

SPECIAL ARTICLE

The SEEN comprehensive clinical survey of adult obesity: Executive summary[☆]



María D. Ballesteros Pomar^{a,*,1}, Nuria Vilarrasa García^{b,1}, Miguel Ángel Rubio Herrera^c, María José Barahona^d, Marta Bueno^e, Assumpta Caixàs^f, Alfonso Calañas Contente^g, Andreea Ciudin^h, Fernando Cordidoⁱ, Ana de Hollanda^j, María Jesús Díaz^k, Lilliam Flores^l, Pedro Pablo García Luna^m, Fernando García Pérez-Sevillanoⁿ, Albert Goday^o, Albert Lecube^p, Juan José López Gómez^q, Inka Miñambres^r, María José Morales Gorria^s, Rosa Morinigo^t, Joana Nicolau^u, Silvia Pellitero^v, Javier Salvador^w, Sergio Valdés^x, Irene Bretón Lesmes^y

^a Endocrinología y Nutrición, Complejo Asistencial Universitario de León, León, Spain

^b Servicio de Endocrinología y Nutrición, Hospital Universitari de Bellvitge-Institut d'Investigació Biomèdica de Bellvitge (IDIBELL), Centro de Investigación Biomédica en Red de Diabetes y Enfermedades Metabólicas Asociadas (CIBERDEM), Barcelona, Spain

^c Endocrinología y Nutrición, Hospital Clínico Universitario San Carlos, Madrid, Spain

^d Servicio de Endocrinología y Nutrición, Hospital Universitari Mútua de Terrassa, Terrassa, Barcelona, Spain

^e Servicio de Endocrinología y Nutrición, Hospital Universitari Arnau de Vilanova, Grupo de investigación en Obesidad, Diabetes y Metabolismo (ODIM), Institut de Recerca Biomèdica de Lleida (IRBLleida), Lleida, Spain

^f Servicio de Endocrinología y Nutrición, Hospital Universitari Parc Taulí, Universitat Autònoma de Barcelona, Institut d'Investigació i Innovació Parc Taulí (I3PT), Sabadell, Barcelona, Spain

^g Unidad de Gestión Clínica de Endocrinología y Nutrición, Hospital Universitario Reina Sofía, Córdoba, Spain

^h Servicio de Endocrinología y Nutrición, Hospital Universitari Vall d'Hebron, Grupo de investigación en Diabetes y Metabolismo, Vall d'Hebron Research Institut (VHIR), Barcelona, Spain

ⁱ Servicio de Endocrinología y Nutrición, Hospital Universitario de A Coruña, Universidad de A Coruña, A Coruña, Spain

^j Servicio de Endocrinología y Nutrición, Hospital Clínic de Barcelona, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Centro de Investigación Biomédica en Red de Obesidad y Nutrición (CIBEROBN), Madrid, Spain

^k Sección de Endocrinología y Nutrición, Hospital Universitario de Cabueñes, Gijón, Asturias, Spain

^l Unidad de Obesidad, Servicio de Endocrinología y Nutrición, Hospital Clínic de Barcelona, Centro de Investigación Biomédica en Red de Diabetes y Enfermedades Metabólicas Asociadas (CIBERDEM), Barcelona, Spain

^m Unidad de Nutrición Clínica y Obesidad, UGEN, Hospital Universitario Virgen del Rocío, Facultad de Medicina, Sevilla, Spain

Available online 9 April 2021

[☆] Please cite this article as: Ballesteros Pomar MD, Vilarrasa García N, Rubio Herrera MÁ, Barahona MJ, Bueno M, Caixàs A, et al. Abordaje clínico integral SEEN de la obesidad en la edad adulta: resumen ejecutivo. Endocrinol Diabetes Nutr. 2021;68:130–136.

* Corresponding author.

E-mail address: mdballesteros@telefonica.net (M.D. Ballesteros Pomar).

¹ Both authors have contributed equally to the authorship of the manuscript.

<https://doi.org/10.1016/j.endien.2020.05.006>

2530-0180/© 2020 SEEN and SED. Published by Elsevier España, S.L.U. All rights reserved.

ⁿ Endocrinología y Nutrición, Hospital Vithas Nisa Sevilla, Grupo de Endocrinología, Nutrición y Ejercicio Físico (GENEFSEEN), Sevilla, Spain

^o Servicio de Endocrinología y Nutrición, Hospital del Mar, Institut Hospital del Mar d'Investigacions Mèdiques (IMIM), Departamento de Medicina, Universitat Autònoma de Barcelona, Centro de Investigación Biomédica en Red de la Fisiopatología de la Obesidad y Nutrición (CIBERObn), Barcelona, Spain

^p Servicio de Endocrinología y Nutrición, Hospital Universitari Arnau de Vilanova, Grupo de investigación en Obesidad, Diabetes y Metabolismo (ODIM), IRBLleida, Universidad de Lleida, Centro de Investigación Biomédica en Red de Diabetes y Enfermedades Metabólicas Asociadas (CIBERDEM), Lleida, Spain

^q Servicio de Endocrinología y Nutrición, Hospital Clínico Universitario de Valladolid, Instituto de Investigación Endocrinología y Nutrición de Valladolid (IENVA), Valladolid, Spain

^r Servicio de Endocrinología y Nutrición, Hospital de la Santa Creu i Sant Pau, Departament de Medicina, Universitat Autònoma de Barcelona, Barcelona, Spain

^s Servicio de Endocrinología y Nutrición, Complejo Hospitalario Universitario de Vigo, Vigo, Pontevedra, Spain

^t Unidad de Endocrinología y Nutrición, Hospital Universitari Sagrat Cor, Barcelona, Spain

^u Hospital Universitario Son Llàtzer, Instituto de Investigación Sanitaria de las Islas Baleares (IdISBa), Palma, Balearic Islands, Spain

^v Endocrinología y Nutrición, Hospital Universitari Germans Trias i Pujol, Institut d'Investigació Germans Trias i Pujol (HGTiP), Barcelona, Spain

^w Servicio de Endocrinología y Nutrición, Clínica Universidad de Navarra, Centro de Investigación Biomédica en Red de la Fisiopatología de la Obesidad y Nutrición (CIBERObn), Instituto Carlos III, Pamplona, Navarra, Spain

^x Endocrinología y Nutrición, Hospital Regional Universitario de Málaga, Instituto de Investigación Biomédica de Málaga (IBIMA), Centro de Investigación Biomédica en Red de Diabetes y Enfermedades Metabólicas Asociadas (CIBERDEM), Málaga, Spain

^y Servicio de Endocrinología y Nutrición, Hospital General Universitario Gregorio Marañón, Instituto de Investigación Gregorio Marañón, Madrid, Spain

Received 19 May 2020; accepted 31 May 2020

Available online 9 April 2021

KEYWORDS

Obesity;
Nutrition;
Physical activity;
Evidence-based
medicine

Abstract: Obesity is one of the great challenges in healthcare nowadays with important implications for health so requiring comprehensive management. This document aims to establish practical and evidence-based recommendations for the diagnosis and management of in Spain, from the perspective of the clinical endocrinologist. A position statement has been made that can be consulted at www.seen.es, and that has been agreed by the Obesity Group of the Spanish Society of Endocrinology and Nutrition (GOSEEN), together with the Nutrition Area (NutriSEEN) and the Working Group of Endocrinology, Nutrition and Physical Exercise (GENEFSEEN).

© 2020 SEEN and SED. Published by Elsevier España, S.L.U. All rights reserved.

PALABRAS CLAVE

Obesidad;
Nutrición;
Actividad física;
Medicina basada en la
evidencia

Abordaje clínico integral SEEN de la obesidad en la edad adulta: resumen ejecutivo

Resumen La obesidad supone uno de los grandes retos en salud en la actualidad. Las importantes repercusiones que implica obligan a un manejo integral. El presente documento tiene como objetivo establecer recomendaciones prácticas y basadas en la evidencia para el diagnóstico y el manejo de la obesidad en España, desde la perspectiva del endocrinólogo clínico. Se ha realizado un documento de posicionamiento que puede consultarse en www.seen.es, que ha sido consensado por el Grupo de Obesidad de la Sociedad Española de Endocrinología y Nutrición (GOSEEN), junto con el Área de Nutrición (NutriSEEN) y el Grupo de trabajo de Endocrinología, Nutrición y Ejercicio Físico (GENEFSEEN).

© 2020 SEEN y SED. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

Introduction

Obesity is one of the main current public health challenges, and its important consequences for health require a comprehensive management strategy. The purpose of this document is to establish practical and evidence-based recommendations for the diagnosis and management of adults with obesity in Spain from the perspective of the clinical endocrinologist.

Methods

The Obesity Group of the Spanish Society of Endocrinology and Nutrition (*Grupo de Obesidad de la Sociedad Española de Endocrinología y Nutrición* [GOSEEN]), together with the Nutrition Area (NutriSEEN) and the Endocrinology, Nutrition and Physical Exercise Working Group (*Grupo de trabajo de Endocrinología, Nutrición y Ejercicio Físico* [GENEFSEEN]), have reviewed the main clinical aspects regarding the evaluation and management of obesity in adults, based on the best available evidence, and classified according to the Grading of Recommendations, Assessment, Development and Evaluation (GRADE).¹ A position document and an accompanying presentation have been prepared, and can be found on www.seen.es.²

Obesity as a chronic disease based on adiposity

Obesity is a chronic disorder defined by increased body fat mass. The concept of obesity based only on measurement of the body mass index (BMI) is currently considered to be imprecise. The American Association of Clinical Endocrinologists proposed a new term for this disorder: adiposity-based chronic disease (ABCD),³ which has also been adopted by the European Association for the Study of Obesity⁴ and is endorsed by the Spanish Society of Endocrinology and Nutrition.

Diagnosis and initial approach to obesity in a non-specialized clinic

Given the difficulty in quantifying fat mass, use is made of anthropometric measures, such as the BMI, with a high correlation to percentage body fat, and waist circumference (WC), which afford an estimate of visceral obesity and cardiometabolic risk.⁵ Initial assessment of the clinical impact should include a clinical history, physical examination and laboratory tests to assess carbohydrate tolerance, or the presence of atherogenic dyslipidemia, hyperuricemia, liver alterations, and inflammatory markers such as C-reactive protein (CRP). Based on the data obtained, it is possible to assess the presence of complications and the associated cardiovascular risk.

Control targets

The main objectives in the management of obesity are to keep patients metabolically healthy, decrease metabolic risk as far as possible, prevent or treat complications if they

are already present, avoid stigmatization and discrimination and restore well-being, and improve body image and self-esteem. Body weight loss *per se* is not considered the first priority. The targets or objectives in terms of the magnitude and speed of weight loss, should be progressive and achievable. A weight loss of 5–15% over a 6-month period is realistic and affords established health benefits⁵ (*Level of evidence: High*).

Assessment criteria in a specialized clinic

The criteria for referral from primary care or other specialists to the specialist in Endocrinology and Nutrition may depend on the resources, organization and degree of coordination of the different care levels in each healthcare area,⁶ and should be agreed upon.

Assessment of obese patients in a specialized clinic

1. A *clinical history focused on obesity* allows us to obtain information regarding the course of body weight, the age at onset of obesity, previous treatments, eating habits, conditioning factors for weight gain, medications that may influence weight variations, physical activity and exercise, and the consumption of toxic substances. The history will also allow us to suspect secondary causes of obesity, identify other diseases associated with obesity, and determine the degree of control of known health problems.
2. In relation to the *physical examination*, it is essential to record body weight and height in order to calculate the BMI. Waist circumference and blood pressure should also be measured. The physical examination likewise helps us to exclude other conditions, while the possible presence of lipodystrophy should also be considered.
3. Depending on the availability at each hospital, it is advisable to perform a *body composition study* to measure percentage fat and lean mass and assess possible sarcopenic/osteosarcopenic obesity.
4. *Laboratory measurements and imaging tests* will depend on the current symptoms and risk factors for the development of other diseases.
5. Since the range of *diseases associated with obesity* is broad, the specialist clinic should address those conditions that would imply a special approach beyond mere characterization of the complication.

An impact-based classification of obesity, such as the Edmonton Obesity Staging System (<http://www.drsharma.ca/wp-content/uploads/edmonton-obesity-staging-system-staging-tool.pdf>), or the ABCD,^{4,5} may prove helpful.

Lifestyle changes: dietary and physical activity recommendations and behavioural intervention

Dietary recommendations

Changes in lifestyle are essential for the management of obesity, and necessarily start with dietary modifications to ensure a healthy eating pattern.

- The reduction of total calorie intake should be the main element of any dietary intervention (*Level of evidence: High*).^{5,7-9}
- The proposed eating plan should be adapted to the clinical characteristics and preferences of each patient, and should be designed to facilitate long-term adherence. A variety of types of diets may produce weight loss in adults who are overweight or obese (*Level of evidence: High*).¹⁰
- An energy reduction in the diet by 500–1000 kcal a day may result in a weight loss of 0.5–1 kg/week, equivalent to a weight loss of over 5% over an average period of 6 months (*Level of evidence: High*).¹¹
- Decreased portion size and/or a lower energy density of the diet are strategic measures that prove effective in reducing weight in obese individuals (*Level of evidence: Low*).^{12,13}
- A high-intensity face-to-face dietary intervention program in the context of a comprehensive lifestyle intervention is the most effective strategy, affording mean weight losses of 5–10% (*Level of evidence: High*).⁵
- Continued clinical contact after the initial intervention is associated with a better maintenance of weight loss (*Level of evidence: High*).^{5,14,15}
- The Mediterranean diet should be promoted in our setting, since it is the option that best suits our culture and is associated with reductions in the risk of numerous conditions, including cardiovascular disease, cancer, type 2 diabetes and degenerative diseases (*Level of evidence: Moderate*).¹⁶⁻¹⁹

The effects of the differences in the qualitative composition of the diet can be found in the reference document of this executive summary.²

Physical activity

As a first step, a decrease in sedentary behaviour should be encouraged in all patients. Physical activity alone has a modest effect upon weight loss. However, when it is associated with a low-calorie diet, the results comprise a greater fat loss with less lean mass loss. In addition, maintaining physical exercise has been shown to be helpful, reducing the risk of regaining lost weight (*Level of evidence: High*).²⁰ It is advisable to perform at least 150 min a week of aerobic physical exercise of moderate intensity spaced over 3–5 times a week, in adults who are overweight or obese. In order to contribute to greater weight loss (and long-term maintenance), it is advisable to gradually increase this exercise level to 200–300 min a week of moderate physical activity (or 75–150 min of vigorous activity).

Strength training also helps promote fat loss while preserving lean mass; in this regard, it is advisable to perform at least 2–3 sessions a week of exercises involving the major muscle groups (*Level of evidence: High*).

Behavioural intervention

A structured lifestyle intervention program consisting of a healthy eating plan, scheduled physical activity and behavioural interventions has been shown to be more effective in terms of weight loss than a standard intervention, and should therefore be available to patients undergoing treatment for overweight or obesity (*Level of evidence: High*).^{21,22} Behavioural therapy involves setting clear, reasonable goals, with systematic approaches to problem solving, and should be performed by a multidisciplinary team including dietitians–nutritionists, nurses, educators, physical activity specialists and clinical psychologists (*Level of evidence: Low*).²¹

Pharmacological treatment of obesity

Pharmacological treatment is indicated in people with obesity (BMI ≥ 30 kg/m²) or who are overweight (BMI ≥ 27 kg/m²), in the presence of complications and in combination with lifestyle changes, but should never be used alone (*Level of evidence: High*).^{21,23,24} It can be started without waiting for the results of lifestyle changes when the patient presents serious coexisting complications that can improve with weight loss (*Level of evidence: High*). Pharmacological treatment should be offered to patients on a prolonged basis, since obesity is a chronic disease (*Level of evidence: High*),²¹ although no data are available on drug treatment beyond 1–4 years. The discontinuation of pharmacological treatment results in weight recovery (*Level of evidence: High*).²⁵⁻²⁷

When deciding on the drug to be used, account should be taken of the patient's characteristics, complications, differences in drug efficacy, side effects, drug interactions, precautions for use, and the adherence rate. In Europe three drugs have been approved for the treatment of obesity: orlistat, the combination bupropion/naltrexone, and liraglutide 3 mg. A detailed description of the drugs, as well as the treatment hierarchy according to the complications involved, can be found in the reference document.²

Surgery in obesity

Indications and techniques

Due to its effects upon body weight, mortality and improvement of the complications of obesity, bariatric surgery (BS) should be offered to subjects with a BMI ≥ 40 kg/m² (*Level of evidence: High*)^{28,29} or a BMI ≥ 35 kg/m² associated with one or more serious complications. This type of surgery may be considered with a BMI 30–34.9 kg/m² in cases of type 2 diabetes mellitus with poor control despite intensified treatment and the presence of other serious complications (*Level of evidence: Moderate*).^{30,31} In non-diabetic individuals with serious complications not adequately controlled by

medical treatments and causing worsened patient quality of life, a surgical approach may also be considered in this BMI range (*Level of evidence: Moderate*).³¹ The requirements for BS can be found in the reference document.² Currently, the most commonly performed procedures are sleeve gastrectomy, gastric bypass, adjustable gastric band and biliopancreatic diversion with or without duodenal switch. The reference document² provides a guidance scheme to help define which surgeries may be most useful according to the initial BMI of the patient and the presence of metabolic and/or gastrointestinal complications. However, the parameters used are arbitrary and many other aspects should also be taken into account, such as the surgical risk, patient preferences or the experience of the operating centre (*Level of evidence: Low*).³²

Follow-up

Long-term multidisciplinary follow-up after BS is advised, and follow-up programs after BS should therefore be developed in all obesity units.^{32,33} The short-, middle- and long-term nutritional management of BS requires the acquisition of nutritional skills through the intervention of physicians specializing in Endocrinology and Nutrition and dieticians/nutritionists with experience in treating BS patients. Dietetic counselling should focus on the general qualitative aspects of a healthy diet and on the adaptation of the patient's eating pattern to the surgical procedure (*Level of evidence: High*).³⁴

Vitamin deficiency is very common after BS and should be monitored through periodic tests. The reference document² reviews the most common vitamin deficiencies after BS. Monitoring of the complications of obesity and the prevention of weight recovery are also essential, and are likewise reviewed in the reference document.²

Endoscopic treatments

Endoscopic procedures are emerging treatment options in obesity. These procedures are minimally invasive, mostly reversible, and are safer and less costly compared to surgical treatment. However, the effects obtained are temporary, and there is a lack of long-term studies. Consequently, their recommendation as primary treatments for obesity has not been well established. A detailed description of the procedures and their effects can be found in the reference document.²

Obesity in special situations

Patients over 65 years of age

Caution is advised when managing obesity in elderly patients, due among other factors to problems related to loss of muscle and/or bone mass, which may condition osteosarcopenic obesity. In the elderly, a moderate caloric reduction (500–750 kcal/day) is recommended. The diet should contain approximately 1 g/kg/day of proteins, with vitamin and mineral supplements to ensure that the recommended daily requirements are met, including 1500 mg/day

of Ca and 1000 IU/day of vitamin D³⁵ (*Level of evidence: Very low*). There are few data on the efficacy and safety of pharmacological treatment for obesity in elderly people, and the available information on the efficacy and safety of BS is also limited. Surgery should be considered in selected cases where the benefits of weight loss are considered to outweigh the possible complications, after both the risks and expectations have been discussed individually with each patient.

Pregnancy

Obesity increases the risks associated with pregnancy. A number of recommendations are therefore established in order to minimize these risks before, during and after pregnancy. These can be consulted in greater detail in the reference document.²

List of recommendations

1. Obesity is a chronic disorder defined by increased body fat mass. It is highly prevalent, affecting over 20% of the Spanish adult population, and has a complex and multifactorial origin.
2. An adequate diagnosis is essential and should consider not only weight and the BMI, but also waist circumference and, ideally, at the specialist clinic, a study of body composition to assess percentage fat mass and lean mass.
3. A comprehensive medical assessment of the possible associated complications should always be made.
4. Weight loss goals should be individualized, realistic, adapted to the associated complications, and focused on a sustained loss over time, without forgetting that loss should be at the expense of fat mass.
5. Monitoring and avoiding the loss of lean mass as far as possible is essential, especially in special situations such as advanced age, in order to prevent the occurrence and/or worsening of sarcopenia and osteosarcopenia.
6. The demonstrated effectiveness of structured and multidisciplinary lifestyle intervention programs implies that they should be available to all people with obesity.
7. In our setting, the low-calorie Mediterranean diet is the most recommended option, because of its proven capacity to reduce cardiovascular events, its cultural acceptance, and the use of local foods.
8. Drug treatment may be useful in selected cases, but should always be used in combination with lifestyle changes. Liraglutide 3 mg is currently the drug with the most favourable safety/efficacy profile.
9. In selected cases of severe obesity, BS is the most effective treatment, though long-term multidisciplinary follow-up is always required in order to avoid nutritional deficiencies and/or weight recovery.
10. Endoscopic procedures are emerging treatment options, though long-term studies are lacking, and their recommendation as primary treatment for obesity has not been well established.

Conflicts of interest

MDBP has received fees for participation in teaching or training activities or for consulting functions from Nestlé Nutrition, Adventia, Vegenat Healthcare and Novo Nordisk.

NVG has received fees from Novo Nordisk, Nestlé Nutrition and Vegenat Healthcare.

MJB has received fees for participation in teaching or training activities from Novo Nordisk, Abbott Nutrition, and Lilly.

MB has received fees from Abbott, AstraZeneca, Baxter, Ferrer, Lilly, and Novo Nordisk.

AC has received fees for participation in teaching or training activities (Novo Nordisk, Sanofi), consulting functions (Millendo Therapeutics) or research projects (Pfizer, Menarini).

ACC has received fees for participation in teaching or training activities or for consulting functions from AstraZeneca, Abbott Nutrition, Fresenius Kabi, Nestlé Health Science, Nutricia Danone Specialized Nutrition, and Vegenat Healthcare.

FC has received fees for participation in teaching or research activities from Novo Nordisk and Lilly.

AdH has received fees for teaching or training or consulting functions from Novo Nordisk, Lilly, Sanofi, Janssen, and Menarini.

MJD has received fees for participation in teaching or training activities from AstraZeneca, Lilly, and Novo Nordisk.

AG reports funding for clinical trials, scientific studies, advisory boards, scientific meetings, informative meetings and participation at congresses from Laboratorios Almirall, AstraZeneca, Ascensia, Esteve, Gebro, GSK, Janssen, Lilly, MSD, Novo Nordisk, Novartis, PronoKal, and Sanofi.

AL has participated in speeches, collaborations and clinical trials with companies interested in the pharmacological approach to obesity, such as Novo Nordisk and AstraZeneca.

JJLG has received fees for participation in teaching or training activities from Novo Nordisk, Lilly, Boehringer, MSD, AstraZeneca, Sanofi Aventis, Janssen, Rovi, Zambon, Abbott Nutrition, Fresenius Kabi, Nestlé Nutrition, Nutricia, Persan Farma and Vegenat Healthcare.

IM has received fees for participation in teaching or training activities or for consulting functions from Novo Nordisk, Lilly, AstraZeneca and MSD.

JN has received fees from Fresenius, Novo Nordisk, Sanofi and Lilly.

JS has conducted consulting activities for Novo Nordisk national and international, and has participated in Novo Nordisk-sponsored clinical trials.

MARH, AC (Andreea Ciudin), SV, LF, PPGL, FGPS, MJMG, RM, SP and IBL declare that they have no conflicts of interest in relation to this study.

References

- Guyatt GH, Oxman AD, Vist GE, Kunz R, Falck-Ytter Y, Alonso-Coello P, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008;336:924–6.
- Ballesteros Pomar MD, Vilarrasa García N, Rubio Herrera MA, Barahona MJ, Bueno M, Caixàs A, et al. Abordaje clínico integral SEEN de la obesidad en la edad adulta. Available from: https://www.seen.es/ModulGEX/workspace/publico/modulos/web/docs/apartados/993/110620.083626_7246364497.pdf [accessed 30.08.20] [posted 2020].
- Mechanick JI, Hurley DL, Garvey WT. Adiposity-based chronic disease as a new diagnostic term: The American Association of Clinical Endocrinologists and American College of Endocrinology position statement. *Endocr Pract*. 2017;23:372–8.
- Fruhbeck G, Busetto L, Dicker D, Yumuk V, Goossens GH, Hebebrand J, et al. The ABCD of obesity: an EASO position statement on a diagnostic term with clinical and scientific implications. *Obes Facts*. 2019;12:131–6.
- Jensen MD, Ryan DH, Apovian CM, Ard JD, Comuzzie AG, Donato KA, et al. 2013 AHA/ACC/TOS guideline for the management of overweight and obesity in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. *J Am Coll Cardiol*. 2014;63 Pt B:2985–3023.
- Mories MT, Astorga R, Soler J, Abellán MT, Aguilar M, Blay V, et al. Criterios de derivación desde Atención Primaria a Atención Especializada de pacientes con obesidad. Criterios de buena práctica en Atención Especializada. *Endocrinol Nutr*. 2005;52:38–9.
- Sacks FM, Bray GA, Carey VJ, Smith SR, Ryan DH, Anton SD, et al. Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates. *N Engl J Med*. 2009;360:859–73.
- Shai I, Schwarzfuchs D, Henkin Y, Shahar DR, Witkow S, Greenberg I, et al. Weight loss with a low-carbohydrate Mediterranean, or low-fat diet. *N Engl J Med*. 2008;359:229–41.
- Schwingshackl L, Hoffmann G. Comparison of the long-term effects of high-fat v. low-fat diet consumption on cardiometabolic risk factors in subjects with abnormal glucose metabolism: a systematic review and meta-analysis. *Br J Nutr*. 2014;111:2047–58.
- Dansinger ML, Gleason JA, Griffith JL, Selker HP, Schaefer EJ. Comparison of the Atkins, Ornish Weight Watchers, and Zone diets for weight loss and heart disease risk reduction: a randomized trial. *JAMA*. 2005;293:43–53.
- Gargallo Fernández M, Marset JB, Lesmes IB, Izquierdo JQ, Sala XF, Salas-Salvadó J, et al. FESNAD-SEEDO consensus summary: evidence-based nutritional recommendations for the prevention and treatment of overweight and obesity in adults. *Endocrinol Nutr*. 2012;59:429–37.
- Ello-Martin JA, Roe LS, Ledikwe JH, Beach AM, Rolls BJ. Dietary energy density in the treatment of obesity: a year-long trial comparing 2 weight-loss diets. *Am J Clin Nutr*. 2007;85:1465–77.
- Ledikwe JH, Rolls BJ, Smiciklas-Wright H, Mitchell DC, Ard JD, Champagne C, et al. Reductions in dietary energy density are associated with weight loss in overweight and obese participants in the PREMIER trial. *Am J Clin Nutr*. 2007;85:1212–21.
- Middleton KMR, Patidar SM, Perri MG. The impact of extended care on the long-term maintenance of weight loss: a systematic review and meta-analysis. *Obes Rev*. 2012;13:509–17.
- Wadden TA, Volger S, Sarwer DB, Vetter ML, Tsai AG, Berkowitz RI, et al. A two-year randomized trial of obesity treatment in primary care practice. *N Engl J Med*. 2011;365:1969–79.
- Estruch R, Ros E, Salas-Salvadó J, Covas MI, Corella D, Arós F, et al. Primary prevention of cardiovascular disease with a Mediterranean diet. *N Engl J Med*. 2013;368:1279–90.
- Esposito K, Maiorino MI, Bellastella G, Chiodini P, Panagiotakos D, Giugliano D. A journey into a Mediterranean diet and type 2 diabetes: a systematic review with meta-analyses. *BMJ Open*. 2015;5:e008222.
- Schwingshackl L, Hoffmann G. Adherence to Mediterranean diet and risk of cancer: an updated systematic review and meta-analysis of observational studies. *Cancer Med*. 2015;4:1933–47.
- Sofi F, Macchi C, Abbate R, Gensini GF, Casini A. Mediterranean diet and health status: an updated meta-analysis and a pro-

- posál for a literature-based adherence score. *Public Health Nutr.* 2014;17:2769–82.
20. Behavioural Weight Management Review Group Johns DJ, Hartmann-Boyce J, Jebb SA, Aveyard P. Diet or exercise interventions vs combined behavioral weight management programs: a systematic review and meta-analysis of direct comparisons. *J Acad Nutr Diet.* 2014;114:1557–68.
 21. Garvey WT, Mechanick JI, Brett EM, Garber AJ, Hurley DL, Jastreboff AM, et al. American Association of Clinical Endocrinologists and American College of Endocrinology comprehensive clinical practice guidelines for medical care of patients with obesity. *Endocr Pract.* 2016;22 Suppl. 3:1–203.
 22. Wadden TA, Butryn ML, Hong PS, Tsai AG. Behavioral treatment of obesity in patients encountered in primary care settings: a systematic review. *JAMA.* 2014;312:1779–91.
 23. Wadden TA, Berkowitz RI, Sarwer DB, Prus-Wisniewski R, Steinberg C. Benefits of lifestyle modification in the pharmacologic treatment of obesity: a randomized trial. *Arch Intern Med.* 2001;161:218–27.
 24. Toplak H, Woodward E, Yumuk V, Oppert JM, Halford JC, Frühbeck G. 2014 EASO position statement on the use of anti-obesity drugs. *Obes Facts.* 2015;8:166–74.
 25. Sjöström L, Rissanen A, Andersen T, Boldrin M, Golay A, Koppeschaar HP, et al. Randomised placebo-controlled trial of orlistat for weight loss and prevention of weight regain in obese patients. *Lancet.* 1998;352:167–72.
 26. Wadden TA, Hollander P, Klein S, Niswender K, Woo V, Hale PM, et al. Weight maintenance and additional weight loss with liraglutide after low-calorie-diet induced weight loss: the SCALE Maintenance randomized study. *Int J Obes.* 2013;37:1443–51.
 27. Le Roux CW, Astrup A, Fujioka K, Greenway F, Lau DCW, van Gaal L, et al. 3 years of liraglutide versus placebo for type 2 diabetes risk reduction and weight management in individuals with prediabetes: a randomised, double-blind trial. *Lancet.* 2017;389:1399–409.
 28. Sjöstrom L, Narbro K, Sjöstrom CD, Karason K, Larsson B, Wedel H, et al. Effects of bariatric surgery on mortality in Swedish obese subjects. *N Engl J Med.* 2007;357:741–52.
 29. Kwok CS, Pradhan A, Khan MA, Anderson SG, Keavney BD, Myint PK, et al. Bariatric surgery and its impact on cardiovascular disease and mortality: a systematic review and meta-analysis. *Int J Cardiol.* 2014;173:20–8.
 30. Müller-Stich BP, Senft JD, Warschkow R, Kenngott HG, Billeter AT, Vit G, et al. Surgical versus medical treatment of type 2 diabetes mellitus in nonseverely obese patients: a systematic review and meta-analysis. *Ann Surg.* 2015;261:421–9.
 31. Aminian A, Chang J, Brethauer SA, Kim JJ. ASMBS updated position statement on bariatric surgery in class I obesity (BMI 30–35 kg/m²). *Surg Obes Relat Dis.* 2018;14:1071–87.
 32. Mechanick JI, Apovian C, Brethauer S, Garvey WT, Joffe AM, Kim J, et al. Clinical practice guidelines for the perioperative nutrition, metabolic, and nonsurgical support of patients undergoing bariatric procedures – 2019 update. *Endocr Pract.* 2019;25:1346–59.
 33. Busetto L, Dicker D, Azran C, Batterham RL, Farpour-Lambert N, Fried M, et al. Practical recommendations of the Obesity Management Task Force of the European Association for the Study of Obesity for the post-bariatric surgery medical management. *Obes Facts.* 2017;10:597–632.
 34. Petasne Nijamkin M, Campa A, Samiri Nijamkin S, Sosa J. Comprehensive behavioural–motivational nutrition education improves depressive symptoms following bariatric surgery: a randomized, controlled trial of obese Hispanic Americans. *J Nutr Educ Behav [Internet].* 2013;45:620–6.
 35. Villareal DT, Apovian CM, Kushner RF, Klein S, American Society for Nutrition, NAASO, The Obesity Society. Obesity in older adults: technical review and position statement of the American Society for Nutrition and NAASO, The Obesity Society. *Am J Clin Nutr.* 2005;82:923–34.