues and how these were addressed are outlined below.

- *Overall focus*—Several submissions felt that the Guidelines should focus on improving health outcomes and not on weight loss, especially given the lack of effective interventions and difficulties of long-term weight management. Although the Guidelines focus on interventions that support weight loss, a greater emphasis has been placed on changing lifestyle behaviours and health outcomes other than weight.
- *Mental health*—A number of submissions raised the need for more discussion of mental health, including eating disorders. Discussion of depression and eating disorders as comorbidities has been expanded, information on assessment included and mental health included as a consideration when planning interventions.
- *Factors affecting weight and lifestyle*—A range of social, physical and psychological factors that affect an individual's ability to prevent weight gain and make lifestyle changes were identified in submissions. These have been included in discussion of drivers of weight gain, assessment and tailoring interventions to the individual. Other sections of the Guidelines have also been reviewed to ensure that these factors are highlighted.
- *Multidisciplinary care*—Submissions raised the need for more practical information on how a multidisclipinary approach might be implemented in primary health care. Chapter 3 of the Guidelines has been expanded to include discussion of the use of the 5As framework and community-based programs, and a wider range of allied health professionals has been included.

- *Discussing weight*—Submissions suggested including information on discussing weight sensitively and reviewing an individual's lifestyle behaviours. Sections on discussing weight have been added to Parts B and C, and current lifestyle behaviours have been included in the section on assessment.
- *Medications*—The Therapeutic Goods Administration questioned whether the Guidelines should include discussion of medications that are not registered for treatment of overweight and obesity in Australia. The section has been revised to clarify that orlistat is the only medication registered for this use in Australia, and details of off-label use of medications have been removed.
- *Bariatric surgery*—A number of submissions identified major studies published since the systematic literature review was conducted. These have been reviewed and are discussed in the text.
- *Children and adolescents*—Submissions suggested strengthening the discussion of parental involvement in weight management, particularly support for behavioural change. 'Family involvement' was included as a separate section and sections on interventions were modified to reflect the need for family behavioural change. Submissions also raised the need for consideration of weight loss (rather than maintenance) in obese children, which was included in the text.
- *Other Australian guidelines*—Submissions identified Australian guidelines that have been revised or are under review. The Guidelines were revised to include current guidelines and refer more generally to those under review.

The specific comments received and the response provided by the committee will be available to the public after the Guidelines have been published.

Independent clinical expert (peer) and methodological review

Peer review

The Guidelines were reviewed by two independent peer reviewers. Comments provided were discussed by the OGDC and the Guidelines changed to improve clarity about:

- the difference between sedentary behaviour and prolonged sitting
- the evidence base for Table 6.4 (Summary of effects of weight management interventions)
- the use of growth charts for children and adolescents
- active management versus long-term monitoring in children and adolescents.

Editorial suggestions and citations provided were also included.

Methodological review

Three Appraisal of Guidelines for Research and Evaluation (AGREE II) appraisals were undertaken independently by NHMRC staff members who were not involved in the development of the Guidelines.

The Guidelines also underwent independent methodological review to ensure that processes and requirements of the *NHMRC Procedures and requirements for meeting the 2011 NHMRC Standard for clinical practice guidelines* (the 2011 NHMRC Standard) were met. The review highlighted some areas where clarity was required to meet mandatory requirements. Additional text was included to ensure consistency between the Guidelines and the technical report and to provide clearer explanation of:

- processes used to involve and support consumer participants
- consideration of ethical issues in formulating recommendations
- how Aboriginal and Torres Strait Islander peoples and any population subgroups were addressed in the search strategy and retrieved articles.

C Evidence review process

Given the number of guidelines on the management of overweight and obesity that have been developed internationally in recent years, the OGDC decided to commission a systematic review only for those areas that were relevant for Australian practice and would benefit from an update of the literature. For those clinical areas that were in scope but were well-established areas of practice, recommendations were to be sourced from recent guidelines. The AGREE II instrument was used to screen a number of international guidelines that related to obesity. The SIGN *Management of obesity: a national clinical guideline* (2010) was selected as the reference guidelines because of their recent development and the similarity of their methods to NHMRC processes.

At the 17 February 2011 meeting of the OGDC, the clinical questions from the SIGN guidelines and those that were drafted by Ms Philippa Middleton were considered and prioritised. Five clinical questions, PICO (population, intervention, comparator, outcomes) criteria, and criteria for inclusion and exclusion of studies were drafted by the OGDC, which was later refined to two questions by the systematic reviewer.

The systematic reviewer was contracted by the NHMRC through a competitive process using the NHRMC Health Advice Panel providers. The reviewer prepared a protocol that outlined the clinical questions to be addressed in the systematic review and the methods to be used. Feedback on and approval of the protocol by the OGDC was sought before the review began.

The systematic reviewer:

- refined the clinical questions and PICO criteria
- developed a search strategy and searched the literature
- assessed the eligibility of identified studies
- critically appraised the included studies
- summarised included studies
- provided evidence statements for the OGDC to review
- provided a final report for the review of the evidence
- attended meetings to respond to queries from the OGDC.

This appendix provides a summary of the systematic literature review. The full report of the review is available by email request to obesityguidelines@nhmrc.gov.au.

Developing structured clinical questions

The PICO criteria were used to develop clinical questions for the review. The four elements of the PICO criteria are (Richardson et al. 1995):

- the target **P**opulation for the question
- the **I**ntervention being considered
- the appropriate **C**omparator for the question (where relevant)
- the clinical **O**utcomes that are most relevant to the question.

The clinical questions used in the review are as follows.

1 *What are the health outcomes associated with weight loss in individuals who are overweight or obese?*

Population	Interventions	Comparators	Outcomes
1. Persons of any age with overweight or obesity 2. Persons with any degree of overweight or obesity	The following methods of weight loss: • nonmedication management (nutrition, physical activity, psychological) • medication management • surgical management	Degree of weight loss: • percentage relative change in body weight • change in BMI or BMI z-score / BMI for age centiles • change in waist circumference • no weight loss • no treatment	Cardiovascular disease Type 2 diabetes Musculoskeletal conditions Mental health Cancer Fertility All-cause mortality

2 *What are the effects of weight reduction interventions on degree and duration of weight loss?*

Population	Interventions	Comparators	Outcomes
1. Persons of any age with overweight or obesity 2. Persons with any degree of overweight or obesity	1. The following methods of weight loss: • nonmedication management (nutrition, physical activity, psychological) • medication management • surgical management • any of these methods in combination 2. EPOC categories of intervention: • professional interventions • financial interventions (provider and patient) • organisational interventions (provider-oriented, patient-oriented, structural) • regulatory interventions	No treatment Placebo intervention	1. Degree of weight loss 2. Duration of weight loss • 12 months to 3 years • > 3 to 5 years • > 5 years

Notes: The target population for the searches was not further stratified to identify literature specific to Aboriginal and Torres Strait Islander peoples or other population subgroups. If evidence relevant to a specific group was identified, it was coded as such.

EPOC = Cochrane Effectiveness of Practice and Organisation of Care

Developing a search strategy, searching the literature and assessing the eligibility of identified studies

Study identification and selection

Electronic databases searched	
MEDLINE, PsychINFO and CINAHL (2007–July 2011), Cochrane Library (all years)	
Search terms	
Overweight and obesity search terms	
1. Obesity/ (MeSH term, all sub trees and subheadings included) 2. Hyperphagia/ (MeSH term, all subheadings included) 3. (obes* or adipos* or overweight* or over weight*) (in abstract or title) 4. (overeat* or overfeed*) (in abstract or title)	5. Weight-gain/ (MeSH term, all subheadings included) 6. Weight-loss/ (MeSH term, all subheadings included) 7. Body-Mass-Index/ (MeSH term) 8. weight gain (in abstract or title)
Study type search terms	
1. (meta anal* or metaanal*) (in abstract or title) 2. Meta-analysis.pt 3. Review, systematic/ 4. randomized controlled trial.pt. 5. random allocation/	6. double blind method/ 7. single blind method/ 8. controlled clinical trial.pt. 9. placebos/ 10. comparative study.pt
Treatment type search terms	
1. Diet therapy (MeSH) 2. Drug therapy (MeSH) 3. Surgery (MeSH) 4. Exercise (MeSH)	5. Psychological techniques (MeSH) 6. Behavior therapy (MeSH) 7. Cognitive therapy, behavior/
Inclusion criteria	
Randomised, placebo-controlled clinical trial, systematic review or meta-analysis Study appraised one or more of the following weight loss interventions: physical activity, nutrition, psychology, medication, and/or surgery Details of the weight loss intervention were described Participants had overweight or obesity measured using one or more valid measures Weight change was measured using a valid measure Medical causes of obesity were absent Outcomes were measured after a period of at least 12 months Study included a control group suitable for determining the overall effect of the intervention	
Exclusion criteria	
Duplicate publication containing only data that had been published in full elsewhere Methodological paper Published in a language other than English	
Results of the search	
The search strategy, performed between April and July 2011, identified 4291 abstracts for perusal. On review of the abstracts, 416 articles were retrieved. Of these, 137 studies were identified as relevant.	

Critically appraising the included studies

The quality assessment of included studies was based on the *NHMRC additional levels of evidence and grades for recommendations for developers of guidelines* (NHMRC 2009a). This included appraisal of:

- the level of evidence using the NHMRC hierarchy (see Table C1)
- a study quality rating (see Table C2)
- a magnitude of effect rating (see Table C3)
- a relevance rating.

Conflict of interest data were not appraised because these are reported as part of the peer review process for publication.

Table C1 NHMRC level of evidence hierarchy

Level	Intervention	Diagnostic accuracy	Prognosis
I	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies
II	A randomised controlled trial	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation	A prospective cohort study
III-1	A pseudorandomised controlled trial	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among non-consecutive persons with a defined clinical presentation	All or none
III-2	A comparative study with concurrent controls	A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence	Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial
III-3	A comparative study without concurrent controls	Diagnostic case-control study	A retrospective cohort study
IV	Case series with either post-test or pre-test / post-test outcomes	Study of diagnostic yield (no reference standard)	Case series or cohort study of persons at different stages of disease

Source: *NHMRC (2009a)*

Table C2 Study quality assessment criteria

Systematic reviews
Questions and methods clearly stated
Search procedure sufficiently rigorous to identify all relevant studies
Review includes all the potential benefits and harms of the intervention
Review only includes randomised controlled trials
Methodological quality of primary studies assessed
Data summarised to give a point estimate of effect and confidence intervals
Differences in individual study results are adequately explained
Examination of which study population characteristics (disease subtypes, age/sex groups) determine the magnitude of effect of the intervention is included
Reviewers' conclusions are supported by data cited
Sources of heterogeneity are explored
Randomised controlled trials
Method of treatment assignment
Correct, blinded randomisation method described OR randomised, double blind method stated AND group similarity documented
Blinding and randomisation stated but method not described OR suspect technique (e.g. allocation by drawing from an envelope)
Randomisation claimed but not described and investigator not blinded
Randomisation not mentioned
Control of selection bias after treatment assignment
Intention to treat analysis AND full follow-up
Intention to treat analysis AND <15% loss to follow-up
Analysis by treatment received only OR no mention of withdrawals
Analysis by treatment received AND no mention of withdrawals OR more than 15% withdrawals/loss-to-follow-up/ postrandomisation exclusions
Blinding
Blinding of outcome assessor AND patient and care giver
Blinding of outcome assessor OR patient and care giver
Blinding not done
Outcome assessment (if blinding was not possible)
All patients had standardised assessment
No standardised assessment OR not mentioned

Source: *Adapted from NHMRC 2000b; 2000c; SIGN 2006*

Table C3 NHMRC magnitude of effect rating

Ranking	Statistical significance	Clinical importance of benefit
High	Difference is statistically significant AND	There is a clinically important benefit for the full range of estimates defined by the confidence interval
Medium	Difference is statistically significant AND	The point estimate of effect is clinically important but the confidence interval includes some clinically unimportant effects
Low	Difference is statistically significant AND OR Difference is not statistically significant AND	The confidence interval does not include any clinically important effects The range of estimates defined by the confidence interval includes clinically important effects

Source: *Adapted from NHMRC 2000b; 2000c*

Data synthesis and summary

For Question 1, studies were grouped according to the specific clinical conditions that characterised the study subjects or outcomes being investigated (e.g. type 2 diabetes).

For Question 2, studies were grouped according to their component interventions, drawing on the taxonomy used to classify quality improvement strategies, developed by the Cochrane Effectiveness of Practice and Organisation of Care (EPOC) group.

An evidence statement of the literature for each question was completed using the NHMRC Evidence Statement Form. To expedite the process, components of the evidence that were straightforward (evidence base and, in some cases, generalisability) were pre-filled by NHMRC staff using information from the systematic review. The OGDC discussed each component of the evidence, referred back to the systematic review and graded the evidence using the NHMRC body of evidence matrix (NHMRC 2009a) (Table C4). Evidence statements were developed by the OGDC based on discussion of all components. An example of the form used to develop evidence statements is provided in Table C31.

Table C4 NHMRC body of evidence matrix

	A	B	C	D
	Excellent	**Good**	**Satisfactory**	**Poor**
Evidence base	one or more level I studies with a low risk of bias or several level II studies with a low risk of bias	one or two level II studies with a low risk of bias or a SR/several level III studies with a low risk of bias	one or two level III studies with a low risk of bias, or level I or II studies with a moderate risk of bias	level IV studies, or level I to III studies/SRs with a high risk of bias
Consistency	all studies consistent	most studies consistent and inconsistency may be explained	some inconsistency reflecting genuine uncertainty around clinical question	evidence is inconsistent
Clinical impact	very large	substantial	moderate	slight or restricted

	A	B	C	D
	Excellent	**Good**	**Satisfactory**	**Poor**
Generalisability	population/s studied in body of evidence are the same as the target population for the guideline	population/s studied in the body of evidence are similar to the target population for the guideline	population/s studied in body of evidence differ to target population for guideline but it is clinically sensible to apply this evidence to target population	population/s studied in body of evidence differ to target population and hard to judge whether it is sensible to generalise to target population
Applicability	directly applicable to Australian healthcare context	applicable to Australian healthcare context with few caveats	probably applicable to Australian healthcare context with some caveats	not applicable to Australian healthcare context

SR = systematic review; several = more than two studies

Summarising the included studies—adults

Lifestyle interventions

Table C5 Weight change and cardiovascular risk factors following lifestyle intervention

LEVEL I STUDIES							
Study	**Group**	**Weight change** (kg)	**Blood pressure** (mmHg)		**Cholesterol** (mmol/L)		
			Systolic	**Diastolic**	**LDL**	**HDL**	**Total**
Aucott et al. 2009 *n* = 57 708 3 years of follow-up	All studies Controlled studies	↓11–↑4 —	↓13–↑6.1 ↓15–↑4.0	↓7–↑2.2 ↓5–↑2.2	— —	— —	— —
Galani & Schneider 2007 *n* = 11 579 6 years of follow-up	Overweight Obese Prediabetes	↓2.2 ↓3.5 ↓2.9	↓2.1 ↓1.6 ↓3.5	↓2.8 ↓1.4 ↓1.8	↓0.2 — ↓0.05	↑0.01 ↑0.04 ↑0.02	↓0.3 ↓0.1 ↓0.1
Horvath et al. 2008 *n* = 1632 3 years of follow-up	Hypertension	↓4.1	↓6.3	↓3.4	—	—	—
Norris et al. 2005a *n* = 5168 Lifestyle 12 months of follow-up	Prediabetes	↓2.8	↓4.0	↓1.6	↓0.04	↑0.02	↓0.1
Shaw et al. 2006 *n* = 3476 Lifestyle 12 months of follow-up	Exercise Diet Exercise + diet Control	↓0.5–7.6 ↓2.3–16.7 ↓3.4–17.7 ↓0.1– ↑0.7	↓0.8–9.9 ↓0.8–13.0 ↓3.1–12.5 ↓1.0	↓1.2–5.9 ↓1.1–7.5 ↓2.0–7.9 ↓1.0–↑0.6	— — — —	↑0.01–0.11 ↓0.05–↑0.12 ↓0.1– ↑0.18 ↓0.02–↑0.01	↓0.25–↑0.18 ↓1.4–0.19 ↓1.23–0.15 ↓0.23–0.13
Witham & Avenell 2010* *n* = 1954 Lifestyle 3 years of follow-up	Diet + exercise Exercise Diet	↓3.8 ↓1.4 ↑0.1	— — —	— — —	↓0.04	↑0.04	↓0.36

Table C5 *(cont)*

LEVEL II STUDIES							
Study	**Intervention**	**Weight change**	**Blood pressure** (mmHg)		**Cholesterol** (mmol/L)		
			Systolic	**Diastolic**	**LDL**	**HDL**	**Total**
Azadbakht et al. 2007 Mean age 45.5 years *n* = 89 14 months of follow-up	Low fat diet	↓1.2 kg	↓3.3	↓1.3	↓3.9	↑3.8	↓0.3
	Moderate fat diet	↓5.0 kg	↓7.4	↓2.9	↓6.9	↑6.6	↓0.6
Dale et al. 2008 Mean age 45–48 years Prediabetes *n* = 79 2 years of follow-up	Diet + exercise	↓1.0 kg	↓5.0	↑1.0	—	0	↓0.4
	Control	↓0.8 kg	↓1.0	↑2.0	—	↑0.1	↑0.2
Groeneveld et al. 2010 *n* = 816 1 year of follow-up	Motivational interviewing (mean BMI: 28.8)	↓0.9 kg	↓4.9	↓3.7	—	↑0.07	—
	Control (mean BMI: 28.2)	↑0.9 kg	↓3.8	↓3.2	—	↑0.05	—
ter Bogt et al. 2009** BMI: 25–40 Cardiovascular risk factors *n* = 457	Nurse practitioner-led intervention	↓1.9%	↓11.1	↓3.6	↓0.26	↓0.05	↓0.4
	GP-led intervention	↓0.9%	↓11.1	↓3.6	↓0.26	↓0.05	↓0.4
Uusitupa et al. 2009 Prediabetes Mean age: 53.7–55.9 years Mean BMI 26.8–31.7 *n* = 522 1 year of follow-up	Diet + exercise counselling	↓4.5 kg	↓5.2	↓4.7	—	↓0.05	↓0.12
	General health behavioural advice	↓1.0 kg	↓1.5	↓2.8	—	↑0.02	↓0.10

— *= not measured; BMI = body mass index; HDL = high-density lipoprotein; kg = kilogram; LDL = low-density lipoprotein; mmHg = millimetres of mercury; mmol/L = millimoles per litre*

* *Based on meta-analysis of data on lipids from four studies only. Data reported for lipids are weighted mean differences between the intervention and control groups.*

** *There were no significant changes in blood pressure between groups so results have been pooled. Changes in blood pressure are those associated with a weight loss of 8.9 kg.*

Table C6 Weight change and cardiovascular outcomes following lifestyle intervention

Study	Intervention	Weight change (kg)	Morbidity		Mortality	
			CV events	Hazard ratio	Deaths	Hazard ratio
Uusitupa et al. 2009 Prediabetes *n* = 522 10.2 years of follow-up	Diet + exercise counselling General health behavioural advice	↓4.5 ↓1.0	57/257 (22%) 54/248 (22%)	0.89 0.87	6 10	0.21 0.39
Shea et al. 2010* Age: ≥60 years Mean age: 69 years Mean BMI: 34 *n* = 318 18 months of follow-up	Diet/exercise and diet only Exercise only and control	↓4.8 ↓1.4	— —	— —	15 30	0.5** 0.5**

— = not measured; CV = cardiovascular

* *Diet/exercise and diet only results were pooled; and exercise only and control results were pooled. The total mortality rate of those who lost > 5% of their body weight was not different to those who lost < 5% of their body weight (hazard ratio [HR] 1.5; 95% confidence interval [CI], 0.4–5.5)*

** *Hazard ratio associated with intentional weight loss. Among older participants (aged > 67.1 years) those randomised to diet/exercise or diet had a lower mortality rate compared with those randomised to exercise or control (HR 0.4; 95% CI: 0.2–1.0).*

Table C7 Weight change and glycaemic control in adults with prediabetes following lifestyle interventions

LEVEL I STUDIES					
Study	**Intervention**	**Weight change** (kg)	**BMI**	**Fasting serum glucose**	**HbA1c**
Galani & Schneider 2007 *n* = 11 579 6 years of follow-up	Diet and exercise ± behavioural therapy	↓2.9	↓1.3	↓0.2 mmol/L	↓0.04%
Norris et al. 2005a *n* = 5168 12 months of follow-up	Lifestyle interventions	↓2.8	↓1.3	—	↓0.2%*
LEVEL II STUDIES					
Study	**Intervention**	**Weight change** (kg)	**BMI**	**Fasting glucose**	**2-hour postprandial glucose**
Dale et al. 2008 Mean age: 45–48 years *n* = 79 2 years of follow-up	Diet and exercise Control	↓1.0 ↓0.8	↓0.7 ↓0.8	↓0.1 0.0	— —
Uusitupa et al. 2009 Mean age: 53.7–55.9 years Mean BMI 26.8–31.7 *n* = 522 1 year of follow-up	Diet + exercise counselling General health behavioural advice	↓4.5 ↓1.0	↓5.2 ↓1.5	↓4.7 ↓2.8	↓0.8 mmol/L ↓0.3

— = not measured; BMI = body mass index; HbA1c = glycated haemoglobin; mmol/L = millimoles per litre

* *Reduction in HbA1c associated with weight loss of 5.5 kg.*

Table C8 Prevalence of metabolic syndrome in adults with prediabetes following lifestyle intervention

Study	Intervention	Metabolic syndrome		Abdominal obesity	
		Before intervention	After intervention	Before intervention	After intervention
Ilanne-Parikka et al. 2008* Randomised controlled trial *n* = 522 Prediabetes Age: 40–64 years 3.9 years of follow-up	Intensive lifestyle	74%	63%	80%	68%
	Control	74%	71%	72%	72%

* *Lifestyle intervention reduced odds of metabolic syndrome (odds ratio [OR] 0.62; 95% CI, 0.4–0.95) and abdominal obesity (OR 0.48; 95% CI, 0.28–0.81) but not reduced fasting plasma glucose.*

Table C9 Weight change and glycaemic control in adults with type 2 diabetes following lifestyle intervention

LEVEL I STUDIES

Study	Intervention	Weight change	HbA1c
Norris et al. 2005b* *n* = 4659; 5 years of follow-up	Lifestyle interventions Diet vs usual care	Up to ↓12.0 kg ↓3.0 kg	↓0.7%
Nield et al. 2007 *n* = 1467; 12 months of follow-up	Diet and exercise	↓2.5–5 kg	↓1.0%
Huisman et al. 2009 *n* = 5469	Lifestyle interventions at < 6 months Lifestyle interventions at > 6 months	Effect size 0.18 Effect size 0.06	Effect size 0.35 Effect size 0.34
Thomas et al. 2006 *n* = 377 12 months of follow-up	Exercise vs no exercise	0.0 kg	↓0.6%

LEVEL II STUDIES

Study	Intervention	Weight change	HbA1c	Blood pressure (mmHg)		Lipids (mg/dL)		
				Systolic	Diastolic	LDL	HDL	Tg
Belacazar et al. 2010 Mean age: 57.5 *n* = 1759 5 years of follow-up	Intensive lifestyle intervention	↓9.0 kg	↓0.7%	—	—	↓0.07	↑0.2	↓1.8
	Diabetes self-education	↓0.8 kg	—	—	—	↓0.3	↑0.08	↓0.7
Pi Sunyer et al. 2007 Age: 45–74 *n* = 5145 12 months of follow-up	Intensive lifestyle intervention	↓8.6%	↓1.3%	↓6.8	↓3.0	↓0.3	↑0.2	↓1.7
	Diabetes self-education	↓0.7%	↓0.1%	↓2.8	↓1.8	↓0.3	↑0.08	↓0.8
Wing 2010a Mean age: 57.5 *n* = 5145 4 years of follow-up	Intensive lifestyle intervention	↓6.5%	↓0.36%	↓5.33%	↓2.92%	↓0.6	↓0.2	↓1.4
	Diabetes self-education	↓0.88%	↑0.09%	↓2.97%	↓2.48%	↓0.7	↓0.1	↓1.1
Cheskin et al. 2008 Mean BMI: 35 *n* = 119 86 weeks of follow-up	Portion controlled diet	↓5.6 kg	No change	↓7.6%	↓2.7%	—	↑0.2	↑0.02
	Standard diet	↓4.7 kg	↓1.2%	↓14.0%	↓9.7%	—	↑0.4	↓0.15

LEVEL II STUDIES								
				Blood pressure (mmHg)		**Lipids** (mg/dL)		
Study	**Intervention**	**Weight change**	**HbA1c**	**Systolic**	**Diastolic**	**LDL**	**HDL**	**Tg**
Christian et al. 2008** Mean BMI: 35.4 *n* = 310 12 months of follow-up	Nutrition and physical activity counselling	↓0.2 kg	↓0.14%	↓2.6%	↓2.6%	—	↓0.02	↓0.8
	Health education pamphlet	↑1.4 kg	↓0.46%	↓4.7%	↓2.5%	—	↑0.09	↓0.5

— = not measured; HbA1c = glycated haemoglobin; HDL = high-density lipoprotein; LDL = low-density lipoprotein; mg/dL = milligrams per decilitre; mmHg = millimetres of mercury; Tg = triglycerides

* *More intense physical activity was associated with greater weight reduction but not with greater reductions in HbA1c.*

** *Because 98% of participants were taking antihyperglycaemic medications, the effect of medication use on HbA1c was unable to be controlled for.*

Medications

Table C10 Weight change following use of weight loss medications and lifestyle intervention

Study	Intervention	Control	Increase in weight loss
Curioni et al. 2006b meta-analysis of 4 RCTs	Rimonobant + hypocaloric diet	Hypocaloric diet	5 kg at 12 months
Nissen et al. 2008 RCT; *n* = 839 mean BMI: 35	Rimonobant + hypocaloric diet	Hypocaloric diet	3.8 kg at 18 months
Van Gaal et al. 2008 RCT; *n* = 1507 mean BMI: 36	Rimonobant + hypocaloric diet	Hypocaloric diet	4.3 kg at 2 years
Franz et al. 2007 meta-analysis of 80 studies	Pharmacotherapy + lifestyle	Lifestyle	2–5 kg at 2 years
Horvath et al. 2008 Hypertension meta-analysis of 8 RCTs	Orlistat + lifestyle Sibutramine + lifestyle	Lifestyle Lifestyle	3.7 kg at 3 years 3.7 kg at 3 years
Smith et al. 2010 RCT; *n* = 3182 BMI: 27–45	Lorcaserin + behavioural therapy	Behavioural therapy	5.8% vs 2.2% at 1 year

BMI = body mass index; kg = kilogram; RCT = randomised controlled trial

Table C11 Weight change and cardiovascular risk factors following use of weight loss medication

LEVEL I STUDIES

Study	Medication	Weight change (kg)	Blood pressure (mmHg)		Lipids (mmol/L)		
			Systolic	Diastolic	LDL	HDL	TG
Padwal et al. 2003 BMI: 42–58 4 years of follow-up	Orlistat *n* = 10 631	↓2.9	↓1.5	↓1.4	↓0.26	↓0.03	↓0.03
	Sibutramine* *n* = 2623	↓4.2	↑1.7	↑2.4	—	↑0.04	↓0.18
Horvath et al. 2008 BMI: 28–43 Hypertension 4 years of follow-up	Orlistat *n* = 3132	↓3.7	↓2.5	↓1.9	—	—	—
	Sibutramine *n* = 610	↓3.7	NR	↑2.4	—	—	—

LEVEL II STUDIES

Study	Intervention	Weight change	Blood pressure (mmHg)		Lipids (mmol/L)		
			Systolic	Diastolic	Total cholesterol	HDL	TG
Greenway et al. 2010 BMI: 27–45 *n* = 1742 1 year of follow-up	Naltrexone 32 mg/ bupropion	↓6.2 cm WC	↓1.0	0	NR	↑8	↓12.7
	Placebo	↓2.5 cm WC	↓1.9	↓0.9	NR	↑0.8	↓3.1
Proietto et al. 2010 BMI: 34.4–34.9 *n* = 1041 13 months of follow-up	Taranabant 0.5 mg + lifestyle	↓5.0 kg	↑0.1	↓0.6	↑4	↑10.6	↓3.9
	Taranabant 1 mg + lifestyle	↓5.2 kg	↓0.5	↓0.5	↑4.4	↑11.2	↓3.3
	Taranabant 2 mg + lifestyle	↓6.4 kg	↑0.7	↓0.4	↑4.2	↑11.7	↓5.4
	Placebo + lifestyle	↓1.4 kg	↑0.7	↓0.04	↑7	↑9.2	0
Ryan et al. 2010** BMI: 40–60 *n* = 390 2 years of follow-up	Sibutramine, orlistat, or diethylpropion hydrochloride	↓9.7%	↓14.7	↑4.4	NR	↑7.9	↓9.2
	Lifestyle	↓0.4%	↓8.6	↑3.2	NR	↑1.5	↓4.8
Smith et al. 2010 BMI: 27–45 *n* = 3182 2 years of follow-up	Lorcaserin	↓5.8 kg	↓1.4	↓1.1%	↓0.9	↑0.1	↓6.2
	Placebo	↓2.2 kg	↓0.8	↓0.6%	↑0.6	↓0.2	↓0.1
Madsen et al. 2008# Mean BMI: 37 *n* = 93 3 years of follow-up	Orlistat + diet and exercise counselling	↓8.9 kg ± 8.3 kg	—	—	↓6.5	↑1.6	↓12
	Placebo + diet and exercise counselling	↓6.3 kg ± 9.1 kg	—	—	↓6.5	↑1.6	↓12

— = not measured; BMI = body mass index; HDL = high-density lipoprotein; kg = kilogram; LDL = low-density lipoprotein; mmHg = millimetres of mercury; mmol/L = millimoles per litre; NR = not recorded; TG = triglycerides; WC = waist circumference

* *Insufficient data were available to estimate pooled changes in LDL with sibutramine.*

** *No statistically significant differences in lipids between groups; results were therefore pooled.*

\# *There was a substantial dropout of participants in the intervention group, with only 10 of the 101 completing the study (compared with 86 of 89 enrolled in the usual care group).*

Table C12 Weight change in adults with metabolic syndrome following use of weight loss medication

Study	**Intervention**	**Weight change** (kg)
Svendsen et al. 2009* RCT; *n* = 44; Mean BMI: 37.5 12 months of follow-up	Orlistat Placebo	↓7.2 ↓3.9

BMI = body mass index; kg = kilogram; RCT = randomised controlled trial

** Dietary intake did not differ between the orlistat and placebo groups.*

Table C13 Weight change and cardiovascular outcomes in adults with comorbidities following use of weight loss medication

Study	**Intervention**	**Weight change** (kg)	**CV events** (%)	**Nonfatal MI** (%)	**Nonfatal stroke** (%)	**Mortality**
Siebenhofer et al. 2009 Systematic review of 8 RCTs; *n* = 3751 baseline SBP > 140 ± DBP > 90 mmHg BMI: 28–43 4 years of follow-up	Orlistat	↓3.7	—	—	—	0 in 2 studies; 1 study reported 3 in treatment group vs 0 in placebo group
	Sibutramine	↓3.7	—	—	—	No deaths in treatment or placebo group
James et al. 2010 RCT; *n* = 10 744 Age ≥ 55 years CVD and/or diabetes 12 months of follow-up	Sibutramine	↓4.3	11.4	4.1	2.6	No increased risk at up to 7 years of follow-up
	Placebo	↓2.6	10.0	3.2	1.9	—

— = not measured; BMI = body mass index; CV = cardiovascular; CVD = cardiovascular disease; DBP = diastolic blood pressure; MI = myocardial infarction; mmHg = millimetres of mercury; RCT = randomised controlled trial; SBP = systolic blood pressure

Table C14 Weight change, cardiovascular risk and glycaemic control in adults with type 2 diabetes following use of weight loss medication

LEVEL II STUDIES								
				Blood pressure (WMD)		**Cholesterol** (WMD)		
Study	**Intervention**	**Weight change** (kg)	**HbA1c**	**Systolic**	**Diastolic**	**LDL**	**HDL**	**Total**
Norris et al. 2005c Meta-analysis of 22 RCTs *n* = 3379 12 months of follow-up	Fluoxetine	↓5.1	↓1.0%	—	—	—	↓0.03	↓0.5
	Orlistat	↓2.0	↓0.5%	—	—	↓0.3	↓0.02	↓0.4
	Sibutramine	↓5.1	↓0.5%	↓0.8*	↓1.4*	↓0.1	↑0.07	↓0.1

Table C14 (cont)

LEVEL II STUDIES						
Study	**Intervention**	**Weight change** (kg)	**HbA1c** (%)	**Cholesterol** (WMD)		
				LDL	**HDL**	**Total**
Eliasson et al. 2007 *n* = 38 Mean BMI: 33 12 months of follow-up	Topiramate	↓7.2 ± 4.3	↓1.1 ± 0.9	↓0.1	↑0.1	↑0.01
	Placebo	↑0.01± 2.5	↓0.2 ± 0.8	No significant changes		
Jacob et al. 2009 *n* = 2250 Mean BMI: 35 12 months of follow-up	Orlistat Placebo	↓3.77 ↓1.42	↓0.74 ↓0.31	— —	— —	— —

— = not measured; BMI = body mass index; HbA1c = glycated haemoglobin; HDL = high-density lipoprotein; LDL = low-density lipoprotein; kg = kilogram; RCT = randomised controlled trials; WMD = weighted mean difference

Lifestyle intervention

Table C15 Weight change and sleep apnoea symptoms following lifestyle intervention

Study	Intervention	Weight change	Symptoms
Tuomilehto et al. 2009 RCT; *n* = 72 BMI 28–40; 12 months follow-up	Very low calorie diet + lifestyle counselling	BMI ↓3.5 ± 2.1	OR 0.24
Foster et al. 2009 Diabetes RCT; *n* = 264 Mean BMI: 36.7 12 months follow-up	Intensive lifestyle intervention Diabetes education	↓10.8 kg ↓0.6 kg	AHI ↓5.4 AHI ↑4.2

— = not measured; AHI = apnoea-hypopnoea index; BMI = body mass index; OR = odds ratio; RCT = randomised controlled trial

Table C16 Weight change and urinary incontinence following lifestyle intervention

Study	Intervention	Weight change	Incontinence episodes
Wing et al. 2010 RCT; *n* = 338 (women) BMI 25–50 12 months follow-up	Weight loss education Group behavioural intervention	↓1.5% ↓7.5%	↓47% ↓65%

BMI = body mass index; RCT = randomised controlled trial

Table C17 Weight change and musculoskeletal problems following lifestyle intervention

Study	Intervention	Weight change	Change in symptoms
Christensen et al. 2007 Review *n* = 454	—	↓4.7–7.6	Knee pain ES 0.20 Function ES 0.23
Jenkinson et al. 2009 Knee pain RCT; *n* = 389 BMI ≥ 28 24 months follow-up	Exercise vs no exercise Diet vs no diet	Mean difference 0.4 kg Mean difference 3.0 kg	Bodily pain score ↑5.62* Bodily pain score ↑0.94*

Study	Intervention	Weight change	Change in symptoms
Manini et al. 2010 RCT; *n* = 424 Age 70–89 years 12 months follow-up	Moderate-intensity physical activity	Not significant	Improved short-duration mobility tasks of daily life
Morey et al. 2009 RCT; *n* = 641 > 5 year survivors of colorectal, breast or prostate cancer BMI 25–40 12 months follow-up	Control Lifestyle education and counselling	↓0.9 kg ↓2.1 kg	Lower extremity function ↓1.89 Lower extremity function ↑0.34
Villareal et al. 2011 RCT; *n* = 107 Age > 65 years	Diet + exercise	↓9%	Physical performance ↑21% Hip bone density ↓1.1%
	Diet	↓10%	Physical performance ↑12% Hip bone density ↓2.6%
	Exercise	↓1%	Physical performance ↑15% Hip bone density ↑1.5%

** Positive scores reflect improvement*

— = not reported; BMI = body mass index; ES = effect size; RCT = ranomised controlled trial

Surgery

Table C18 Risk of mortality associated with bariatric surgery

Study	Intervention	**Risk of mortality** (odds ratio)		
		Cardiovascular disease	**All-cause**	**Global**
Pontiroli & Morabito 2011 8 nonrandomised controlled trials *n* = 44 022 Mean BMI: 47 ± 1.1	All surgery Gastric banding Gastric bypass	0.58 (95% CI, 0.46–0.73) 0.71 0.48	0.70 (95% CI, 0.59–0.84) 0.57 0.55	0.55 (95% CI, 0.49–0.63) 0.66 0.7

Table C19 Weight change and cardiovascular risk following bariatric surgery

Study	Intervention	**Weight loss** (kg)	**BMI reduction**
Buchwald et al. 2009 *n* = 135 246 Mean age: 40.2 years Mean BMI: 47.9	Bariatric surgery Gastric banding Gastroplasty BPD/duodenal switch Gastric bypass	38.5 32 26 43.5 44.7	14 10.6 13.8 18.8 16.3
Padwal et al. 2011 *n* = 1103 Mean age: 30–48 years Mean BMI: 42–58	Jejunoileal bypass Mini-gastric bypass BPD Sleeve gastrectomy RYGB Horizontal gastroplasty LAGB	— — — — — — —	11.4 11.3 11.2 10.1 9.0 5.0 2.4

Table C19 (cont)

Study	Intervention	Excess weight loss (%)	Reduction in BMI
Picot et al. 2009 23 RCTs and 3 cohort studies *n* = 5766 Mean BMI: 30–60	LAGB BPD RYBG VBG Sleeve gastrectomy	39.0–87.2 — 60.5–84.4 37–68.8 66–69.7	7.4–18 13–18 10.7–15 — 27.5

Included studies on hypertension

Study	Intervention	Excess weight loss (%)	Prevalence of hypertension (%)	
			Baseline	Follow-up
Dixon et al. 2008 Diabetes 2 years of follow-up	LAGB	62.5	70.0	20.7
Van Dielen et al. 2005 *n* = 100 2 years of follow-up	VBG LAGB	70.1 54.9	20.0 14.0	14.6 10.0
Puzziferri 2006 3 years of follow-up	Open RYGB Laparoscopic RYGB	67.0 77.0	49.0 31.0	0 25.4

Included studies on hyperlipidaemia

Study	Intervention	Excess weight loss (%)	Resolution of hyperlipidaemia (%)
Dixon et al. 2008 Diabetes 2 years of follow-up	LAGB Control	62.5 —	27 4
Bessler et al 2 years of follow-up	Nonbanded gastric bypass Banded gastric bypass	64.0 57.0	50 62
Puzziferri 2006 3 years of follow-up	Open RYGB Laparoscopic RYGB	67.0 77.0	100 88

— = not measured; BMI = body mass index; BPD = biliopancreatic diversion; LAGB = laparoscopic adjustable gastric banding; RCT = randomised controlled trial; RYGB = Roux-en-Y gastric bypass; VBG = vertical banded gastroplasty

Table C20 Weight change, glycaemic control and cardiovascular risk following bariatric surgery in adults with type 2 diabetes

Study	Intervention	Weight change	Diabetes		Blood pressure (mmHg)		Lipids (mmol/L)		
			HbA1c	Remission	Systolic	Diastolic	Total	TG	HDL
Dixon et al. 2008 RCT; *n* = 60 mean BMI: 37 2 years of follow-up	LAGB Control (lifestyle)	↓20.7% ↓1.7%	↓1.8% ↓0.9%	73% 13%	↓6.0 ↓0.9	↓0.7 ↓0.4	↑0.09 ↓0.02	↓0.8 ↓0.2	↑0.3 ↑0.7

BMI = body mass index; HbA1c = glycated haemoglobin; HDL = high-density lipoprotein; LAGB = laparoscopic adjustable gastric banding; mmHg = millimetres of mercury; mmol/L = millimoles per litre; TG = triglycerides

Table C21 Markers of mild to moderate chronic kidney disease following bariatric surgery

Study	Intervention	Weight change	GFR/creatinine clearance (mL/min)
Afshinnia et al. 2010 *n* = 522 Mean BMI: 31–48 2 years of follow-up	Surgery Non-surgical intervention	— —	↓23.7 ↓0.5
Navaneethan et al. 2009 *n* = 528 Mean BMI: 30–54	Surgery Non-surgical intervention	↓16.5 ↓3.7	↓25.6 ↑4.3

— = not measured; BMI = body mass index; GFR = glomerular filtration rate; mL/min = millilitres per minute

Surgery

Table C22 Symptoms of sleep apnoea following bariatric surgery

Study	Intervention	Weight change	AHI
Greenburg et al. 2009 Meta-analysis; *n* = 342 Mean BMI: 55.3	Surgery	↓17.9	↓38.2

= not measured; AHI = apnoea-hypopnoea index; BMI = body mass index; GFR = glomerular filtration rate; mL/min = millilitres per minute

Table C23 Symptoms of gastro-oesophageal reflux following bariatric surgery

Study	Intervention	Weight change	Change in symptoms
De Groot et al. 2009 SLR; Mean BMI 39.8	RYGB LABG VBG	↓72% Mean BMI 31.5	Favourable effect Conflicting effects No effect
De Jong et al. 2010 SLR; *n* = 3,307; Prevalence of reflux 32.9% Mean BMI > 42	LAGB	BMI ↓9–19	Prevalence of symptoms 7.7% Newly developed symptoms 15%

— = not measured; BMI = body mass index; LAGB = laparoscopic adjustable gastric banding; RYGB = Roux-en-Y gastric bypass; VBG = vertical banded gastroplasty

Quality of life

Table C24 Weight change and depression and self-esteem following weight loss intervention

Study	Intervention	Weight change	Change in symptoms
Witham & Avenell 2010 SLR *n* = 1,954	Diet + exercise	↓3.0 kg	Improvement in one of the two studies that reported quality of life
Cooper et al. 2010 RCT; *n* = 150 Mean BMI 34.7 3 years follow-up	CBT BT	Median regain 88.6% Median regain 89.8%	SF36 mental component score ↑5.43 SF36 physical component score ↑3.96
Morey et al. 2009 RCT; *n* = 641 > 5 year survivors of colorectal, breast or prostate cancer BMI 25–40 12 months follow-up	Control Lifestyle education and counselling	↓0.9 kg ↓2.1 kg	SF36 mental health score ↓2.0 SF36 mental health score ↑0.5
Villareal et al. 2011 RCT; *n* = 107 Age > 65 years	Diet + exercise Diet Exercise	↓9% ↓10% ↓1%	SF36 physical component score ↑15% SF36 physical component score ↑14% SF36 physical component score ↑10%
Blaine et al. 2007 SLR; *n* = 4,574 BMI 25–57	Medication or surgery Psychotherapy	↓22.8 kg ↓5.9 kg	Moderate reduction in depression Modest improvement in self-esteem No reduction in depression Significant improvement in self-esteem
Picot et al. 2009 SLR; *n* = 5,766 Mean BMI 30–60	LAGB BPD RYGB	BMI ↓7.4–18 BMI ↓13–18 BMI ↓10.7–15	Improved quality of life Improved quality of life Improved quality of life

BMI = body mass index; BPD = biliopancreatic diversion; BT = behavioural therapy; CBT = cognitive behavioural therapy; LAGB = laparoscopic adjustable gastric banding; RYGB = Roux-en-Y gastric bypass; SLR = systematic literature review; VBG = vertical banded gastroplasty

Children and adolescents

Table C25 Weight change in children and adolescents following lifestyle intervention or use of weight loss medication

Study	Intervention	Reduction in BMI
Whitlock et al. 2010 Analysis of 20 studies Age: 4–18 years 6–12 months of follow-up	Comprehensive lifestyle intervention Comprehensive lifestyle intervention + sibutramine Comprehensive lifestyle intervention + orlistat	1.9–3.3 more than control Additional 2.2 No additional weight loss
Oude Luttikhuis et al. 2009* Meta-analysis of 64 studies Age: ≥ 12 years 6 months of follow-up	Lifestyle interventions vs standard care Lifestyle interventions + sibutramine Lifestyle interventions + orlistat	Effect size ↓0.14 (–0.17 to –0.12) at 6 months Effect size ↓0.14 (–0.18 to –0.10) at 12 months Additional 1.7 (1.4–1.9) Additional 0.8 (0.4–1.1)

BMI = body mass index

Note: This table summarises research identified in the systematic literature review. In Australia, orlistat is not registered for use in children and sibutramine, which was never registered for use in children, has been withdrawn.

* *Medications increased weight loss but also increased adverse events.*

Table C26 Weight change in postpubertal adolescents following gastric banding compared to lifestyle intervention

Study	Intervention	Weight change (kg)	Excess body weight (%)	BMI
O'Brien et al. 2010 RCT; *n* = 50 Age: 14–18 years BMI: > 35 2 years of follow-up	Supervised lifestyle intervention	↓3.0	↓13.2%	↓1.3
	Gastric banding	↓34.6	↓78.8%	↓12.7

BMI = body mass index; kg = kilogram; RCT = randomised controlled trials

Assessing the body of evidence and formulating recommendations

Tables C21 and C22 include evidence statements and recommendations developed by the OGDC. Full summaries of the evidence for each question are included in the technical report of the systematic literature review (Shaw 2011), which is available from the NHMRC website.

Table C27 Evidence statements supporting recommendations for adults

CARDIOVASCULAR RISK					
Is there a relationship between degree of weight loss and blood pressure in adults?					
In adults with a BMI > 35 kg/m², weight loss of at least 2 kg achieved with lifestyle interventions may result in a clinically meaningful reduction in systolic blood pressure.					**A**
Evidence base A	***Consistency*** A	***Clinical impact*** B	***Generalisability*** A	***Applicability*** A	
REFERENCES: Shaw et al. 2006; Azadbakht 2007; Galani & Schneider 2007; Aucott et al. 2009; Groeneveld et al. 2010					
What is the impact of pharmacotherapy for weight loss on blood pressure in adults?					
Pharmacological interventions associated with weight loss have variable effects on blood pressure. Orlistat (lipase inhibitor) is associated with clinically meaningful reductions in systolic blood pressure.					**B**
Evidence base A	***Consistency*** B	***Clinical impact*** C	***Generalisability*** B	***Applicability*** B	
REFERENCES: Padwal et al. 2003; Norris et al. 2005c; Rucker et al. 2007; Horvath et al. 2008; Siebenhofer et al. 2009; Greenway et al. 2010; James et al. 2010; Ryan et al. 2010; Smith et al. 2010					
Is there a relationship between degree of weight loss and changes in lipid profiles?					
Sustained weight loss is associated with small improvements in lipid profiles.					**A**
Evidence base A	***Consistency*** B	***Clinical impact*** C	***Generalisability*** A	***Applicability*** A	
REFERENCES: Padwal et al. 2003; Norris et al. 2005a, 2005c; Shaw et al. 2006; Azadbakht et al. 2007; Galani & Schneider 2007; Pi Sunyer et al. 2007; Cheskin et al. 2008; Christian et al. 2008; Dale et al. 2008; Dixon et al. 2008; Madsen et al. 2008; ter Bogt et al. 2009; Uusitupa et al. 2009; Belalcazar et al. 2010; Greenway et al. 2010; Groeneveld et al. 2010; Ryan et al. 2010; Smith et al. 2010; Wing 2010a; Witham & Avenell 2010					
Does weight loss affect mortality rates in obese adults?					
Weight loss reduces cardiovascular and all-cause mortality in adults with Grade III obesity or impaired glucose tolerance.					**C**
Evidence base C	***Consistency*** B	***Clinical impact*** B	***Generalisability*** B	***Applicability*** A	
REFERENCES: Uusitupa et al. 2009; Shea et al. 2010; Pontiroli & Morabito 2011					
RECOMMENDATION 4 Adults who are overweight or obese can be strongly advised that modest weight loss reduces cardiovascular risk factors.					**A**

Table C27 (cont)

TYPE 2 DIABETES PREVENTION AND CONTROL					
How much weight loss is necessary to prevent diabetes in adults with prediabetes?					
Lifestyle-induced sustained weight loss contributes to the prevention, or delays progression, of diabetes.					**A**
Evidence base A	***Consistency*** B	***Clinical impact*** A	***Generalisability*** A	***Applicability*** A	
REFERENCES: Norris et al. 2005a; Galani & Schneider 2007; Dale et al. 2008; Knowler et al. 2009; Uusitupa et al. 2009					
How much weight loss is necessary to affect requirements for diabetes control therapy in adults with type 2 diabetes?					
Sustained weight reduction of approximately 5 kg is associated with a reduction in HbA1c of approximately 0.5–1%.					**A**
Evidence base A	***Consistency*** B	***Clinical impact*** B	***Generalisability*** B	***Applicability*** A	
REFERENCES: Norris et al. 2005a, 2005b; Thomas et al. 2006; Eliasson et al. 2007; Nield et al. 2007; Pi-Sunyer et al. 2007; Cheskin et al. 2008; Christian et al. 2008; Dixon et al. 2008; Buchwald et al. 2009; Huisman et al. 2009; Jacob et al. 2009; Belalcazar et al. 2010; Fried et al. 2010; Wing 2010a					
Is there a relationship between degree of weight loss and blood pressure in adults with hypertension, prediabetes or type 2 diabetes?					
In adults with a BMI < 35 kg/m^2 or with prediabetes or hypertension, weight loss of at least 2–3 kg achieved with lifestyle interventions may result in a clinically meaningful reduction in systolic blood pressure.					**A**
Evidence base A	***Consistency*** A	***Clinical impact*** B	***Generalisability*** A	***Applicability*** A	
REFERENCES: Norris et al. 2005a; Galani 2007; Pi Sunyer et al. 2007; Cheskin et al. 2008; Christian et al. 2008; Dale et al. 2008; Dixon et al. 2008; Horvath et al. 2008; ter Bogt et al. 2009; Uusitupa et al. 2009; Wing 2010a; Witham & Avenell 2010					
RECOMMENDATION 5 Adults with prediabetes or diabetes can be strongly advised that the health benefits of modest weight loss include prevention, delayed progression or improved control of type 2 diabetes.					**A**
OTHER CONDITIONS					
Does weight loss improve proteinuria and microalbuminuria in overweight and obese adults?					
The evidence suggests that weight loss improves proteinuria and microalbuminuria in overweight and obese adults with chronic kidney disease.					**B**
Evidence base B	***Consistency*** A	***Clinical impact*** B	***Generalisability*** B	***Applicability*** B	
REFERENCES: Navaneethan et al. 2009; Afshinnia et al. 2010					
Does weight loss affect the occurrence or severity of obstructive sleep apnoea in obese adults?					
Weight loss is associated with significant reduction in obstructive sleep apnoea in adults.					**B**
Evidence base B	***Consistency*** A	***Clinical impact*** B	***Generalisability*** B	***Applicability*** B	
REFERENCES: Foster et al. 2009; Greenburg et al. 2009; Tuomilehto et al. 2009					
RECOMMENDATION 6 Adults with kidney disease or sleep apnoea can be advised that improvements in these conditions are associated with a 5% weight loss.					**B**

Table C27 (cont)

OTHER SYMPTOMS					
Does weight loss improve symptoms related to urinary incontinence in adults?					
A weight loss intervention may reduce stress incontinence at 12 months in obese women.					**C**
Evidence base C	***Consistency*** NA	***Clinical impact*** D	***Generalisability*** B	***Applicability*** C	
REFERENCES: Wing et al. 2010b					
Does weight loss affect the occurrence or severity of knee pain associated with osteoarthritis in adults?					
Moderate weight loss (6 kg) in obese adults with osteoarthritis reduces knee pain.					**C**
Evidence base C	***Consistency*** C	***Clinical impact*** C	***Generalisability*** B	***Applicability*** B	
REFERENCES: Christensen 2007; Jenkinson 2009					
Does weight loss improve functional mobility and physical performance in older adults?					
Weight loss, especially with exercise, can improve functional mobility and physical performance in older people.					**B**
Evidence base B	***Consistency*** B	***Clinical impact*** C	***Generalisability*** B	***Applicability*** B	
REFERENCES: Morey et al. 2009; Manini et al. 2010; Villareal et al. 2011					
Does weight loss affect symptoms of gastro-oesophageal reflux in obese adults?					
For those who lose weight by lifestyle interventions, symptoms associated with gastro-oesophageal reflux improve. The nature of some of the surgical interventions can impact on the resolution of gastro-oesophageal reflux.					**C**
Evidence base C	***Consistency*** B	***Clinical impact*** B	***Generalisability*** B	***Applicability*** B	
REFERENCES: De Groot et al. 2009; de Jong et al. 2010					
RECOMMENDATION 7 Adults with musculoskeletal problems, gastro-oesophageal reflux or urinary incontinence can be advised that weight loss of 5% or more may improve symptoms.					**C**

Table C27 (cont)

QUALITY OF LIFE, SELF-ESTEEM AND DEPRESSION

Does weight loss improve quality of life for obese adults?

The evidence suggests that lifestyle changes may improve quality of life even if no weight is lost. In people with previous breast, prostate or colorectal cancer, health-related quality of life declines less rapidly with lifestyle-induced weight loss.					**C**
Evidence base B	***Consistency*** C	***Clinical impact*** C	***Generalisability*** C	***Applicability*** B	
REFERENCES: Morey et al. 2009; Picot et al. 2009; Cooper et al. 2010; Witham & Avenell 2010; Villareal et al. 2011					

Does weight loss improve depression or self-esteem in obese adults?

Interventions that aim to reduce weight loss are associated with improvement in self-esteem and depression.					**C**
Evidence base C	***Consistency*** NA	***Clinical impact*** B	***Generalisability*** C	***Applicability*** B	
REFERENCES: Blaine et al. 2007					

RECOMMENDATION 8
Adults who are overweight or obese can be advised that quality of life, self-esteem and depression may improve even with small amounts of weight loss. **C**

LIFESTYLE INTERVENTION

What combinations of lifestyle interventions have been successful at achieving significant reductions in weight in adults?

In adults with a BMI < 35 kg/m^2, multicomponent interventions that incorporate a combination of diet, physical activity and a behavioural component will result in greater weight loss for at least 12 months than single-component lifestyle interventions.					**A**
Evidence base A	***Consistency*** B	***Clinical impact*** A	***Generalisability*** A	***Applicability*** B	
REFERENCES: Shaw et al. 2006; Seo & Sa 2008					

RECOMMENDATION 9
For adults who are overweight or obese, strongly recommend lifestyle change — including reduced energy intake, increased physical activity and measures to support behavioural change. **A**

WEIGHT MANAGEMENT MEDICATIONS

How much weight loss do pharmacological interventions achieve in adults?

Orlistat in conjunction with a lifestyle intervention can achieve a weight loss of 4–5 kg.					**A**
Evidence base A	***Consistency*** B	***Clinical impact*** B	***Generalisability*** B	***Applicability*** B	
REFERENCES: Curioni et al. 2006; Franz et al. 2007; Horvath et al. 2008; Neovius et al. 2008; Smith et al. 2010					

RECOMMENDATION 12
For adults with BMI ≥ 30 kg/m^2, or adults with BMI ≥ 27 kg/m^2 and comorbidities, orlistat may be considered as an adjunct to lifestyle interventions, taking into account the individual situation. **A**

Table C27 (cont)

BARIATRIC SURGERY

How much weight loss do surgical interventions achieve?

In patients with a BMI > 35kg/m^2, surgery produces approximately 20–30% weight loss. Surgical procedures require significant follow-up and the potential for adverse outcomes needs to be assessed.					**A**
Evidence base A	***Consistency*** A	***Clinical impact*** A	***Generalisability*** B	***Applicability*** A	
REFERENCES: Fernandes et al. 2007; Imaz et al. 2008; Buchwald et al. 2009; Picot et al. 2009; Padwal et al. 2011					

How effective are surgical interventions at maintaining weight loss in adults?

Successful bariatric surgery is more effective than other treatments in maintaining weight loss over long-term follow-up. Some weight regain usually occurs within 5–10 years.					**A**
Evidence base A	***Consistency*** B	***Clinical impact*** A	***Generalisability*** B	***Applicability*** A	
REFERENCES: Buchwald et al. 2009; Garb et al. 2009; Picot et al. 2009; Padwal et al. 2011					

RECOMMENDATION 13
For adults with BMI > 40 kg/m^2, or adults with BMI > 35 kg/m^2 and comorbidities that may improve with weight loss, bariatric surgery may be considered, taking into account the individual situation. **A**

SELF-MANAGEMENT

Does self-management contribute to the effectiveness of weight loss interventions?

Self-management approaches may contribute to weight loss in overweight or obese adults with a BMI < 35kg/m^2 for up to 12 months.					**C**
Evidence base B	***Consistency*** C	***Clinical impact*** C	***Generalisability*** B	***Applicability*** B	
REFERENCES: Bosch-Capblanch et al. 2007; MConnen et al. 2007; Haapala et al. 2009; Keranen et al. 2009; Parikh et al. 2010					

RECOMMENDATION 14
For adults, include a self-management approach in weight management programs. **C**

INTENSITY OF INTERVENTIONS

What intensity (frequency/duration) of intervention achieves significant reductions in weight?

The effectiveness of lifestyle interventions to achieve modest weight loss increases with the frequency (up to fortnightly) and duration of contacts for up to 12 months.					**B**
Evidence base A	***Consistency*** B	***Clinical impact*** C	***Generalisability*** B	***Applicability*** B	
REFERENCES: Shaw et al. 2005; Littman et al. 2007; Hemmingsson et al. 2009; Keranen et al. 2009; Tsai & Wadden 2009					

RECOMMENDATION 15
For active weight management in adults, arrange fortnightly review for the first 3 months and plan for continuing monitoring for at least 12 months, with additional intervention as required. **B**

Table C27 (cont)

LONG-TERM WEIGHT MANAGEMENT					
How effective are lifestyle interventions in maintaining weight loss in adults?					
Weight loss following lifestyle intervention is maximal at 6–12 months. Regardless of the degree of initial weight loss, most weight is regained within a 2-year period and by 5 years the majority of people are at their pre-intervention body weight.					**A**
Evidence base A	***Consistency*** B	***Clinical impact*** A	***Generalisability*** A	***Applicability*** A	
REFERENCES: Dansinger et al. 2007; Schmitz et al. 2007; Stahre et al. 2007; Cussler et al. 2008; Martin et al. 2008; Svetkey et al. 2008; Cooper et al. 2010; Neve et al. 2010					
How effective are pharmacological interventions at maintaining weight loss in adults?					
Lifestyle interventions that are combined with orlistat result in less weight regain than lifestyle interventions alone. However, by 10 years follow-up, most weight that was lost has been regained.					**A**
Evidence base A	***Consistency*** B	***Clinical impact*** A	***Generalisability*** A	***Applicability*** A	
REFERENCES: Padwal et al. 2003; Franz et al. 2007; Knowler et al. 2009; Turk et al. 2009; Ryan et al. 2010					
RECOMMENDATION 16 For adults who achieve initial weight loss, strongly recommend the adoption of specific strategies, appropriate to their individual situation, to minimise weight regain.					**A**

Table C28 Evidence statements supporting recommendations for children and adolescents

FOCUS OF INTERVENTION					
Is there any difference between child-directed and parent-directed approaches to achieving weight loss in children?					
Targeting lifestyle interventions to the family or the parent (rather than the child) increases their effectiveness in improving anthropometric outcomes.					**C**
Evidence base C	***Consistency*** C	***Clinical impact*** C	***Generalisability*** B	***Applicability*** A	
REFERENCES: Golley et al. 2007; Kalavainen et al. 2007; Hughes et al. 2008; Kalarchian et al. 2009; Okely et al. 2010					
Is there any difference between adolescent-directed and parent-directed approaches to achieving weight loss in adolescents?					
Targeting lifestyle interventions to the parent and adolescent, compared with the adolescent alone, improves weight reduction.					**C**
Evidence base C	***Consistency*** NA	***Clinical impact*** C	***Generalisability*** B	***Applicability*** C	
REFERENCES: Kelly & Melnyk 2008					
RECOMMENDATION 17 For children and adolescents, focus lifestyle programs on parents, carers and families.					**C**

Table C28 (cont)

INTENSITY OF INTERVENTION					
At what intensity (frequency/duration) should interventions be to manage weight appropriately in children and adolescents?					
The effectiveness of lifestyle interventions to achieve modest weight loss increases with the frequency and duration of contacts.					**B**
Evidence base A	***Consistency*** B	***Clinical impact*** C	***Generalisability*** B	***Applicability*** B	
REFERENCES: Collins et al. 2007; Okely et al. 2010; Whitlock et al. 2010; Sargent et al. 2011					
RECOMMENDATION 18 For children and adolescents, plan weight management programs that involve frequent contact with health professionals.					**B**
LIFESTYLE INTERVENTION					
What combinations of interventions have been successful in preventing weight gain in children and achieving significant reductions in weight in adolescents?					
Lifestyle interventions that include nutrition, physical activity and behavioural components can prevent weight gain in children and produce moderate weight loss in adolescents.					**B**
Evidence base A	***Consistency*** B	***Clinical impact*** C	***Generalisability*** B	***Applicability*** B	
REFERENCES: McGovern et al. 2008; Oude Luttikhuis et al. 2009; Whitlock et al. 2010					
What interventions are effective at maintaining weight loss in children and adolescents?					
A multicomponent lifestyle intervention that includes behavioural components can result in maintenance of BMI reduction at 2 years of follow-up in children and adolescents.					**B**
Evidence base A	***Consistency*** B	***Clinical impact*** B	***Generalisability*** B	***Applicability*** B	
REFERENCES: Wilfley et al. 2007; Okely et al. 2010; Whitlock et al. 2010					
RECOMMENDATION 20 For children and adolescents who are overweight or obese, recommend lifestyle change—including reduced energy intake and sedentary behaviour, increased physical activity and measures to support behavioural change.					**B**

Table C28 (cont)

INTENSIVE INTERVENTION IN POSTPUBERTAL ADOLESCENTS					
How much weight loss do surgical interventions achieve in adolescents?					
There is evidence that laparoscopic adjustable gastric banding is effective in producing weight loss in adolescents. There is emerging evidence that other surgical procedures may be effective for weight loss.					**C**
Evidence base C	***Consistency*** B	***Clinical impact*** B	***Generalisability*** B	***Applicability*** C	
REFERENCES: Treadwell et al. 2008; O'Brien et al. 2010					
Does weight loss affect the occurrence or severity of obstructive sleep apnoea in obese adolescents?					
Weight loss from surgery is associated with significant reduction in obstructive sleep apnoea in adolescents.					**C**
Evidence base C	***Consistency*** B	***Clinical impact*** B	***Generalisability*** B	***Applicability*** B	
REFERENCES: Treadwell et al. 2008; Greenburg et al. 2009					
RECOMMENDATION 21 For postpubertal adolescents with a BMI > 40 kg/m^2 (or > 35 kg/m^2 with obesity-related complications), laparoscopic adjustable gastric banding via specialist paediatric centres may be considered if other interventions have been unsuccessful in producing weight loss.					**C**

Table C29 Evidence statements that informed the narrative on weight management in adults

EVIDENCE STATEMENT	GRADE
Does patient education contribute to weight loss interventions?	
As a stand-alone intervention, patient education for adults is not usually associated with significant weight reduction. **REFERENCES**: Pi Sunyer et al. 2007; Schmitz et al. 2007; Christian et al. 2008; Belalcazar et al. 2010; Neve et al. 2010; Silva et al. 2010; Teixera et al. 2010; Wing 2010a	C
Do patient reminders contribute to the effectiveness of weight loss interventions?	
There is insufficient evidence to determine whether patient reminders contribute to weight loss. **REFERENCES**: DeMattia et al. 2007; McConnen et al. 2007; Richardson et al. 2008; Ford et al. 2010	D
Do financial interventions contribute to the effectiveness of weight loss interventions?	
In adults, weight loss is not improved with small financial incentives. **REFERENCES**: Collins et al. 2007; Paul-Ebhohimhen & Avenell 2008	C
Does the type of provider affect the outcomes of weight loss interventions in adults?	
The success of weight loss interventions in adults is not affected by the type of trained provider delivering that intervention. **REFERENCES**: Schmitz et al. 2007; Paul-Ebhohimhen & Avenell 2008; ter Bogt et al. 2009; Tsai & Wadden 2009; Flodgren et al. 2010; Parikh et al. 2010	B

EVIDENCE STATEMENT	GRADE
Is there any difference between group and individual approaches in achieving weight loss in adults?	
Group and individual approaches are both moderately effective in achieving weight loss in adults. **REFERENCES**: Paul-Ebhohimhen & Avenell 2008; Seo & Sa 2008	B
Can weight loss interventions for adults be successfully delivered in a worksite?	
Weight loss interventions for adults can be delivered successfully in a worksite. **REFERENCES**: Groeneveld et al. 2010	C
Does the use of technology contribute to the success of weight loss interventions in adults?	
The use of information and communication technology, including computer and telephone, can augment the effectiveness of lifestyle interventions for weight loss in adults but the evidence does not support replacing human interventions with technology. **REFERENCES**: McConnen et al. 2007; Christian et al. 2008; Haapala et al. 2009; Flodgren et al. 2010; Neve et al. 2010; Ryan et al. 2010; Arem & Irwin 2011	B
What interventions are effective at maintaining weight loss in adults with prediabetes or type 2 diabetes?	
In adults with type 2 diabetes or prediabetes, substantial weight losses can be sustained following bariatric surgery, and moderate weight losses can be sustained with intensive lifestyle programs with or without orlistat use. **REFERENCES**: Pi Sunyer et al. 2007; Christian et al. 2008; Dale et al. 2008; Buchwald et al. 2009; Belalcazar et al. 2010; Wing 2010a	B
Does weight loss from pharmacological interventions affect mortality rates in adults?	
There is insufficient evidence on mortality associated with orlistat use in obese adults. **REFERENCES**: James et al. 2010	—
Does weight loss affect bone mineral density in older obese adults?	
Weight loss has a small negative effect on bone mineral density in obese older people. **REFERENCES**: Villareal et al. 2008; 2011	B
Does weight loss from pharmacological interventions affect mortality rates in adults?	
There is insufficient evidence on mortality associated with orlistat use in obese adults. **REFERENCES**: Siebenhofer et al. 2009; James et al. 2010	C
Does weight loss affect erectile dysfunction in morbidly obese adult males?	
There is insufficient evidence to determine if weight loss, even if induced by surgery, improves erectile dysfunction. **REFERENCES**: Reis et al. 2010	D
Does weight loss affect nonalcoholic steatohepatitis (NASH) or nonalcoholic fatty liver disease in adults?	
There is some evidence that weight loss improves markers of liver function and inflammation in obese adults with diagnosed NASH. **REFERENCES**: Chavez-Tapia et al. 2010	C

Table C30 Evidence statements that informed the narrative on weight management in children and adolescents

EVIDENCE STATEMENT	GRADE
Does patient education contribute to the effectiveness of weight management interventions in adolescents and children?	
As a stand-alone intervention, patient education directed at children and adolescents is not usually associated with significant weight reduction. **REFERENCES**: Collins et al. 2007; De Mattia et al. 2007; McCallum et al. 2007; Plachta-Danielzik et al. 2007; Li et al. 2008	C
Do financial measures contribute to the effectiveness of weight management interventions?	
Financial incentives may improve weight loss in the short term (< 6 months) in adolescents with overweight and obesity. **REFERENCES**: Oude Luttikhuis et al. 2009; Nguyen et al. 2011	C
Does the use of computer-based technology contribute to the success of weight management interventions in children, adolescents and young people?	
It is uncertain whether information and communication technology can be used successfully to augment delivery of lifestyle interventions in children, adolescents and young people. **REFERENCES**: Oude Luttikhuis et al. 2009; Nguyen et al. 2011	C
Does the type of provider impact on the success of weight management interventions in children and adolescents?	
Interventions provided by medical and allied health professionals successfully achieve improvements in anthropometry in children and adolescents. **REFERENCES**: DeMattia et al. 2007; Savoye et al. 2007; Kelly & Melnyk 2008; Sargent et al. 2011	C
Does the setting of service delivery contribute to the success of weight management interventions in children and adolescents?	
Weight management interventions for children and adolescents can be delivered successfully in schools, hospital clinics, general practice and other community health settings. **REFERENCES**: DeMattia et al. 2007; Plachta-Danielzik et al. 2007; Kelly & Melnyk 2008; Li et al. 2008; Oude Luttikhuis et al. 2009; Johnston et al. 2010; Sargent et al. 2011	B
How much weight loss is necessary to affect blood pressure, lipid and blood glucose profiles in adolescents?	
Weight loss in adolescents who have Grade III obesity and elevated blood pressure leads to a significant decrease in blood pressure and improvements in lipid profiles. **REFERENCES**: Savoye et al. 2007; Kelly & Melnyk 2008; Li et al. 2008; Janssen & LeBlanc 2010; Johnston et al. 2010; O'Brien et al. 2010	C
What is the effect of pharmacotherapy for weight loss on blood pressure in adolescents?	
There is insufficient evidence on orlistat use for weight loss to assess the effect on blood pressure in adolescents. **REFERENCES**: Daniels et al. 2007; Czernichow et al. 2010; Viner et al. 2010	—
Does weight loss affect quality of life in overweight and obese children and adolescents?	
In the absence of weight loss, children and adolescents participating in lifestyle interventions may experience improvement in quality of life or indicators of mental health, suggesting a positive impact of the intervention itself. **REFERENCES**: McCallum et al. 2007; Hughes et al. 2008; Treadwell et al. 2008; Oude Luttikhuis et al. 2009; Ford et al. 2010; O'Brien et al. 2010	C

Table C31 Example of NHMRC template used to draft evidence statements

Is there a relationship between degree of weight loss and blood pressure in adults?		
1. Evidence base (number of studies, level of evidence and risk of bias in the included studies)		
2 x Level I systematic reviews (Shaw et al. 2006, Galani & Schneider 2007), low risk of bias **1 x Level I systematic review** (Aucott et al. 2009), moderate risk of bias, nonrandomised controlled trials included **1 x Level II randomised controlled trial** (Azadbakht 2007), moderate risk of bias, artial blinding (not of outcome assessor or patient) **1 x Level II randomised controlled trial** (Groeneveld et al. 2010), high risk of bias, > 15% of participants did not complete follow-up	A	One or more level I studies with a low risk of bias or several level II studies with a low risk of bias
	B	One or two Level II studies with a low risk of bias or systematic review/several Level III studies with a low risk of bias
	C	One or two Level III studies with a low risk of bias or Level I or II studies with a moderate risk of bias
	D	Level IV studies or Level I to III studies/systematic reviews with a high risk of bias
2. Consistency (if only one study was available, rank this component as 'not applicable')		
All studies demonstrated reduction in blood pressure with lifestyle interventions. Meta-analysis showed that, for lifestyle interventions for less than 1 year in nondiabetic or prediabetic adults, a 4 kg weight loss was associated with a 3.5 mmHg drop in blood pressure. After 2 years these changes were not statistically significant (–2.56 mmHg with weight loss of 2 kg). Aucott et al. (2009) demonstrated that 1 kg weight loss correlated to 1 mmHg decrease in systolic blood pressure, but only for follow-up periods of 2 to 3 years.	A	All studies consistent
	B	Most studies consistent and inconsistency can be explained
	C	Some inconsistency, reflecting genuine uncertainty around question
	D	Evidence is inconsistent
	NA	Not applicable (one study only)
3. Clinical impact (indicate in the space below if the study results varied according to some unknown factor (not simply study quality or sample size) and thus the clinical impact of the intervention could not be determined)		
Lifestyle interventions in adults with overweight or obesity are associated with significant reductions in both systolic and diastolic blood pressure. A 4 kg loss of body weight was associated with approximately 3.5 mmHg reduction in systolic blood pressure across the majority of included studies in both overweight and obese participants. However, reductions in systolic blood pressure were generally greater than reductions in diastolic blood pressure per kilogram or percentage of weight lost. Surgical studies outlined a reduction of 83% in use of antihypertensive medicine.	A	Very large
	B	Substantial
	C	Moderate
	D	Slight or restricted

Table C31 (cont)

Is there a relationship between degree of weight loss and blood pressure in adults?		
4. Generalisability (How well does the body of evidence match the population and clinical settings being targeted by the Guidelines?)		
Galani & Schneider 2007: BMI 28–34 kg/m^2 Shaw et al. 2006: BMI > 27 kg/m^2 Aucott et al. 2009: BMI 35 kg/m^2 Azadbakht 2007: Mean age 45.5 years, people of Middle-Eastern descent Groeneveld et al. 2010: BMI 28.8 kg/m^2, males	A	Evidence directly generalisable to target population
	B	Evidence directly generalisable to target population with some caveats
	C	Evidence not directly generalisable to the target population but could be sensibly applied
	D	Evidence not directly generalisable to target population and hard to judge whether it is sensible to apply
5. Applicability (Is the body of evidence relevant to the Australian healthcare context in terms of health services/delivery of care and cultural factors?)		
Studies conducted in a range of countries, interventions are applicable to Australia	A	Evidence directly applicable to Australian healthcare context
	B	Evidence applicable to Australian healthcare context with few caveats
	C	Evidence probably applicable to Australian healthcare context with some caveats
	D	Evidence not applicable to Australian healthcare context
Other factors Type of diet has also been shown to independently affect blood pressure.		
EVIDENCE STATEMENT (Please summarise the development group's synthesis of the evidence relating to the key question, taking all the above factors into account).		

Component	**Rating**	**Comments** (Indicate any dissenting opinions)
Evidence base	**A**	
Consistency	**A**	
Clinical impact	**B**	
Generalisability	**A**	
Applicability	**A**	

EVIDENCE STATEMENT	**GRADE**
In adults with a BMI > 35 kg/m^2, weight loss of at least 2 kg achieved with lifestyle interventions may result in a clinically meaningful reduction in systolic blood pressure.	A

Process of recommendation development

Formulation of recommendations

At the 12–13 September 2011 meeting of the OGDC, the committee formulated draft recommendations based on the evidence statements. After the meeting, recommendations were circulated to the OGDC and a series of teleconferences were established to finalise the wording and prioritisation of the recommendations and the supporting guideline content. Considerations in formulating recommendations included harms and benefits, equity (e.g. access and affordability) and autonomy (e.g. treatment is not appropriate if a person is not ready to change).

The technical writers ensured language and wording was consistent and reflected the strength of the evidence.

Process for resolving conflicting evidence or varying interpretations of evidence

In a few instances, the OGDC was required to formulate a recommendation based on controversial evidence. An example was Recommendation 13, referring to the BMI threshold for considering bariatric surgery. Some of the available evidence suggested that bariatric surgery should be considered for adults who had a BMI ≥ 30 kg/m^2 and comorbidities such as diabetes, but most of the research focused on patients with higher BMI (≥ 35 kg/m^2). The OGDC reviewed the evidence and debated the practical implications of the options. In this instance, the OGDC set the threshold as BMI ≥ 35 kg/m^2. Members noted that bariatric surgery was an invasive procedure that was not free of complications, and that capacity to undertake bariatric procedures was limited. They reasoned that the recommendation should help to confine its use to those more likely to benefit from surgery, so the higher threshold was chosen.

In a few other instances, the OGDC had to decide how to deal with interventions that were questioned in the public consultation. In such instances, the OGDC debated the available evidence afresh, particularly considering potential harms attributable to an intervention. For example, a public submission suggested that very low-energy diets caused significant adverse effects including eating disorders. Members of the OGDC differed in their views on the relative benefits and harms of very low-energy diets, based on their own experience in practice. The OGDC further reviewed the evidence given in the submission and noted that there was little evidence of harm from very low-energy diets when administered under medical supervision—harm appeared more likely to arise with unsupervised restrictive eating. This was noted in Section 6.2.1.

Adaptation of SIGN recommendations

The SIGN recommendations for inclusion in these Guidelines were reviewed at the 12–13 September 2011 meeting of the OGDC. They were modified slightly to ensure consistent grammar, syntax and wording with the other recommendations (as per the 2011 NHMRC Standard) and to reflect the Australian context. Additional considerations surrounding the modified wording of the recommendations are outlined in Table C32. The SIGN grading system and evidence underpinning the recommendations are still maintained for these recommendations. Table C33 is a summary of the SIGN grading system.

Table C32 Comparison of wording of SIGN recommendations with NHMRC recommendations

NO.	RECOMMENDATION	CHANGES	GRADE
SIGN	BMI should be used to classify overweight or obesity in adults.		B
1	Use BMI to classify overweight or obesity in adults.	Wording changed for consistency with other recommendations	**B**
SIGN	Waist circumference may be used, in addition to BMI, to refine assessment of risk of obesity-related comorbidities.		C
2	For adults, use waist circumference, in addition to BMI, to refine assessment of risk of obesity-related comorbidities.	Wording changed for consistency with other recommendations	**C**
SIGN	Health care professionals should discuss willingness to change with patients and then target weight loss interventions according to patient willingness around each component of behaviour required for weight loss, e.g. specific dietary and/or activity changes.		D
3	For adults who are overweight or obese, discuss readiness to change lifestyle behaviours.	Committee considered that more detailed commentary on this topic should be discussed in the text and associated tables	**D**
SIGN	Dietary interventions for weight loss should be calculated to produce a 600 kcal/day energy deficit. Programmes should be tailored to the dietary preferences of the individual patient.		A
10	For adults who are overweight or obese, design dietary interventions that produce a 2500 kilojoule per day energy deficit and tailor programs to the dietary preferences of the individual.	Wording changed for consistency with other recommendations Calories converted to kilojoules for Australian system 'Design' considered to be broader than 'calculate' when developing programs	**A**
SIGN	In most obese children (BMI ≥ 98th centile) weight maintenance is an acceptable treatment goal.		D
19	For children who are managing overweight or obesity, advise that weight maintenance is an acceptable approach in most situations.	Wording changed for consistency with other recommendations Weight maintenance deemed an acceptable approach for overweight children by the committee	**D**

Table C33 SIGN evidence grades

GRADE	EVIDENCE USED TO SUPPORT GRADE	EVIDENCE CATEGORIES*
A	At least one meta-analysis, systematic review, or randomised controlled trial (RCT) that is rated as 1++, and is directly applicable to the target population, or A systematic review of RCTs or a body of evidence that consists principally of studies rated as 1+, is directly applicable to the target population and demonstrates overall consistency of results. Evidence drawn from a NICE [National Institute for Health and Clinical Excellence] technology appraisal	1++ High-quality meta-analyses, systematic reviews of randomised controlled trials (RCT), or RCT with a very low risk of bias 1+ Well-conducted meta-analyses, systematic reviews of RCT, or RCT with a low risk of bias 1- Meta-analyses, systematic reviews of RCT, or RCT with a high risk of bias*
B	A body of evidence that includes studies rated as 2++, is directly applicable to the target population and demonstrates overall consistency of results, or Extrapolated evidence from studies rated as 1++ or 1+	2++ High-quality systematic reviews of case–control or cohort studies. High-quality case–control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal
C	A body of evidence that includes studies rated as 2+, is directly applicable to the target population and demonstrates overall consistency of results, or Extrapolated evidence from studies rated as 2++	2+ Well-conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal 2- Case–control or cohort studies with a high risk of confounding, bias or chance and a significant risk that the relationship is not causal*
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+	3 Non-analytic studies (for example, case reports, case series) 4 Expert opinion, formal consensus

* *Studies with a level of evidence '–' should not be used as a basis for making a recommendation. More information on the SIGN Obesity Guidelines and grading systems can be found at http://www.sign.ac.uk/guidelines/fulltext/115/index.html.*

Source: *SIGN (2010)*

Consideration of implications for practice

For each recommendation, the OGDC discussed potential implications for practice. NHMRC staff recorded these comments during discussion of the recommendations and distributed them to the OGDC to review for insertion into the Guidelines.

Process for developing the consensus-based recommendation

The systematic review carried out to inform these Guidelines identified insufficient evidence to make a recommendation on the duration and intensity of physical activity to support weight loss or prevent weight regain. The SIGN recommendation advised a lesser amount of physical activity than that identified in more recent evidence for primary prevention of weight gain. The OGDC agreed to develop a consensus-based recommendation rather than adapt the SIGN recommendation.

The consensus-based recommendation is based on:

- the duration and intensity of physical activity required to provide additional health benefits including preventing weight gain (300 minutes of moderate-intensity activity, or 150 minutes of vigorous activity, or an equivalent combination of moderate and vigorous activities, each week) (Powell et al. 2011; Brown et al. 2011)
- evidence that physical activity has little effect on weight unless it is combined with reduced dietary intake (Shaw et al. 2006; Thomas et al. 2006; Shea et al. 2010; Witham & Avenell 2010)
- findings from one study into long-term weight maintenance that identified physical activity of 60 minutes per day as contributing to reduced weight regain (Wing & Phelan 2005).

Consensus on the wording was achieved by email.

Process for developing practice points

Early in the guideline development process, OGDC members realised that research-based evidence did not exist for many important aspects of contemporary practice in the prevention and management of overweight and obesity. Exclusion of these aspects would have greatly reduced the usefulness of the Guidelines. The OGDC was reluctant to set down consensus-based recommendations because the diversity of the issues and the diversity of expertise among members seemed likely to preclude a comprehensive consensus process. Members therefore decided to offer 'practice points' that would give advice on what health professionals might do in dealing with particular clinical situations.

The process of formulating practice points was as follows:

- One or more members of the OGDC identified an important clinical problem or situation known to have created uncertainty or difficulty.
- Members with relevant expertise confirmed whether published evidence on the problem or situation was available for decision-making.
- If no published studies were available, the member or members with relevant expertise explained to the OGDC (in session) the importance of the problem or situation and why it was essential that the Guidelines include advice on it.
- The member or members with relevant expertise reflected on their own practice and proposed a practice point.
- The wording and implications of the practice point were discussed and refined by the OGDC and further refined by the technical writers engaged by the NHMRC.

As the development of the Guidelines progressed and as feedback was incorporated from the public consultation, some of the practice points were modified. All changes were discussed and the wording of each practice point was carefully reviewed by the OGDC.

Process for developing the narrative

Information included in the narrative was drawn from the background text of the systematic review, discussion by the OGDC at meetings and teleconferences, and other guidelines and materials identified by the OGDC. The committee's discussion of public consultation submissions informed the refinement of the narrative.

D Implementation of the Guidelines recommendations

It is anticipated that routine assessment of weight, height and BMI, and promotion of health benefits, may increase consultation times with healthcare professionals for some individuals. This can be somewhat offset by encouraging self-monitoring of height and weight, which is reinforced by other public health messages or campaigns. Referral to weight management clinics, other health providers and local services for more specific advice and goal setting would reduce the time implications for primary healthcare professionals.

Ensuring that primary healthcare professionals reinforce public health messages around lifestyle interventions and promote discussion of healthy weight ranges could also assist other current preventive health programs across Australia.

Other limiting factors for implementing recommendations in primary health care are as follows:

- *Patient motivation*—It is often difficult for GPs to gauge how ready an individual is to change, or when and how to suggest that the individual would benefit from a weight management program. Reinforcing the benefits of a healthy lifestyle, routine measurement of weight and discussion of weight trends will help to facilitate this discussion.
- *Clinical presentation*—GPs see many people who are already overweight or obese, reinforcing the need to maintain therapeutic relationships and send reminders for health checks.
- *Time*—Consultation with a GP is typically held in time slots of between 5 and 30 minutes. Management of individuals will need to occur over multiple sessions, but may also be done by other health professionals in the team, such as a practice nurse. Recall times could potentially be shorter if both the patient and GP were aware that the appointment would be a routine health check.
- *Monitoring and follow-up*—Monitoring can be conducted by other health providers, organisations and groups, including commercial weight loss programs. While this should not replace consultations with the usual healthcare provider, it promotes awareness of healthy weight and provides the support individuals need to adhere to programs or maintain a healthier weight.
- *Locality of services*—In rural and remote areas, and even in larger cities, services may not be available or be difficult to access. It is important that each practice understands who is available in the area and builds a local network of providers and services that can be used in a weight management program.
- *Duration of intervention*—Given the likelihood of weight regain, once weight loss has been achieved, monitoring is still necessary to establish whether the intervention maintains effectiveness. Additional interventions may be required to sustain the weight lost. Team-based care can assist in monitoring and help guide decisions about specific methods to sustain weight loss.

Glossary

acanthosis nigricans	Velvety, light-brown to black markings, usually on the neck, under the arms or in the groin.
active transport	A form of transport that requires physical activity, such as walking or cycling.
adolescents	For the purposes of these Guidelines, adolescents are defined as aged 12–18 years.
anthropometry	Measures of the human body.
bariatric surgery	Surgery on the stomach and/or intestines to help a person with severe obesity lose weight.
behavioural intervention	Use of the common components of behavioural treatment—self-monitoring, goal setting and stimulus control.
body mass index	An index of weight for height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2).
children	For the purposes of these Guidelines, children are defined as being younger than 12 years.
cholecystitis	Inflammation of the gall bladder, most often caused by gall stones.
community-based programs	Programs that do not involve healthcare professionals. These include evaluated commercial programs, walking groups and community support groups.
consensus-based recommendation	A recommendation formulated in the absence of high-quality evidence (where a systematic review of the evidence was conducted as part of the search strategy).
Cushing syndrome	An endocrine disorder caused by high levels of cortisol in the blood, which results in rapid weight gain and central obesity, and can be caused by use of glucocorticoid medications.
disordered eating	Unhealthy, extreme and dangerous dietary and weight control practices, including fasting, skipping meals, self-induced vomiting, misuse of laxatives and diet pills, and binge eating.
dysmorphism	A difference of body structure that suggests a congenital disorder, genetic syndrome or birth defect.

eating disorder	Complex and serious illness with mental and physical aspects involving intense worry and concern about body image, eating and weight control. Eating disorders include anorexia nervosa, bulimia nervosa and 'eating disorders not otherwise specified' (e.g. binge eating disorder and syndromes that do not meet full criteria for anorexia nervosa or bulimia nervosa).
energy-dense food	Food and drinks that provide relatively high amounts of kilojoules per gram, millilitre and/or serve. The World Health Organization (2003) states that energy-dense foods 'tend to be processed foods that are high in fat and/or sugar. Low energy dense (or energy dilute) foods such as fruit, legumes, vegetables and whole grain cereals are high in dietary fibre and water.'
fast foods	Commonly used term for foods that are generally sold in retail outlets and are high in kilojoules, fat, saturated fat, sugar and/or salt.
gastro-oesophageal reflux disease (GORD)	A condition in which the stomach contents (food or liquid) reflux from the stomach into the oesophagus, causing heartburn and other symptoms.
ghrelin	A hormone that acts in the brain to stimulate hunger and increase food intake.
glomerulopathy	Any disease, especially any noninflammatory disease, of the renal glomeruli (capillary tufts involved in the first step of filtering blood to form urine).
goitre	Enlargement of the thyroid gland, which can lead to a swelling of the neck or larynx.
Green Book	The Royal Australian College of General Practitioners' resource *Putting prevention into practice*, which provides a framework for prevention and a range of strategies to improve prevention activities (RACGP 2006).
gynaecomastia	Abnormal development of mammary glands in males resulting in breast enlargement.
healthy diet	A diet that contains plenty of fruit and vegetables; is based on starchy foods such as wholegrain bread, pasta and rice; and is low in fat (especially saturated fat), salt and sugar.
healthy weight	A body mass index (BMI) of 18.5 to 24.9.
hepatomegaly	The condition of having an enlarged liver.
hypercalcaemia	Elevated level of calcium in the blood.
hyperinsulinaemia	Higher levels of insulin circulating in the blood than would be expected by the level of glucose.
hyperlipidaemia	Abnormally elevated levels of any or all lipids and/or lipoproteins in the blood.
hyperphagia	Excessive ingestion of food beyond that needed for basic energy requirements.
hypersomnolence	Excessive daytime sleepiness not due to abnormal nocturnal awakenings.

hypertension	Elevated systemic arterial blood pressure.
hypothyroidism	An endocrine condition where the thyroid gland is underactive and produces insufficient levels of T3 and T4 hormones.
incidental activity	An activity that is performed as part of everyday life, such as climbing stairs, walking (e.g. to work, school or shops) and cycling. Incidental activities are normally contrasted with planned activities such as attending a dance class or fitness training session.
insulin	A hormone that is central to regulating carbohydrate and fat metabolism in the body.
intertrigo	An inflammatory rash of the body folds and adjacent areas of skin.
ketosis	A state of elevated blood levels of ketone bodies, which are formed by ketogenesis of fat cells and used as an energy source when liver glycogen stores are depleted.
kilojoule	A unit used to define the energy value of food.
leptin	A hormone that has an important role in regulating appetite and metabolism.
Lifescripts	Resources that provide general practice with evidence-based tools and skills to help patients address the main lifestyle risk factors for chronic disease, including unhealthy weight.
metabolic syndrome	A combination of medical disorders (including high blood pressure, obesity, high cholesterol and insulin resistance) that, when they occur together, increase the risk of developing cardiovascular disease and type 2 diabetes.
multicomponent intervention	An intervention that aims to address a range of factors that may influence the outcome measure of interest.
nonalcoholic steatohepatitis	A condition that causes inflammation and accumulation of fat and fibrous tissue in the liver.
obesity	Excessive fat accumulation that may impair health, classified when the BMI is ≥ 30 kg/m^2.
overweight	Excessive fat accumulation that may impair health, classified when the BMI is between 25 and 29.9 kg/m^2.
polycystic ovary syndrome	An endocrine disorder that is present if a woman has two of the following three criteria: infrequent or irregular ovulation and/or anovulation; excess androgen activity; polycystic ovaries (by gynaecologic ultrasound).
practice point	Advice on subject matter that was outside the scope of the search strategy for the systematic literature review.
Prader-Willi syndrome	A genetic condition characterised by neurological impairments that cause an altered pattern of growth and development with associated hyperphagia (overeating).

prediabetes	A condition in which blood glucose levels are higher than normal, but not high enough to be diagnosed as type 2 diabetes; includes impaired fasting glucose and impaired glucose tolerance.
psychosocial	Involving aspects of social and psychological behaviour; for example, 'a child's psychosocial development'.
randomised controlled trial (RCT)	A comparative study in which participants are randomly allocated to intervention and control groups and followed up to examine differences in outcomes between groups.
recall systems	Systems to ensure individuals are flagged for routine and other planned follow-up episodes of health care.
Red Book	The Royal Australian College of General Practitioners' Guideline for preventative activities in general practice (RAGCP 2012).
revisional surgery	Bariatric procedure performed to correct or modify a previous bariatric procedure.
sleep apnoea	A sleep disorder characterised by abnormal pauses in breathing or instances of abnormally low breathing during sleep.
SNAP (smoking, nutrition, alcohol, physical activity)	A guide published by the Royal Australian College of General Practitioners to help GPs support healthy lifestyles for their patients. Provides a five-step model for the detection, assessment and management of risk factors, including practical strategies to apply the SNAP approach to general practice.
striae	Areas of skin that look like bands, stripes, or lines (also called stretch marks).
Tanner staging	A staging system used to describe the sequence of changes occurring during pubertal maturation in boys and girls.
tibia vara	A growth disorder of the shin bone (tibia) in which the lower leg turns inward, resembling a bowleg, thought to be caused by the effect of excess weight on the growth plate.
type 2 diabetes	A metabolic disorder that is characterised by high blood glucose in the context of insulin resistance and relative insulin deficiency.
very low-energy diet	A diet that generally provides between 1675 and 3350 kilojoules per day.
waist-to-hip ratio	Waist circumference (cm) divided by hip circumference (cm). Provides a proxy measure of central distribution of fat (intra-abdominal fat).

Acronyms and abbreviations

AASM	American Academy of Sleep Medicine
ABS	Australian Bureau of Statistics
ACSM	American College of Sports Medicine
AHMAC	Australian Health Ministers' Advisory Committee
AICR	Association for International Cancer Research
AIDA	Australian Indigenous Doctors' Association
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
APCC	Australian Primary Care Collaborative
APA	American Psychiatric Association
APNA	Australian Practice Nurses Association
ASAM	American Society for Adolescent Medicine
ATAPS	Access to Allied Psychological Services
BMI	body mass index
CBR	consensus-based recommendation
CMACE	Centre for Maternal and Child Enquiries
DAA	Dietitians Association of Australia
DoHA	Australian Government Department of Health and Ageing
EPOC	Cochrane Effectiveness of Practice and Organisation of Care
GORD	gastro-oesophageal reflux disease
GP	general practitioner
HbA1c	glycated haemoglobin
HDL	high-density lipoprotein
ICSI	Institute for Clinical Systems Improvement
IDF	International Diabetes Federation
INR	international normalised ratio
IOM	Institute of Medicine
LAGB	laparoscopic adjustable gastric banding
NACA	National Asthma Council of Australia
NACCHO	National Aboriginal Community Controlled Health Organisation
NASH	nonalcoholic steatohepatitis
NEDC	National Eating Disorders Collaboration
NHLBI	National Heart, Lung, and Blood Institute
NHFA	National Heart Foundation of Australia
NHMRC	National Health and Medical Research Council
NICE	National Institute for Health and Clinical Excellence
NPHT	National Preventative Health Taskforce

NRHA	National Rural Health Association
NSW COO	New South Wales Centre for Overweight and Obesity
NT DHCS	Northern Territory Department of Health and Community Services
NVDPA	National Vascular Disease Prevention Alliance
NZ MOH	New Zealand Ministry of Health
OGDC	Obesity Guidelines Development Committee
PBS	Pharmaceutical Benefits Scheme
PCOS	polycystic ovary syndrome
PHA	Public Health Association of Australia
PICO	population, intervention, comparator, outcomes
PSA	Pharmaceutical Society of Australia
PSC	Prospective Studies Collaboration
RACGP	Royal Australian College of General Practitioners
RACS	Royal Australian College of Surgeons
RCOG	Royal College of Obstetricians and Gynaecologists
RCT	randomised controlled trial
RPBS	Repatriation Pharmaceutical Benefits Scheme
RYGB	Roux-en-Y gastric bypass
SIGN	Scottish Intercollegiate Guidelines Network
SOGC	Society of Obstetricians and Gynaecologists of Canada
SOS	Swedish Obese Subjects
TGA	Therapeutic Goods Administration
US-CDC	United States Centers for Disease Control and Prevention
VBG	vertical banded gastroplasty
WC	waist circumference
WCRF	World Cancer Research Fund
WHO	World Health Organization

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Notes

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