

REVIEW

Clinical Management

Obesity in South and Southeast Asia—A new consensus on care and management

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Summary

Obesity is a chronic disease in which the abnormal or excessive accumulation of body fat leads to impaired health and increased risk of mortality and chronic health complications. Prevalence of obesity is rising rapidly in South and Southeast Asia, with

Abbreviations: AACE/ACE, American Association of Clinical Endocrinologists/American College of Endocrinology; ASEAN, Association of Southeast Asian Nations; BMI, body mass index; CV(D), cardiovascular (disease); EOSS, Edmonton Obesity Staging System; EOSS-P, Edmonton Obesity Staging System for Pediatrics; EWL, excess weight loss; GI, gastrointestinal; HTN, hypertension; KOSC, King's Obesity Staging Criteria; OAGB, one-anastomosis gastric bypass; QoL, quality of life; RYGB, Roux-en-Y gastric bypass; SD, standard deviation; SG, sleeve gastrectomy; T2DM, type 2 diabetes mellitus; VLCD, very low-calorie diet; WC, waist circumference; WHO, World Health Organization; WOF, World Obesity Federation.

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potentially serious consequences for local economies, healthcare systems, and quality of life. Our group of obesity specialists from Bangladesh, Brunei Darussalam, India, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, Thailand, and Viet Nam undertook to develop consensus recommendations for management and care of adults and children with obesity in South and Southeast Asia. To this end, we identified and researched 12 clinical questions related to obesity. These questions address the optimal approaches for identifying and staging obesity, treatment (lifestyle, behavioral, pharmacologic, and surgical options) and maintenance of reduced weight, as well as issues related to weight stigma and patient engagement in the clinical setting. We achieved consensus on 42 clinical recommendations that address these questions. An algorithm describing obesity care is presented, keyed to the various consensus recommendations.

KEYWORDS

childhood obesity in Southeast Asia, consensus on obesity in Southeast Asia, obesity management in Southeast Asia, weight stigma in Southeast Asia

1 | INTRODUCTION

Obesity represents an ongoing global health crisis, with prevalence continuing to rise rapidly, especially in low- and middle-income countries.^{1,2} A recent projection from the World Obesity Federation (WOF) predicts that by 2030, approximately one billion people will be living with obesity worldwide, including one in five women and one in seven men.³

In South and Southeast Asia, prevalence of obesity is predicted to double between 2010 and 2030. By that same year, childhood obesity, which is rising steeply in parallel with adult rates across the region, may affect 45 million South and Southeast Asian children over 5 years of age.³ National prevalence data likely underestimate the scale of the problem, because adults^{4,5} and children⁶ of Asian descent experience obesity-related pathophysiologic changes at lower body mass index (BMI) values, relative to other populations. Adjusting for this effect, by changing the BMI cut points that define obesity, yields a higher prevalence estimate—and probably a more realistic appraisal of the health risks associated with obesity in the various countries.⁷ Thus, the WOF estimated that 5.5% of adults in India met BMI criteria that define obesity in Caucasian populations (see Table A1),⁸ but by applying a lower BMI cut point, a recent nationwide cross-sectional study from the same country put the prevalence of obesity at 40.3% of adults.⁹

The burden on economies and healthcare systems associated with the rise in obesity is difficult to overstate. In addition to direct costs of treatment for obesity and associated diseases,¹⁰ it has been estimated that these conditions reduce men's and women's productive time in the work force by 4–9 years across the countries within the Association of Southeast Asian Nations (ASEAN).¹¹ Countries lacking adequate health resources, policies and programs to manage the growing epidemic will likely be hardest hit by the rise in chronic diseases (e.g., cardiovascular disease [CVD], type 2 diabetes mellitus [T2DM], and certain cancers).¹² In addition, experience with the coronavirus

disease 2019 during the current pandemic reminds us that comorbid obesity increases mortality and complications associated with infectious disease.¹³

In recent decades, South and Southeast Asia have experienced a period of rapid nutrition and lifestyle transition, leading to a commensurate rise in the burden of obesity and T2DM.^{14–16} Even now, obesity is observed alongside food scarcity, resulting in a double burden of overnutrition and undernutrition in some countries in the region.^{17–19} This double burden occurs at the societal level, but also sometimes at an individual level, such as when children with stunted growth due to micronutrient or macronutrient deficiency are later exposed to high energy-density food and develop obesity.

With these concerning trends in mind, our group of South and Southeast Asian obesity specialists undertook to develop a series of practical recommendations on the management and care of obesity. Despite the size of this region and the diverse histories of the 10 countries represented in this consensus (Bangladesh, Brunei Darussalam, India, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, Thailand, and Viet Nam), there are sufficient cultural and social demographic similarities across South and Southeast Asia to justify this shared effort.

The recommendations presented here are broadly consistent with international obesity guidelines, as well as with previously published guidance from some of the countries represented here. They are intended to be used by clinicians across the region, to improve the quality of care for all South and Southeast Asians living with obesity.

Beyond the medical goals of improved diagnosis and management of obesity, we recognize that bodyweight is intensely personal for many individuals. The psychological and social aspects of overweight and obesity must be recognized, both within and outside a clinical interaction. To establish a constructive relationship with their patients with obesity, clinicians need to use respectful, appropriate language.

In addition, clinicians must work to understand the burden that many such people experience because of weight stigma and stereotyped attitudes. Finally, clinicians are well positioned to advocate for public health policies that promote healthy habits and help prevent obesity through exercise, antenatal, infant, and child nutrition programs, and education.

2 | METHODS

Our panel of physicians from South and Southeast Asia with expertise in managing pediatric and adult obesity undertook to develop recommendations for clinical approach to and management of obesity in this region. Panel members invited by the Asia-Oceania Association for the Study of Obesity (AOASO) included endocrinologists, a pediatric endocrinologist, and a bariatric surgeon. In addition to the physicians from the 10 South and Southeast Asian countries to which this consensus document is directed, two members from Australia (BO and SH) participated in all discussions, voted on treatment recommendations, and commented on the manuscript.

Our process for generating consensus was formalized by the panel during a webinar held at the outset of the project. At this webinar, held in September 2021, the panel determined that $\geq 80\%$ agreement would be required for acceptance of a treatment recommendation, and that any minority opinions concerning these recommendations would be noted in the final document. At the same meeting, clinical questions related to practical aspects of obesity diagnosis and management, which had been drafted by the co-Chairs (BO and KWT), were shared with the full panel as a basis for developing recommendations. The wording of 12 clinical questions was ratified unanimously by the full panel.

Following the meeting, the approved questions were used to guide searches of relevant literature published in English using the PubMed electronic database, including currently available data from the region, national and international obesity guidelines, and reports from other relevant expert working groups. A research document containing the relevant findings was presented to the full panel and was revised according to the group's input. The revised document was shared with the panel in advance of a consensus webinar, held in February 2022.

Based upon the findings from the literature review and feedback from the panel, the co-Chairs proposed draft treatment recommendations, which were shared with the panel for pre-voting prior to the final consensus webinar, using a web-based survey tool (SurveyMonkey; <https://www.surveymonkey.co.uk>). Panelists at the consensus webinar then had the opportunity to propose additional recommendations and to modify the wording of the draft recommendations, before taking a final vote on each of the 42 treatment recommendations shown below. A final draft of the complete manuscript was provided to, and endorsed by, the Council of AOASO.

Findings related to the 12 clinical questions are presented below.

3 | RESULTS

3.1 | Question 1: How is obesity defined and what are the diagnostic criteria in adults and children?

Obesity represents an abnormal or excessive accumulation of body fat, which leads to impaired health and increased risk of long-term health complications and mortality.¹² Underlying causes are complex, involving dysregulated energy homeostasis and a combination of genetic, metabolic, behavioral, environmental, and cultural factors that predispose to overweight and obesity.²⁰

Recognizing these genetic and pathophysiologic underpinnings, our group of South and Southeast Asian obesity specialists identify obesity as a chronic disease, in agreement with many other authorities and medical associations.^{20–23} In choosing this wording, we aim to shift a variety of erroneous beliefs, for example, that obesity results from poor lifestyle choices or inadequate willpower, and that it should be regarded merely as a risk factor for other conditions. Rather, obesity is in itself a complex, progressive and relapsing disease requiring effective prevention and treatment. Effective management occurs at a multisystem level, with root causes and prevention of complications in mind. By recognizing obesity as a disease, we hope to combat the stigma and discrimination associated with weight, promote adoption of a chronic disease management approach, and encourage people who live with obesity to seek appropriate and effective care.

3.1.1 | BMI

Epidemiological data demonstrate that high BMI is associated with increased risk of mortality, cardiometabolic disease, and certain cancers.^{12,24} BMI provides the standard measure of adiposity and is widely used to identify people with overweight or obesity.^{5,12}

BMI cut points are used as a practical definition of a person's adiposity. In a clinical context, individuals who meet BMI criteria for overweight or obesity are at heightened risk of health complications such as cardiometabolic disease, cancer, osteoarthritis, sleep apnea, and depression. These individuals thus require further assessment, including a full physical examination and patient history and hemodynamic and biochemical evaluation (see *Question 2*, below).

Based on data from largely Caucasian populations, international definitions have been established for overweight (BMI 25–29.9 kg/m²) and obesity (BMI ≥ 30 kg/m²) in adults.¹² However, it is also well established that the relationship between BMI and body fat storage and distribution varies across different ethnicities. Thus, for the same body fat percentage, Asians typically have BMIs that are 2–3 kg/m² lower than Caucasians.^{25–28} Asian populations, in particular South Asians, have higher levels of body fat at a given BMI, especially in visceral adipose tissue.^{4,29} Insulin resistance, observed at the cellular and physiological levels, is evident even in lean South Asian individuals, contrasting with other Asian ethnicities (e.g., Malay and Chinese) and Caucasians.^{30,31} Inter-ethnic differences related to the

metabolic effects of excess adiposity can be attributed in part to genetic variation that may have been selected for earlier in the history of Asia and Oceania.³²

Cardiometabolic disease risk in Asian populations is correspondingly elevated, even at BMI values that would be considered low or moderate risk in Caucasian people.^{7,33–35} For T2DM, age- and sex-adjusted risk associated with a BMI of 30 kg/m² in Caucasian populations occurs at 23.9 kg/m² (95% confidence interval [CI] 23.6, 24.0) and 26.9 kg/m² (95% CI 26.7, 27.2) in South Asian and Chinese populations, respectively.⁷ Similarly, the prevalence of combined dysglycemia and dyslipidemia in urban South Asians is elevated by fivefold to ninefold relative to Americans of various ethnicities. This difference in cardiovascular (CV) risk profile is seen for both men and women across weight categories and is most extreme in the normal weight range (BMI ranging from 18.5 to 24.9 kg/m²).³⁶

Risk may also vary among different Asian countries³⁷ and for different ethnic groups, even those living in similar environments within the same country.³⁸ Thus, in Asian populations, lower BMI cut points should be used for overweight and obesity, to improve the identification of people at risk of cardiometabolic disease. Various cut points for South and Southeast Asian countries have been proposed by pan-Asian, as well as national expert groups.^{5,21,39–43} Some, including the Asian-Pacific guidance,²⁹ identify different degrees of obesity with differing levels of risk. As shown in Table 1, most apply threshold values of BMI ≥ 23 kg/m² for overweight and BMI ≥ 25 or ≥ 27.5 kg/m² for obesity.

3.1.2 | Waist circumference (WC) and waist-hip ratio

Owing to known limitations of BMI in Asian populations, other anthropometric parameters can be used to evaluate adiposity and risk of complications in adults. These include waist-hip ratio,^{44,45} or more commonly, WC.¹² Among the several recognized techniques for determining WC, the method preferred by the WHO is to measure circumference at the midpoint between the superior iliac crest and the lower margin of the last rib, in a horizontal plane.⁴⁶ WC provides an estimate of abdominal or visceral fat, which is strongly associated with cardiometabolic disease and premature death.^{47–50} Because it may be better at predicting mortality and morbidity than BMI,⁵¹ WC measurement is particularly valuable for risk assessment in individuals with obesity-related complications, whether or not their BMI is elevated.

As with BMI, cardiometabolic risk associated with elevated WC measurement varies among ethnicities.^{4,29} For example, South and East Asians tend to experience dyslipidemia and T2DM at lower WC values than those typical among Caucasians.^{4,35} Presumably, this difference reflects, at least in part, the elevated percent body fat and visceral adipose tissue seen even at lower WC values in Asian populations.^{4,52}

As shown in Table 1, WC threshold values associated with elevated cardiometabolic risk are generally cited as ≥ 90 cm and ≥ 80 cm

for Asian men and women, respectively. Adults meeting these WC values should be considered at risk, and further assessment is warranted.⁵³ Different cut points are used in certain East Asian populations. For example, in Japan, cut points of ≥ 85 cm and ≥ 90 cm are used for men and women, respectively; in China ≥ 85 cm and ≥ 80 cm are used for men and women, respectively.⁵³

Other proposed WC cut points might be applied to identify people at risk of T2DM or other specific complications, or for use in specific Asian ethnicities. For example, to identify individuals at risk of metabolic syndrome in Indonesia, it has been proposed that WC cut points need to be reduced relative to general Asian cut points and further tailored to specific Indonesian ethnic groups. Still lower cut points may be required for analysis of T2DM risk in these same populations.^{54,55}

As BMI and WC cut points are generally not available to define obesity or overweight in specific ethnicities, the values in Table 1 may be used in South and Southeast Asian countries. Owing to Asian people's response to adiposity even at BMI values that are within the normal range for other ethnicities, evidence of obesity-related complications should be used in combination with anthropometric findings to assess the health impact of an individual's bodyweight.

3.1.3 | Considerations for assessing obesity in children

For children and adolescents aged 2–20 years, assessment is typically based on BMI percentile for the individual's age and sex; in general, overweight is defined as the 85th to 95th percentile and obesity as ≥ 95 th percentile.⁵⁶ Pediatric overweight and obesity can also be defined by using standard deviations (SDs) above the World Health Organization (WHO) Growth Reference median⁵⁷; for those aged 5–19 years, overweight and obesity are defined as BMI-for-age >1 SD and >2 SDs above the WHO Growth Reference median, respectively.

These approaches depend on standard growth data for children in a given country and can be skewed by ethnic diversity within the population. As in adults, BMI underestimates body fat percentage in South Asian children, owing to the lower lean body mass at a given bodyweight in this population, relative to European-based norms.⁵⁸ If BMI percentile is used to assess childhood obesity, country-specific childhood growth chart data should be used, when available. If country- or population-specific data are not available, the International Obesity Task Force charts can be considered. This resource includes tables of age- and sex-specific cut points for children and adolescents aged 2–18 years, derived in part from Asian data.⁵⁹

In addition to BMI, other measurements may be considered, including WC,⁶⁰ upper arm circumference,⁶¹ waist-height ratio,⁶² and skin-fold thickness.⁶³ However, no general assessment tool is yet available to correlate anthropometric findings in children with biochemical measurements or with risk of metabolic disease.

TABLE 1 Anthropometric cut points used to identify obesity or overweight^{5,12,29,43–45,132,264–269}

	Overweight BMI (kg/m ²)	Obese BMI (kg/m ²)	Excess risk WC (cm)
International guidance			
WHO international guidelines	25.0	30.0 (class I) 35.0 (class II) ≥40.0 (class III)	80 (F)/94 (M) Increased risk 88 (F)/102 (M) Higher risk
The Asia-Pacific Perspective: Redefining Obesity and its Treatment	23.0	25.0 (class I) ≥30.0 (class II)	80 (F)/90 (M)
WHO expert consultation	23.0 Increased risk (action point) ^a	27.5 High risk (action point) ^a	–
IDF consensus	–	–	80 (F)/90 (M)
National cut points for action			
Bangladesh	23.0	25.0	80 (F)/90 (M)
Brunei Darussalam	25.0	30.0	80 (F)/90 (M)
India	23.0	25.0	80 (F)/90 (M)
Indonesia	23.0	25.0	80 (F)/90 (M)
Malaysia	23.0	27.5	80 (F)/90 (M)
Philippines	23.0	25.0	80 (F)/90 (M)
Singapore ^b	23.0	27.5	80 (F)/90 (M)
Sri Lanka	23.0	25.0	80 (F)/90 (M)
Thailand	23.0	25.0	80 (F)/90 (M)
Viet Nam	23.0	25.0	80 (F)/90 (M)

Abbreviations: BMI, body mass index; F, female; IDF, International Diabetes Federation; M, male; WC, waist circumference; WHO, World Health Organization.

^aThe WHO consultation agreed that the WHO BMI cut points should remain as international classifications but identified additional trigger points for taking public health action on risks associated with overweight and obesity: 23 kg/m² or higher representing increased risk, and 27.5 kg/m² representing high risk (less than 18.5 kg/m², underweight; 18.5–23 kg/m², increasing but acceptable risk; 23–27.5 kg/m², increased risk; and 27.5 kg/m² or higher, high risk).

^bIn Singapore, the official BMI cut points used to define overweight and obesity are 25.0 and 30.0, respectively. These differ from the cut points shown, which are used for clinical decision making.

When BMI findings are borderline or ambiguous, clinical findings suggesting insulin resistance⁶³ or hypertension (HTN) will increase the index of suspicion that a child is developing unhealthy excess weight.⁵⁸ Further assessment is warranted, along with serial monitoring of weight or BMI.

3.2 | Question 2: What are the key elements of initial work-up for patients with obesity?

People presenting with overweight or obesity require a comprehensive clinical assessment to screen for obesity-related complications and risk factors and to determine the impact of excess adiposity on the individual's physical and mental health, function, and quality of life (QoL). In this assessment, the clinician should attempt to identify the drivers of weight gain, including medical conditions, medications, metabolism, dietary habits and energy intake, sleep habits, and sedentary lifestyle. Psychological factors (stress, anxiety, eating disorders, or depression) and family and financial circumstances should also be investigated. The clinician and patient should work together to identify appropriate weight goals and possible barriers

to successful management. Risk factors for CVD should be noted. These include smoking, HTN, dyslipidemia, prediabetes (impaired fasting glucose or impaired glucose tolerance), and a family history of CVD.

As described below, clinical assessment should include three elements: An extensive history, including personal medical, social (e.g., nutritional, physical, and cultural), and family history; a physical examination; and laboratory and diagnostic tests to identify complications of obesity (Table 2).²¹ Patient history should focus on identifying personal events or behaviors that may have contributed to the individual's unhealthy weight, as well as barriers to treatment, and presence of, or risk factors for, obesity-related complications. The clinician should also investigate impact that the individual experiences owing to excess bodyweight, including the effects of bias.

Elements of a complete history are described in Table A2. Physical examination for people with obesity (see Table A3) should include anthropometric assessment of adiposity, as well as signs and symptoms of obesity-related complications and factors that could affect the individual's daily function and ability to be physically active.

TABLE 2 Some common complications of obesity. Adapted from Abusnana²⁷⁰ and MIMS²⁷¹

Body system	Disease/condition
Cardiovascular	Hypertension, atherosclerotic heart and peripheral vascular disease with myocardial infarction and stroke, peripheral venous insufficiency, thrombophlebitis, pulmonary embolism, atrial fibrillation
Endocrine and reproductive	Polycystic ovary syndrome and female infertility, increased risk of pregnancy complications and fetal abnormalities, male hypogonadism, cancers of the endometrium, breast, ovary, prostate, and pancreas
Gastrointestinal	Cholelithiasis, gastro-esophageal reflux disease, metabolic-associated fatty liver disease, hepatic cirrhosis, hepatic carcinoma, and colorectal carcinoma
Metabolic	Type 2 diabetes mellitus, impaired fasting glucose, impaired glucose tolerance, dyslipidemia
Musculoskeletal	Osteoarthritis of the weight-bearing joints, lumbar muscle strain, degenerative disc disease Blount's disease in children, slipped capital femoral epiphysis in pre-teen or teen
Neurological	Idiopathic intracranial hypertension ²⁷²
Psychological	Depression, body image disturbance
Respiratory	Asthma, obstructive sleep apnea, obesity-hypoventilation syndrome
Urologic	Stress incontinence

Initial laboratory and diagnostic tests (see Table A4) required for all adults with obesity investigate potential endocrine causes of obesity and examine the various components of metabolic syndrome, as well as kidney function and blood liver enzymes. Secondary tests may be ordered to follow up on any suspected abnormalities, such as Cushing's syndrome or thyroid conditions, metabolic-associated fatty liver disease, renal impairment, polycystic ovary syndrome, or sleep apnea. For older people, screening for cancer and cardiovascular disease becomes a priority.

3.2.1 | Assessment of pediatric obesity and overweight

Similar tests, including liver function, lipid profile, fasting glucose, glycated hemoglobin, and uric acid, are appropriate when assessing older adolescents and even children with obesity.⁶² The decision to assess these parameters should be based on the child's personal and family history. For instance, fasting glucose may be assessed at a relatively young age if there is a history of T2DM in a child's family or evidence of acanthosis nigricans or other signs or symptoms of metabolic disorders.

Because even young children with obesity may experience social rejection, clinicians should attempt to establish good family support

for them, in the face of possible teasing or bullying by the child's peers or others (see Questions 11 and 12, below).

3.3 | Question 3: What gradations of severity should be used for screening and monitoring adults and children with obesity?

Following an assessment of overweight or obesity using BMI or other anthropometric approaches (see Question 1, above), it is necessary to understand the impact of obesity on the person's health and QoL.⁶⁴ Classifying patients according to health risk and burden can assist clinicians in selecting clinical goals and determining the type and intensity and urgency of treatment and assessing treatment benefit.^{40,64}

Several recognized clinical staging systems are used for this purpose. These include the Edmonton Obesity Staging System (EOSS),⁶⁴ the American Association of Clinical Endocrinologists/American College of Endocrinology (AACE/ACE) framework,⁴⁰ and the King's Obesity Staging Criteria (KOSC).⁶⁵ The EOSS (Figure 1) classifies people with obesity into five stages of disease severity (Stages 0–4), based on clinical assessment of obesity-associated risk factors and complications, mental health, functional limitations, and QoL.^{64,66}

The EOSS stages correlate with risk of all-cause mortality and with incident CVD and cancer.^{66,67} In this system, Stage 0 includes people who, despite meeting criteria for obesity, have no evident risk factors for complications of obesity; such individuals, as well as those with Stage 1 obesity (subclinical risk factors or mild health impairments) should avoid further weight gain, but weight loss may not be required. In contrast, for those with Stage 2 or 3 obesity (clinical manifestation of obesity-related chronic diseases and/or significant limitation in function and/or well-being), weight loss is a clinical priority, and lifestyle, pharmacological, and surgical interventions should be considered. Interventions to reduce bodyweight may continue to be appropriate in these individuals. Finally, Stage 4 describes patients with end-stage disease, for whom palliative care is needed.⁶⁴

3.3.1 | Staging obesity in children

A staging system similar to the EOSS has been described for use in pediatric patients aged 2–17 years, namely, the Edmonton Obesity Staging System for Pediatrics (EOSS-P) (Figure 2).⁶⁸ This system is tailored to identify, not just the extent of excess bodyweight, but also the specific types of disease burden that young people might experience owing to obesity. The system evaluates four different domains of the child's experience, termed the four “M”s,^{68,69} namely, metabolic complications; (bio)mechanical complications, including musculoskeletal issues and sleep apnea; mental health issues, such as attention deficit hyperactivity disorder, anxiety and depression, poor body image, and binge-eating; and social milieu. Each term is scored

EOSS: EDMONTON OBESITY STAGING SYSTEM – Staging Tool

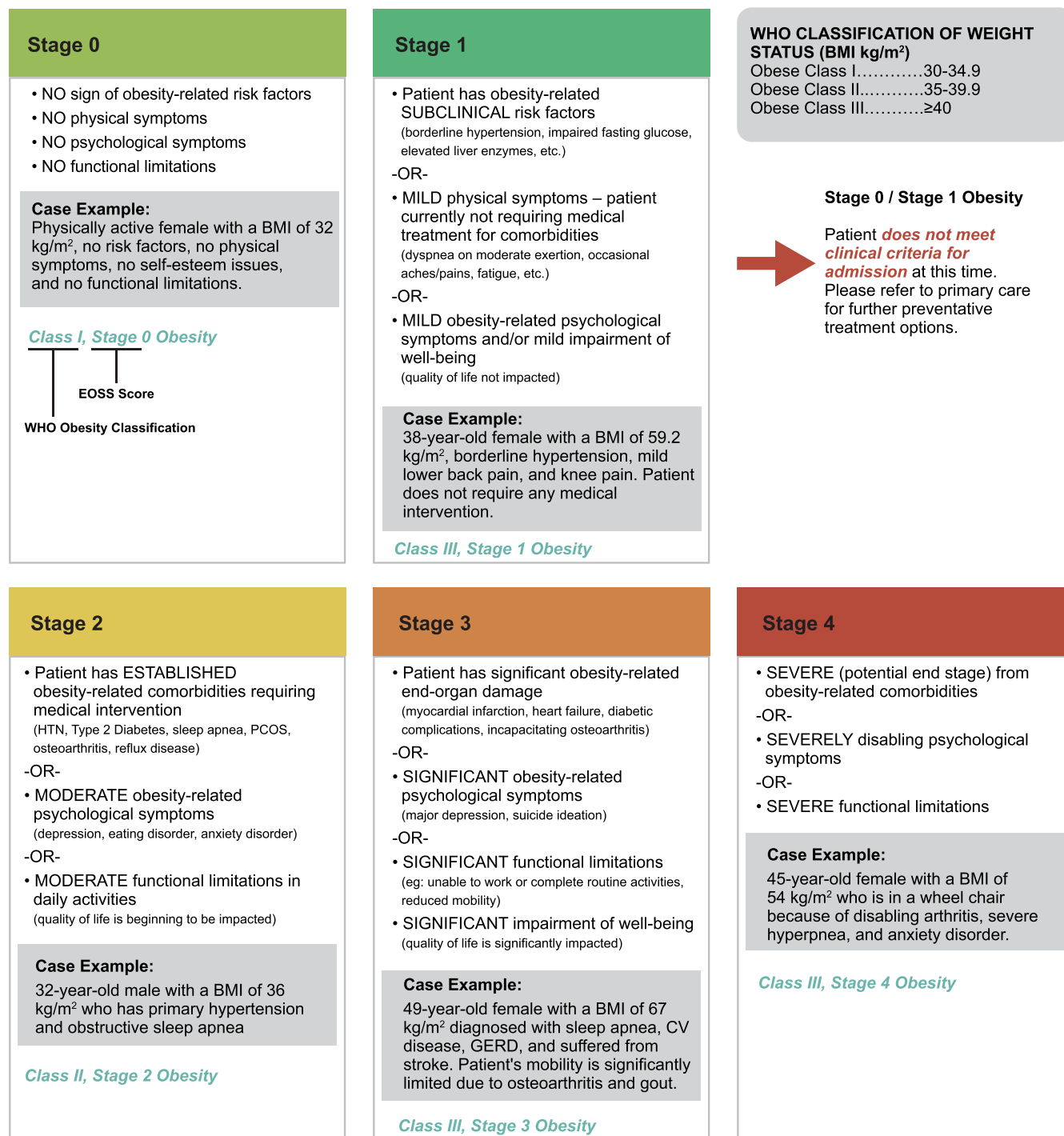


FIGURE 1 The Edmonton Obesity Staging System. Adapted from Sharma.⁶⁴ Permission pending. BMI, body mass index; CV, cardiovascular; EOSS, Edmonton Obesity Staging System; GERD, gastroesophageal reflux disease; HTN, hypertension; PCOS, polycystic ovary syndrome; WHO, World Health Organization

separately on a scale of 0 to 3. The patient's overall EOSS-P score is the highest of the individual subscores, but the subscores should be considered separately, as they can all suggest priorities for helping the child and the child's family manage the condition.

The final “M” in this system, social milieu, refers to the child's interactions with parents and family, as well as behavioral issues that may manifest in school.^{68,69} Scoring milieu may require the clinician to take a more thorough history than is usual in a clinical encounter. For

Stage 0	• Metabolic: No metabolic abnormalities • Mechanical: No functional limitations • Mental: No psychopathology • Milieu: No parental, familial or social environmental concerns
Stage 1	• Metabolic: Mild metabolic abnormalities (i.e. IGT, pre-hypertension, mild lipid abnormalities, mild fatty infiltration of liver/elevation in transaminases) • Mechanical: Mild bio-mechanical complications (i.e. OSA not requiring PAP therapy, mild MSK pain not interfering with ADL, GERD) • Mental: Mild psychopathology, ADHD, LD, mild body image pre-occupation, occasional emotional/binge eating, bullying, mild developmental delay • Milieu: Minor problems in relationships, minor limitations in caregivers ability to support child's needs
Stage 2	• Metabolic: Moderate metabolic complications requiring pharmacotherapy (i.e. T2DM, hypertension lipid abnormalities, PCOS, moderate to severe fatty infiltration of liver) • Mechanical: Moderate bio-mechanical complications (i.e. OSA requiring PAP therapy, GERD, MSK pain limiting activity, moderate limitations in ADLs) • Mental: Moderate mental health issues (i.e. major depression, anxiety, frequent bingeing, significant body image disturbance, moderate developmental delay) • Milieu: Moderate problems in relationships, significant bullying at home or at school, significant limitations in caregivers ability to support child's needs
Stage 3	• Metabolic: Uncontrolled metabolic complications (i.e. T2DM (+ complications/ not meeting glycemic targets), uncontrolled hypertension, FSGS, markedly elevated liver enzymes and/or liver dysfunction, symptomatic gall stones, marked lipid abnormalities) • Mechanical: OSA requiring PAP therapy and suppl. oxygen, limited mobility, shortness of breath sitting/sleeping • Mental: Uncontrolled psychopathology, school refusal, daily binge eating, severe body image disturbance • Milieu: Severe problems in relationships, caregivers unable to support child's needs (may include exposure to family violence), dangerous environment (home, neighbourhood or school)

FIGURE 2 Staging obesity in children: The EOSS-P tool. Reprinted from Hadjiyannakis.⁶⁸ Permission pending. ADHD, attention deficit hyperactivity disorder; ADL, activity of daily living; EOSS-P, Edmonton Obesity Staging System for Pediatrics; FSGS, focal segmental glomerulosclerosis; GERD, gastroesophageal reflux disease; IGT, impaired glucose tolerance; LD, learning disability; MSK, musculoskeletal; OSA, obstructive sleep apnea; PAP, positive airway pressure; PCOS, polycystic ovary syndrome; T2DM, type 2 diabetes mellitus

instance, parental disabilities and family financial strain may be relevant to understanding the child's home life. The occurrence of weight-based bullying at school may be significant with respect to the child's eating and exercise patterns, mental health, and willingness to adhere to recommendations.

There is currently less information to validate the EOSS-P as a prognostic tool, relative to the adult EOSS. However, one cross-sectional, registry-based study showed generally good concordance between EOSS-P score and BMI-based obesity staging.⁶⁹

3.3.2 | Alternatives to the EOSS in adults with obesity

The AACE/ACE staging system and KOSC offer alternative assessment tools that may be advantageous for some clinicians. The AACE/ACE framework⁴⁰ categorizes patients into three stages of obesity (stages 0–2) according to BMI and the number of obesity-related complications, using criteria specific for each complication. BMI threshold values in this system have been adjusted for ethnicity; for

Asian populations, a BMI $\geq 23 \text{ kg/m}^2$ with ≥ 1 severe complication defines Stage 2 obesity, the highest severity rank. The AACE/ACE framework explicitly guides treatment decisions, namely, initiation of intensive lifestyle therapy, pharmacotherapy, and bariatric surgery at different BMI values and levels of disease severity.

The KOSC^{65,70} evaluates nine health-related domains associated with obesity: airway/apnea, BMI, CV risk, diabetes mellitus, economic complications, functional limitations, gonadal dysfunction, perceived health status, body image. Each domain is scored separately on a four-point scale, according to specified criteria.⁶⁵ This system does not stratify overall risk to guide treatment decisions or prioritization, but it enables clinicians to assess treatment benefit on specific health outcomes.⁷⁰

3.4 | Question 4: What are the goals of obesity treatment?

The overall treatment goals are to reduce obesity-associated health risks and to improve the individual's health. Because health benefits can be achieved even through moderate weight loss, an effective

management strategy should firstly, focus on setting realistic, clinically meaningful weight loss goals that will reduce health risks or improve QoL, and secondly, support long-term weight maintenance. In the circumstance where weight loss, for whatever reason, is unlikely, it is reasonable that this focus shifts to the prevention of further weight gain, which in itself will prevent escalation of associated health issues.

Goals should be set by both the clinician and the patient after a thorough discussion. Clinical experience and intervention studies suggest that 5–15% weight loss over a period of 6 months represents a safe and realistic short-term weight loss goal.^{71–74} Health and QoL endpoints may be identified as part of the treatment goal. Thus, modest weight loss (5–10% of bodyweight) and modest lifestyle interventions can provide significant health benefits.^{71,75–78}

However, as shown in Table 3, greater weight loss provides additional health benefits,⁷¹ and may be required to achieve specific clinical goals, such as prevention of progression to T2DM.⁴⁰ For most

patients in the DiRECT study, remission of T2DM occurred only when patients achieved weight loss of approximately 10% or greater.⁷² Clinical improvement of mild sleep apnea is observed in patients achieving 7–11% weight reduction. Full remission of more severe forms of sleep-disordered breathing typically requires more substantial weight loss (e.g., following bariatric surgery).⁷⁹ Weight loss >10% may also be required to reduce fibrosis in nonalcoholic steatohepatitis^{80,81} and improve hepatic steatosis⁸² and CVD risk factors.⁷⁷

Following initial weight loss, the long-term goals should focus on weight maintenance or additional weight loss needed to achieve specific clinical goals (see *Question 10*, below, for strategies and recommendations for weight maintenance after initial weight loss).

For individuals with overweight or obesity but showing no signs or symptoms of obesity-related complications, the clinical goal is to delay or prevent the development of such complications. Ongoing assessment is appropriate, to identify incident complications at an early stage.⁸³

TABLE 3 Amelioration or remission of clinical conditions associated with obesity. Suggested weight loss goal assumes the individual is Asian, with BMI ≥ 23 kg/m². Adapted from Garvey⁴⁰

Obesity treatment goals		
Clinical condition	Clinical goal	Weight loss typically required
Metabolic syndrome	Prevention of T2DM	10%
Prediabetes	Prevention of T2DM	5–10%
T2DM	- Reduction in A1c - Reduction in glucose-lowering medication - T2DM remission	5% to $\geq 15\%$
Dyslipidemia	- Lower triglycerides - Higher HDL-c - Lower non-HDL-c	5% to $>15\%$
Hypertension	- Lower systolic and diastolic BP - Reduction in antihypertensive medication	5% to $\geq 15\%$
Nonalcoholic fatty liver disease	Steatosis	$\geq 5\%$
	Steatohepatitis	10–40%
Polycystic ovary syndrome	- Ovulation - Regulation of menses - Reduced hirsutism - Enhanced insulin sensitivity - Reduced serum androgen levels	5% to $\geq 15\%$
Female infertility	- Ovulation - Pregnancy	$\geq 10\%$
Male hypogonadism	Increase in serum testosterone	5% to $\geq 10\%$
Obstructive sleep apnea	- Improvement in symptomatology - Decreased apnea–hypopnea index	7% to $\geq 11\%$
Asthma/reactive airway disease	- Improvement in forced expiratory volume at 1 second - Improvement in symptomatology	7% to $\geq 8\%$
Osteoarthritis	Improvement in symptomatology	10%
	Increased function	5% to 10% with exercise
Urinary stress incontinence	Reduced frequency of incontinence episodes	5% to $\geq 10\%$
GERD	Reduced symptom frequency and severity	$\geq 10\%$
Depression	- Reduction in symptomatology - Improvement in depression scores	Uncertain

Abbreviations: BMI, body mass index; BP, blood pressure; GERD, gastroesophageal reflux disease; HDL-c, high-density lipoprotein cholesterol; T2DM, type 2 diabetes mellitus.

3.5 | Question 5: How should multidisciplinary collaborative care be optimally structured for patients with obesity?

Where possible, obesity is best managed through a multidisciplinary collaborative approach involving various healthcare specialties,⁸⁴ to facilitate and help maintain weight loss.^{84–86} Obesity treatment includes a combination of dietary, activity, and behavioral interventions, and, when necessary, pharmacotherapy and surgical options.

In addition to the individual's main physician, who may be a primary care doctor or an obesity specialist, the optimal multidisciplinary team should therefore include a dietician and/or nutritionist; an exercise specialist or physiotherapist; a psychologist, psychiatrist, or behavioral therapist; and an obesity nurse and/or educator.

In practice, the structure of and access to this team will vary greatly across South and Southeast Asian countries, depending on the healthcare system, availability of professionals trained in these different specialties, and financial limitations. A stratified approach may be adopted in which individuals with more severe obesity, and/or who require more intensive or specialized interventions should be referred to specialists in obesity management. Where possible, patient referral to a weight management center is encouraged, to ensure that the multiple components of obesity are considered and managed. In countries lacking specialist resources, an individual primary care physician or specialist can effectively support patients in their weight management.

3.6 | Question 6: What are the indications for initiating/recommending lifestyle therapy in adults and children? What are the current treatment options?

The goal of lifestyle therapy is to achieve weight loss through dietary modification (i.e., nutritional counseling and a reduced calorie diet), increased physical activity, and behavior modification. These three interventions are most effective when applied together.^{87,88} Lifestyle therapy must be tailored to the individual, taking cultural, geographical, and financial factors into consideration.^{89,90}

3.6.1 | Dietary therapy

While initial rapid weight loss is often possible with reduced caloric intake, maintaining long-term weight loss is a challenge. Response to a given dietary intervention is highly heterogeneous⁹¹ and subject to genetic, behavioral, psychological, and environmental factors.⁹² However, the average maximum weight loss with dietary intervention occurs at 6 months, usually followed by slow weight regain.^{71,93}

Regain is largely due to physiological responses including adaptive changes in circulating hormones that control appetite^{94,95} and weight loss-induced reductions in energy expenditure,^{96,97} which make long-term adherence to diet modification difficult. To support both weight

loss and long-term maintenance, dietary interventions need to be individualized and based on realistic goals.⁹⁸

To date, dietary studies for obesity management in South and Southeast Asia populations have largely explored calorie restriction as a component of comprehensive behavioral change. For example, studies assessing community-based weight management programs that incorporated a personalized dietary plan⁹⁹ or daily meal replacement¹⁰⁰ demonstrated significant weight loss in Malaysian populations. In Asian Indians, high-protein meal replacement, combined with standard lifestyle changes, was associated with significant weight loss and improvement in obesity-related health parameters.¹⁰¹ Clinicians have a variety of evidence-based dietary interventions from which to choose, keeping in mind the individual's personal and cultural preferences, health, and complications.^{29,40,98}

Sidebar: Dietary interventions: Considerations for South and Southeast Asia

Throughout Asia, increasing access to Western-style fast food and sugar-sweetened beverages, as well as restaurants and convenience stores, has been linked to a significant rise in obesity and associated chronic diseases, including CVD, metabolic syndrome, and T2DM.^{102–106} In most parts of Asia, local fast foods are energy-dense,¹⁰⁷ with high levels of saturated fats, sodium, and cholesterol. Notably, common ready-to-eat meals and fried snacks sold by street vendors contain high levels of saturated and trans fats from hydrogenated oils.^{108,109} The South Asian diet is also high in carbohydrates (particularly highly refined rice and sugar from sweetened beverages and traditional sweets) and low in fiber, protein, and mono- and polyunsaturated fatty acids.^{103,110–114}

Increased consumption of refined carbohydrates and hyperpalatable, high-fat foods,¹⁶ and low intake of dietary fiber are associated with increased cardiometabolic risk in South Asian populations.^{114,115} South and Southeast Asian people should be advised to replace highly refined carbohydrates with complex carbohydrates, reduce intake of saturated fats, partially hydrogenated vegetable oils, and sugar, and increase intake of fiber, protein, fruits, and vegetables.⁸⁹

In some circumstances, counseling may need to challenge traditional beliefs and misconceptions that weight is associated with health in both adults and children^{116,117} (see Question 12, below). Other cultural patterns common in some parts of South and Southeast Asia may also reduce adherence to prescribed diets. These include the custom of providing a surplus of food at meals and family gatherings, and regarding refusal of food as rude. Clinicians should recognize realities of their patients' family life and social habits that may complicate their efforts to lose weight, and counsel them accordingly.

3.6.2 | Nutrition counseling

Clinicians' advice should highlight that long-term adherence to a healthy, balanced, reduced-calorie diet supports sustainable weight loss and positive health outcomes.⁹⁸

Multiple diets have demonstrated clinical efficacy for weight loss and health benefits.^{118,119} These diets fall into three broad categories (see Table A5), namely, energy-based interventions, which restrict overall calories, with or without the use of meal replacements; macronutrient-based interventions, which target carbohydrate, protein, or fat content in the diet; and dietary pattern interventions, which restrict or favor specific foods.

An additional strategy of time restriction of meals has been proposed to improve adherence to dietary interventions. A recent study conducted in China found no difference in weight and related outcomes over 12 months from caloric restriction with or without time restriction.¹²⁰ Indeed, based on the available evidence, no one diet is superior in terms of efficacy for weight loss or weight maintenance.^{118,121,122} Even very low-calorie diets (VLCDs, ≤ 800 kcal/day), which can produce substantial initial weight loss, show similar efficacy to low-calorie diets following 1 year of treatment.¹²³

Nevertheless, lifestyle patterns, cultural differences, and preferences will play a role in adoption and adherence to a particular diet. For both adults and children, these various diets can all reduce weight provided the individual adheres to the intervention and experiences an overall reduction in energy intake.^{119,122} In counseling patients, a diet that reduces calorie intake by >500 kcal/day for weight loss may be taken as a starting point, corresponding to a total energy intake of 1200–1500 kcal/day for women and 1500–1800 kcal/day for men.⁷¹ VLCDs require close medical supervision but can be considered when rapid weight loss is indicated, for example, in patients with severe obesity prior to bariatric surgery, or moderate to severe obesity that has not responded to other dietary interventions. VLCDs are rarely appropriate for children, unless the intervention is closely managed by a specialist.

3.6.3 | Physical activity

Independent of weight loss, physical activity provides significant health benefits, including improvement in cardiometabolic risk factors and reduced risk of CVD and other chronic diseases, depression, and dementia.^{124–127} To maintain or improve health, adults should devote ≥ 150 min per week (approximately 20 min per day) to moderate-intensity exercise.¹²⁸ Based on the higher risk of cardiometabolic disease in South Asians, some experts recommend 60 min per day of physical activity, including aerobic activity, work-related activity and resistance exercises.³⁹

Regular physical activity is effective for purposes of weight control, especially when combined with dietary modification.^{87,124,129} Regular aerobic activity also reduces visceral fat (a characteristic feature of obesity in South and Southeast Asians)¹³⁰ and helps maintain

weight after weight loss¹²⁸; an increased level of activity is generally required for weight maintenance.¹³¹ More modest steps, such as decreasing sedentary behavior (particularly screen time or TV) and increasing overall daily activity (for example walking or climbing stairs) represent important initial goals.²³

Activity interventions need to be individualized according to the person's age, bodyweight, prior level of fitness, and the presence of physical or behavioral barriers or complications.^{40,132} For this reason, it is recommended that clinicians screen for complications and risk factors and identify any physical and/or behavioral barriers before patients increase their physical activity.⁹⁰ Activity interventions should be achieved by gradually increasing activity over time, especially in patients who are inactive or with low fitness.

Resistance training provides additional benefits for people with obesity, including enhanced body fat loss, preservation of fat-free mass, weight maintenance, improvement in mobility,^{133–136} as well as a reduction in cardiometabolic risk factors for those with comorbid T2DM.^{137–139} In addition to aerobic exercise, these individuals benefit from two to three sessions per week of resistance exercise.^{132,137}

Sidebar: Activity interventions: Considerations for South and Southeast Asia

South and Southeast Asian people are typically less physically active than other ethnic groups,^{140–142} with studies reporting low levels of physical activity in both urban and rural populations.^{143–145} Participation in recreational physical activities^{140,141,146,147} is uncommon, particularly in women and older age groups.^{148,149} In immigrant communities in England, researchers found that Indian, Pakistani, and Bangladeshi men and women reported significantly lower levels of physical activity than Europeans, and the level of physical activity correlated inversely with BMI, WC, systolic blood pressure, blood glucose, and insulin levels.¹⁴⁰ Sedentary behavior has also been identified as a risk factor for chronic diseases including obesity^{145,150} and increasing levels of sedentary behavior have been reported in several South and Southeast Asian countries.^{146,151}

Common barriers to physical activity in South and Southeast Asia include ambivalence regarding physical exercise, limited time owing to long working hours and cultural obligations to family, the absence of appropriate facilities and infrastructure, limited safe areas, an unfavorable climate, and environmental pollution.^{89,90,149} Women may experience additional cultural barriers related to modesty or avoiding mixed-sex activities.

These observations highlight the need for clinicians to work closely with their patients to help them overcome these barriers and become more physically active.

Combined with structured behavioral support, intensive lifestyle therapy can lead to T2DM remission in people with overweight/obesity and T2DM. The DIRECT study, carried out in the primary care settings, focused on diet, using low- and very low-calorie meal replacements, followed by stepped reintroduction of regular meals.⁷² In the tertiary care setting, the Look AHEAD study applied a combination of calorie restriction and regular, moderate-intensity physical activity, supported by frequent contacts between the individual and the treatment center.¹⁵² In both studies, T2DM remission occurred specifically in individuals who achieved higher levels of weight loss (e.g., 15% loss of bodyweight over 1 year).

3.6.4 | Lifestyle interventions for children

Management of obesity in children should emphasize healthful habits to avoid overweight and prevent progression to obesity. As with adults, programs that combine physical activity with improved diet have proved more successful than either approach separately.¹⁵³ For younger children, dietary guidance should include avoidance of fast food and any other highly energy-dense items (e.g., fried snack foods and heavily sweetened drinks), and increased consumption of whole grains.¹⁵⁴ Children should be guided to avoid skipping meals, which strengthens the urge to overeat; rather, meals should be regular, with healthy foods provided for snacks.^{155,156} Nevertheless, portion control and structured dietary interventions similar to those for adults may be considered for some adolescents, depending on their motivation and family support.¹⁵⁷

Children should be given the opportunity to exercise, including sports and other physical activities such as playing or household chores, aiming for a minimum of 60 min of moderate-to-vigorous activity, at least 5 days per week. They should be discouraged from spending long periods on sedentary activities with electronic devices.^{155,156,158}

Parents should emphasize positive options (desirable foods that can be chosen; vigorous play), rather than using negative remarks, threats, or prohibitions (avoiding junk food; sedentary habits).¹⁵⁶ As parental habits predict children's obesity,¹⁵⁹ parents should also be encouraged to model healthful behaviors for their children.

Unlike adults, children with obesity rarely experience adiposity-related barriers to physical activity.¹⁵⁸

3.7 | Question 7: What are the indications for initiating/recommending psychological and/or behavioral therapy? What are the current treatment options?

Behavioral change is at the heart of obesity management. Interventions to support healthier eating habits and patterns of physical activity can include individual or group counseling. In the primary care setting, behavioral change is enhanced by establishing open and respectful communication between the clinician and the patient (see Question 11, below) and setting clear and appropriate treatment

targets. Behavioral interventions are not taken in isolation but are appropriate for people at any stage of obesity or overweight, to promote healthful habits and improve adherence to dietary change and physical exercise.

One successful approach, termed motivational interviewing, aims to enhance the individual's motivation to make behavioral changes. In motivational interviewing, the clinician demonstrates an empathetic attitude and helps the individual identify and address issues that could otherwise interfere with their intention to maintain healthy habits^{160,161} (see Question 12, below). Barriers to adherence may include the following: poor motivation; lack of time; environmental, societal, and social pressures; knowledge gaps; poor sleep hygiene; and reluctance to exercise.^{162,163} Behavioral interventions, such as self-monitoring, mindful eating, stimulus control, and stress management, empower the individual to identify and address factors such as stress-related eating that promote weight gain. They are best used in combination with other structured changes, including dietary counseling, exercise, and medical monitoring. Their success should be evaluated not solely by weight loss, but also by improvements in health, physical stamina, and QoL.¹⁶³

For those who are comfortable with technology, electronically delivered behavioral interventions may provide additional support beyond what the primary care clinician can offer. Electronic tools include websites and apps for smartphones and tablets, which allow the user to track and report their daily meals and exercise, and receive automatic or, in some cases, personal coaching.^{164,165} Those who continue to log in or interact with these tools show corresponding success in weight loss over 6 months, as well as WC and glycemic control.¹⁶⁵ However, attrition is common as the tools lose their novelty.¹⁶⁴

Behavioral interventions should continue to be offered to patients on pharmacotherapy¹⁶⁶ and after bariatric surgery,¹⁶⁷ to support improved habits and adherence to a healthful lifestyle, as well as for mental health and QoL benefits. Intensive behavioral and lifestyle therapy can result in 5–10% weight loss over 4–12 months.^{72,77} In one randomized controlled study, 39%, 20%, and 9% of patients receiving intensive behavioral therapy alone for over 1 year achieved 5%, 10%, and 15% weight loss, respectively. Addition of liraglutide as treatment was associated with significantly greater success in reaching each of these weight loss targets.¹⁶⁸ Similar benefits have been observed with naltrexone/bupropion and semaglutide.^{169,170}

As with lifestyle interventions, behavioral changes should generally be maintained to help with long-term weight loss maintenance.

3.8 | Question 8: What are the indications for initiating/recommending pharmacotherapy for adults and children? What are the current pharmacotherapy options?

Pharmacotherapy for obesity can be used in appropriate patients, to increase and help maintain weight loss, improve obesity-related risk

factors, and prevent or reverse obesity-related complications.¹⁷¹⁻¹⁷⁴ Pharmacotherapy options are best used in combination with lifestyle modification, as their efficacy is limited unless lifestyle changes are also made.^{171,175-177}

Factors favoring the use of pharmacotherapy as an adjunct to lifestyle modification include a history of nonresponse (e.g., if the individual does not achieve 5% bodyweight reduction), weight regain, or weight cycling when lifestyle therapy is used alone. Alongside lifestyle modification, antiobesity pharmacotherapy can also be considered as initial therapy for some individuals with more severe stages of obesity and those for whom urgent treatment or a greater degree of weight loss is required to manage their obesity-related complications.^{40,178,179}

For some individuals, combining pharmacotherapy with intensive behavioral interventions, or an initial low-calorie diet followed by pharmacotherapy and behavioral therapy, may achieve greater bodyweight reduction and help maintain weight loss.^{169,170}

3.8.1 | Indications for pharmacotherapy

International obesity guidelines,^{23,40,132,179} following evidence from clinical trials of antiobesity medications, generally recommend pharmacotherapy for those with BMI ≥ 30 kg/m² or ≥ 27 kg/m² in the presence of cardiometabolic obesity-related risk factors or complications (e.g., HTN, T2DM, sleep apnea). However, lower BMI cut points have been proposed for use of pharmacotherapy, reflecting the fact that Asian people experience obesity-related complications at lower BMIs, compared with non-Asian people.^{29,39} Thus, a 2009 consensus statement recommends pharmacotherapy in Asian Indian adults with a BMI > 27 kg/m² or > 25 kg/m² with complications.³⁹ This same guidance suggests initiating pharmacotherapy based on a WC measurement at least 10 cm greater than the upper limit of normal for Asian Indian men and women.³⁹

Clinicians considering the use of pharmacotherapy for people with obesity should be aware that long-term improvement in obesity-related complications has not been demonstrated with short-term pharmacotherapy, and weight regain is common when medication is withdrawn.^{173,174,180} Extended treatment may be needed to support weight maintenance and provide long-term health benefits. Conversely, terms of authorization require that treatment be stopped if weight loss is $< 5\%$ of total bodyweight after 12 weeks on the maximally tolerated dosage.⁴⁰

As shown in Table 4, antiobesity medications commonly used in most countries in South and Southeast Asia include orlistat, liraglutide, and phentermine. Of these, only orlistat is available across the region. In addition, a combination of bupropion and naltrexone has recently been approved in Singapore; other sympathomimetic agents, including mazindol and diethylpropion, are approved for short-term use in Indonesia. The dosing, mechanisms, and side effect profiles of these agents are summarized in Table 5, along with their pharmacologic features and prescribing considerations. Also covered here are two drug options not currently approved for obesity treatment in this region, namely: low-dose phentermine with topiramate extended-release combination, which is approved by regulatory authorities in other parts of Asia; and semaglutide 2.4 mg, which at present, is approved for the treatment of obesity in the United States and Europe but not in Asia. Semaglutide (oral and subcutaneous) is approved for use in T2DM in South and Southeast Asia and is associated with significant weight loss. In the clinical setting, a patient with T2DM and overweight or obesity may benefit from treatment with glucose-lowering agents that also promote weight loss, for example, glucagon-like peptide-1 receptor agonists and sodium-glucose cotransporter-2 inhibitors.

Choice among antiobesity medications should be based on obesity-related complications, severity of obesity, concurrent medications, and barriers to adherence, as well as the medications' efficacy, side effects, and contraindications.

TABLE 4 Pharmacotherapies for managing obesity in South/Southeast Asia

	Orlistat	Liraglutide 3.0 mg	Phentermine ^a	Naltrexone ER/bupropion ER
Bangladesh	✓	✓		
Brunei Darussalam	✓	✓		
India	✓			
Indonesia	✓	✓		
Malaysia	✓	✓	✓	
Philippines	✓	✓ ^b	✓	
Singapore	✓ ^b	✓ ^b	✓	✓
Sri Lanka	✓	✓		
Thailand	✓	✓ ^b	✓	
Viet Nam	✓	✓		

Abbreviation: ER, extended-release.

^aPhentermine is approved only for short-term use (≤ 12 weeks).

^bApproved for use in adolescents ≥ 12 years old.

TABLE 5 Overview of pharmacotherapy. Adapted from Garvey⁴⁰ and Apovian¹⁷⁸

Antibesity pharmacotherapy, indication/use ^a	Mechanism of action, study name, study duration: % TBWL greater than placebo or mean kg weight loss over placebo	Dose	Common side effects	Contraindications, cautions, and safety concerns	Monitoring and comments
Orlistat Chronic weight management	Lipase inhibitor XENDOS 1 year: 4.0% 4 years: 2.6%	120 mg PO TID (before meals) OTC: 60 mg PO TID (before meals)	• Steatorrhea • Fecal urgency • Incontinence • Flatulence • Oily spotting • Frequent bowel movements • Abdominal pain • Headache	✓ Pregnancy and breastfeeding ✓ Chronic malabsorption syndrome ✓ Cholestasis ✓ Oxalate nephrolithiasis • Rare severe liver injury • Cholelithiasis • Malabsorption of fat-soluble vitamins • Effects on other medications: – Warfarin (enhance) – Antiepileptics (decrease) – Levothyroxine (decrease) – Cyclosporine (decrease)	Monitor for: • Cholelithiasis • Nephrolithiasis – Recommend standard multivitamin (to include vitamins A, D, E, and K) at bedtime or 2 h after orlistat dose – Eating >30% kcal from fat results in greater GI side effects – FDA-approved for children ≥12 years old – Administer levothyroxine and orlistat 4 h apart
Phentermine Short-term use (<12 weeks) for the management of obesity	NE-releasing agent 2–24 weeks: 3.6 kg	15–37.5 mg (HCl) PO once daily 15–30 mg (ion-exchange resin complex) PO once daily	• Headache, elevated BP, elevated HR, insomnia, dry mouth, constipation, anxiety • Cardiovascular: palpitation, tachycardia, elevated BP, ischemic events • Central nervous system: overstimulation, restlessness, dizziness, insomnia, euphoria, dysphoria, tremor, headache, psychosis • GI: dryness of the mouth, unpleasant taste, diarrhea, constipation, other GI disturbances • Allergic: urticaria • Endocrine: impotence, changes in libido	• Anxiety disorders (agitated states) • History of heart disease, uncontrolled hypertension • Seizure • MAOIs • Pregnancy and breastfeeding • Hyperthyroidism • Glaucoma • History of drug abuse • Sympathomimetic amines	– Long-term use may lead to pharmacological tolerance, dependence, and withdrawal symptoms
Diethylpropion Short-term use (<12 weeks) for the management of obesity	NE-releasing agent 6–52 weeks: 3.0 kg	75 mg/day	• See phentermine	• See phentermine	• See phentermine

TABLE 5 (Continued)

Antibesity pharmacotherapy, indication/use ^a	Mechanism of action, study name, study duration: % TBWL greater than placebo or mean kg weight loss over placebo	Dose	Common side effects	Contraindications, cautions, and safety concerns	Monitoring and comments
Phentermine/topiramate ER Chronic weight management	NE-releasing agent (phentermine) GABA receptor modulation (topiramate) EQUIP CONQUER SEQUEL 1 year: 8.6–9.3% on high dose; 6.6% on treatment dose 2 years: 8.7% on high dose; 7.5% on treatment dose	Starting dose: 3.75/23 mg PO QD for 2 weeks Recommended dose: 7.5/46 mg PO QD Escalation dose: 11.25/69 mg PO QD Maximum dose: 15/92 mg PO QD	- Headache - Paresthesia - Insomnia - Decreased bicarbonate - Xerostomia - Constipation - Nasopharyngitis - Anxiety - Depression - Cognitive impairment (concentration and memory) - Dizziness - Nausea - Dysgeusia	✓ Pregnancy and breastfeeding (topiramate teratogenicity) ✓ Hyperthyroidism ✓ Acute angle-closure glaucoma ✓ Concomitant MAOI use (within 14 days) - Tachyarrhythmia - Decreased cognition - Seizure disorder - Anxiety and panic attacks - Nephrolithiasis - Hyperchloremic metabolic acidosis - Dose adjustment with hepatic or renal impairment - Concern for abuse potential - Combined use with alcohol or depressant drugs can worsen cognitive impairment	Monitor for: - Increased heart rate - Depressive symptomatology or worsening depression especially on maximum dose - Hypokalemia (especially with HCTZ or furosemide) - Acute myopia and/or ocular pain - Acute kidney stone formation - Hypoglycemia in patients having T2DM treated with insulin and/or sulfonylureas - Potential for lactic acidosis (hyperchloremic nonanion gap) in combination with metformin - MAOI (allow ≥14 days between discontinuation) 15 mg/92 mg dose should not be discontinued abruptly (increased risk of seizure); taper over at least 1 week - Healthcare professional should check βHCG before initiating, followed by monthly self-testing at home - Monitor electrolytes and creatinine before and during treatment - Can cause menstrual spotting in women taking birth control pills owing to altered metabolism of estrogen and progestins
Naltrexone ER/bupropion ER Chronic weight management	Opiate antagonist (naltrexone) Reuptake inhibitor of DA and NE (bupropion)	Titrate dose: Week 1: 1 tablet (8/90 mg) PO QAM	- Nausea - Headache - Insomnia	✓ Pregnancy and breastfeeding ✓ Uncontrolled hypertension	Monitor for: Increased heart rate and blood pressure

(Continues)

TABLE 5 (Continued)

Antibesity pharmacotherapy, indication/use ^a	Mechanism of action, study name, study duration: % TBWL greater than placebo or mean kg weight loss over placebo	Dose	Common side effects	Contraindications, cautions, and safety concerns	Monitoring and comments
	COR-I	Week 2: 1 tablet (8/90 mg) PO BID	Vomiting	✓ Seizure disorder	• Worsening depression or suicidal ideation
	COR-II COR-BMOD 1 year: 4.2–5.2%	Week 3: 2 tablets (total 16/180 mg) PO QAM and 1 table (8/90 mg) PO QHS Week 4: 2 tablets (total 16/180 mg) PO BID	• Constipation • Diarrhea • Dizziness • Anxiety • Xerostomia	✓ Bulimia nervosa ✓ Severe depression ✓ Drug or alcohol withdrawal ✓ Concomitant MAOI (within 14 days) ✓ Chronic opioid use • Cardiac arrhythmia • Dose adjustment for liver or kidney impairment • Narrow-angle glaucoma • Uncontrolled migraine disorder • Generalized anxiety disorder • Bipolar disorder • Safety data lacking in patients who have depression • Seizures (bupropion lowers seizure threshold)	• Worsening of migraines • Liver injury (naltrexone) • Hypoglycemia in patients having T2DM treated with insulin and/or sulfonylureas • Seizures (bupropion lowers seizure threshold) – MAOI (allow ≥14 days between discontinuation) – Dose adjustment for patients with renal and hepatic impairment – Avoid taking medication with a high-fat meal – Can cause false positive urine test for amphetamine – Bupropion inhibits CYP2D6
Liraglutide 3.0 mg Chronic weight management FDA-approved for adolescents ≥12 years	GLP-1 analog SCALE Obesity & Prediabetes 1 year: 5.6% 3 years: 4.3%	Titrate dose weekly by 0.6 mg as tolerated by patient (side effects): 0.6 mg SC QD → 1.2 mg SC QD → 1.8 mg SC QD → 2.4 mg SC QD → 3.0 mg SC QD	• Nausea • Vomiting • Diarrhea • Constipation • Headache • Dyspepsia • Increased heart rate	• Pregnancy and breastfeeding • Personal or family history of medullary thyroid cancer or MEN2 • Pancreatitis • Acute gallbladder disease • Gastroparesis • Severe renal impairment can result from vomiting and dehydration • Use caution in patients with history of pancreatitis • Use caution in patients with cholelithiasis • Suicidal ideation and behavior • Injection site reactions	• Monitor for: • Pancreatitis • Cholelithiasis and cholecystitis • Hypoglycemia in patients having T2DM treated with insulin and/or sulfonylureas • Increased heart rate • Dehydration from nausea/vomiting • Injection site reactions – Titrate dose based on tolerability (nausea and GI side effects)

TABLE 5 (Continued)

Antibesity pharmacotherapy, indication/use ^a	Mechanism of action, study name, study duration: % TBWL greater than placebo or mean kg weight loss over placebo	Dose	Common side effects	Contraindications, cautions, and safety concerns	Monitoring and comments
Senaglutide 2.4 mg ^{73,169,273-275} Chronic weight management	GLP-1 analog STEP Obesity Adults without T2DM 68 weeks: 10.3–12.4% 104 weeks: 12.6% Adults with T2DM 68 weeks: 6.2%	Titrate dose every 4 weeks as tolerated by patient (side effects): 0.25 mg SC QW→ 0.5 mg SC QW→ 1.0 mg SC QW→ 1.7 mg SC QW→ 2.4 mg SC QW	• Nausea • Vomiting • Diarrhea • Constipation • Headache • Fatigue • Dyspepsia • Dizziness • Abdominal distension • Eructation • Gastroenteritis • Gastroesophageal reflux disease	✓ Pregnancy and breastfeeding ✓ Personal or family history of medullary thyroid cancer or MEN2 ✓ Pancreatitis ✓ Acute gallbladder disease • Gastroparesis • Severe renal impairment can result from vomiting and dehydration • Use caution in patients with history of pancreatitis • Use caution in patients with cholelithiasis • Suicidal ideation and behavior • Injection site reactions	Monitor for: • Pancreatitis • Cholelithiasis and cholecystitis • Hypoglycemia in patients having T2DM treated with insulin and/or sulfonylureas • Diabetic retinopathy in patients with T2DM • Increased heart rate • Dehydration from nausea/vomiting • Injection site reactions – Titrate dose based on tolerability (nausea and GI side effects)

Note: FDA indication for all medications: BMI ≥ 30 kg/m² or BMI ≥ 27 kg/m² with significant complications.

After 3 to 4 months of treatment with antiobesity medication:

- For naltrexone ER/bupropion ER: If the patient has not yet lost at least 5% of their baseline body weight at 12 weeks on the maintenance dose, the medication should be discontinued.
- For phentermine/topiramate ER: Continue medication if the patient has lost $>5\%$ body weight after 12 weeks on recommended dose (7.5 mg/42 mg); if the patient has not lost at least 3% of body weight after being on the recommended dose for 12 weeks, then the medication should be discontinued, or the patient can be transitioned to maximum dose (15 mg/92 mg); if the patient has not lost at least 5% after 12 additional weeks on the maximum dose, the medication should be discontinued.
- For liraglutide 3.0 mg: If the patient has not lost at least 4% of body weight 16 weeks after initiation, the medication should be discontinued.

Abbreviations: BP, blood pressure; CYP2D6, cytochrome P450 2D6; DA, dopamine; ER, extended-release; FDA, US Food and Drug Administration; GABA, gamma-aminobutyric acid; GI, gastrointestinal; GLP-1, glucagon-like peptide-1; HCG, human chorionic gonadotropin; HCTZ, hydrochlorothiazide; HR, heart rate; MAOI, monoamine oxidase inhibitor; MEN2, multiple endocrine neoplasia type 2; NE, norepinephrine; PO, oral; QAM, every morning; QD, daily; QHS, every bedtime; QW, every week; SC, subcutaneous; TBWL, percent total body weight loss from baseline over that observed in the placebo group; T2DM, type 2 diabetes mellitus; TID, three times daily.

^aIndication may vary by country.

Sidebar: Pharmacotherapy in children and adolescents

The use of pharmacotherapy in children and adolescents with obesity is limited in clinical practice.^{158,181} Pharmacotherapy is a recognized tool for obesity management only in adolescents and requires close monitoring by the pediatrician to identify adverse effects.¹⁵⁵

Compared with adults, there is a lack of well-controlled studies and long-term data on the efficacy and safety of pharmacotherapy in children, and the risk versus long-term benefit ratio remains uncertain.¹⁸² Consequently, pharmacotherapy should be considered for adolescents with obesity only if lifestyle modification has been ineffective or the patient has severe complications, and even then, only as an adjunct to behavioral change.^{132,155,182} As with adults, treatment should be evaluated after 12 weeks at the maximum dose and pharmacotherapy discontinued if BMI or BMI z-score reduction is <4%.¹⁸²

Currently, orlistat and liraglutide 3.0 mg are approved for use in adolescents (>12 years) in several Asian countries. Metformin, approved for use in children over age 10 with T2DM, can be associated with weight loss.¹³² However, long-term studies are needed to confirm efficacy in treating children and adolescents with obesity who do not have T2DM.

Clinical studies on orlistat plus lifestyle modification suggest that adolescents may experience 0.55–0.8 kg/m² reduction in BMI.^{183,184} Mild to moderate gastrointestinal (GI) adverse events are more common with orlistat than placebo^{183,185,186} and have been associated with treatment discontinuation in population-based studies.^{187,188}

For liraglutide plus lifestyle therapy in adolescents (12 to <18 years) with obesity, a 56-week phase 3 study demonstrated a significant reduction in BMI relative to placebo (estimated treatment difference in BMI SD score, –0.22; *P* = 0.002). GI adverse events and adverse events leading to discontinuation were more common in the liraglutide group than in the placebo group.¹⁸⁹

3.9 | Question 9: What are the indications for initiating/recommending procedures and surgery? What are the current options?

Metabolic and bariatric surgery encompass a variety of procedures that alter GI anatomy, leading to weight loss due to reduced food intake and other mechanisms.^{190,191} To guide referral to bariatric surgeons, clinicians in South and Southeast Asia should be aware of the

potential benefits of surgery, as well as patient selection considerations and treatment limitations.

Common bariatric approaches in Asia include sleeve gastrectomy (SG), Roux-en-Y gastric bypass (RYGB), and one-anastomosis gastric bypass (OAGB) performed laparoscopically. Endoluminal bariatric procedures, which may be indicated at different BMI ranges, are also gaining popularity. These include intragastric balloon insertion and the novel endoscopic sleeve gastroplasty.^{190,191}

3.9.1 | Benefits of bariatric surgery

Bariatric surgery results in more extensive and often more durable weight loss compared with lifestyle modification and obesity pharmacotherapy. Treatment benefits include improved QoL and amelioration or remission of comorbid conditions. Studies in Asian and other populations indicate that these procedures can lead to remission of T2DM,^{192,193} with significant improvement in glycemic control, dyslipidemia, and systolic blood pressure.^{194,195} Ethnicity does not appear to influence the clinical benefits seen with bariatric surgery.¹⁹⁶

Database analysis indicates that, up to 20 years following bariatric surgery, CV events and all-cause mortality decrease significantly relative to matched patients treated nonsurgically.¹⁹⁴ Projected increase in lifespan in these individuals reflects the restoration of glucose sensitivity and the reversal of dyslipidemia and HTN.^{197–199}

In suitable patients, surgical procedures can lead to substantial weight loss, with the prospect of durable amelioration of overweight and obesity. Studies in South and Southeast Asian countries report median excess weight loss (EWL) of ~50% to >70% at 5 years after surgery, depending in part on the bariatric procedure used.^{200–203} Note that excess weight refers to the difference between the individual's actual weight and the ideal bodyweight of a person of the same sex and height, with a BMI of 25 kg/m². Peak weight loss typically occurs 1–2 years after surgery,^{195,202} with EWL of 65% to >80%.²⁰⁴ In some populations, RYGB and OAGB result in greater and more sustainable long-term weight loss than SG.^{203,205}

3.9.2 | Caveats for patients considering bariatric surgery

Despite its potential advantages, surgery is not appropriate for all people with obesity. Based on the realities of surgical availability in each country, patients should be counseled that the wait time can be long, even for an initial consultation. Moreover, some may be required to lose weight via diet and exercise before undergoing the procedure.

Bariatric surgery generally poses little risk of serious complications, with mortality <0.1%. However, postsurgical adverse events related to altered GI tract anatomy and function are common.¹⁹⁹ Patients must adhere to a strict diet progression during the initial weeks after surgery and to life-long dietary modification afterwards.²⁰⁶

After bariatric surgery, patients are at risk of weight regain and relapse of obesity-related complications, as well as micronutrient (vitamins and minerals) and even macronutrient deficiency. The need for nutritional supplements may be lifelong. Patients must therefore commit to regular consultation with their physician and potentially a dietician, to monitor their dietary habits and blood biochemistry, check for signs and symptoms of nutrient deficiency (particularly in women of reproductive age), and adjust supplementation.^{190,199,206} Bariatric surgery may alter the oral bioavailability of medications, including oral contraceptives, warfarin, antibiotics, and antidepressants.²⁰⁷ Women who are pregnant or planning to conceive within 1 year should not undergo bariatric surgery.

3.9.3 | Indications for bariatric surgery

Bariatric surgery can be recommended for appropriate patients as an adjunct to lifestyle modification, with or without pharmacotherapy. As shown in Table 6, BMI cut points for recommendation or consideration of surgical procedures vary among countries in the region. However, there is general consensus that BMI values specific for Asian populations should be used in Asian countries, and that poorly controlled T2DM or other complications of obesity should be factored into the decision for surgery.²⁰⁸

Surgical procedures are generally recommended for adults aged 18–69 years with indications. For adolescents with severe obesity, bariatric surgery may be considered after detailed assessment by an experienced multidisciplinary care team, including considerations of pubertal and skeletal maturation and whether the patient and family have the motivation and ability to adhere to recommended treatments.^{62,190,209} Similarly, for those ≥70 years, careful assessment by an experienced care team is necessary before recommending surgery. Adults with substance use disorders or psychiatric illness that would limit their ability to adhere to dietary restrictions or medical

monitoring should not be considered for surgery. Caution is also indicated in individuals with hepatic dysfunction and in tobacco smokers.¹⁹⁰

Finally, although many patients experience postsurgical improvement in physical and mental QoL,²¹⁰ psychological support may be needed for people who experience depression or other mood disorders.²⁰⁶ Suicidality and increased substance abuse may occur, necessitating careful patient selection and postoperative monitoring.

Sidebar: Bariatric surgery considerations for South and Southeast Asia

Access to bariatric surgery is increasing across the Asia-Pacific region.^{191,211} Significant barriers to uptake remain, including limited public insurance coverage, patients' fears and misconceptions, and a lack of acceptance of the need for surgery.^{191,212,213} Even among healthcare professionals, low awareness of bariatric surgery options and safety leads to low referral rates in South and Southeast Asian countries,¹⁹¹ as has been reported elsewhere.^{214,215}

3.10 | Question 10: What strategies are important to consider for long-term weight reduction/maintenance for adults and children?

As with initial weight loss, the challenge of maintaining bodyweight reduction is complex and influenced by genetics,²¹⁶ habits, and psychosocial characteristics.^{197,217} Given the chronic nature of obesity, it is expected that most people who achieve weight loss targets in the

TABLE 6 BMI criteria for bariatric and metabolic surgery (kg/m²)^{43,132,190,208,276–278}

BMI criteria for bariatric surgery in Asian patients (kg/m ²)	IFSO-APC	National guidance						
		Brunei Darussalam	India	Malaysia	Singapore	Sri Lanka	Thailand	DSS-II
May be recommended regardless of complications	≥35	≥40	≥35	≥37.5	≥37.5	≥35	≥37.5	≥37.5 ^a
May be recommended for patients with complications	≥30 ^b	≥35	≥30 ^c	≥32.5 ^b	≥32.5 ^d	≥30 ^e	≥32.5	≥32.5 ^f
May be considered	≥27.5 ^f		≥27.5 ^f	<32.5			≥27.5	≥27.5 ^f

Abbreviations: BMI, body mass index; DSS-II, Second Diabetes Surgery Summit; IFSO-APC, International Federation for the Surgery of Obesity and Metabolic Disorders Asia Pacific Chapter.

^aFor patients with type 2 diabetes mellitus.

^bFor patients with metabolic syndrome.

^cFor patients with ≥2 obesity-related complications.

^dFor patients with ≥1 difficult-to-control obesity-related complication.

^eMay be recommended if there are severe complications.

^fFor patients with poorly controlled type 2 diabetes mellitus.

short term will experience partial or complete regain of their prior bodyweight.⁹⁵

Weight regain is driven by a complex interaction between biology, behavior, and an obesogenic environment. Short-term (e.g., 8-week) caloric restriction induces changes in gut-derived hormones, increasing appetite and food intake and reducing satiety and energy expenditure. These physiologic changes promote escalating weight regain and persist for at least a year following a diet.⁹⁴ Similarly, individuals who reduce bodyweight by $\geq 10\%$ experience an adaptive reduction in energy expenditure,⁹⁷ which opposes weight loss in response to calorie reduction.²¹⁸ Ongoing metabolic adaptation correlates with greater difficulty in maintaining extreme weight loss. This effect appears to persist over at least 6 years, suggesting that maintenance of reduced weight loss is a challenge that does not readily subside over time.⁹⁶

It is important that patients realize that there are powerful biological determinants at play making weight maintenance difficult. For those using behavioral approaches for weight reduction, early weight loss (e.g., over 1–2 months) predicts long-term maintenance (Figure 3).^{197,219,220} In general, some degree of regain is expected, with women experiencing particular challenges in the peripartum and perimenopausal and postmenopausal stages. Women may therefore require postpartum and perimenopausal support, to institute or reinstitute lifestyle measures when they are safe and feasible.^{221–223}

Ongoing interaction with healthcare practitioners has consistently been associated with improved long-term weight loss outcomes.^{71,224} Strategies by which clinicians can support patients and minimize weight regain include counseling to ensure frequent self-monitoring of weight and lifestyle change, continually exploring and addressing factors that may contribute to the individual's unhealthy weight, supervised adherence to reduced calorie intake, and increased physical activity.¹⁵² Likewise, cognitive restructuring based around realistic weight loss goals can enhance patients' behavioral skills, extending into the long term.⁹⁵ Finally, it may be necessary to extend behavioral modification strategies to interventions that require medical supervision, including intermittent or extended use of VLCDs or meal replacements, pharmacotherapy, and bariatric procedures.

An individual's aspirational weight goals may be more ambitious than targets set in the clinic, and failure to meet them does not correlate with subsequent weight trajectory.²²⁰ Therefore, regardless of whether patients achieve their personal targets, weight stabilization and establishment of a new, lower baseline weight should be regarded as success. Similarly, clinicians should highlight the importance of improvements in obesity-related complications and increased QoL or daily function benefits that may persist despite weight regain.

Ongoing psychosocial support should be considered, to help maintain healthier habits regarding diet and physical activity. In patients using pharmacotherapy, rapid progress early in treatment is

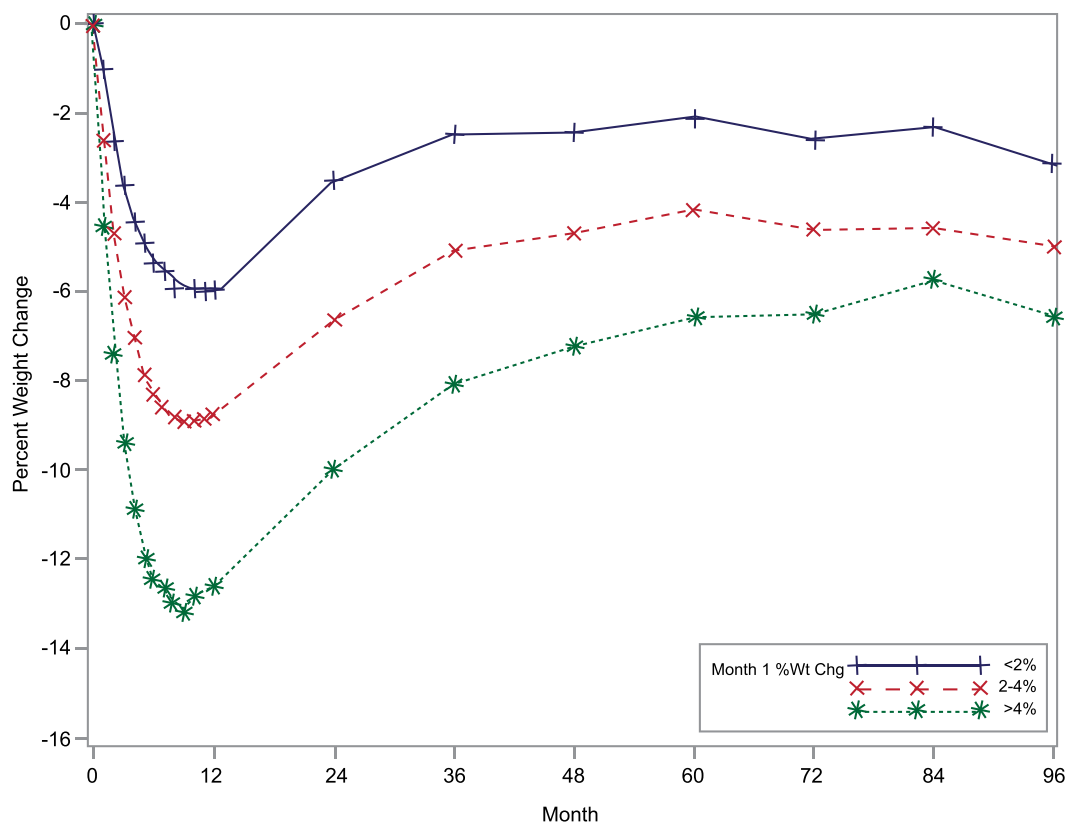


FIGURE 3 Weight change trajectories over 8 years in patients enrolled in an intensive behavioral weight loss program vary with 2-month outcomes. Reprinted from Unick et al.²²⁰ Permission pending

associated with greater success in long-term maintenance of reduced weight.²²⁵ Odds of longer-term maintenance are greater for those attempting to lose weight with pharmacotherapy or surgery, in combination with lifestyle and behavioral change.¹⁹⁷ Of the available pharmacotherapies in South and Southeast Asia, three are approved for long-term use (liraglutide, orlistat, and bupropion ER/naltrexone ER combination), with evidence demonstrating effective weight loss and maintenance over 1–4 years.^{171,174,226} For those who tolerate and respond well to treatment, extended pharmacotherapy can be part of a long-term treatment strategy. The benefits and risks of such an approach must be evaluated in each individual.¹⁷⁶

Following bariatric surgery, most people experience some degree of weight regain over long-term follow-up.^{206,227} One large South Asian study found that by 5 years after surgery, mean regain was 14% of nadir weight. Mean weight regain varied substantially based on the surgical method chosen, ranging from 3% in patients undergoing OAGB to 35% in patients with SG.²²⁸ Patients should be told to expect this outcome, which can be a source of significant distress, even if they stabilize at a weight below their presurgical baseline and enjoy improved metabolic and CV health. Continued behavioral and psychological support may be required in the post-surgical setting.²⁰⁶

Centile charts are available for postsurgical weight loss, specifically in Asian patients undergoing various bariatric procedures.²⁰⁵ Because they display a wide range of weight trajectories, these charts can be helpful in counseling patients before surgery and the times at which weight regain is commonly expected. Weight trajectory charts can be used to identify individuals with suboptimal response. Causes of weight regain may include surgical failure or could be essentially behavioral, with reduced adherence to dietary and physical activity regimens.²²⁹ Therefore, strategies to minimize or avoid regain after surgery may include structured dietary control,²³⁰ exercise, behavioral counseling, endoscopic or revisional surgery, and pharmacotherapy.^{167,231}

Of the available antiobesity medications, the best studied in the postbariatric setting is liraglutide, which appears to be similarly well tolerated and efficacious in bariatric patients as in others with obesity.^{206,232} Liraglutide is particularly useful in patients requiring better diabetes control after bariatric surgery.²³³ Other agents that have been studied include canagliflozin (for those with T2DM), phentermine, phentermine-topiramate and naltrexone/bupropion.^{197,234,235} Orlistat is not recommended for patients who have undergone bariatric surgery or malabsorptive procedures, such as RYGB.²⁰⁶

3.11 | Question 11: What is obesity stigma and how can it be recognized and addressed in the healthcare setting?

Stigma is now recognized as a common experience for people with obesity, with pervasive negative consequences for their physical and mental health.²³⁶ Experience of stigma includes explicit or subtle

forms of discrimination and bias affecting personal, educational, and employment opportunities. Especially in women, stigma and internalized weight bias may lead to social isolation, depression, and anxiety, thus complicating the management of metabolic disorders and other medical burdens associated with obesity.^{236,237}

People with obesity experience poorer medical care as a result of stigma and judgmental attitudes held, and often expressed, by various healthcare professionals.²³⁸ Such attitudes may arise from the common but unfounded assumption that people with obesity have poor self-control or present a high risk of treatment nonadherence. Surveys in Asian, including South and Southeast Asian, countries suggest that such opinions are common among clinicians and the general public, and that people with obesity are reluctant to engage their doctors in a discussion about their weight.^{213,239,240}

Internalization of stigma²⁴¹ generates a poor self-image, which is difficult to treat but may be easily worsened by a hostile encounter. The experience of hostile or insensitive language in the healthcare system can create a barrier to treatment of obesity and its complications.^{236,238}

Owing to external and internalized weight stigma, people with obesity may be reluctant to seek medical care, including routine cancer screening, thus increasing risk of delayed detection of serious disorders otherwise unrelated to bodyweight.^{236,242,243}

3.11.1 | Physical and mental health effects of obesity stigma

Contrary to the assumption that negative response from others might encourage people with obesity to increase their energy output or adopt a healthier diet, the experience of stigma appears to drive further weight gain. Thus, weight-related teasing and shaming appear to promote unhealthy eating habits (e.g., binge eating) and an isolated, sedentary lifestyle.^{236,244,245} Whereas the experience of stigma does indeed motivate some people with obesity to undergo bariatric surgery, the surgical option can itself be stigmatized, being portrayed unsympathetically as an “easy way out.”²³⁶ Hence, even a successful response to this medical condition can represent a source of shame for people with obesity.

Stigma experienced in childhood and beyond represents a risk factor for later progression from overweight to obesity. This effect is independent of baseline BMI, indicating that teasing is not a marker for more severe obesity.^{238,244} Rather, it appears that the experience of stigma itself is destructive to the individual's later ability to adopt and maintain healthy habits.

3.11.2 | Recognizing and addressing obesity stigma in the healthcare system

Physicians and allied healthcare workers, such as nutritionists, share their prejudices as other members of their society.^{236,246} They

therefore need to be on guard against holding and expressing hostile attitudes toward, and unfair assumptions about, people with obesity.

These attitudes may be difficult to recognize in oneself but may be evident to the individual. Even if it is not stated explicitly, a clinician's assumptions (e.g., that the individual is not fully committed to losing weight) can undermine trust between them. Clinicians caring for patients with obesity should be mindful of their personal biases and the deleterious impact of weight bias and obesity stigma on the health of their patients and treatment outcomes.

Practicing respect toward people with obesity requires use of language that avoids placing blame.^{236,238} Thus, in discussions with patients, clinicians should acknowledge the roles of genetics, environmental influences, and individual physiology, all of which can place people at heightened risk of obesity. Identifying obesity as a chronic disease also helps frame the discussion in a constructive manner.

Stigmatizing terms (such as “fat”) and those that emphasize the severity of the individual's condition (such as “morbidly obese”) should be avoided. To motivate patients without shaming them, clinicians should preferentially use more neutral terms, such as “weight” or “unhealthy weight.”²⁴⁷

Given the diversity of South and Southeast Asian countries, the challenge of choosing respectful language and actions with people with obesity requires sensitivity to the local culture. In each country, further research is needed on the cultural beliefs that lead to stigma and ways to reduce weight bias and prevent shaming or stigmatizing people with obesity.

3.12 | Question 12: How should patients and families be engaged in a discussion about bodyweight?

Across cultures, bodyweight has personal significance, contributing positively or negatively to an individual's body image satisfaction. For both men and women, weight can be linked to social status and personal and professional opportunity.^{236,248}

The cultural understanding of body fat varies across South and Southeast Asian countries and may vary across generations even in a single community. In general, exposure to Western-inspired culture and advertising motivates people in this region to adopt Western standards of appearance and weight.²⁴⁹ These standards may run counter to a traditional view of high bodyweight as a marker of status.²⁵⁰

Cultural assumptions and personal experience provide context that forms people's perception of their own bodyweight and shape. Some may be unaware that their overweight has placed them at risk of metabolic disease. Others may be fixated on an unachievable weight reduction goal. Each of these circumstances represents a barrier to safe and well-managed long-term weight reduction.^{163,251}

Because the topic is subjectively understood and potentially emotionally sensitive, it is crucial for clinicians to consider ways to engage their patients about the health aspects of overweight and to help them make a long-term commitment to address their unhealthy weight. Techniques of motivational interviewing are often helpful in

this dialog, leading to increased engagement and significantly enhanced weight loss.^{160,161}

One widely used approach to initiating these discussions is the so-called 5As framework, as follows²⁵²: **ASK** for permission to discuss weight and explore readiness. **ASSESS** obesity related risks and “root causes” of obesity. **ADVISE** on health risks and treatment options. **AGREE** on health outcomes and behavioral goals. **ASSIST** in accessing appropriate resources and providers.

Asking permission, the crucial first step in the 5As approach, requires the clinician to be open to hearing the individual's experience in dieting and their fears, which may be based on a history of experiencing stigma and weight shaming. The individual may be reassured to learn that weight goals will be tailored to them personally, so they do not need to commit to reaching an ideal weight. Less daunting goals include modest weight loss, weight stabilization, or improved physical fitness. If a patient is not open to a discussion about weight or does not appear ready to make long-term changes, the clinician may choose to leave the discussion for a later date.

Assessment includes both staging (see *Question 2*, above) and investigation of any underlying factors that may contribute to the individual's unhealthy weight, including metabolism, sleep difficulties, overeating, and a sedentary lifestyle. Psychological factors such as stress, depression, and internalized weight stigma (see *Question 11*, above) should also be acknowledged at this step.

Advising refers to communicating the chronic health risks associated with different degrees of overweight and obesity and advising on all relevant treatment options, recognizing that the individual's self-perception of their weight may be greater or less than obesity staging would indicate.

Agreeing is in part a goal-setting exercise, wherein the individual commits to a course of action and sets realistic targets to achieve and maintain. Targets should be specific and clearly stated, such as 5–10% weight reduction over an agreed-upon timeframe. A plan should be set for monitoring progress, not only for the stated goal, but also for other potential benefits that they might experience, such as increased physical stamina and stabilization or improvement in CV risk markers.

Assistance includes helping the individual discover and understand factors that drive their weight gain and barriers that they will need to overcome to reach their target. Such barriers may be medical (e.g., use of prescription medications that promote weight gain), psychological (e.g., internalized stigma and fear of shaming that discourages exercise in public), or practical (e.g., transportation systems that are designed for smaller body size). The clinician should help the individual find workable solutions to these problems. If agreeable to the patient, the clinician should arrange for referrals to other specialists, including dietitians, psychologists, and physical or occupational therapists.

As noted (see *Question 1*, above), the recognition that obesity is a disease may help address the common attitudes that drive weight stigma,²³⁶ setting the stage for a productive discussion with people with overweight or obesity. Therefore, a sixth A might be added to the five above, namely, **Acknowledgement** that obesity is a chronic disease.

Sidebar: Bringing the patient's family into the discussion

For pediatric patients and others,^{253,254} understanding the home setting may be key to helping the individual achieve and maintain weight loss. Family support can be a crucial resource. Conversely, shaming or lack of support may foster internalized stigma²³⁶ and a psychological barrier to addressing weight issues and improving physical and mental health.

The clinician should therefore attempt to bring the patient's family into discussions about root causes of their unhealthy weight, the barriers they experience, and the individualized targets they have set. In a Malay community study, family-based interventions that combined face-to-face training sessions and social media were effective at reducing child adiposity.²⁵⁵ Constructive family involvement may also be appropriate in the patient's interactions with allied healthcare practitioners, such as dietitians.

Family counseling may be considered if all parties are open to the possibility.

4 | DISCUSSION

This review documents a new consensus on the care and management of obesity in South and Southeast Asia in the form of 42 recommendations that address issues around staging, treatment, and maintenance of weight loss. While the focus is on clinical care, the contributing faculty also offered insights and strategies regarding the important and related issues of weight stigma and patient engagement, and—particularly where families are involved—tertiary prevention approaches. Each of these elements is contextualized in the South and Southeast Asian setting.

4.1 | Achieving consensus

The treatment recommendations are presented in Table 7. For all 42 of these statements, our panel of South and Southeast Asian obesity specialists achieved consensus on the wording shown. Indeed, approval was unanimous for all but one of the treatment recommendations.

The sole exception was *Recommendation 12*, which states that initial therapy should be tailored to the severity of an individual's obesity and obesity-related complications. In this case, a minority expressed the opinion that lifestyle change must always be attempted first, with pharmacotherapy and surgical approaches reserved as second-line options. In this view, the attempt at lifestyle change must not be bypassed, although it might be of shorter duration or increased

intensity in some high-needs individuals. Conversely, the majority endorsed the stated position, namely, that pharmacotherapy or bariatric referral may be considered as initial therapeutic approaches for people with severe obesity requiring immediate and substantial weight reduction.

Another point of discussion among the authors was the period used to assess initial therapies for obesity. The group reached consensus that loss of 5–15% over a period of 6 months represents a feasible and clinically appropriate goal for many individuals (*Recommendation 10*), but some members noted that different weight loss targets might be chosen, depending on clinical goals. Some outcomes, such as T2DM remission, are unrealistic with <10% weight loss, as shown in Table 3. Similarly, the recommended 6-month window for evaluating success might be reconsidered, depending on the therapeutic approach. Some antiobesity medications, including semaglutide and liraglutide, do not show maximal benefit until after 6 months.^{73,74,256} Therefore, for individuals who respond with the requisite 5% weight loss, it is appropriate to continue treatment and evaluate the full treatment response after 12 months on the maximally tolerated dose.

4.2 | A clinical algorithm for obesity

The recommended approach to care and management of obesity is shown schematically in Figure 4. This clinical algorithm is keyed to the various consensus recommendations, and it shows stages where the 5As approach to discussions about obesity are likely to be most relevant. The left side of the figure shows recommendations that clinicians should apply in all clinical interactions. These ongoing clinical practices include encouragement of healthy eating habits and physical activity, to ameliorate or prevent the development of obesity. Similarly, support for healthy lifestyle change and use of respectful, non-stigmatizing language apply at all stages of care to people across the spectrum of bodyweight.

The right side of the algorithm proceeds from the initial identification of overweight or obesity, through clinical assessment, treatment, and monitoring. Adults meeting the definition of overweight require a full clinical assessment, including physical examination and patient history, as well as laboratory assessments. In most South/Southeast Asian countries, overweight is defined by BMI ≥ 23 kg/m² or WC ≥ 80 cm (women) or ≥ 90 cm (men), whereas in Brunei Darussalam, overweight is defined by BMI ≥ 25 kg/m². Assessment may also be appropriate in those who are approaching but not meeting these cut points, or displaying signs and symptoms of obesity-related complications regardless of BMI/WC.

Obesity staging, using a recognized system such as the EOSS,⁶⁴ will identify clinical concerns and possible barriers to treatment success and will aid in the setting of individualized treatment targets, which the individual should understand and agree to. Lifestyle and behavioral interventions are always recommended and may be applied alone, particularly for those with less extreme obesity and no evident complications. A 3-month trial is appropriate in this case.

TABLE 7 Consensus recommendations for care and management of obesity in South and Southeast Asia*Question 1: How is obesity defined and what are the diagnostic criteria in adults and children?*

1. Clinicians should recognize and treat obesity as a chronic, progressive, relapsing disease.
2. Given that disease risk associated with obesity varies by ethnicity, clinicians should measure BMI and apply the BMI cut points adopted by each country to assess excess adiposity in adults.
3. To confirm excess abdominal adiposity in adults, clinicians should measure WC and apply the WC cut points adopted by each country.
4. For adults approaching but not meeting BMI- or WC-based criteria for overweight or obesity, clinicians should clarify the individual's long-term health risks from excess adiposity by screening for obesity-related complications.
5. To assess excess adiposity in children and adolescents, clinicians should refer to BMI growth charts specific for the individual's country, age, and sex. In addition, waist-height ratio ≥ 0.5 can be used to identify adolescents at risk of obesity-related metabolic abnormalities.^a
6. For children approaching but not meeting criteria for overweight or obesity, clinicians should clarify the child's long-term health risks from excess adiposity by screening for obesity-related complications.

Question 2: What are the key elements of initial work-up for patients with obesity?

7. For people with overweight or obesity, clinicians should conduct a comprehensive clinical assessment to identify obesity-related complications, health risks, and potential barriers to treatment, as well as explore factors that may have contributed to the individual's unhealthy weight.

Question 3: What gradations of severity should be used for screening and monitoring adults and children with obesity?

8. Clinicians should apply a recognized obesity staging system such as the Edmonton Obesity Staging System to assess the severity of obesity in adults and guide clinical treatment.
9. Clinicians caring for children with obesity may consider using the Edmonton Obesity Staging System for Pediatrics tool to assess severity and guide clinical treatment.

Question 4: What are the goals of obesity treatment?

10. Weight loss of 5–15% over a period of 6 months represents a realistic short-term weight loss goal in adults depending on the goals of treatment and the severity of obesity, as determined using a recognized obesity staging system. Initial weight loss should be followed by long-term weight maintenance.
11. Clinicians should work with their patients to set individualized weight loss targets, based on clearly stated treatment goals.
12. Initial therapy should be tailored to the severity of the individual's obesity and obesity-related complications.
13. Treatments implemented should be assessed periodically, in line with the goals of obesity treatment, and may be intensified or de-intensified accordingly.

Question 5: How should multidisciplinary collaborative care be optimally structured for patients with obesity?

14. A multidisciplinary approach to obesity management should be used where possible to support and maintain weight loss.

Question 6: What are the indications for initiating/recommending lifestyle therapy in adults and children? What are the current treatment options?

15. A comprehensive lifestyle intervention program that includes diet modification, increased physical activity, and behavior modification is fundamental in obesity management.
16. An individualized dietary intervention that reduces overall calorie intake by at least 500 kcal/day, with sufficient protein, vitamins, and minerals, is recommended for initial weight loss and maintenance in adults.
17. When selecting a dietary intervention, healthcare professionals should take into consideration the individual's motivation, personal and cultural preferences, and associated complications.
18. To optimize health and prevent disease, clinicians should encourage adults with overweight or obesity to devote 30–60 min per day to moderate-intensity aerobic exercise, at least 5 days per week (≥ 150 min per week). In addition:
 - Longer or more intensive exercise (200–300 min per week of moderate-intensity activity or ≥ 150 min per week of vigorous activity), alongside dietary modification, may be needed to promote and maintain weight loss
 - Resistance exercises, 2–3 times per week, should be encouraged to enhance muscular strength and physical function.
19. Activity interventions should be gradually increased over time to reach a target level and tailored to the individual's age, current level of function and physical fitness, and complications/risk factors. When counseling patients on increasing physical activity or entering an exercise program:
 - Clinicians should screen for complications and risk factors
 - Clinicians should identify any physical and/or behavioral barriers to physical activity and consider culturally appropriate activities and strategies to encourage participation.
20. To prevent and manage childhood obesity, clinicians should work with parents or caregivers to support healthy habits of eating and exercise, including regular meals, limited consumption of energy-dense snacks, junk food, and sugar-added beverages, and daily opportunities for vigorous play or other forms of physical activity.
21. Clinicians should evaluate the effectiveness of lifestyle changes within 3 months. Depending on treatment targets, intensive lifestyle therapy, pharmacotherapy, or surgical referral may be considered for individuals showing minimal weight loss at this time.

Question 7: What are the indications for initiating/recommending psychological and/or behavioral therapy? What are the current treatment options?

22. Clinicians should recommend behavioral modification in individuals at all stages of overweight or obesity, including those attempting dietary change, those already using pharmacotherapy, and those who have undergone bariatric surgery.

TABLE 7 (Continued)

23. Behavioral interventions may be maintained as long as the individual appears to be benefitting in terms of bodyweight reduction or stabilization, or improved function, cardiovascular health, or quality of life.
24. Stress, unhealthy sleep habits, social dynamics, and environmental factors that promote obesity should be addressed concurrently, as part of behavioral modification.
25. For suitable individuals, intensive behavioral interventions may be recommended under the supervision of experienced clinicians.
26. For suitable individuals, web-, phone-, or tablet-based electronic tools may be recommended as a means of supporting healthful lifestyle changes.

Question 8: What are the indications for initiating/recommending pharmacotherapy for adults and children? What are the current pharmacotherapy options?

27. Pharmacotherapy may be used as an adjunct therapy to lifestyle modification to improve or maintain weight loss and to control obesity-related complications.
28. Clinicians should consider pharmacotherapy in combination with lifestyle therapy for adults with a BMI ≥ 30 kg/m² or BMI ≥ 27 kg/m² with at least one obesity-related complication, especially for people:
 - Who require more urgent weight loss, owing to more severe obesity
 - Who require a greater amount of weight loss to manage inadequately controlled obesity-related complications
 - Who are unable to achieve or maintain adequate weight loss through lifestyle intervention alone.
29. Choice of obesity medication should be made with respect to the individual's clinical characteristics and the country-specific approved labeling of the available products.
30. Duration of use of obesity medication should be considered with respect to the individual's clinical characteristics, treatment targets, and the country-specific approved labeling of the available products.
31. In countries that define obesity as a BMI ≥ 25 kg/m², use of pharmacotherapy for adults with a BMI of 25–26.9 kg/m² may be considered on a case-by-case basis to help ameliorate obesity-related complications. Use of pharmacotherapy in these individuals should only be carried out by clinicians experienced in obesity medicine, with close monitoring.
32. Experienced clinicians may consider antiobesity pharmacotherapy as an adjunct to lifestyle interventions for adolescents with more severe obesity and inadequate weight loss.

Question 9: What are the indications for initiating/recommending procedures and surgery? What are the current options?

33. Clinicians may recommend bariatric and metabolic surgery according to national guidelines. In countries without national guidance on bariatric and metabolic surgery, clinicians may refer to regional guidelines such as the International Federation for the Surgery of Obesity and Metabolic Disorders Asia Pacific Chapter or the Second Diabetes Surgery Summit guidelines.
34. Bariatric and metabolic surgery may be used as an adjunct therapy to lifestyle modification, with or without pharmacotherapy, to improve or maintain weight loss and to control obesity-related complications.
35. Individuals considering bariatric surgery should be counseled regarding short- and long-term risks, benefits, and outcomes of surgery and the lifelong commitment required to prevent weight regain and should be monitored for nutrient deficiency and obesity-related complications.
36. Individuals undergoing bariatric surgery should be managed by an experienced multidisciplinary team comprising the surgeon, a bariatric physician, a dietitian, a physiotherapist/exercise physiologist, and a psychologist or psychiatrist, as well as other local experts, as deemed appropriate.
37. Individuals undergoing bariatric surgery should be prepared for the likelihood of partial weight regain. All options for supportive care, including pharmacotherapy, should be considered to help maintain weight close to the postsurgical nadir.

Question 10: What strategies are important to consider for long-term weight reduction/maintenance for adults and children?

38. Clinicians and individuals with obesity should be aware that weight regain is common after weight loss, including after bariatric surgery.
39. To minimize weight regain and support weight long-term maintenance, clinicians should:
 - Regularly monitor their patient's weight
 - Encourage continued use of lifestyle and behavioral interventions
 - Consider extended use of pharmacotherapy.

Question 11: What is obesity stigma and how can it be recognized and addressed in the healthcare setting?

40. Clinicians should carefully examine their own potential biases regarding people with overweight and obesity and, in the context of their local culture, consciously adopt behaviors that respect the dignity of the individual and language that does not place blame, but motivates the individual to adopt healthier habits.

Question 12: How should patients and families be engaged in a discussion about bodyweight?

41. Clinicians should seek opportunities to constructively engage with their patient's family to help support the individual reach and maintain treatment targets.
42. Clinicians should consider the 5As approach when planning their discussions with patients regarding their unhealthy weight.

Abbreviations: BMI, body mass index; WC, waist circumference.

^aFor children and adolescents 5–19 years, overweight and obesity correspond to the ≥ 85 th to < 95 th and ≥ 95 th percentile, respectively, of BMI-for-age and sex, or ≥ 1 and ≥ 2 standard deviations, respectively, above the World Health Organization 2007 Growth Reference median BMI-for-age-and-sex.

Algorithm for managing overweight and obesity in South and Southeast Asian adults

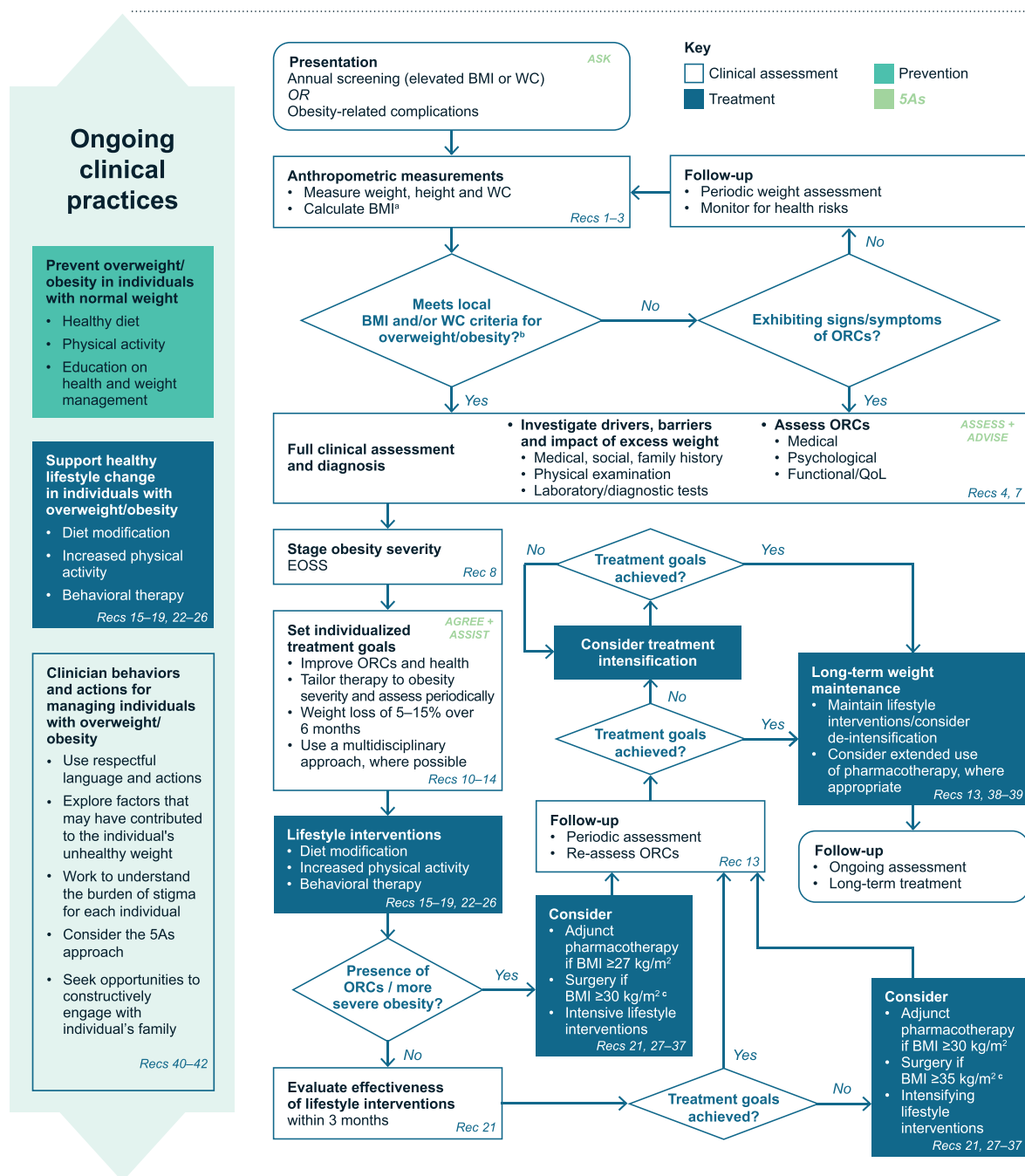


FIGURE 4 Algorithm for managing overweight and obesity in South and Southeast Asian adults. BMI, body mass index; DSS-II, Second Diabetes Surgery Summit; EOSS, Edmonton Obesity Staging System; IFSO-APC, International Federation for the Surgery of Obesity and Metabolic Disorders Asia Pacific Chapter; ORC, obesity-related complication; WC, waist circumference. ^aFor some countries in the region, also calculate waist-to-hip ratio. ^bIn most South/Southeast Asian countries, overweight is defined by BMI ≥ 23 kg/m² or WC ≥ 80 cm (women) or ≥ 90 cm (men). In Brunei Darussalam, overweight is defined as BMI ≥ 25 kg/m². ^cCut points for bariatric surgery are based on the IFSO-APC guidelines for Asian individuals with metabolic syndrome or T2DM. Refer to national guidance, where available. Alternative cut points are recommended in the DSS-II guidelines (≥ 32.5 kg/m² for individuals with poorly controlled T2DM, and ≥ 37.5 kg/m² regardless of ORCs)

However, pharmacotherapy or surgery, as well as supervised intensive dietary interventions, may be considered earlier for some people, based on their BMI and complications. Reassessment of weight and complications should be scheduled on a regular basis,

after which interventions may be intensified or deintensified. Those who reach their treatment target will require ongoing support, and sometimes extended treatment to maintain their initial weight loss. For individuals with no obesity-related complications, periodic and

ongoing assessment should be conducted to identify complications early in their development.

This approach to obesity management is described above in greater detail. In general, it applies across South and Southeast Asia, although the context of care differs greatly among the various countries in this large and diverse region.

4.3 | Toward a unified approach to combat obesity

Over and above the clinical guidance described above, the countries of South and Southeast Asia require a whole-systems approach to obesity, emphasizing primary and secondary prevention. Coordinated action is needed to increase public awareness, address food security, encourage healthful habits and early life nutrition, and improve access to care for people with overweight or obesity. In light of the paucity of tools for managing obesity in the region, policies and healthcare resources should prioritize training of healthcare professionals and multidisciplinary teams, including in the use of tools such as VLCDs and intensive behavioral therapy, as well as improved access to pharmacotherapy.

In line with the ASEAN sustainable development goals,²⁵⁷⁻²⁵⁹ several countries have established programs aimed at improving nutrition and dietary patterns and increasing physical activity. For example, Singapore has introduced the Healthy Meals in Schools Program and National Steps Challenge.^{260,261} Malaysia has mandated nutrition labeling and introduced taxes on sugar-sweetened beverages.^{11,262} Interventions to support breastfeeding have been implemented by each ASEAN member state.²⁵⁹ Elsewhere in Asia, a comprehensive national strategy for obesity prevention and control has been recently proposed in China.²⁶³ Notwithstanding the geopolitical differences across the region, elements of this effort should be studied and might be adapted for use in South and Southeast Asia. Given the scale of the problem, ambitious programs are needed at a national and regional level to prevent obesity and minimize its medical, financial, and personal costs.

Clinicians, who see firsthand the impact that obesity can have on their patients, can and should be at the forefront of these efforts. The Consensus presented here represents an aggregated view from leaders across the region, providing an essential tool for improving care and management of obesity in this part of Asia. For the benefit of those living with obesity, physician advocacy is no less essential, to promote obesity prevention and attitudinal change, as well as improved access to care.

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CONFLICT OF INTEREST

KWT has disclosed receiving scientific advisory board fees, honoraria and consulting fees from Novo Nordisk, and an honorarium from DKSH Singapore. RAG has received research funding from AstraZeneca, Medtronic, Boehringer Ingelheim and Novo Nordisk, and sponsorship in the form of travel grants from AstraZeneca, Medtronic, Servier, Boehringer Ingelheim, MSD, Novo Nordisk, Novartis, and Eli Lilly. RAG has also received sponsorships for Continuous Medical Education for healthcare providers from Novo Nordisk, and has been involved in clinical trials with Johnson & Johnson, Boehringer Ingelheim, Bayer and AstraZeneca. RAG is currently involved as an investigator on multicentre clinical trials with Novo Nordisk. TN has disclosed receiving scientific advisory board fees from Novo Nordisk, Sanofi, Astra Zeneca, and Boehringer Ingelheim Viet Nam, and honoraria for acting as a speaker for Novo Nordisk, Sanofi, AstraZeneca, Boehringer Ingelheim, Novartis, MSD, and Merck Serono. NS has disclosed that he has received an honorarium for acting as a speaker for Novo Nordisk. BO has received consulting fees and honoraria from Novo Nordisk not related to this publication.

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APPENDIX A

TABLE A1 Prevalence of obesity in South and Southeast Asian countries. Adapted from the World Obesity Federation Global Obesity Observatory⁸

Country	Population (age, years)	Obesity prevalence (%) (year assessed)	Prevalence by sex (%)
Bangladesh	Adults (18–69)	5.4 (2018)	Women: 8.6 Men: 2.3
	Children (10–19)	7.02 (2018–19)	Girls: 8.0 Boys: 6.0
Brunei Darussalam	Adults (18–69)	28.2 (2015–16)	Women: 29.5 Men: 26.9
	Children (13–17)	18.1 (2019)	Girls: 15.3 Boys: 20.9
India	Adults (15–49)	5.5 (2019–20)	Women: 6.3 Men: 4.7
	Children (5–9)	1.3 (2018)	Girls: 0.9 Boys: 1.8
Indonesia	Adults (18+)	5.6 (2013)	Women: 8.2 Men: 3.0
	Children (13–17)	4.6 (2015)	Girls: 3.6 Boys: 5.4
Malaysia	Adults (18+)	19.7 (2019)	Women: 24.7 Men: 15.3
	Children (5–17)	14.8 (2019)	Girls: 12.0 Boys: 17.5
Country	Population (age, years)	Obesity prevalence (%) (year assessed)	Prevalence by sex (%)
Philippines	Adults (20+)	6.9 (2015)	Women: 8.7 Men: 5.0
	Children (13–17)	3.7 (2019)	Girls: 3.1 Boys: 4.3
Singapore	Adults (18–74)	10.5 (2019–20)	Women: 9.3 Men: 11.9
	Children	13.0 (2017)	Girls: 3.0 ^a Boys: 6.1 ^a
Sri Lanka	Adults (18–69)	5.9 (2014–15)	Women: 8.4 Men: 3.5
	Children (13–15)	0.5 (2008)	Girls: 0.6 Boys: 0.4
Thailand	Adults (15+)	11.6 (2018)	Women: 12.0 ^b
	Adults (20+)	9.0 (2009)	Men: 7.0 ^b
	Children (6–18)	7.3 (2016)	Girls: 5.2 Boys: 9.9
Viet Nam	Adults (18–69)	1.7 (2015)	Women: 1.7 Men: 1.7
	Children (11–14)	5.4 (2018)	Girls: 3.2 Boys: 7.6

Note: Obesity in adults defined as ≥ 30 kg/m². Obesity in children defined by country-specific cut points.

^aData from 1993 and extrapolated from a study of 5350 10-year-olds; note that the 2017 study did not present prevalence of obesity in boys and girls separately.

^bBased on data from 2009; note that the 2018 study did not present prevalence of men's and women's obesity separately.

TABLE A2 Components of patient history for individuals with obesity. Adapted from Obesity Canada Clinical Practice Guidelines Expert Panel: Assessment of people living with obesity²¹ and MIMS²⁷¹

History	History component	Details	Notes
Medical	Underlying medical	- Medical and surgical history - Medications - Allergies	Underlying diseases/conditions that could impact weight loss or physical activities
	Weight history	- Age of weight gain onset and major weight trajectories over time - Previous weight loss interventions/treatments and results - Major life event(s) associated with weight gain e.g., with pregnancy, after illness or stress event - Nutritional/weight status as a child	- Can help to understand patient journey, causes of weight gain/loss in the past, childhood versus adult obesity - Can help to prevent future weight gain and target treatment - Can help to make appropriate goals; consider charting weight trend with life events - Child status: small or large weight-for-dates (both are risk factors for obesity in childhood and adulthood); maternal gestational diabetes, Cushing's disease, or hypothalamic tumors
	Exclude secondary causes of obesity	- Weight-promoting medications - Genetic disorders - Endocrine disorders	- Refer to Rueda-Clausen et al. 2021 for a full list of weight-promoting medications - E.g., Prader-Willi syndrome - E.g., Cushing's disease, Hypothyroidism
	Mental health assessment	- Patient's body image and self-esteem - Depression and other mood disorders - Anxiety - Chronic stress - Psychosocial barriers	- Consider using the PHQ-9 - GAD
	Abuse	Previous or current physical, psychological, and sexual abuse	

(Continues)

TABLE A2 (Continued)

History	History component	Details	Notes
Social <i>Nutrition, activity, lifestyle, culture, environment</i>	Dietary/nutrition history	- Assess diet habits and energy intake - Assess nutrition literacy - Identify nutritional restrictions	- Divergence from traditional to Western diet - Possible knowledge deficit - Cultural, medical e.g., vegetarianism, food allergies, and intolerances (notably lactose intolerance)
	Eating patterns	Identify possible eating disorder	E.g., binge-eating disorder, emotional eating, mindless eating, night-eating syndrome, bulimia
	Physical activity	- Current physical activities - Time spent in sedentary activities - Barriers to activity - Social and cultural factors limiting/restricting access to activities	- Frequency and nature - E.g., screen time - E.g., pain, time, motivation - See below
	Addiction/dependency	- Smoking history - Alcohol consumption - High-fat / high-sugar food or beverages - Substance abuse	- Including smoking cessation - Consider using the Yale Food Addiction Scale - Consider binge-eating scales, such as EDEQ, BES, or BEDS-7
	Sleep hygiene	- Hours of sleep per night - Use of sleeping medications - Sleep apnea–hypopnea screening - Sleep quality	- Signs of break in circadian cycle (e.g., night shifts) - Consider using the STOP BANG Sleep Apnea Questionnaire
	Social/cultural	- Age, sex, ethnicity, marital status - Family responsibilities and commitments - Occupation and work schedule - Education - Socioeconomic status - Cultural attitudes to body weight and exercise	- E.g., living with extended family in the same household, living with other family members with overweight/obesity - Hours, variable shift work, night work - Identify possible knowledge deficit - Lack of access to a healthy diet or recreational physical activities - Societal preference for overweight; negative stigma towards exercise (more priority placed on academics, occupation, or familial duties than athletic / recreational activities)
	Environmental	- Local food systems - Exposure to endocrine-disrupting chemicals such as plasticizers and pesticides	Availability of affordable, high-quality, diverse food choices
	Family medical history	Relatives with overweight / obesity or obesity-related complications	E.g., family history of obesity, CVD, hypertension, T2DM, dyslipidemia, premature strokes, and death (<55 years of age), thyroid disease, obesity-related cancer
	Family		

Abbreviations: BEDS-7, seven-item Binge-Eating Disorder Screener; BES, Binge-Eating Scale; CVD, cardiovascular disease; EDEQ, Eating Disorder Examination Questionnaire; GAD, generalized anxiety disorder; PHQ-9, Patient Health Questionnaire 9; T2DM, type 2 diabetes mellitus.

TABLE A3 Elements of a physical examination for patients with obesity. Adapted from Obesity Canada Clinical Practice Guidelines Expert Panel: Assessment of people living with obesity²¹ and MIMS²⁷¹

Exam	Details	Notes
Anthropometry	- Weight - Height - Waist circumference - BMI - Note stunted growth, evidence of malnutrition in childhood	- Measured to the nearest 0.1 kg - Measured to the nearest 1 cm - Measured to the nearest 1 cm, at the midpoint between the anterior superior iliac crest and the lower margin of the last rib, in a horizontal plane - Use ethnic-specific cut points for increased health risk and obesity - Waist-hip ratio may be used in some countries in preference to WC¹³² and may also be used in countries without national data¹³² - Calculated as BMI = weight (kg)/[height (m)]². Use ethnic-specific BMI cut-off points for overweight and obesity - BMI percentile or SD for age is used in children <19 years to determine healthy weight status
Blood pressure	Both arms	- Screen for hypertension or prehypertension - Use appropriate size cuff
Head and neck	- Neck circumference - Thyroid exam - Signs of Cushing's syndrome - Signs of androgen excess in females	Risk of sleep apnea
Cardiorespiratory	- Heart rate and rhythm - Signs of heart failure	
Gastrointestinal	- Liver span - Umbilical, incisional hernias - Signs of chronic liver disease (MAFLD)	
Musculoskeletal	- Osteoarthritis - Gout - Gait exam	Assess for barriers to mobility
Skin	- Acanthosis nigricans as a sign of insulin resistance - Hidradenitis suppurativa - Candida, intertrigo, tinea, skin tags, psoriasis - Abdominal striae - Hirsutism in females - Striae in abdomen and other body parts like breast, inguinal areas, and thighs	
Lower limbs	- Lymphedema - Lipedema - Venous insufficiency, ulcers, stasis, thrombophlebitis	
Other	- Signs of hypogonadism - Signs of dysmorphism - Signs of precocious puberty in children	

Abbreviations: BMI, body mass index; MAFLD, metabolic associated fatty liver disease; SD, standard deviation.

TABLE A4 Laboratory and diagnostic tests for patients with obesity. Adapted from Obesity Canada Clinical Practice Guidelines Expert Panel: Assessment of people living with obesity,²¹ Yumuk,²³ and MIMS²⁷¹

Indication	Test	Notes
Minimum testing for most patients	- Blood pressure - Fasting blood glucose, HbA1c - Lipid profile (total cholesterol, HDL- and LDL-cholesterol, triglycerides) - Renal function (creatinine, eGFR) - Liver function (alanine aminotransferase) - Uric acid level	- Screen for metabolic syndrome - Screen for MAFLD - Screen for gout
When indicated	- Cortisol (e.g., overnight dexamethasone suppression test) - Thyroid function (TSH levels) - Cardiovascular assessment (ECG, ECHO, stress test) - Further liver investigation (full liver function test, abdominal ultrasound, FibroScan, or biopsy) - Urinalysis for microalbuminuria/proteinuria - Polysomnography or other sleep studies - Tests for menstrual irregularity/disturbance (LH, FSH, total testosterone, DHEAS, prolactin, 17 hydroxyprogesterone levels) - Nutritional deficiency (vitamin D, iron studies, serum B12) - Endoscopy - Cancer screening (age-dependent) - Cranial magnetic resonance imaging (screen for hypothalamic-pituitary tumor (e.g., hypothalamic hamartoma, craniopharyngioma) - Chromosomal tests and genetic studies in children	- In patients with signs of Cushing's syndrome - In patients with signs of an enlarged thyroid gland - In patients with risk factors - If abnormal liver function tests suggest MAFLD - In patients at risk for sleep apnea (high neck circumference, high STOP BANG score, suggestive signs and symptoms) - In women with obesity and symptoms of PCOS - In patients with a diagnosis of GERD if symptoms cannot be controlled by pharmacotherapy - In patients with dysmorphic features and signs of syndromes such as Prader-Willi syndrome

Abbreviations: DHEAS, dehydroepiandrosterone sulfate; ECG, electrocardiogram; ECHO, echocardiogram; eGFR, estimated glomerular filtration rate; FSH, follicle-stimulating hormone; GERD, gastroesophageal reflux disease; HbA1c, glycated hemoglobin; HDL, high-density lipoprotein; LDL, low-density lipoprotein; LH, luteinizing hormone; MAFLD, metabolic associated fatty liver disease; PCOS, polycystic ovary syndrome; TSH, thyroid-stimulating hormone.

TABLE A5 Categories of dietary intervention for weight loss^{23,71,72,93,98,118,119,121,123,132,271,279-297}

Dietary intervention	Description	Efficacy for weight loss	Additional notes
Energy-based approach (caloric restriction) <i>Nutritionally balanced diets that provide a daily energy intake goal</i> <i>Usually prescribe moderate-fat intake</i> <i>Varying levels of structure, including use of meal replacements</i>	Hypocaloric balanced diet (moderate calorie restriction)	• Nutritionally balanced diet that reduces calorie intake by > 500 kcal/day • A diet of 1200–1500 kcal/day for women and 1500–1800 kcal/day for men can usually achieve this goal	• Follows current nutrition recommendations • Moderate reduction in total fat (≤30% of total calories), carbohydrates (55–60%), and protein (15–20%) • Emphasis on reducing saturated fats, increasing fiber-rich foods and whole grains • Healthy meal planning and portion control recommended
	Low-calorie diet (LCD)	• At 6 months, participants prescribed 1000 kcal/day lost more weight than those prescribed 1500 kcal/day (mean $\pm$ SE = -10.03 ± 0.92 kg versus -6.23 ± 0.94 kg, $P=0.045$); however, by 12 months the 1000 kcal/day participants experienced significant weight regain (1.51 ± 0.77 kg, $P=0.025$) • 7–8% reduction in total body weight reported with partial meal replacement (2.43 kg greater weight loss at 1 year than with a conventional reduced calorie diet)	• Partial use of meal replacements or structured meal planning and portion control may be required to avoid micronutrient deficiencies and achieve targets • LCDs achieve short-term weight loss but weight regain likely • May require dietary supplements
	Very low-calorie diet (VLCD)	• Diet that provides an intake of ≤ 800 kcal/day • For patients with a BMI 27–30 kg/m² with complications, severe obesity prior to bariatric surgery, or moderate to severe obesity that has not responded to other dietary interventions • Short-term (12–16 weeks maximum); can be extended or used intermittently	• Requires consumption of meal replacements as part of a structured program and close monitoring by an experienced physician, nutritionist, or dietitian • Large initial weight loss but specific interventions may be required to support weight maintenance long term • Intermittent use has been shown to support sustained longer-term weight loss • Not recommended for children, adolescents, pregnant or lactating women, the elderly, more severe CKD • Can be recommended for rapid weight loss in those with poorly controlled ORCs in the short-term to control these ORCs

(Continues)

TABLE A5 (Continued)

Dietary intervention		Description	Efficacy for weight loss	Additional notes
Macronutrient-based approach <i>Diets that target one macronutrient</i> <i>Targeting one macronutrient also leads to changes in other macronutrients</i>	Low carbohydrate (LC)	LC: Reduced carbohydrate intake (20–40% of total energy intake), with no restrictions on other macronutrients (protein 25–40%; fat 30–55%)	A network meta-analysis comparing various macronutrient-based interventions showed significant weight loss with any LC diet (median difference in weight loss compared with no diet 8.73 kg [95% CI: 7.27 to 10.20 kg] at 6-month follow-up and 7.25 kg [95% CI: 5.33 to 9.25 kg] at 12-month follow-up)	Effective and safe in the short term but no long-term safety and efficacy studies. Long-term adherence can be an issue
	Very low carbohydrate (VLC) / ketogenic	- VLC: <20% carbohydrate; usually an initial period of 20 g/day for up to 3 months, followed by steady re-introduction (up to 50 g/day) until stable weight achieved - Weight loss may also occur through ketotic acidosis and appetite suppression - A practical strategy for reducing calories for some patients	- No differences were observed at 6 or 12 months of follow-up between diets targeting different macronutrients - A study comparing VLC consumption (20 g/day for 3 months) with an energy restricted low-fat diet (<30% calories from fat) showed no difference in weight loss between the two diets	- May lead to high intake of saturated fat and cholesterol - Use with caution in patients with osteoporosis, kidney disease or high LDL-cholesterol, established CVD/T2DM, or high risk of CVD - Can lead to deficiencies in vitamin A, B₁, B₆, folate, C, and E, and minerals including magnesium, potassium, calcium, and iron
Dietary patterns <i>Diets that focus on which types of food to consume and on improving overall diet quality</i> <i>A specific dietary pattern may be considered for certain patient groups</i> <i>Cultural differences and preferences will play a role in adoption and adherence</i>	Low fat/very low fat	- Reduced fat consumption (<10–19% of total energy intake), leading to decreased energy intake - Diet typically based on high complex carbohydrates (fruits, vegetables, and whole grains), beans, and non-fat dairy - A practical strategy for reducing calories for some patients	- A network meta-analysis comparing various macronutrient-based interventions showed significant weight loss with any low-fat diet (7.99 kg [95% CI: 6.01 to 9.92 kg] at 6-month follow-up and 7.27 kg [95% CI: 5.26 to 9.34 kg] at 12 months follow-up) - No differences were observed at 6 or 12 months of follow-up between diets targeting different macronutrients	- Healthy meal planning recommended to avoid protein deficiency - Can lead to deficiencies in fat-soluble vitamins, vitamin B₁₂, and zinc
	Low GI	- Replacing high GI foods with low GI foods (vegetables, fruits, legumes, dairy, etc.) - No standard definition	A low-GI diet produced more weight loss compared with conventional diets (weighted mean difference -1.1 kg, 95% CI: -2.0 to -0.2, P<0.05)	- Limited efficacy without energy restriction; not recommended for weight loss on its own - May be considered for patients with IR/pre-T2DM/T2DM
DASH <i>A specific dietary pattern may be considered for certain patient groups</i> <i>Cultural differences and preferences will play a role in adoption and adherence</i>	DASH	Dietary pattern emphasizing fruits, vegetables, whole grains, pulses, nuts, legumes, seeds, low-fat dairy, lean meats, and low consumption of salt, red and processed meats, sweets, caffeine, and alcohol	- In the PREMIER clinical trial, DASH (together with behavior lifestyle intervention) reduced weight by 5 kg over 6 months - A systematic review and meta-analysis demonstrated that DASH led to significant weight loss, particularly when combined with energy restriction (weighted mean difference = -1.42 kg, 95% CI: -2.03 to -0.82) in 8–24 weeks compared with controls)	- Energy restriction required for weight loss - May be considered for patients with HTN and CVD

TABLE A5 (Continued)

Dietary intervention	Description	Efficacy for weight loss	Additional notes
Mediterranean	Dietary pattern that focuses on plant-based foods (fruit and vegetables, whole grains and pulses, nuts, and seeds); extra virgin olive oil as the main source of fat; moderate consumption of dairy, eggs, poultry, fish, and seafood; low consumption of red meat; moderate intake of wine	- A moderate-fat, calorie-restricted, Mediterranean diet produced an overall weight change at 24 months of -4.4 ± 6.0 kg - In the PREDIMED study (energy-unrestricted Mediterranean diet), minimal effect on body weight was observed over a median of 4.8 years follow-up	- Energy restriction required for weight loss - May be considered for patients with MAFLD, pre-T2DM and T2DM
Vegetarian	Plant-based dietary pattern (lacto-ovo vegetarian, lacto vegetarian, vegetarian, vegan)	Vegetarian dietary patterns significantly reduced body weight (mean difference = -2.15 kg [95% CI: -2.95 to -1.34 kg]), BMI (mean difference = -0.74 kg/m² [95% CI: -1.09 to -0.39 kg/m²]) and waist circumference (mean difference = -2.86 cm [95% CI: -3.76 to -1.96 cm])	
Intermittent fasting	- Regular periods of no or very restricted intake (<25% of caloric need) - Also referred to as alternate-day fasting, reduced meal frequency, and time-restricted feeding	Time-restricted feeding or intermittent fasting shown to be as efficacious as conventional LCD	Can be recommended as a dietary intervention for those who are suitable

Abbreviations: BMI, body mass index; CI, confidence interval; CKD, chronic kidney disease; CVD, cardiovascular disease; DASH, Dietary Approaches to Stop Hypertension; GI, glycemic index; HTN, hypertension; IR, insulin resistance; LCD, low-calorie diet; LDL, low-density lipoprotein; MAFLD, metabolic associated fatty liver disease; ORC, obesity-related complication; SE, standard error; T2DM, type 2 diabetes mellitus; VLC, very low carbohydrate; VLCD, very low-calorie diet.