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ORIGINAL RESEARCH

Evidence-based clinical standard for the diagnosis, treatment, and follow-up of adults with obesity and massive weight loss

Estándar clínico basado en la evidencia para el diagnóstico, tratamiento y seguimiento de adultos con obesidad y pérdida masiva de peso

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Abstract

Introduction: Obesity is a noncommunicable disease (NCD) associated with higher mortality and morbidity rates. It poses a great economic burden, particularly in terms of increased health care costs. Massive weight loss after treatment must always be considered due to the consequences it may have on this population.
Objective: To identify the clinical indications for the diagnosis, treatment, and follow-up of adult patients with obesity and for the surgical treatment of individuals who have experienced massive weight loss by developing an evidence-based clinical standard (EBCS) in a national referral university hospital in Colombia.
Materials and methods: Upon conformation of the development group and the definition of the EBCS scope and objectives, a systematic search in MEDLINE, EMBASE and LILACS, as well as in clinical practice guidelines (CPG) development and compiling agencies, was carried out in April 2021 to identify CPGs published in the last 10 years that responded to these objectives and scope. CPGs quality was assessed using the AGREE II instrument. Based on the selected CPGs, a preliminary EBCS was drafted (clinical algorithm and recommendations) and then validated by means of an interdisciplinary consensus (modified Delphi methodology).
Results: Eleven CPGs were selected. After reaching full agreement on the interdisciplinary consensus, a seven-section clinical algorithm was consolidated: "initial and interdisciplinary approach to the adult patient with obesity", "interdisciplinary follow-up", "surgical treatment (bariatric surgery)", "initial assessment of the patient who has experienced weight loss by the plastic surgery service", "selection of the surgical technique to be used to remove excess skin on the extremities", "selection of the surgical technique to be used to remove excess skin in the abdomen and breasts", and "definition of operative time and postoperative care". In addition, key aspects for the implementation of the algorithm and clinical recommendations were defined, as well as for the evaluation and follow-up of their implementation, referred to as checkpoints.
Conclusion: The evidence-based clinical recommendations included in this EBCS are intended to standardize practices and actions related to the diagnosis, treatment, and follow-up of adult patients with obesity, as well as to the surgical treatment of individuals who have experienced massive weight loss in Colombia, and even in the region.

Resumen

Introducción. La obesidad es una ENT que se asocia con mayores tasas de mortalidad y morbilidad y que tiene un gran impacto económico, particularmente el aumento de los costos de atención en salud. Además, la perdida masiva de peso luego del tratamiento es un aspecto a tener siempre en cuenta debido a las secuelas que puede causar en esta población.
Objetivo. Identificar las indicaciones clínicas para el diagnóstico, tratamiento y seguimiento de pacientes adultos con obesidad y para el tratamiento quirúrgico de aquellos con pérdida masiva de peso mediante el desarrollo de un estándar clínico basado en la evidencia (ECBE) en un hospital universitario de referencia nacional en Colombia.
Materiales y métodos. Una vez conformado el grupo desarrollador y definidos el alcance y los objetivos del ECBE, en abril de 2021 se realizaron búsquedas sistemáticas en MEDLINE, EMBASE y LILACS y en organismos desarrolladores y compiladores de guías de práctica clínica (GPC) para identificar GPC publicadas en los últimos 10 años que respondieran a dichos objetivos y alcance. La calidad de las GPC fue evaluada con el instrumento AGREE II. Con base en las GPC seleccionadas se desarrolló una propuesta preliminar de EBCE (algoritmo clínico y recomendaciones) que fue validada mediante un consenso interdisciplinario (metodología Delphi modificada).
Resultados: Se seleccionaron 11 GPC. Luego de lograr un acuerdo total en el consenso interdisciplinario se consolidó un algoritmo clínico de siete secciones: "abordaje inicial y abordaje interdisciplinario del paciente adulto con obesidad", "seguimiento interdisciplinario", "tratamiento quirúrgico (cirugía bariátrica)", "valoración inicial del paciente con pérdida de peso por el servicio de cirugía plástica", "Elección de la técnica quirúrgica a utilizar para remover el exceso de piel en las extremidades", "Elección de la técnica quirúrgica a utilizar para remover el exceso de piel en el abdomen y las mamas" y "definición del tiempo quirúrgico y de los cuidados posoperatorios". Además, se definieron aspectos claves para la implementación del algoritmo y las recomendaciones clínicas y para la evaluación y seguimiento de su implementación, denominados como puntos de control.
Conclusión: Las recomendaciones clínicas basadas en la evidencia incluidas en este ECBE contribuyen a estandarizar las prácticas y acciones relacionadas con el diagnóstico, tratamiento y seguimiento de pacientes adultos con obesidad, así como con el tratamiento quirúrgico de aquellos con pérdida masiva de peso en Colombia e incluso en la región.

Introduction

Obesity is a chronic noncommunicable disease (NCD) characterized by excessive fat accumulation. It can affect health[1] and has been associated with an increased risk of multiple metabolic complications and chronic diseases, including, among others, type 2 diabetes mellitus (DM2), hypertension (HT), cardiovascular disease, metabolic syndrome, chronic kidney disease, nonalcoholic fatty liver disease, osteoarthritis, obstructive sleep apnea (OSAHS), and many cancers (at least 13 types).[2,3]

According to the World Health Organization (WHO), obesity is defined as a body mass index (BMI) ≥30kg/m^2.[1,4-6] However, although BMI is the most widely used method for measuring obesity,[4] since the WHO guidelines state that this parameter is to be used to identify and diagnose obesity,[5] there are other objective measurement methods such as waist circumference, waist-to-hip ratio, skin impedance, skinfold thickness, dual-energy x-ray absorptiometry, and bioimpedance.[4,7,8]

In 2021, the WHO reported that NCDs caused at least 43 million deaths worldwide,[9] a figure equivalent to 75% of non-pandemic-related deaths in that year. Furthermore, 73% of all NCD deaths occur in low- and middle-income countries. Along the same lines, in 2021, 18 million people died from a NCD before their seventieth birthday, with 82% of these premature deaths reported in low- and middle-income countries.[9] Cardiovascular diseases, cancer, chronic respiratory diseases, and DM2 are, in that order, the most common NCDs, accounting for 80% of premature deaths from such diseases.[9]

Regarding obesity, it has been reported that this disease has reached epidemic proportions with the number of cases worldwide increasing almost threefold between 1975 and 2016.[10] As of 2016, according to the WHO, 650 million adults were obese, that is, 13% of the world's adult population (11% of men and 15% of women).[10] Also, as of 2022, 890 million adults were obese, representing 16% of all adults (≥18 years) worldwide.[1]

In 1997, the WHO declared obesity a global epidemic and a serious public health concern due to its serious consequences on individual health and the economy, being a major contributor to the global burden of NCDs and associated disability.[10] Moreover, obesity often coexists with malnutrition in developing countries, so it is a complex condition with significant pathological, physiological, social and psychological implications that affect virtually all people, regardless of age and socioeconomic status.[10] As for its economic impact, it derives mainly from increased health care costs and loss of productivity among patients.[11]

Apart from being associated with higher mortality and morbidity rates and poorer quality of life,[12,13] patients with obesity who have experienced massive weight loss as a result of surgical treatment (e.g., bariatric surgery) encounter several after-effects, mainly localized lipodystrophy and skin laxity.[14]

In Colombia, based on the 2015 National Nutritional Status Survey, 18.7% of Colombian adults (18-64 years) were obese in 2015, with a higher prevalence in women (22.4%) than in men (14.4%) and in people with low and medium wealth indices (19.4% and 20.5%) than in individuals with very low and high wealth indices (16.8% and 18.6%).[15] Furthermore, in the same year, according to the 2021 Analysis of the Health Situation in Colombia, obesity was more prevalent in urban areas (19.5%) than in rural areas (15.9%).[16] Similarly, according to these reports, an increase in the prevalence of obesity was observed in the country between 2010 and 2015 (16.5% vs. 18.7%).[15,16]

In view of the serious health implications[12,13] and the high economic impact of obesity,[10,11] Law 1355 was enacted in 2009, defining obesity and the chronic noncommunicable diseases associated with it as a public health priority and adopting measures for its

control, care, and prevention. It acknowledges obesity as a chronic disease and a public health problem in the country, urging all organizations and state entities to promote strategies for its prevention.[17]

Current Colombian regulations also require health care institutions (IPS for its Spanish acronym) to develop clinical guidelines or protocols to address the most prevalent diseases in the country in order to be recognized as such and to obtain quality certifications in health care.[18-20] Therefore, together with the fact that obesity is associated with higher morbidity and mortality rates and, consequently, with an increase in health care costs, it is essential to standardize the comprehensive approach to patients with this condition.

With this in mind, the objective of this article is to identify clinical indications for the diagnosis, treatment, and follow-up of adult patients with obesity, as well as for the surgical treatment of individuals who have experienced massive weight loss, by developing an evidence-based clinical standard (EBCS).

Materials and methods

This EBCS was developed in a sequential seven-phase process proposed by the Hospital Nacional Universitario de Colombia, in collaboration with the Universidad Nacional de Colombia and the Instituto de Investigaciones Clínicas from the Universidad Nacional de Colombia. The phases are described below:

Forming the development group

The development group consisted of experts in endocrinology, plastic surgery, and clinical epidemiology who met online to establish the methodological, technical, and thematic guidelines for the formulation of the EBCS recommendations. Before accepting to be part of the development group, all members filled out a conflict-of-interest disclosure form.

Defining the EBCS scope and objectives

The EBCS scope was defined based on the following elements: i) target population in which the recommendations will be used; ii) special populations in which the recommendations may be used, such as indigenous peoples, Afro-descendant communities, rural populations, etc., to ensure health equity; iii) aspect of the condition or disease to be addressed (treatment, diagnosis, prevention, follow-up, etc.); iv) aspects of the condition or disease that will not be within the scope of the recommendations; v) health care context (outpatient, inpatient, surgery, intensive care, etc.); and vi) specialties, areas or health services involved in the implementation and use of the recommendations.

The recommendations contained in this EBCS are aimed at health professionals involved in the care of adult patients with obesity or massive weight loss (general practitioners, internists, endocrinologists, geriatricians, sports medicine specialists, bariatric surgeons, plastic surgeons, nurses, nutritionists, psychologists, physical therapists, pharmaceutical chemists, and clinical laboratory specialists). Furthermore, it was established that the recommendations can also be used by health sciences students (undergraduate and graduate) who are involved in the care of these patients during their clinical practice, their professors, and the health care or administrative personnel of the health care institutions responsible for making decisions regarding the treatment and follow-up of this population. It should be noted that the EBCS does not include

recommendations for the pediatric population (<18 years of age), pregnant women, and individuals with obesity caused by genetic disorders.

The general and specific objectives of this EBCS were formulated based on a literature review, an analysis of the care areas involved in the treatment of these patients, and an interdisciplinary consensus. The formulated objectives clearly and concisely describe the purpose of the EBCS. In addition, checkpoints and directions for the dissemination and implementation of the EBCS were included in its formulation.

Systematic review of clinical practice guidelines

A systematic search was conducted in MEDLINE, EMBASE and LILACS, as well as in CPG development and compiling agencies, using controlled language and sensitive electronic search strategies to identify CPGs that met the stated objective and scope (Supplement 1). The searches were conducted between April 19 and April 21, 2021. The CPG screening and selection process was carried out taking into account the following eligibility criteria established by the development group:

Inclusion criteria

- CPG on the diagnosis, treatment, and follow-up of obese adult patients, with or without associated complications, treated in outpatient, inpatient, and surgical wards.
- CPG on reconstructive surgical treatment of adult patients who have experienced massive weight loss receiving care in outpatient services and surgical wards.
- CPGs published in English or Spanish and with full-text access.
- CPGs published within the last 10 years as of the time of performing the searches.

Exclusion criteria

- CPGs with an overall quality assessment <6 according to the AGREE II instrument[21] and with a score <60% in the domains of methodological rigor and editorial independence.
- CPGs on the diagnosis, treatment, and follow-up of obese patients in the pediatric population, pregnant women, and people with obesity caused by genetic disorders.
- CPGs on the reconstructive treatment of the sequelae associated with massive weight loss in the pediatric population, pregnant women, and people with obesity derived from genetic disorders.

Since this EBCS includes recommendations for the treatment of two conditions (obesity and massive weight loss after obesity treatment), the search for evidence was performed separately for each condition by two subgroups: endocrinology and plastic surgery. Evidence screening was performed in each subgroup by reviewing title and abstract, as well as the full text of the papers identified in the systematic searches. This process was performed independently by two members of the development group in each subgroup, namely two clinical experts in endocrinology in the endocrinology subgroup and one clinical expert in plastic surgery and the clinical leader of the development group in the plastic surgery subgroup. Any discrepancies were resolved by a third member (the clinical leader in the case of the endocrinology team and the methodological leader in the case of the plastic surgery team). The quality of the selected CPGs was assessed using the AGREE II instrument;[21] this process was also carried out independently by two members of the development group: a clinical expert and a methodological expert.

Preliminary algorithm development

The development group used the selected CPGs to draft a preliminary proposal for the EBCS (clinical algorithm plus checkpoints [key recommendations for implementing the algorithm and clinical recommendations and for evaluating and monitoring their implementation]). To extract the evidence contained in the 11 selected CPGs, an information extraction table was created using a domain system. After reviewing the evidence gathered in several meetings, the development group elaborated the proposed clinical algorithm and recommendations for the diagnosis, treatment, and follow-up of adult patients with obesity and for the surgical treatment of individuals who have experienced massive weight loss. The recommendations included the level of evidence for each of the CPGs used to formulate the recommendation. Importantly, the level of evidence is presented following the evidence grading system used in the CPG.

Developing an interdisciplinary agreement

After identifying the health areas/services involved in the comprehensive care process of adult patients with obesity and adult patients presenting with massive weight loss, representatives of these services from the national referral university hospital were designated. They received the draft of the clinical algorithm for their assessment prior to attending a consensus meeting. The consensus meeting took place in December 2021 and was attended by representatives of the following hospital care services: bariatric surgery, plastic surgery, endocrinology, nursing, pharmacy, internal medicine, clinical nutrition, psychiatry, and psychology. The clinical leaders were responsible for the presentation of the preliminary algorithm (flow charts) and the meeting was moderated by a research methodologist.

Seven sections of the EBCS (algorithm) and an additional section on checkpoints were presented at the meeting. Using the modified Delphi methodology and a 1-9 Likert scale, it was possible to evaluate the degree of agreement among the participants with the information presented in each section. The results of the 8 polls confirmed that all participants of the interdisciplinary consensus group fully endorsed the use of the recommendations for the diagnosis, treatment, and follow-up of the adult patient with obesity and the surgical treatment of the adult patient who has experienced massive weight loss contained in the flowcharts presented below. More detailed information on this step is available in the full text of this EBCS.[22]

Development of the final algorithm

Once the interdisciplinary consensus was achieved, the development team met and consolidated the suggestions made at the consensus meeting and based on them, modified the preliminary algorithm of the document.

EBCS review and editing

The final activity of the process involved the revision of the document's wording and layout, resulting in the final version of the EBCS.[22] As in the preliminary proposal, the recommendations include the level of evidence for each of the CPGs used to formulate the recommendation, and the level of evidence is presented in accordance with the evidence grading system used in each CPG.

Results

Systematic search for CPGs - Endocrinology Subgroup

The preliminary searches retrieved 967 records. After removing duplicates (n=32), a total of 935 studies were identified, of which 899 were excluded at the title and abstract review stage. Then, out of the 36 documents that were fully read, 14 CPGs were selected for quality assessment using the AGREE II instrument.[21] Lastly, during the methodological quality assessment stage, 4 CPGs were excluded. The 10 CPGs that met the eligibility criteria and were finally included for evidence review are listed in Table 1. The evidence search, screening, and selection process is summarized in Figure 1.

Table 1. Clinical practice guidelines identified in the literature search that met the eligibility criteria for the development of the evidence-based clinical standard - Endocrinology subgroup.

Id	CPG Title	Development group	Country or continent	Language	Year
CPG1	Obesity in adults: A clinical practice guideline[7]	Obesity Canada y Canadian Association of Bariatric Physicians and Surgeons	Canada	English	2020
CPG2	A.S.P.E.N. Clinical Guidelines: Nutrition Support of Hospitalized Adult Patients with Obesity[23]	American Society for Parenteral and Enteral Nutrition (A.S.P.E.N)	United States	English	2013
CPG3	Recommendations for prevention of weight gain and use of behavioral and pharmacologic interventions to manage overweight and obesity in adults in primary care[24]	The Canadian Task Force on Preventive Health Care	Canada	English	2015
CPG4	Guía de Práctica Clínica para la prevención, diagnóstico, tratamiento del sobrepeso y la obesidad en adultos[8]	Ministry of Health and Social Protection	Colombia	Spanish	2016
CPG5	Diagnóstico y tratamiento del sobrepeso y la obesidad exógena[25]	Mexican Social Security Institute	Mexico	Spanish	2018
CPG6	Tratamiento quirúrgico de la obesidad en el adulto[26]	Mexican Social Security Institute	Mexico	Spanish	2018
CPG7	Intervención dietética: paciente con obesidad[27]	Instituto Mexicano del Seguro Social	Mexico	Spanish	2013
CPG8	Clinical Practice Guidelines for the Perioperative Nutrition, Metabolic, and Nonsurgical Support of Patients Undergoing Bariatric Procedures - 2019 Update: Cosponsored by American Association of Clinical Endocrinologists/American College of Endocrinology, The Obesity Society, American Society for Metabolic and Bariatric Surgery, Obesity Medicine Association, and American Society of Anesthesiologists[28]	American Association of Clinical Endocrinologists, The Obesity Society, American Society for Metabolic and Bariatric Surgery, Obesity Medicine Association, and American Society of Anesthesiologists	United States	English	2020
CPG9	Interdisciplinary European Guidelines on metabolic and bariatric surgery[29]	International Federation for the Surgery of Obesity and Metabolic Disorders - European Chapter and European Association for the Study of Obesity	Europe	English	2017
CPG10	American Association of Clinical Endocrinologists and American College of Endocrinology Comprehensive Clinical Practice Guidelines for medical Care of Patients with Obesity[30]	American Association of Clinical Endocrinologists and American College of Endocrinology	United States	English	2016

CPG: clinical practice guideline.

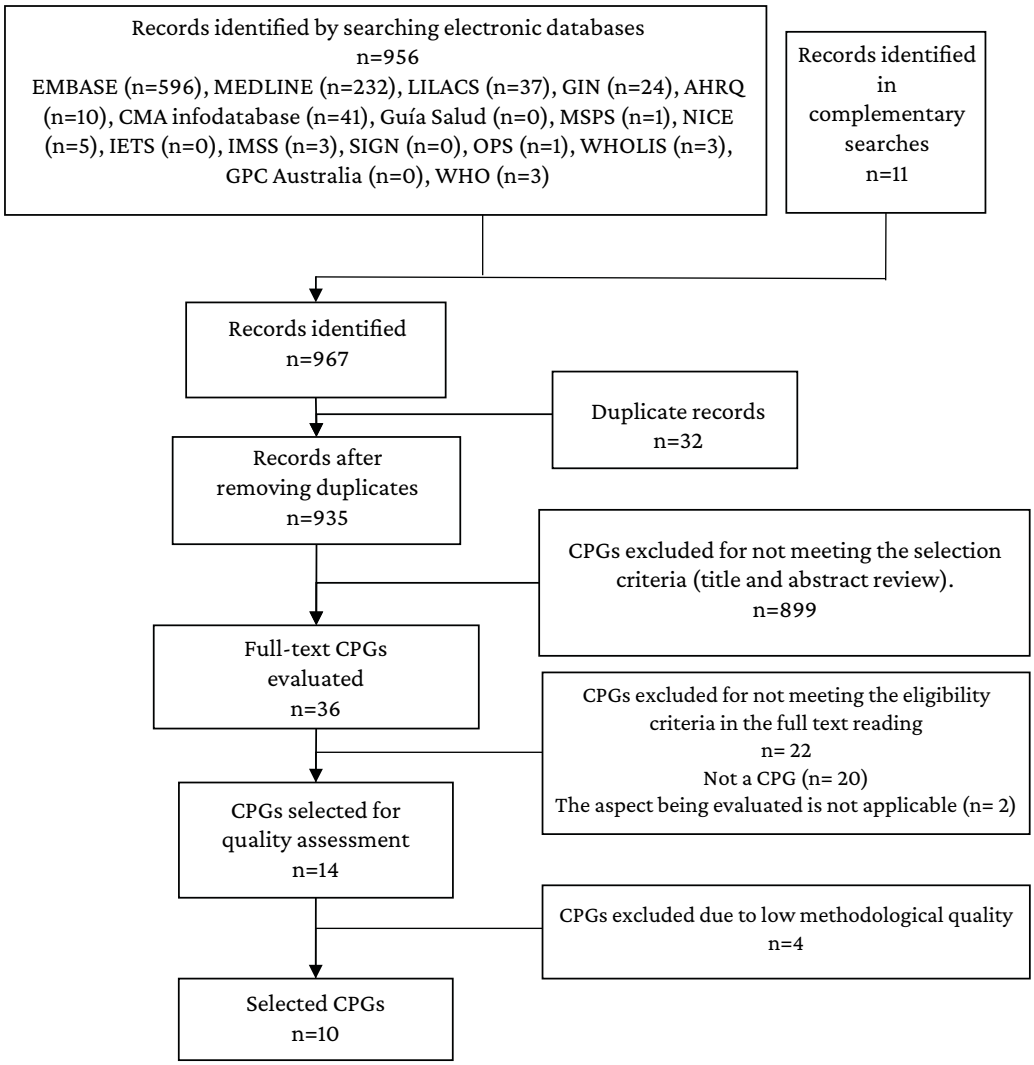

Figure 1. Systematic search for CPGs - Endocrinology Subgroup.

Systematic search for CPGs - Plastic Surgery Subgroup

The preliminary searches retrieved 131 records. After removing duplicates (n=4), a total of 127 studies were identified, of which 124 were excluded at the title and abstract review stage. Then, of the 3 documents that were fully read, 2 CPGs were selected to assess their quality using the AGREE II instrument.[21] Lastly, during the methodological quality assessment stage, 1 CPG was excluded. The CPG that met the eligibility criteria and was finally included for the evidence review is listed in Table 2. The evidence search, screening, and selection process is summarized in Figure 2.

Table 2. Clinical practice guideline identified in the literature search that met the eligibility criteria for the development of the evidence-based clinical standard - Plastic Surgery subgroup.

Id	CPG Title	Development group	Country or continent	Language	Year
CPG11	National commissioning guidelines: body contouring surgery after massive weight loss[31]	Multidisciplinary group sponsored by the Department of Health of United Kingdom, the British Association of Plastic, Reconstructive and Aesthetic Surgeons, and the Royal College of Surgeons	England	English	2014

CPG: clinical practice guideline.

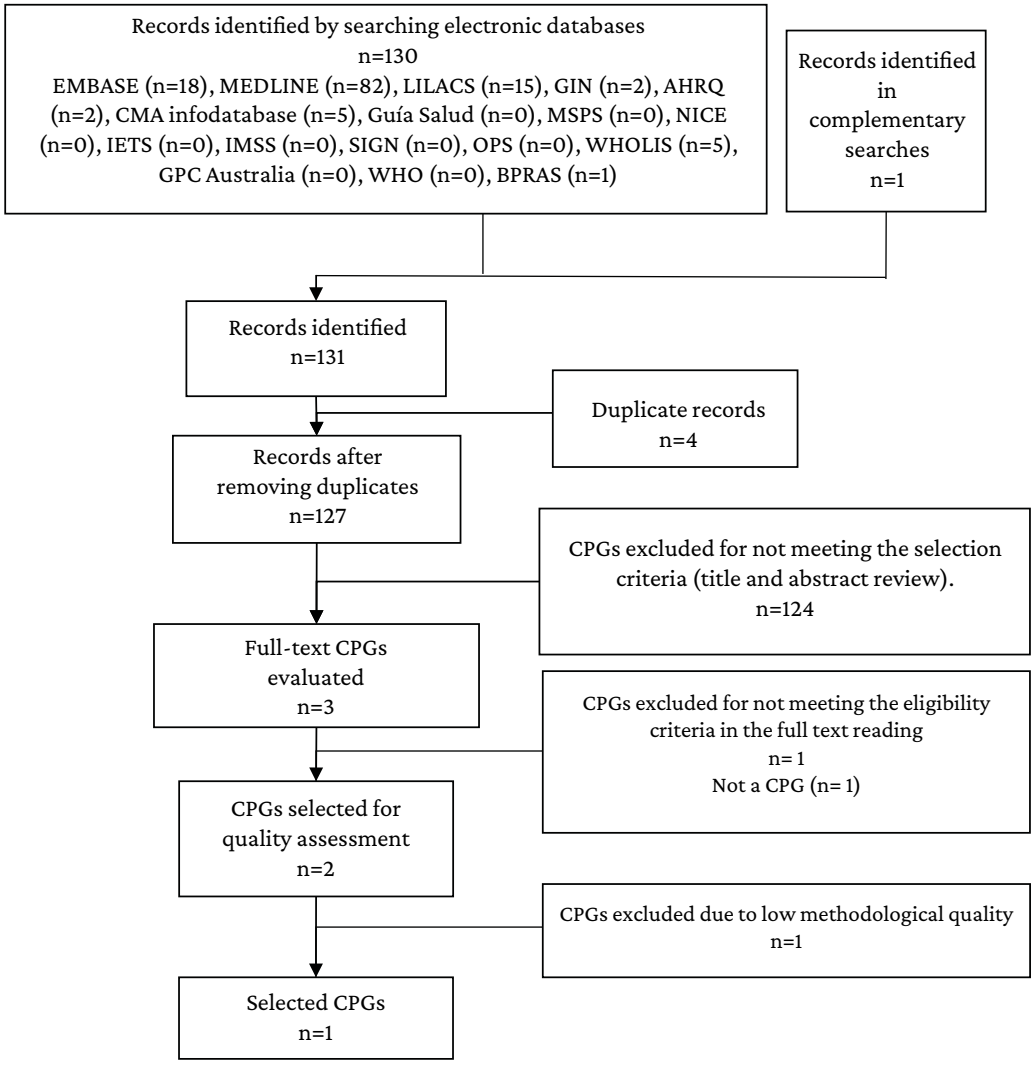

Figure 2. Systematic search for CPGs – Plastic Surgery Subgroup.

Recommendations

The recommendations for diagnosing, treating, and monitoring adult patients with obesity and adult patients who have experienced massive weight loss are presented using

the sections of the clinical algorithm formulated by the development group, based on the evidence retrieved from the selected CPGs and the opinions of the expert members of the development group, as well as the experts involved in the interdisciplinary consensus (Figure 3). The results are described below:

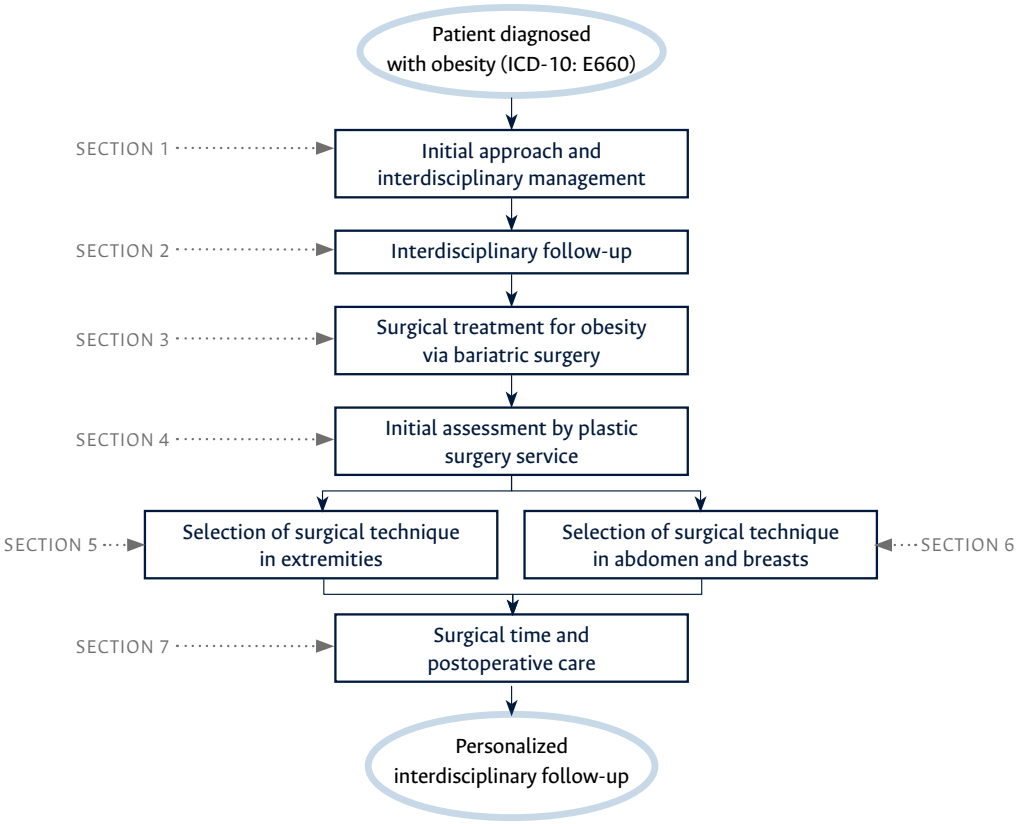

Figure 3. Flowchart for the diagnosis, treatment, and monitoring of adult patients with obesity (ICD-10: E660) and adult patients who have experienced massive weight loss.
ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th Revision.

Section 1 - Recommendations for initial and interdisciplinary approach to the adult patient with obesity

Context: A patient diagnosed with obesity must undergo a comprehensive initial assessment by an interdisciplinary team, which will develop a personalized treatment plan. This approach must consider the treatment of comorbidities, nutritional counseling, physical activity, and psychological support. Figure 4 illustrates the flowchart for Section 1.

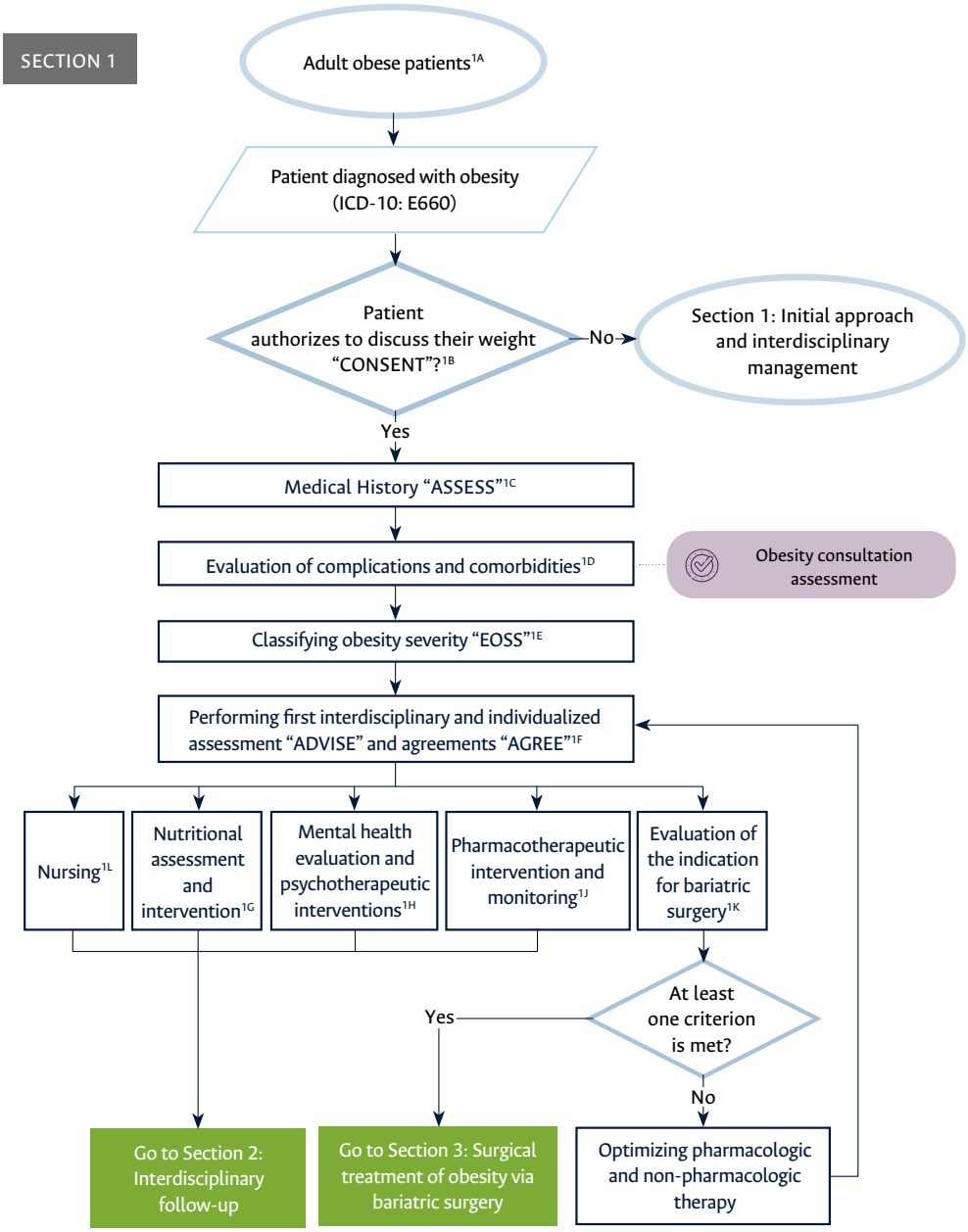

Figure 4. Flowchart of the initial approach and interdisciplinary treatment of the adult patient with obesity. ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th Revision. EOSS: Edmonton Obesity Staging System.

Summary of recommendations:

1.A Confirmation of obesity diagnosis: Obesity diagnosis must be confirmed based on BMI (LE: Very low, GRADE)[24] and abdominal perimeter, taking into account the following cut-off points: BMI≥30kg/m2; abdominal girth ≥80cm in men and ≥90cm in women (LE: expert consensus, GRADE).[8]

Patients who are candidates for assessment in a specialized obesity consultation can be referred from any outpatient service (outpatient clinic), general hospital ward, or surgical ward (expert recommendation).

1.B Discussion of weight ("CONSENT"): When talking to the patient about their weight, their self-esteem must be considered to prevent them from feeling stigmatized or having feelings of guilt (expert recommendation).

1.C Medical history focused on possible causes of obesity ("ASSESS"): A comprehensive interview must be performed, focusing on the identification of the factors or situations that trigger weight gain in the patient, as well as on the barriers to weight loss (LE: 4, Shekelle).[7] Moreover, secondary causes associated with obesity (LE: D, AACE/G4GAC) must be investigated on a case-by-case basis.[28]

1.D Evaluation of comorbidities and complications in patients with obesity: All patients with obesity must be referred to a specialized obesity consultation to identify comorbidities and complications, taking into account the following aspects (expert recommendation):

- Assessment of cardiometabolic risk (LE: 2, AACE/ACE)[30] by taking blood pressure and testing fasting plasma glucose, fasting glucose, glycosylated hemoglobin (HbA1c), lipid profile (NE:III, Shekelle)[7] (LE: 2, AACE/ACE),[30] and complete blood count (CBC).
- Assessment of the risk of steatohepatitis via alanine aminotransferase (NE: III, Shekelle)[7] and aspartate aminotransferase blood tests. If the levels of these transaminases are significantly elevated (LE: 2, AACE/ACE)[30] or metabolic dysfunction-associated fatty liver disease (MAFLD) is suspected, hepatobiliary ultrasound must be performed.
- Asking about the presence of cardiovascular symptoms (LE: 2, AACE/ACE)[30] such as angina, palpitations, dyspnea, etc. (expert recommendation).
- Asking about the patient's ability to perform activities of daily living, as well as activities related to skin, foot, or wound care (LE: 3, Shekelle).[7]
- Performing OSAHS risk stratification (LE: 2, AACE/ACE)[30] and, in high-risk cases, performing polysomnography (NE LE D; AACE/ACE),[30] (LE: 3; AACE/G4GAC).[28]
- Performing an upper GI endoscopy in patients with severe gastrointestinal symptoms (LE: D, AACE/ACE).[30]
- Performing an anthropometric and body composition assessment (LE:1 2, AACE/ACE).[30]
- Examining skin condition to detect wounds, especially on the feet (LE: 3, Shekelle).[7]
- Asking questions to identify the presence of anxiety, depression, or eating disorders.

1.E Obesity severity classification: Obesity severity must be established using the Edmonton Obesity Staging System (LE: 4, Shekelle).[7]

1.F Interdisciplinary assessment and treatment plan ("ADVISE") and establishment of agreements on therapeutic goals ("AGREE"): Every patient with obesity must be evaluated by an interdisciplinary team consisting of professionals from different health areas. This evaluation must be carried out simultaneously (NE: Moderate, GRADE)[24] (LE: 1, AACE/ACE).[30] Objective therapeutic goals must also be set in accordance with the patient's condition, e.g.:

- To achieve a reduction of at least 5-10% of body weight (NE: IV, Shekelle),[27] (LE: 2; AACE/ACE)[30] within 6 to 12 months (LE: Low; GRADE).[8]
- In patients with steatohepatitis, to lose 10% to 40% of weight (LE: 1; AACE/ACE).[30]
- To maintain weight loss in the medium term and prevent long-term weight gain (LE: 4, Shekelle).[27]
- To reduce metabolic and cardiovascular risk (NE: IV; Shekelle)[27] and control comorbidities or associated cardiovascular risk factors (LE: 1a, Shekelle),[7] (LE: 4, Shekelle).[27]

1.G Nutritional assessment and intervention: All patients with obesity must undergo a comprehensive and personalized nutritional assessment by a professional in nutrition and dietetics (LE: 1, AACE/ACE)[30] that includes anamnesis, analysis of dietary patterns, anthropometric measurements (weight, height, abdominal circumference, girth, and

skinfolds), laboratory tests (lipid profile, Hb1Ac test, blood albumin test, total protein test, thyroid profile, blood urea nitrogen test, and creatinine test) and nutritional diagnosis. All this must be done by setting nutritional goals to calculate energy expenditure and caloric needs in terms of macronutrients and micronutrients (caloric intake of 15-20kcal/kg of adjusted weight and protein intake of 1.2-2.0g/kg of adjusted weight depending on renal function), in order to establish a nutritional plan aimed at weight loss. Moreover, dietary and nutritional education must be provided to these patients, both during the delivery of the outpatient nutritional plan and during subsequent check-ups.

1.H Mental health assessment and psychotherapeutic interventions: Every patient with obesity must be interviewed by a professional psychologist (LE: expert consensus, GRADE),[8] (LE: 1, AACE/ACE),[30] who must assess personal and social adjustment areas, identify the presence of mental disorders (anxiety, depression, eating disorders, smoking), and provide ongoing motivational therapy and behavioral interventions aimed at removing barriers that prevent the patient from making progress in the weight reduction program (LE: 1; AACE/ACE),[30] (LE: 1a, Shekelle).[7] In addition, obese patients will be referred to the obese patient support group, where they will be provided with psychological support and their motivation to lose weight will be monitored (LE: 11a, Shekelle),[7] (LE: 2, AACE/G4GAC),[28] (LE: 4, Oxford),[29] (LE:1, AACE/ACE).[30]

If a major mental or social illness is identified, the patient must be referred to the psychiatry service or social work service to initiate specific medical intervention and treatment on a case-by-case basis.

1.I Physical activity: All patients with obesity must be evaluated by a sports medicine specialist (LE: 1, AACE/ACE),[30] who must inquire about the patient's physical limitations and interest in physical activity. Based on this assessment, a personalized workout plan will be designed to focus primarily on moderate to vigorous intensity aerobic exercise performed in 3 to 5 sessions of 30 to 60 minutes per week (LE: 1a, 2a, Shekelle),[7] (LE: Low, GRADE),[8] (LE: 1, AACE/ ACE)[30] and strength and endurance exercises (LE: 4, Shekelle),[7] (LE: Low, GRADE),[8] (LE: 1, AACE/ACE)[30] base on the patient's musculoskeletal and cardiovascular risk (LE: 1, AACE/ACE).[30]

1.J Pharmacotherapeutic intervention and follow up: Drug therapy must be considered in the following cases: patient with BMI≥30kg/m² (LE: 2a, Shekelle),[7] (LE: Moderate, GRADE)[8] or patient with BMI≥27kg/m² associated with comorbidity (LE: 2a, Shekelle),[7] (LE: Moderate, GRADE).[8] Patients who meet these conditions and have agreed to start pharmacological therapy can be given the following treatments:

- Liraglutide at a dose of 3.0mg/day, subcutaneously, without exceeding the maximum tolerated daily dose according to INVIMA or regulatory agencies' recommendations (LE: 2a; Shekelle),[7] (LE: 1++, NICE).[25]
- Orlistat at a dose of 120mg 3 times a day, orally, without exceeding the maximum tolerated daily dose according to INVIMA or regulatory agencies' recommendations (LE: Moderate; GRADE)[8] (LE: 1++, NICE).[26]

Patients with obesity who are hospitalized or in the postoperative period after bariatric surgery require pharmacological treatment follow-up to monitor drug-drug interactions and changes in the pharmacokinetics of the medication (expert recommendation).

1.K Bariatric surgery: Patients with obesity will be evaluated by the surgical service for bariatric surgery if they meet one or more of the following criteria:

- BMI ≥40kg/m² (LE: 4, Shekelle),[7] (LE: Low, GRADE),[8] (LE: 1++, 2+; NICE),[25] (LE: 1-4, Oxford),[29] (LE: 1, AACE/ACE).[30]
- BMI≥35kg/m² with an associated complication, such as dyslipidemia, MAFLD, poorly controlled HTA, insulin resistance, prediabetes, metabolic syndrome, OSAHS,

stress incontinence, hip and knee osteoarthritis, obesity hypoventilation syndrome, idiopathic intracranial hypertension, gastroesophageal reflux, severe venous stasis, limited mobility due to obesity, and significant impairment of quality of life (LE: Low, GRADE)[8] (LE: 1++,2++; NICE),[25] (LE: 1-3,5; Oxford),[29] (LE: 3; AACE G4AG),[28] (LE: 1, AACE/ACE).[30]

- BMI≥30kg/m² associated with poorly controlled DM2 despite optimum medical treatment (NE: 1a; Shekelle),[7] (LE: 4; NICE),[25], (LE: 2; AACE G4AG),[28] (LE: 1-5; Oxford).[29]
- Patients between 18 and 65 years of age who have had obesity for 3 to 5 years and in whom therapeutic failure (medical and nutritional treatment) has been documented for 6 or more months (LE: good clinical practice point; GRADE).[26]

1.L Nursing: The nursing staff will be responsible for delivering health care education to patients with obesity and for recognizing risks and obstacles to care (risk management).

Section 2 - Recommendations for the interdisciplinary follow-up of the adult patient with obesity

Context: Patients diagnosed with obesity require constant follow-up, with regular interventions coordinated by an interdisciplinary team comprising professionals from fields such as nutrition, internal medicine, psychology, etc. This will facilitate the assessment of the treatment's impact up to that point and make adjustments if required. Figure 5 illustrates the flowchart for Section 2.

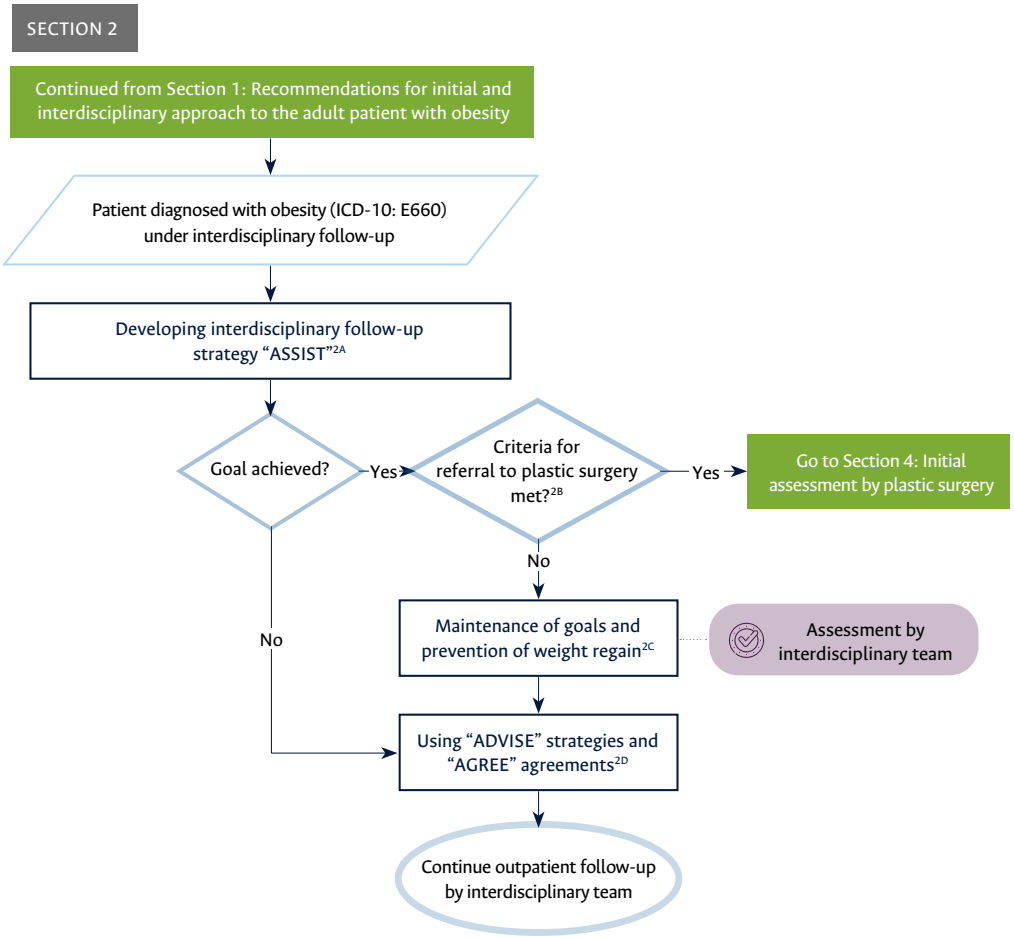

Figure 5. Flowchart of the interdisciplinary follow-up of the adult patient with obesity.
ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th Revision.

Summary of recommendations:

2.A Interdisciplinary follow-up ("ASSIST"): Each treating service/care area must carry out an individualized interdisciplinary follow-up to maintain the patient's motivation and self-confidence, thus promoting adherence to nutritional and physical activity interventions (LE: 1a, Shekelle),[7] (LE: Low, GRADE).[8] Also, progress in terms of the patient's anthropometric indicators must be recorded (expert recommendation).

2.B Criteria for assessment by the plastic surgery service: Patients meeting the following criteria must be referred to the plastic surgery service for assessment (expert recommendation): BMI≥30kg/m², weight loss demonstrated by adherence to therapeutic goals and weight stability for 12 months in patients who underwent bariatric surgery or 6 months in patients receiving medical treatment.

2.C Maintenance of treatment goals: Patients being treated must attend follow-up appointments with the interdisciplinary team every 3 months during the first year. If the established goals and weight stability are achieved, follow-ups will continue to be performed every 6 months until the second year of treatment is completed (expert recommendation). Subsequent follow-ups after the second year must be scheduled depending on the specific conditions and needs of the patient (expert recommendation). During each follow-up, it is required to identify whether there is any weight gain, defined as a monthly increase of 0.2% of the nadir weight.[32]

2.D Follow-up ("ADVISE") and agreements ("AGREE"): All patients with obesity receiving treatment must undergo a reassessment of their condition by all members of the treating interdisciplinary team (nursing, nutritional assessment and intervention, mental health assessment and psychotherapeutic interventions, physical activity, pharmacotherapeutic intervention and follow-up, and specialized obesity consultation assessment), as well as a follow-up taking into account the "ADVISE" strategy and the agreements on therapeutic goals established in accordance with the aforementioned "AGREE" strategy. The follow-up time will be decided by each specialty.

Section 3 - Recommendations for the surgical treatment (bariatric surgery) of the adult patient with obesity

Context: Patients who meet the criteria for bariatric surgery must be considered for this procedure after evaluating the risks and benefits. The procedure must be performed in specialized centers, and adequate post-surgical care is required. Figure 6 illustrates the flowchart for Section 3.

Summary of recommendations:

3.A Selection of the surgical technique for the performance of bariatric surgery: The surgical technique for bariatric surgery must be selected taking into account the specific conditions of the patient (LE: D, AACE/ACE),[26] (LE: 3, AACE/G4AG)[28] (LE: good clinical practice point, GRADE),[8] as well as BMI, the presence of metabolic comorbidities, or other specific characteristics (LE: 4, Shekelle).[7] Surgical options for this surgery include: sleeve gastrectomy, Roux-en-Y gastric bypass, and biliopancreatic diversion (NE: IV, Shekelle),[7] (LE: 1, AACE/ACE),[26] (LE: 3, AACE/G4AG),[28] (LE: 1-5; Oxford).[29]

The patient must be informed about the various techniques available to perform this surgery, as well as the long-term effects, associated morbidity and mortality rates, and follow-up parameters (LE: 1; AACE).[26]

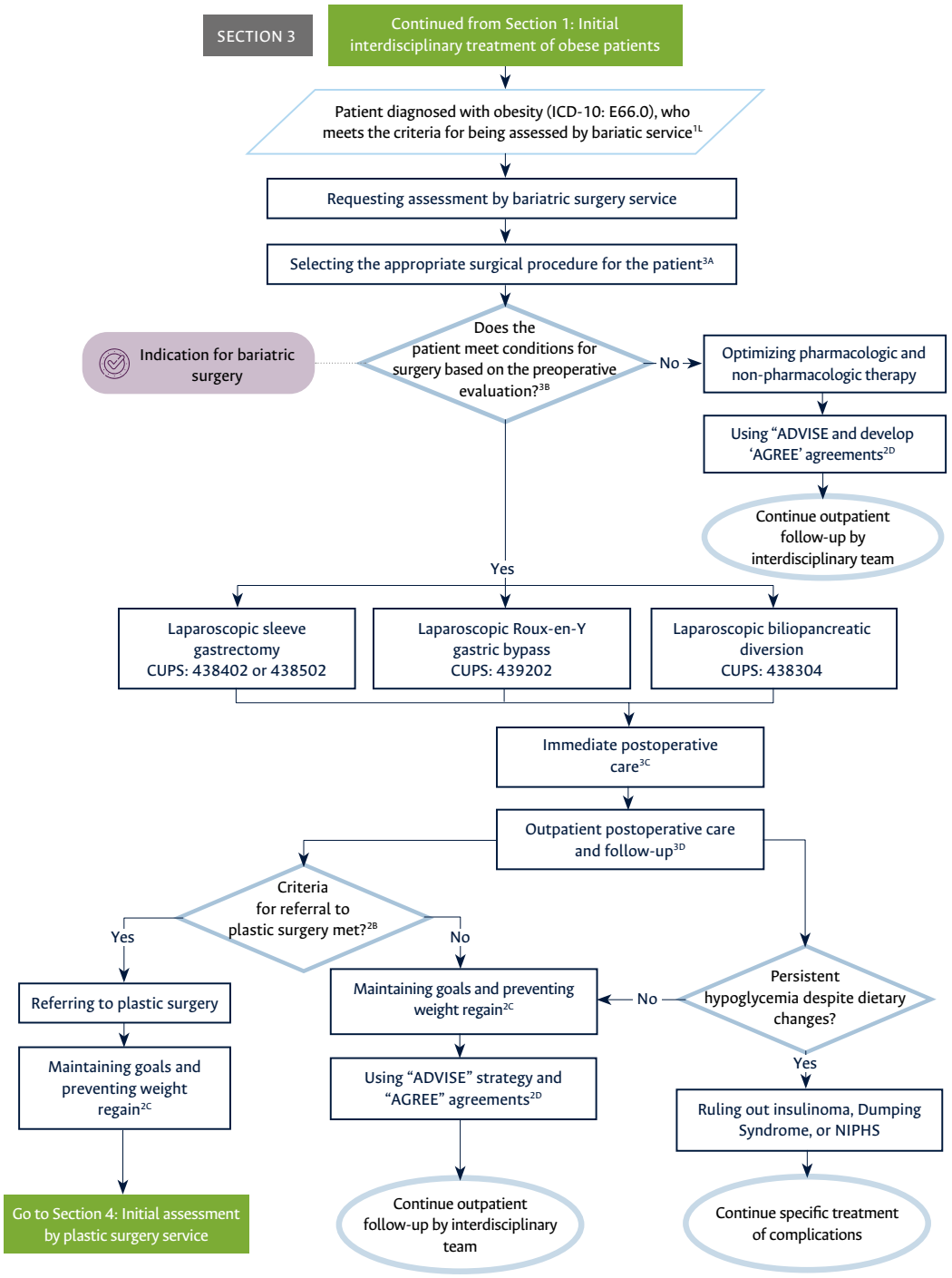

Figure 6. Flowchart of the surgical treatment (bariatric surgery) of the adult patient with obesity.
ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th Revision.
CUPS: Unified Classification of Health Procedures in Colombia by its Spanish acronym
NIPHS: Noninsulinoma Pancreatogenous Hypoglycemia Syndrome

3.B Preoperative assessment: During the preoperative assessment of these patients, which is interdisciplinary, it is necessary to confirm that cardiometabolic conditions, such as DM2, are compensated (LE: 1, AACE/ACE),[26] (LE: 1, AACE/G4AG)[28] and that there are no nutritional deficiencies (LE: 2-5; Oxford),[29] (LE: 1; AACE/G4AG),[28] (LE: 4; Shekelle).[7] Moreover, the procedure must also be endorsed by a mental health specialist (LE: 4; AACE),[26] (LE: 3, AACE/G4AG),[28] (LE: 4, Oxford).[29]

3.C Immediate postoperative care: Immediately after the completion of the surgical procedure, analgesics and antiemetics must be administered cautiously (LE: 3, AACE/G4GAC),[28] favoring fast-release drugs over slow-release drugs (LE: D, AACE/G4GAC)[28] (LE: 2-3,5, Oxford)[29] and thromboprophylaxis depending on the patient's risk profile (LE: high; GRADE).[26] The best meal option for resuming food intake must be determined by the nutrition team according to the patient's particular situation (LE: 1; AACE/G4GAC)[28] and early discharge from the hospital must be facilitated.

3.D Outpatient postoperative care and follow-up: Outpatient follow-up is required depending on the type of surgery performed, considering the following indications:

- Maintaining physical activity and psychosocial support. For psychosocial support activities, the Alcohol Use Disorders Identification Test (AUDIT)[33] must be used to screen for excessive drinking and alcohol use disorders (LE: 1-2; AACE/G4GAC)[28] (expert recommendation).
- Ensuring the patient's inclusion in a follow-up and support group for individuals
- with obesity (LE: 1a, Shekelle),[7] (LE: 2, AACE/G4GAC)[28] (LE: 4, Oxford)[29]
- Implementing periodic measurements of micronutrients and macronutrients for each patient individually (LE: 4, Shekelle),[7] (LE: expert consensus, GRADE).[8]
- Providing postoperative nutritional counseling and initiating multivitamin supplementation (by a nutrition professional') (LE: expert consensus, GRADE),[8] (LE: High; GRADE),[26] (NE: 1, AACE/G4GAC),[28] (LE: 2-5, Oxford).[29]
- Reassessing the patient's metabolic status and adjusting pharmacologic therapies (LE: 4, Shekelle).[7]
- Performing bone densitometry every two years (LE: D, AACE G4GAC)[28]
- Conducting an active search for gastrointestinal symptoms, such as gastroesophageal reflux, dumping syndrome, small bowel bacterial overgrowth, gastrojejunal anastomotic strictures, *Helicobacter pylori* infection, and presence of gastric ulcers, fistulas, cholecystopathies or hernias (LE: 2; AACE/G4GAC).[28]
- Reevaluating the presence of OSAHS and considering the need for positive pressure devices (LE: 4; AACE).[26]

Section 4 - Recommendations for the initial assessment of the patient who has experienced weight loss by the plastic surgery service

Context: Patients who have experienced massive weight loss, whether due to medical or surgical interventions, and have undergone significant physical changes must be assessed by the plastic surgery service, including an evaluation of the affected body areas. Figure 7 illustrates the flowchart for Section 4.

Summary of recommendations:

4.A Criteria for the performance of body contouring surgery: Body contouring surgery must only be performed after the patient has undergone bariatric surgery or has experienced massive weight loss (LE: 3, AACE/G4GAC),[28] provided that they meet the following criteria: BMI <30kg/m2 or loss of at least 50% of excess weight (expert recommendation) and weight stability for 12 months following bariatric surgery (LE: D, AACE/G4GAC)[28] or 6 months in patients under medical treatment (expert recommendation).

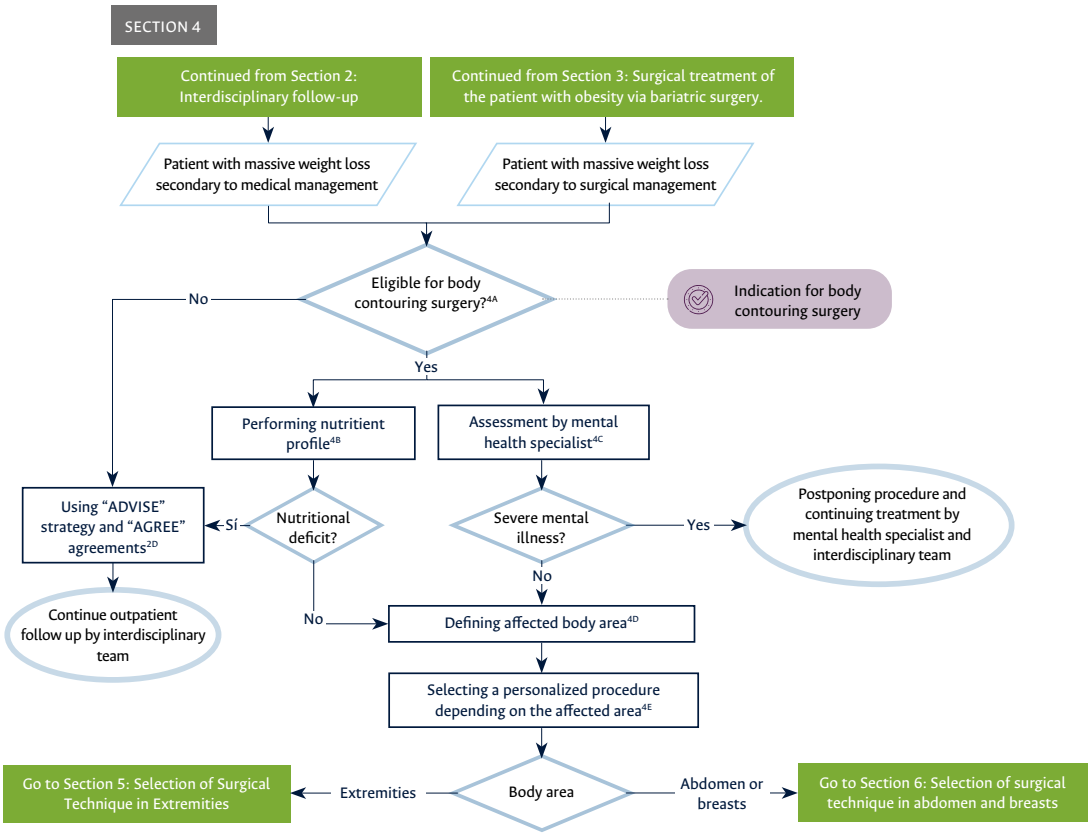

Figure 7. Flowchart for the initial assessment of a patient who has experienced weight loss by the plastic surgery service.

4.B Nutritional profile: Prior to evaluating the nutritional profile of patients who have undergone significant weight loss, it is necessary to obtain data from the following laboratory tests; if any of these tests are unavailable, they must be performed (expert recommendation): complete blood count; liver function tests, including blood albumin test and pre-albumin blood test; electrolyte panel (Na, K, Cl, Ca, Mg); blood glucose test; ferrokinetic profile: mean corpuscular volume, mean corpuscular hemoglobin, reticulocyte count, blood ferritin level, transferrin test and transferrin saturation index; vitamin B12 test; vitamin D test; folic acid test; kidney function tests; and thyroid function tests.

4.C Assessment by a mental health specialist: An assessment by the psychology service must be requested, in order to confirm or rule out the presence of a serious mental disease using the strategy described above (expert recommendation), including: major depressive disorder or anxiety, body dysmorphic disorder, and eating disorders.

4.D Determining the affected area: To determine whether the surgical procedure will have an aesthetic or functional purpose, the affected body area must be determined using the Iglesias classification (expert recommendation):

- Abdomen: Iglesias grade >III, Iglesias grade II with skin changes (intertrigo), or limitation of mobility.
- Thighs, arms, or back: Iglesias grade II, skin changes, or limitation of mobility.
- Breast: Iglesias grade III.

4.E Personalized selection of reconstructive surgical procedure(s): In patients with more than one body area affected, the possibility of performing more than one reconstructive procedure in the same surgical stage must be evaluated taking into account the following criteria (expert recommendation): The patient must be under 70 years of age, the operative time must

be <6 hours, and the patient must have an ASA I or II classification. If these criteria are met, the following indications must be considered when performing the procedures (expert recommendation): beginning with the body area that is most affected and minimizing the number of position changes that affect the areas to be operated on during the transoperative period.

Section 5 - Recommendations for the selection of the surgical technique to be used to remove excess skin on the extremities of patients with massive weight loss

Context: Patients with an indication for a plastic surgery procedure on the extremities due to flaccidity or excess skin caused by massive weight loss must be evaluated to define the most appropriate surgical technique depending on their anatomy and the expected final aesthetic outcome. Figure 8 illustrates the flowchart for Section 5.

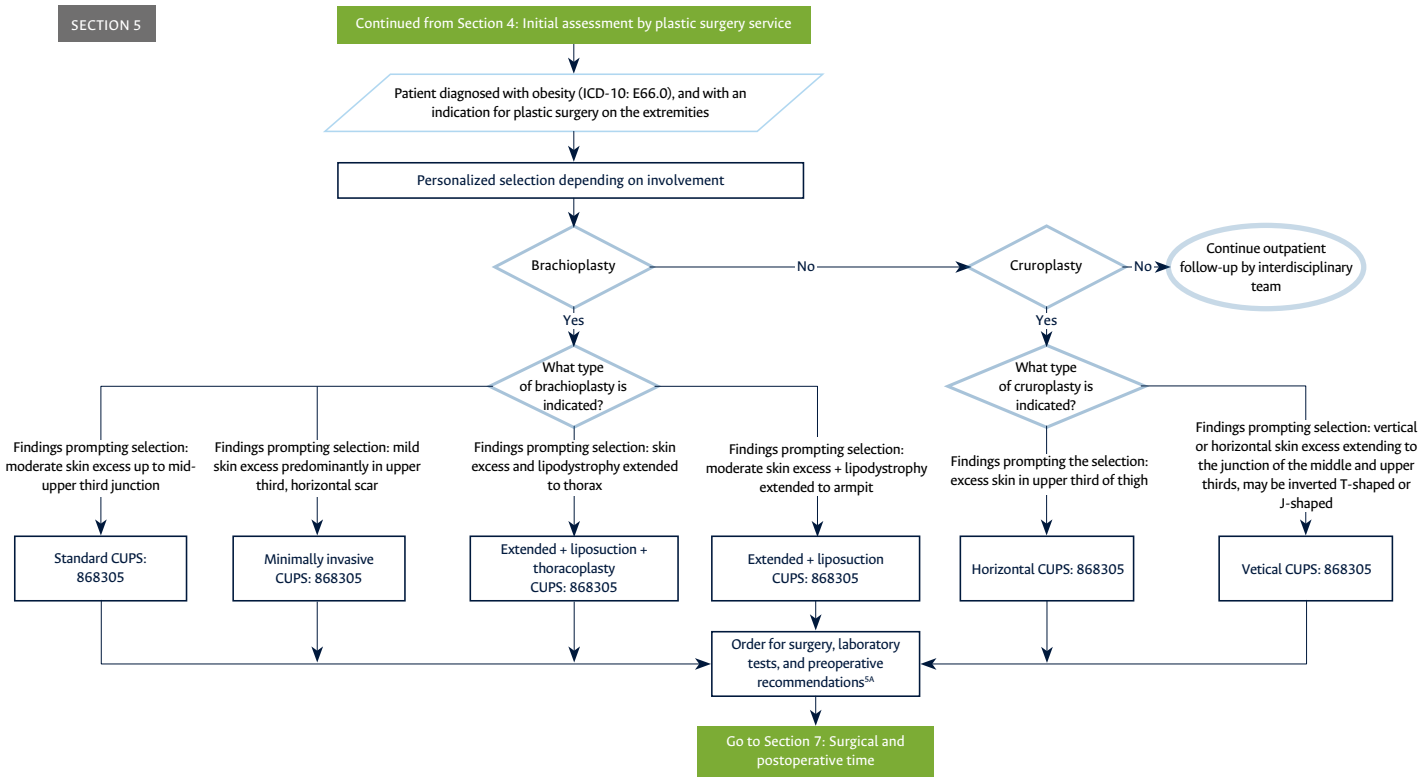

Figure 8. Flowchart of the surgical technique to be used to remove the excess skin on the extremities of the patient who has experienced massive weight loss.
ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th Revision.
CUPS: Unified Classification of Health Procedures in Colombia by its Spanish acronym.

Summary of recommendations:

5.A Pre-operative recommendations: The following tests must be performed prior to surgery (expert recommendation): thyroid function tests (thyroid stimulating hormone test and free thyroxine (T4) test), complete blood count, prothrombin time and INR (PT/INR) test, electrocardiogram, and chest X-ray. Moreover, the anesthesia service must assess the patient based on the results of these tests.

Homeopathic medications must also be discontinued. If the patient is unable to cease smoking, they must be advised to refrain from smoking for four weeks before the surgical treatment.

Section 6 - Recommendations for the selection of the surgical technique to be used to remove excess skin in the abdomen and breasts of the patient who has experienced massive weight loss

Context: Patients with an indication for plastic surgery in the abdomen or breasts due to flaccidity or excess skin caused by massive weight loss must undergo an evaluation to select the most appropriate surgical technique based on their anatomy and the expected final esthetic outcome. Figure 9 illustrates the flowchart for Section 6.

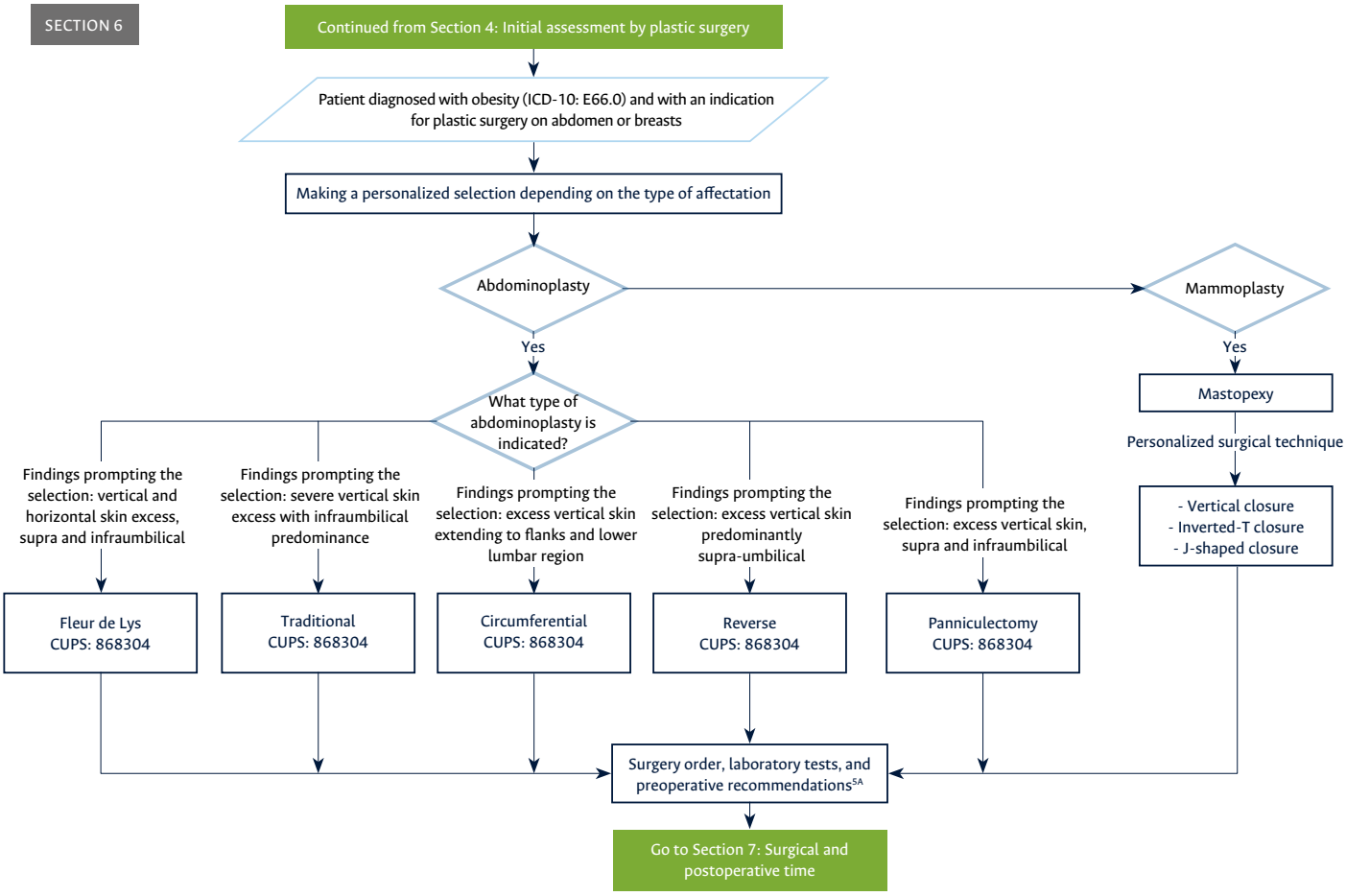

Figure 9. Flowchart for selecting surgical techniques to remove excess skin on the abdomen and breasts in patients who have experienced massive weight loss.
ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th Revision.
CUPS: Unified Classification of Health Procedures in Colombia

Summary of recommendations:

6. A Abdominoplasty: Upon assessing the patient's need for abdominoplasty, the most appropriate intervention is selected depending on individual clinical findings. Thus, if there is both vertical and horizontal excess skin in the supra- and infra-umbilical region, the recommended option is a Fleur-de-lis abdominoplasty (CUPS: 868304). If vertical skin excess is mainly concentrated on the supraumbilical region, the recommendation is to perform a traditional abdominoplasty (CUPS: 868304). If vertical excess skin extends to the flanks and lower lumbar region, the indicated option is a circumferential abdominoplasty (CUPS: 868304). If excess skin is severe and predominates in the infraumbilical region, lipectomy or panniculectomy is recommended (CUPS: 868304). Finally, if there is excess vertical skin in the suprapubic region, the recommendation is to perform a reverse abdominoplasty (CUPS: 868304).

6.B Mammoplasty: If it is concluded that the patient does not require abdominoplasty, the subsequent step is to assess the need for mammoplasty. If the answer is yes, a mastopexy is performed using a personalized surgical technique, which may include vertical closure, inverted T-closure, or J-closure.
6. C Outpatient follow-up: If neither abdominoplasty nor mammoplasty are indicated, it is suggested to continue outpatient follow-up by an interdisciplinary team.
6. D Surgery: If it is decided to proceed with surgery (abdominoplasty or mammoplasty), laboratory tests must be requested and the corresponding pre-surgical recommendations must be complied with. Then, the process continues to the next Section, which discusses surgical time and postoperative care.

Section 7 - Recommendations for the definition of operative time and postoperative care

Context: Surgical time and postoperative strategies in patients undergoing plastic surgery must be personalized. Thus, the focus must be the optimal recovery of patients, ensuring adequate postoperative care and outpatient clinical follow-up. Figure 10 illustrates the Section 7 flowchart.

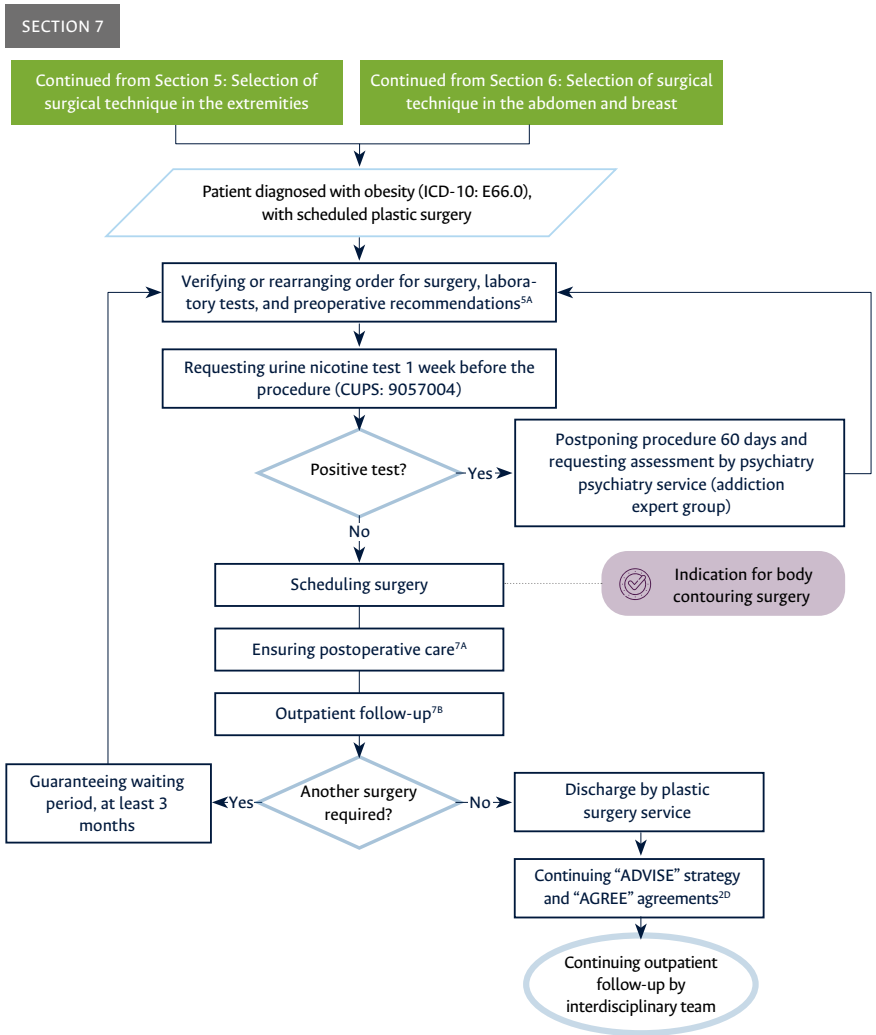

Figure 10. Flowchart of surgical time and postoperative care definition.
ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th Revision.
CUPS: Unified Classification of Health Procedures in Colombia

Summary of recommendations:

7.A Postoperative care: It is recommended to implement the following measures in the post-operative care of patients undergoing plastic surgery interventions (expert recommendation):

- Promoting early ambulation.
- Administering thromboprophylaxis with low molecular weight heparins (adjusted to the patient's body weight) for 15 days starting the day after the surgery.
- Removing drainage when the amount drained is <30mL in 24 hours.
- Starting antibiotic therapy with first generation cephalosporins and maintaining it until the drainage is removed.
- Wearing compression stockings and a girdle for 2 and 6 weeks, respectively.
- Removing the bladder catheter the day after surgery.
- Initiating the use of an incentive spirometer in the postoperative period in patients undergoing lipectomy.

7.B Outpatient follow-up: Outpatient follow-up will be as outlined below (expert recommendation):

- First follow-up: 3 days after discharge and focused on evaluating the amount of fluid drained to define the removal of the drainage.
- Second follow-up: 10 days after discharge to detect the presence of hematomas, seromas, flap necrosis, or suture dehiscence.
- Third follow-up: 1 month after discharge to evaluate the healing process and the presence of collections associated with this process.
- Fourth and fifth follow-up: 3 and 6 months after the surgical procedure, respectively, to evaluate healing progress and edema reduction.
- Sixth follow-up: 1 year after the surgical procedure to evaluate scar revision requirements and to decide on discharge from the plastic surgery service in case no further follow-up is required.

Section 8 - Checkpoints

The checkpoints for the EBCS, which were established considering key moments in the comprehensive care of patients with obesity or massive weight loss, are presented below:

1. All patients with a confirmed diagnosis of obesity must be referred to a specialized obesity consultation, since the assessment by the specialized team is essential for the initial approach to these patients and for providing comprehensive and interdisciplinary care.
2. A comprehensive assessment of patients with obesity by an interdisciplinary team is necessary, as this assessment provides objective information about the patients.
3. Bariatric surgery must be performed on patients who meet the criteria for this procedure, as this point allows for an indirect assessment of the surgical care process.
4. Body contouring surgery in patients with massive weight loss who are eligible for this procedure allows for indirect evaluation of the surgical care process.

Implementation and updating

A multi-stage approach is proposed to implement the EBCS and evaluate adherence to these recommendations. First, an interdisciplinary team will be created, comprising members of the development group and representatives of the administrative and clinical areas of the referral university hospital who can support the implementation process; priority will be given to information technology staff. This team will be key to identifying barriers and facilitators of the implementation process.

Subsequently, two approaches will be adopted to address possible EBCS implementation actions. The first will focus on the dissemination of the clinical algorithm and its checkpoints through educational activities, such as face-to-face and pre-recorded educational talks, and dissemination using social networks and institutional billboards. The second approach will focus on developing administrative strategies that utilize information technology and electronic health record software to generate interactive prompts and reminders that are incorporated into educational activities.

Finally, the assessment of adherence to the EBCS will include three components: i) assessment of EBCS knowledge; ii) assessment of adherence using administrative information sources; and iii) evaluation of impact (clinical, financial, and patient-reported) through additional studies in priority areas of the hospital. The implementation process will take place in stages other than those of the development process, thereby allowing the identification of the best implementation solutions for this EBCS.

The EBCS will be updated in accordance with the stipulated institutional processes. To this end, the development group has set a time limit of 3 to 5 years for updating the EBCS, taking into account various critical aspects: i) the volume of evidence currently available, ii) the availability of new evidence that may have an impact on the comprehensive care of patients with obesity or massive weight loss, iii) the quality of the evidence available at the time of EBCS development, and iv) the availability of institutional resources for the implementation and updating of the standard.

Conclusions

The evidence-based clinical recommendations included in this EBCS are intended to standardize practices and actions related to the diagnosis, treatment, and follow-up of adult patients with obesity, as well as the surgical treatment of patients who have experienced massive weight loss in Colombia and even in the region. In this sense, the algorithm and clinical recommendations presented here aim to optimize the use of resources and improve the quality of care provided to this population and, therefore, their health outcomes. Finally, it is worth noting that this article can also be used as an educational tool in undergraduate and postgraduate studies for health professionals involved in the care of patients with this condition.

Conflicts of interest

None stated by the authors.

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Supplement 1. Reporting tables detailing the search strategies used by the endocrinology and plastic surgery subgroup.

Database: MEDLINE

Type of search	Clinical practice guidelines
Database	MEDLINE
Platform	PubMed
Search date	21/04/2021 21:03:01
Search date range	Last 10 years
Language restrictions	None
Other restrictions	None
Search strategy	"(((((((adult[MeSH Terms]) OR (adults[MeSH Terms])) OR (adultos[Title/Abstract])) AND ((((((((((((((((((((obesity[MeSH Terms]) OR (abdominal obesities[MeSH Terms])) OR (Obesities, Abdominal[Title/Abstract])) OR (abdominal obesity[MeSH Terms])) OR (central obesity[MeSH Terms])) OR (central obesities[MeSH Terms])) OR (Obesities, Central[Title/Abstract])) OR (obesity, central[MeSH Terms])) OR (obesity, visceral[MeSH Terms])) OR (visceral obesity[MeSH Terms])) OR (obesities, visceral[MeSH Terms])) OR (visceral obesities[MeSH Terms])) OR (morbid obesities[MeSH Terms])) OR (morbid obesity[MeSH Terms])) OR (obesity, morbid[MeSH Terms])) OR (obesities, morbid[MeSH Terms])) OR (Obesity, Severe[Title/Abstract])) OR (Obesities, Severe[Title/Abstract])) OR (Severe Obesities[Title/Abstract])) OR (Severe Obesity[Title/Abstract]))) AND ((((((((((((Diagnosis[MeSH Terms]) OR (diagnoses[MeSH Terms])) OR (Diagnose[Title/Abstract])) OR (Diagnoses[Title/Abstract] AND Examinations[Title/Abstract])) OR (Examinations[Title/Abstract] AND Diagnoses[Title/Abstract])) OR (diagnoses, postmortem[MeSH Terms])) OR (diagnosis, postmortem[MeSH Terms])) OR (Postmortem Diagnoses[Title/Abstract])) OR (Antemortem Diagnosis[Title/Abstract])) OR (Antemortem Diagnoses[Title/Abstract])) OR (diagnoses, antemortem[MeSH Terms])) OR (diagnosis, antemortem[MeSH Terms]))) AND therapeutics[MeSH Terms]) OR (therapeutic[Title/Abstract])) OR (Therapy[Title/Abstract])) OR (Therapies[Title/Abstract])) OR (Treatment[Title/Abstract])) OR (Treatments[Title/Abstract])) OR (disease management[MeSH Terms])) OR (disease managements[MeSH Terms])) OR (safety manegement[Title/Abstract])) OR (Management, Safety[Title/Abstract])) OR (Safety Culture[Title/Abstract])) OR (Culture, Safety[Title/Abstract])) OR (Safety Cultures[Title/Abstract])) OR (Hazard Management[Title/Abstract])) OR (Management, Hazard[Title/Abstract])) OR (Hazard Control[Title/Abstract])) OR (Control, Hazard[Title/Abstract])) OR (Hazard Controls[Title/Abstract])) OR (Hazard Surveillance Program[Title/Abstract])) OR (Hazard Surveillance Programs[Title/Abstract])) OR (Program, Hazard Surveillance[Title/Abstract])) OR (Programs, Hazard Surveillance[Title/Abstract])) OR (Surveillance Program, Hazard[Title/Abstract])) OR (Surveillance Programs, OR (medication therapy management[MeSH Terms])) OR (management, medication therapy[MeSH Terms])) OR (therapy management, medication[MeSH Terms])) OR (drug therapy management[MeSH Terms])) OR (management, drug therapy[MeSH Terms])) OR (therapy management, drug[MeSH Terms])) OR (MEDICARE Prescription Drug Improvement[Title/Abstract] AND Modernization Act of 2003[Title/Abstract])) OR (Obesity Management[Title/Abstract])) OR (Management, Obesity[Title/Abstract])) OR (Managements, Obesity[Title/Abstract])) OR (Obesity Managements[Title/Abstract])) OR (Obesity Management Systems[Title/Abstract])) OR (Management System, Obesity[Title/Abstract])) OR (Management Systems, Obesity[Title/Abstract])) OR (Obesity Management System[Title/Abstract])) OR (System, Obesity Management[Title/Abstract])) OR (Systems, Obesity Management[Title/Abstract])) OR (surgical procedures, operative[MeSH Terms])) OR (operative procedure[MeSH Terms])) OR (operative procedures[MeSH Terms])) OR (procedure, operative[MeSH Terms])) OR (procedures, operative[MeSH Terms])) OR (surgical procedure, operative[MeSH Terms])) OR (Operative Surgical Procedures[Title/Abstract])) OR (Procedure, Operative Surgical[Title/Abstract])) OR (Procedures, Operative Surgical[Title/Abstract])) OR (Surgical Procedures[Title/Abstract])) OR (Procedure, Surgical[Title/Abstract])) OR (Procedures, Surgical[Title/Abstract])) OR (Surgical Procedure[Title/Abstract])) OR (Operative Surgical Procedure[Title/Abstract])) OR (Surgery, Ghost[Title/Abstract])) OR (Ghost Surgery[Title/Abstract])) OR (nutrition therapy[MeSH Terms])) OR (therapy, nutrition[MeSH Terms])) OR (medical nutrition therapy[MeSH Terms])) OR (nutrition therapy, medical[MeSH Terms])) OR (therapy, medical nutrition[MeSH Terms])) OR (behavior therapy[MeSH Terms])) OR (behavior therapies[MeSH Terms])) OR (therapy, conditioning[MeSH Terms])) OR (conditioning therapy[MeSH Terms])) OR (Conditioning Therapies[MeSH Terms])) OR (therapy, behavior[MeSH Terms])) OR (Behavior Treatment[Title/Abstract])) OR (Treatment, Behavior[Title/Abstract])) OR (behavior modification[MeSH Terms])) OR (behavior modifications[MeSH Terms])) OR (modification, behavior[MeSH Terms]))) AND (((((((practice guideline[MeSH Terms]) OR (Clinical Guidelines[Title/Abstract])) OR (Best Practices[Title/Abstract])) OR (Best Practice[Title/Abstract])) NOT (Clinical Practice Guideline[Title/Abstract])) OR (clinical practice guideline[MeSH Terms])) OR (practice guidelines as topic[MeSH Terms])) AND (2011:2021[pdat])) NOT ((((((((((children[MeSH Terms]) OR (adolescence[MeSH Terms])) OR (adolescent[MeSH Terms])) OR (child[MeSH Terms])) OR (infant[MeSH Terms])) OR (infants[MeSH Terms])) OR (teens[MeSH Terms])) OR (teen[MeSH Terms])) OR (teenagers[MeSH Terms])) OR (teenager[MeSH Terms]))"„„"((""adult""[MeSH Terms] OR ""adult""[MeSH Terms] OR ""adultos""[Title/Abstract]) AND (""Obesity""[MeSH Terms] OR ""obesity, abdominal""[MeSH Terms] OR ((""obeses""[All Fields] OR ""Obesity""[MeSH Terms] OR ""Obesity""[All Fields] OR ""obese""[All Fields] OR ""Obesities""[All Fields] OR ""obesitys""[All Fields]) AND ""Abdominal""[Title/Abstract]) OR ""obesity, abdominal""[MeSH Terms] OR ""obesity,

Search strategy	abdominal""[MeSH Terms] OR ""obesity, abdominal""[MeSH Terms] OR (((""obeses""[All Fields] OR ""Obesity""[MeSH Terms] OR ""Obesity""[All Fields] OR ""obese""[All Fields] OR ""Obesities""[All Fields] OR ""obesity s""[All Fields]) AND ""Central""[Title/Abstract]) OR ""obesity, abdominal""[MeSH Terms] OR ""obesity, abdominal""[MeSH Terms] OR ""obesity, abdominal""[MeSH Terms] OR ""obesity, abdominal""[MeSH Terms] OR ""obesity, abdominal""[MeSH Terms] OR ""obesity, morbid""[MeSH Terms] OR ""obesity, morbid""[MeSH Terms] OR ""obesity, morbid""[MeSH Terms] OR ""obesity, morbid""[MeSH Terms] OR ""obesity severe""[Title/Abstract] OR ((""obeses""[All Fields] OR ""Obesity""[MeSH Terms] OR ""Obesity""[All Fields] OR ""obese""[All Fields] OR ""Obesities""[All Fields] OR ""obesity s""[All Fields]) AND ""Severe""[Title/Abstract]) OR ((""sever""[All Fields] OR ""Severe""[All Fields] OR ""severed""[All Fields] OR ""severely""[All Fields] OR ""severer""[All Fields] OR ""severes""[All Fields] OR ""severing""[All Fields] OR ""severities""[All Fields] OR ""severity""[All Fields] OR ""severs""[All Fields]) AND ""Obesities""[Title/Abstract]) OR ""severe obesity""[Title/Abstract]) AND (""Diagnosis""[MeSH Terms] OR ""Diagnosis""[MeSH Terms] OR ""Diagnose""[Title/Abstract] OR (""Diagnoses""[Title/Abstract] AND ""Examinations""[Title/Abstract]) OR (""Examinations""[Title/Abstract] AND ""Diagnoses""[Title/Abstract]) OR ""Diagnosis""[MeSH Terms] OR ""Diagnosis""[MeSH Terms] OR ""postmortem diagnoses""[Title/Abstract] OR ""antemortem diagnosis""[Title/Abstract] OR ""antemortem diagnoses""[Title/Abstract] OR ""Diagnosis""[MeSH Terms] OR ""Diagnosis""[MeSH Terms]) AND (""therapeutics""[MeSH Terms] OR ""therapeutic""[Title/Abstract] OR ""Therapy""[Title/Abstract] OR ""Therapies""[Title/Abstract] OR ""Treatment""[Title/Abstract] OR ""Treatments""[Title/Abstract] OR ""disease management""[MeSH Terms] OR ""disease management""[MeSH Terms] OR (((""Safety""[MeSH Terms] OR ""Safety""[All Fields] OR ""safeties""[All Fields]) AND ""manegement""[Title/Abstract]) OR ""management safety""[Title/Abstract] OR ""safety culture""[Title/Abstract] OR ""culture safety""[Title/Abstract] OR ""safety cultures""[Title/Abstract] OR ""hazard management""[Title/Abstract] OR ""management hazard""[Title/Abstract] OR ""hazard control""[Title/Abstract] OR ""control hazard""[Title/Abstract] OR ""hazard controls""[Title/Abstract] OR ""hazard surveillance program""[Title/Abstract] OR ((""Hazard""[All Fields] OR ""hazard s""[All Fields] OR ""hazardous""[All Fields] OR ""hazardously""[All Fields] OR ""hazardousness""[All Fields] OR ""hazards""[All Fields]) AND ""surveillance programs""[Title/Abstract]) OR ((""Program""[All Fields] OR ""program s""[All Fields] OR ""programe""[All Fields] OR ""programed""[All Fields] OR ""programes""[All Fields] OR ""programing""[All Fields] OR ""programmability""[All Fields] OR ""programmable""[All Fields] OR ""programmably""[All Fields] OR ""programme""[All Fields] OR ""programme s""[All Fields] OR ""programmed""[All Fields] OR ""programmer""[All Fields] OR ""programmer s""[All Fields] OR ""programmers""[All Fields] OR ""programmes""[All Fields] OR ""programming""[All Fields] OR ""programmings""[All Fields] OR ""Programs""[All Fields]) AND ""hazard surveillance""[Title/Abstract]) OR ((""Program""[All Fields] OR ""program s""[All Fields] OR ""programe""[All Fields] OR ""programed""[All Fields] OR ""programes""[All Fields] OR ""programing""[All Fields] OR ""programmability""[All Fields] OR ""programmable""[All Fields] OR ""programmably""[All Fields] OR ""programme""[All Fields] OR ""programme s""[All Fields] OR ""programmed""[All Fields] OR ""programmer""[All Fields] OR ""programmer s""[All Fields] OR ""programmers""[All Fields] OR ""programmes""[All Fields] OR ""programming""[All Fields] OR ""programmings""[All Fields] OR ""Programs""[All Fields]) AND ""hazard surveillance""[Title/Abstract]) OR ((""epidemiology""[MeSH Subheading] OR ""epidemiology""[All Fields] OR ""Surveillance""[All Fields] OR ""epidemiology""[MeSH Terms] OR ""surveilance""[All Fields] OR ""surveillances""[All Fields] OR ""surveilled""[All Fields] OR ""surveillence""[All Fields]) AND ""program hazard""[Title/Abstract]) OR ((""epidemiology""[MeSH Subheading] OR ""epidemiology""[All Fields] OR ""Surveillance""[All Fields] OR ""epidemiology""[MeSH Terms] OR ""surveilance""[All Fields] OR ""surveillances""[All Fields] OR ""surveilled""[All Fields] OR ""surveillence""[All Fields]) AND ""programs hazard""[Title/Abstract]) OR ""medication therapy management""[MeSH Terms] OR ""medication therapy management""[MeSH Terms] OR ""medication therapy management""[MeSH Terms] OR ""medication therapy management""[MeSH Terms] OR ""medication therapy management""[MeSH Terms] OR (""medicare prescription drug improvement""[Title/Abstract] AND ""modernization act of 2003""[Title/Abstract]) OR ""obesity management""[Title/Abstract] OR ""management obesity""[Title/Abstract] OR ((""manage""[All Fields] OR ""managed""[All Fields] OR ""management s""[All Fields] OR ""Managements""[All Fields] OR ""manager""[All Fields] OR ""manager s""[All Fields] OR ""managers""[All Fields] OR ""manages""[All Fields] OR ""managing""[All Fields] OR ""managment""[All Fields] OR ""organization and administration""[MeSH Terms] OR (""organization""[All Fields] AND ""administration""[All Fields]) OR ""organization and administration""[All Fields] OR ""Management""[All Fields] OR ""disease management""[MeSH Terms] OR (""disease""[All Fields] AND ""Management""[All Fields]) OR ""disease management""[All Fields]) AND ""Obesity""[Title/Abstract]) OR (((""obeses""[All Fields] OR ""Obesity""[MeSH Terms] OR ""Obesity""[All Fields] OR ""obese""[All Fields] OR ""Obesities""[All Fields] OR ""obesity s""[All Fields]) AND ""Managements""[Title/Abstract]) OR ""obesity management systems""[Title/Abstract] OR ((""manage""[All Fields] OR ""managed""[All Fields] OR ""management s""[All Fields] OR ""Managements""[All Fields] OR ""manager""[All Fields] OR ""manager s""[All Fields] OR ""managers""[All Fields] OR ""manages""[All Fields] OR ""managing""[All Fields] OR ""managment""[All Fields] OR ""organization and administration""[MeSH Terms] OR (""organization""[All Fields] AND ""administration""[All Fields]) OR ""organization and administration""[All Fields] OR ""Management""[All Fields] OR ""disease management""[MeSH Terms] OR (""disease""[All Fields] AND ""Management""[All Fields]) OR ""disease

Search strategy	management""[All Fields]) AND ""system obesity""[Title/Abstract]) OR (((""manage""[All Fields] OR ""managed""[All Fields] OR ""management s""[All Fields] OR ""Managements""[All Fields] OR ""manager""[All Fields] OR ""manager s""[All Fields] OR ""managers""[All Fields] OR ""manages""[All Fields] OR ""managing""[All Fields] OR ""managment""[All Fields] OR ""organization and administration""[MeSH Terms] OR (""organization""[All Fields] AND ""administration""[All Fields]) OR ""organization and administration""[All Fields] OR ""Management""[All Fields] OR ""disease management""[MeSH Terms] OR (""disease""[All Fields] AND ""Management""[All Fields]) OR ""disease management""[All Fields]) AND ""systems obesity""[Title/Abstract]) OR ""obesity management system""[Title/Abstract] OR ((""drug delivery systems""[MeSH Terms] OR (""Drug""[All Fields] AND ""delivery""[All Fields] AND ""Systems""[All Fields]) OR ""drug delivery systems""[All Fields] OR ""System""[All Fields] OR ""system s""[All Fields] OR ""Systems""[All Fields]) AND ""obesity management""[Title/Abstract]) OR ((""drug delivery systems""[MeSH Terms] OR (""Drug""[All Fields] AND ""delivery""[All Fields] AND ""Systems""[All Fields]) OR ""drug delivery systems""[All Fields] OR ""System""[All Fields] OR ""system s""[All Fields] OR ""Systems""[All Fields]) AND ""obesity management""[Title/Abstract]) OR ""surgical procedures, operative""[MeSH Terms] OR ""surgical procedures, operative""[MeSH Terms] OR ""surgical procedures, operative""[MeSH Terms] OR ""surgical procedures, operative""[MeSH Terms] OR ""surgical procedures, operative""[MeSH Terms] OR ""surgical procedures, operative""[MeSH Terms] OR ""operative surgical procedures""[Title/Abstract] OR ((""methods""[MeSH Terms] OR ""methods""[All Fields] OR ""Procedure""[All Fields] OR ""methods""[MeSH Subheading] OR ""Procedures""[All Fields] OR ""procedural""[All Fields] OR ""procedurally""[All Fields] OR ""procedure s""[All Fields]) AND ""operative surgical""[Title/Abstract]) OR ""procedures operative surgical""[Title/Abstract] OR ""surgical procedures""[Title/Abstract] OR ""procedure surgical""[Title/Abstract] OR ""procedures surgical""[Title/Abstract] OR ""surgical procedure""[Title/Abstract] OR ""operative surgical procedure""[Title/Abstract] OR ((""Surgery""[MeSH Subheading] OR ""Surgery""[All Fields] OR ""surgical procedures, operative""[MeSH Terms] OR (""Surgical""[All Fields] AND ""Procedures""[All Fields] AND ""Operative""[All Fields]) OR ""operative surgical procedures""[All Fields] OR ""general surgery""[MeSH Terms] OR (""general""[All Fields] AND ""Surgery""[All Fields]) OR ""general surgery""[All Fields] OR ""surgery s""[All Fields] OR ""surgerys""[All Fields] OR ""surgeries""[All Fields]) AND ""Ghost""[Title/Abstract]) OR ""ghost surgery""[Title/Abstract] OR (""nutritional support""[MeSH Terms] OR ""nutrition therapy""[MeSH Terms]) OR ""nutrition therapy""[MeSH Terms] OR ""nutrition therapy""[MeSH Terms] OR ""nutrition therapy""[MeSH Terms] OR ""nutrition therapy""[MeSH Terms] OR ""behavior therapy""[MeSH Terms] OR ""behavior therapy""[MeSH Terms] OR ""behavior therapy""[MeSH Terms] OR ""behavior therapy""[MeSH Terms] OR ""behavior therapy""[MeSH Terms] OR ""behavior therapy""[MeSH Terms] OR ""behavior treatment""[Title/Abstract] OR ""treatment behavior""[Title/Abstract] OR ""behavior therapy""[MeSH Terms] OR ""behavior therapy""[MeSH Terms] OR ""behavior therapy""[MeSH Terms]) AND (((((""practicability""[All Fields] OR ""practicable""[All Fields] OR ""practical""[All Fields] OR ""practicalities""[All Fields] OR ""practicality""[All Fields] OR ""practically""[All Fields] OR ""practicals""[All Fields] OR ""Practice""[All Fields] OR ""practice s""[All Fields] OR ""practiced""[All Fields] OR ""Practices""[All Fields] OR ""practicing""[All Fields]) AND ""guidelines as topic""[MeSH Terms]) OR ""clinical guidelines""[Title/Abstract] OR ""best practices""[Title/Abstract] OR ""best practice""[Title/Abstract]) NOT ""clinical practice guideline""[Title/Abstract]) OR (((""nephron clin pract""[Journal] OR ""clin pract lond""[Journal] OR (""Clinical""[All Fields] AND ""Practice""[All Fields]) OR ""clinical practice""[All Fields]) AND ""guidelines as topic""[MeSH Terms]) OR ""practice guidelines as topic""[MeSH Terms]) AND 2011/01/01:2021/12/31[Date - Publication]) NOT (""child""[MeSH Terms] OR ""adolescent""[MeSH Terms] OR ""adolescent""[MeSH Terms] OR ""child""[MeSH Terms] OR ""infant""[MeSH Terms] OR ""infant""[MeSH Terms] OR ""adolescent""[MeSH Terms] OR ""adolescent""[MeSH Terms] OR ""adolescent""[MeSH Terms] OR ""adolescent""[MeSH Terms])" 232,21:03:01
References retrieved	232
References with no duplicates	232

Database: Embase

Type of search	Clinical practice guidelines
Database	EMBASE
Platform	ELSEVIER
Search date	04/06/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None

Search strategy	#19 #17 AND 'practice guideline'/de AND ('Article'/it OR 'Article in Press'/it OR 'Review'/it) #18 #17 AND 'practice guideline'/de #17 #15 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) AND [2017-2021]/py #16 #15 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) #15 #14 NOT #12 #14 #3 AND #11 AND #13 #13 'morbid obesity'/exp OR 'morbid obesity' OR 'obesity'/exp OR obesity OR 'abdominal obesity'/exp OR 'abdominal obesity' OR 'abdominal obesit*':ab,ti OR 'central obesit*':ab,ti OR 'visceral obesit*':ab,ti OR 'morbid obesit*':ab,ti OR 'severe obesit*':ab,ti #12 'child'/exp OR child #11 #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 #10 (disease* NEAR/2 management*):ab,ti #9 therap*:ab,ti OR treatment*:ab,ti #8 'disease management'/exp #7 'therapy'/exp #6 examination*:ab,ti #5 diagnos*:ab,ti #4 'diagnosis'/exp #3 #1 OR #2 #2 (guideline* NEAR/2 (clinical OR practice)):ab,ti #1 'practice guideline'/exp OR 'practice guideline'
References retrieved	596
References with no duplicates	596

Database: LILACS

Type of search	Clinical practice guidelines
Database	LILACS
Platform	VHL Regional Portal
Search date	21/04/2021
Search date range	Last 10 years
Language restrictions	None
Other restrictions	LILACS, Clinical Practice Guideline, Human, Adult
Search strategy	(Obesity AND (Diagnosis OR Treatment))
References retrieved	37
References with no duplicates	37

Compilers: Guidelines International Network (GIN)

Type of search	Clinical practice guidelines
Database	GIN
Platform	GIN
Search date	21/04/2021
Search date range	Last 10 years
Language restrictions	None
Other restrictions	None
Search strategy	"Obesity"
References retrieved	24
References with no duplicates	23

Developers: Agency for Healthcare Research and Quality (AHRQ)

Type of search	Clinical practice guidelines
Database	AHRQ
Platform	AHRQ
Search date	25/04/2021
Search date range	None
Language restrictions	None
Other restrictions	"in the title of the page"
Search strategy	"obesity treatment guidelines"; "Obesity treatment"; "obesity management"; "obesity therapy"; "obesity therapies"; "obesity diagnosis"
References retrieved	10
References with no duplicates	7

Compilers: CMA Info

Type of search	Clinical practice guidelines
Compiler	CMA Info
Platform	CMA Info
Search date	21/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	Adult
Search strategy	"obesity"
References retrieved	41
References with no duplicates	21

Developers: Biblioteca Guía Salud

Type of search	Clinical practice guidelines
Developer	Guía Salud España
Platform	Guía Salud España
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	None
Search strategy	"Obesidad"
References retrieved	0
References with no duplicates	0

Developers: Ministry of Health and Social Protection

Type of search	Clinical practice guidelines
Developer	Ministry of Health and Social Protection
Platform	Ministry of Health and Social Protection
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	None
Search strategy	"Obesidad"
References retrieved	1
References with no duplicates	1

Developers: Instituto de Evaluación Tecnológica en Salud (IETS)

Type of search	Clinical practice guidelines
Developer	IETS
Platform	IETS
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	None
Search strategy	"Obesidad"
References retrieved	0
References with no duplicates	0

Developers: Instituto Mexicano del Seguro Social (IMSS)

Type of search	Clinical practice guidelines
Developer	IMSS
Platform	IMSS
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	None
Search strategy	"Obesidad"
References retrieved	3
References with no duplicates	3

Developers: National Institute for Health and Clinical Excellence (NICE)

Type of search	Clinical practice guidelines
Developer	NICE
Platform	NICE
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	None
Search strategy	"Obesity"
References retrieved	5
References with no duplicates	1

Developers: WHOLIS

Type of search	Clinical practice guidelines
Developer	WHOLIS
Platform	WHOLIS
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	Clinical practice guidelines
Search strategy	"Obesidad"
References retrieved	3
References with no duplicates	3

Developers: World Health Organization (WHO)

Type of search	Clinical practice guidelines
Developer	WHO
Platform	WHO
Search date	21/04/2021
Search date range	Last 10 years
Language restrictions	None
Other restrictions	None
Search strategy	“Obesity”, “guidelines”, “adult”
References retrieved	3
References with no duplicates	1

Developers: Scottish Intercollegiate Guidelines Network (SIGN)

Type of search	Clinical practice guidelines
Developer	SIGN
Platform	SIGN
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	None
Search strategy	“Obesity”
References retrieved	0
References with no duplicates	0

Developers: Pan American Health Organization (PAHO)

Type of search	Clinical practice guidelines
Developer	PAHO
Platform	PAHO
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	None
Search strategy	“Obesity”
References retrieved	1
References with no duplicates	1

Developers: Australian Clinical Practice Guidelines (GPC Australia)

Type of search	Clinical practice guidelines
Developer	GPC Australia
Platform	GPC Australia
Search date	21/04/2021
Search date range	None
Language restrictions	None
Other restrictions	None
Search strategy	"Obesity"
References retrieved	0
References with no duplicates	0