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ISPRM/ESPRM Guidelines on Physical and Rehabilitation Medicine (PRM)  
professional practice for adults with obesity and related comorbidities

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## ABSTRACT

**Background:** The World Health Organization (WHO) has declared obesity as the largest global chronic health problem in adults. In the last years, attention has been drawn to the rehabilitative interventions for patients with obesity.

**Aim:** The aim of this manuscript is to provide Physical and Rehabilitation Medicine physicians with evidence-based recommendations for the rehabilitation of patients with obesity and related comorbidities.

**Design:** Evidence-based guidelines.

**Population:** Adults with overweight or obesity.

**Methods:** Guidelines were based on GRADE and WHO recommendations. A comprehensive search of the available evidence about rehabilitation treatments for obesity was performed, and 17 separate systematic literature reviews were conducted. For each outcome, estimates of the effects of rehabilitation treatments were computed and employed along with an assessment of quality of evidence, desirable and undesirable effects, values and preferences to formulate the recommendations. Recommendations were reviewed by a consensus expert panel using a modified Delphi process.

**Results:** We strongly recommend providing comprehensive multiprofessional and multidisciplinary interventions including exercise, diet and behavioral or cognitive-behavioral therapy. The nutritional component of these treatments should include diets with either a high-protein or a low-fat content. It is strongly recommended to prescribe frequent moderate aerobic exercise. We strongly recommend providing cognitive-behavioral interventions as the behavioral component of rehabilitation programs.

**Conclusion:** PRM physicians should lead multidisciplinary teams providing comprehensive and individualized rehabilitation programs for patients with overweight or obesity. These guidelines were endorsed by the

International Society of Physical and Rehabilitation Medicine (ISPRM) and  
by the European Society of Physical and Rehabilitation Medicine (ESPRM).

*Key words:* Obesity, Overweight, Rehabilitation, Lifestyle, Physical and  
Rehabilitation Medicine, Guidelines

## **ISPRM/ESPRM Guidelines on Physical and Rehabilitation Medicine professional practice for adults with obesity and related comorbidities**

### **INTRODUCTION**

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Insert Table 1 here

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### **Definitions and epidemiology**

Overweight and obesity are abnormal or excessive fat accumulation that may impair health (1). Diagnosis of such conditions is based on examination of the person's Body Mass Index (BMI), calculated as weight in kg/height in m<sup>2</sup>. Cutoff values for BMI are reported in Table 2.

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Insert Table 2 here

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Overweight and obesity are epidemic diseases affecting over 600 million adults worldwide and have been declared by the World Health Organization (WHO) as the leading global chronic health issues (2). It is estimated that the overall overweight and obesity rate in Europe is 53.1%, with 15.9% of adults being obese, with no differences between males and females, and that overweight and obese persons double the number of persons with normal weight in the USA (3,4). Importantly, trends are steadily increasing in both prevalence and overall mean BMI across the whole globe (4,5). Consequences of the spread of this epidemics are manifold and span a broad range of economic and public health effects (4,6). These consequences are mainly due to the fact that overweight and obese patients are at high risk to develop many comorbidities.

## **Comorbidities associated with overweight and obesity**

Overweight and obesity are gateway to ill health. Both conditions are associated to various types of adipose tissue dysfunction, including impairment in adipocyte storage and release of fatty acids, abnormal production of cytokines, hormonal derangement and mechanical effects of excess adiposity (7). Consequently, overweight and obese adults have a higher risk of developing medical conditions such as type 2 diabetes, all cardiovascular diseases, chronic back pain, obstructive sleep apnoea syndrome, obesity hypoventilation syndrome, gallbladder disease, liver diseases, gout, and several common forms of cancer (7–9). In addition, overweight and obese patients are at risk for mental health issues such as depression and anxiety disorders, in particular when Binge Eating Disorder co-occurs (10). Due to the high rate of comorbidities, overweight and obesity are associated with disability, reduced quality of life and higher mortality.

## **Overweight, obesity and disability**

Both direct and indirect links exist between overweight and obesity and disability. Excess of adipose tissue mass impacts in postural control and reduces functional mobility, since it has a detrimental effect on stability and walking speed. Due to the load on weight bearing joints, pain can be present. Furthermore, overweight and obesity are associated with impairment of cognitive functions, cause limitation in physical activities and restrict participation (11–13). In 2015, overweight and obesity found to contribute to 120 million disability-adjusted life-years, which represents 4.9% of the totality of the disability-adjusted life-years among adults (2). The management of these conditions, their comorbidities and the associated disability poses a significant challenge for Physical and Rehabilitation Medicine (PRM) physicians.

## **The role of Physical and Rehabilitation Medicine physicians**

The development of rehabilitation programs is mandatory to address the clinical needs of overweight and obese patients, to reduce the impact of the ensuing disability and, ultimately, the costs for the health system. Obesity is a chronic progressive disease requiring proper treatment based on the severity of disability and on the clinical status of the patient in post-acute and rehabilitation settings, as well as in the long term. PRM

physicians are therefore called to provide specialized treatment, but are at present mostly unprepared to treat patients with overweight and obesity (14,15). Existing clinical guidelines for the treatment and management of these conditions (e.g. 16–19) are not specifically focused on rehabilitation interventions and, in addition, their recommendations are not always based on meta-analyses and on the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach, which is the most rigorous and transparent norm for assessing the strength of the evidence. Providing PMR physicians with up-to-date and rigorous recommendations could help to enhance the standard of care to meet the needs of overweight and obese patients.

### **Context of these guidelines**

The European Union of Medical Specialists - PRM Section has published in 2017 an evidence-based position paper (15), developed according to the Methodology defined by its Professional Practice Committee (20), which defined the professional role of PRM physicians and provided clinical recommendations regarding the treatment of patients with overweight and obesity. Clinical recommendations regarded treatment of comorbidities, provision of leadership to multidisciplinary rehabilitation teams, use of a distinctive holistic perspective to the patient care process, development of rehabilitation protocols tailored according the characteristics of the patient's condition. Following that position paper, a Guideline Development Group (GDG) was established to create clinical guidelines for the treatment of patients with obesity specifically focusing on rehabilitation interventions.

## **METHODS**

The guideline creation process followed the WHO guidelines development process and the GRADE methodology (21–23). Its main steps were creating the GDG, planning the review process, formulating the questions in PICO format (Population, Intervention, Comparison, Outcome), performing a comprehensive search of the available evidence on rehabilitation interventions for overweight and obesity, conducting a systematic review for each question, performing a meta-analysis for each outcome, and formulating



recommendations based on the quality of the available evidence. The GDG was a panel of PRM physicians, endocrinologists, dietitians and clinical psychologists with experience in the field of rehabilitation of patients with obesity or in the methodology for the development of guidelines. Patients or representative from customer organizations were not involved. None of the participants to the GDG had any financial or intellectual conflict of interest during the study. Currently, updates or revisions of the guidelines have not been planned.

### **Systematic literature review**

Systematic reviews were based on a unique comprehensive search, which was performed in PubMed, EMBASE, Scopus and Cochrane Database of Systematic Reviews in May 2018. Studies were then screened for inclusion to each of the research questions. No language or publication date restrictions were used. Only data from randomized controlled trials and non-randomized controlled trials was considered. The target population of the guidelines were adult patients with overweight or obesity, with or without comorbidities. Accordingly, inclusion criteria were:

- Adult population;
- Included patients with BMI  $\geq 25$ ;
- Assessed the effect of lifestyle, nutritional, physical or psychological\behavioral treatments;
- Reported data about at least one of the critical or important outcomes.
- Had a follow-up period of at least 3 months.

Exclusion criteria were:

- Studies which included women in pregnancy;
- Pharmacologically induced obesity;
- Non-interventional studies
- Pharmacological treatment with anti-obesity medications
- Bariatric surgery approach

Research questions in PICO format and details about keywords employed during the electronic search are reported in Supplementary Digital Material I.

Decision about the critical, important and less important outcomes to be used during the guideline development process was based on discussion between the members of the GDG. Reduction of weight and BMI was considered critical since it is a fundamental requirement for health improvement, as it is associated with reduction of cardiovascular and cardiometabolic risk factors (24,25) and with clinical improvement in comorbidities (26) and it motivates adherence to treatment and further weight reduction (25). Since the treatment effect on weight and BMI could be confounded by increase in lean mass when rehabilitation treatments include exercise programs or suggest increased physical activity, the GDG decided to consider waist circumference alongside weight and BMI as a critical outcome. as it predicts visceral fat and is an index of central obesity. Waist circumference is associated with cardiovascular risk factors and comorbidities independently from BMI (27), and its reduction is associated with benefits in these domains (28).

Accordingly, critical outcomes were:

- weight,
- BMI,
- waist circumference;

important outcomes were:

- quality of life,
- body fat percentage,
- total cholesterol,
- Low-Density Lipoprotein (LDL),
- High-Density Lipoprotein (HDL),
- systolic and diastolic blood pressure;

and less important outcomes were:

- hip circumference,

- triglycerides,
- fasting glucose,
- fasting insulin,
- Glycated Hemoglobin (HbA1c),
- Homeostatic Model Assessment of Insulin Resistance (HOMA-IR),
- High-sensitivity C-reactive Protein (hs-CRP).

For studies assessing the effects of physical exercise, maximum rate of oxygen consumption ( $VO_2$  max) was considered as an additional important outcome. For studies assessing the efficacy of psychological treatments, additional important outcomes were anxiety, depression and binge eating days. For studies assessing the efficacy of psychological treatments for binge eating disorder, binge eating days was a critical outcome.

#### ***Data extraction and management***

Titles, abstracts and, if needed, full texts of articles written in languages other than English, Italian and French were translated using Google translate. Retrieved records were first exported to the QCRI Rayyan software (29) and scanned according their titles and abstract. Reference lists of systematic reviews and guidelines found in this process were scanned to retrieve additional studies to be considered for inclusion. Screened records were then exported to the Colandr software (30), which was used to screen the full text of the remaining records and to perform data extraction. Extracted data were: diagnosis (overweight, obesity, or both), comorbidities (none, metabolic syndrome, diabetes, eating disorders, osteoarthritis, heart disease, or other), treatment description, patients' sex, patients' age, study design (randomized controlled trial, controlled trial, or non-controlled trial), number of patients included, number of patients allocated to each treatment arm, treatment duration, each of the outcomes listed above.

#### ***Assessment of risk of bias***

The methodological quality of the included studies was evaluated according the Cochrane Risk of Bias tool (31), which assesses random sequence generation, allocation concealment procedures, study participants or personnel blinding, blinding of the assessors, attrition, reporting bias and other biases. Ratings of the methodological

quality of the studies were employed to rate the quality of the evidence for each outcome in the recommendations creation phase.

### **Meta-analysis**

For each research question and for each outcome, when possible, random-effects model meta-analyses were employed to synthesize the results of the included studies. When available, 12-months outcomes were analyzed, otherwise the nearest follow-up longer than 12 months was used. In case neither were present, 6-months follow-up were used. Standardized Mean Differences between the compared treatments were computed based on change scores and their associated standard deviations or, if they were not available, follow-up scores and their associated standard deviations. In case standard errors were reported, standard deviations were computed (32). A Restricted Maximum Likelihood estimator was employed. Heterogeneity was assessed using the  $I^2$  index and presence of publication bias was ascertained using funnel plots. This analysis was performed using the R (version 3.5.1) package *metafor* (33).

### **Creation of the recommendations**

The process of formulation of the guidelines was performed using the GRADEPro software (34). For each outcome, quality of evidence was assessed evaluating seriousness of risk of bias (35), inconsistency (36), indirectness (37), imprecision (38) and presence of publication bias (39). Evidence based on randomized controlled trials was initially rated as of high quality, whereas evidence based on non-randomized trials was initially rated as of low quality. In both cases, quality of evidence was then downgraded by one point for each serious flaw, and by two points for each very serious flaw. The overall quality of evidence was equal to the lowest quality of evidence of critical outcomes (22). Possible ratings were high, moderate, low and very low.

### ***Formulation of the recommendations***

The formulation of each recommendation was based on an overall assessment of quality of evidence, desirable and undesirable effects, benefits and harms of the treatment, values and preferences, acceptability for clinicians and patients and feasibility and resource use. Patients' values and preferences and acceptability for patients were investigated based on unstructured literature reviews. This information was mainly employed to assess potential patient burdens associated with the treatment under study or, when comparing active treatments, to evaluate which one was more likely to be favorably met by patients. Strong recommendations were formulated when high quality evidence suggested clear benefits of the intervention under scrutiny. Instead, conditional recommendations were preferred when low quality evidence was available or when desirable effects did not strongly outweigh undesirable effects. Following the GRADE and WHO methodology, wording of the recommendations reflected their strength, with wording such as "We strongly recommend..." for strong recommendations and "We conditionally recommend..." or "Consider using..." for conditional recommendations (40). Creation of each recommendation was based on discussion by the GDG. The resulting document was then evaluated by two external reviewers, which were not included in the GDG, to improve the reporting of the guidelines. After this phase, the guidelines were modified accordingly.

### **Modified Delphi process**

A two-round modified Delphi process was finally undertaken to review and refine the individual recommendations (41,42). Both rounds were conducted by e-mail. Participants were four international experts in the field of rehabilitation of patients with obesity. During the first round, participants were asked to rate the quality of each recommendation using a set of 7-point Likert scales assessing four domains adapted from the AGREE instrument, namely scope and purpose, rigor of development, clarity of presentation and applicability (43). In addition, they could provide comments and propose modifications to the recommendations' formulation, content and/or strength. Recommendations which received ratings < 6 in any domain were revised and all recommendations were modified integrating the comments of all the participants. In round 2, the revised recommendations were presented to the participants, as well as

explanations about the changes that were made. For each revised recommendation, participants were asked to decide whether to accept it, to provide additional modifications or to reject it. The GDG incorporated the modifications proposed in round 2. In both rounds, participants' ratings and responses were anonymous.

## RESULTS

Overall, 7847 studies were screened for titles and abstract and 836 full texts were analyzed. Meta-analyses were performed on 133 studies. Overall, only 14 studies included in meta-analyses reported data about quality of life and, since this outcome was operationalized and measured in a heterogeneous way, only a narrative evaluation was performed. Summary of the recommendations, their strength and confidence in their evidence is reported in Table 2. For each recommendation, description of the studies included in the correspondent review, their methodological quality, the evidence tables including the estimates of the effects of each treatment and the evidence-to-decision tables are reported in Supplementary Digital Material II. Below are reported the recommendations and a brief comment with information about the treatment which was evaluated, balance of benefits and harms, subgroup and implementation considerations.

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Insert Table 3 here

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### Final recommendations

- 1) We strongly recommend that all obese patients are treated with comprehensive lifestyle interventions including exercise, diet and behavioral or cognitive-behavioral therapy to reduce weight, body mass index, waist circumference, blood pressure and fasting insulin levels. (Strength of the recommendation: strong; confidence of the recommendation: moderate)

Explanations: Comprehensive and multidisciplinary programs aiming at weight reduction through long-term lifestyle modifications are required for a successful rehabilitation of patients with overweight or obesity. These programs are associated with small-to-moderate improvement in weight, body composition, lipid profile and cardiovascular risk factors after 12 months and studies investigating long-term outcomes show that these results are maintained and that these programs reduce comorbidities rates (44,45). These effects were deemed as substantial and provide strong evidence for the implementation of these treatments. Efforts should be made to motivate the patients to maintain the maximum compliance to each intervention component as well as to ensure long-term adherence to lifestyle changes. Therefore, patients should be informed that such changes should be maintained lifelong. These programs should be administered by a multidisciplinary team and should include tailored diet and exercise goals and individual or group sessions with the aim to facilitate behavior change. They can be provided in outpatients settings. Specific recommendations regarding the content of these programs are discussed in the next sections. The main drawback of lifestyle interventions is in their cost, which is higher than that of less intensive treatments, and in the need of specialized multidisciplinary teams. From the patients' point of view, lifestyle treatments require strong efforts in terms of time and indirect costs. However, even if the costs in terms of time and resources are higher compared to less complex treatments, the benefits of these programs far outweigh the costs associated with them (46,47).

- 2) Consider using internet-based lifestyle interventions to improve weight and BMI in case patients' barriers, such as distance or resource constraints, prevent the attendance to face-to-face lifestyle interventions. (Strength of the recommendation: conditional; confidence of the recommendation: low)

Explanations: Internet-based lifestyle interventions can be considered as a viable and cost-effective way to deliver lifestyle interventions, since they can considerably reduce the costs of the interventions and provide tools that can be used to improve the long-term adherence and compliance to treatment prescriptions, potentially resulting in better longer-term outcomes. These treatments include online information materials, tools for goal setting and self-monitoring, automated feedback and suggestions, chats with clinicians or other patients. Compared to control conditions, these treatments have

shown to be associated with small changes in weight, body composition, blood pressure and glucose levels. However, these treatments are less effective than face-to-face lifestyle interventions in terms of weight loss, and they are not associated with changes in outcomes such as waist circumference and lipid profile. These factors are particularly important because they are related to risk of comorbidities. In addition, creation of new internet-based treatments requires initial investment that might not be available to most of the health providers. Therefore, these treatments should be considered only if face-to-face interventions cannot be administered due to patient barriers such as difficulty to schedule treatment sessions, need to travel long distances, or resource constraints. Addition of internet-based treatment components to face-to-face lifestyle treatments has shown to add little value (47,48).

- 3) We recommend against the use of mobile application-based lifestyle interventions instead of face-to-face lifestyle interventions in the rehabilitation of overweight and obese patients. (Strength of the recommendation: conditional; confidence of the recommendation: low)

Explanations: Mobile application-based lifestyle interventions are considered as an enhancement of internet-based treatments, since they have similar treatment components but are more interactive, can be delivered anytime and allow to extend the patient-clinician relationship over time (49). Although mobile applications can be a viable solution to deliver personalized feedback (see Recommendation 5), the GDG decided to currently recommend against mobile-based lifestyle treatments since the available evidence on their effects is still scarce and these treatments are not associated with better outcomes when compared to health education or other control conditions. Overall, certainty of evidence was low. Further high-quality research is required to support the use of these treatments for the rehabilitation of obese patients.

- 4) We recommend providing feedback about weight loss and physical activity levels to all overweight and obese patients during lifestyle interventions. (Strength of the recommendation: conditional; confidence of the recommendation: low)

Explanations: Along with self-monitoring, feedback about weight loss and physical activity has been recognized as a key skill for weight loss and weight loss maintenance, since it creates opportunity for positive reinforcement, improves self-efficacy and



enables both patient and clinician to manage progress over time (50,51). Providing feedback is associated with moderate reduction in weight and waist circumference compared to not providing feedback. No undesirable effects were found. We recommend providing feedback about physical activity at least weekly, and feedback about weight loss at least monthly. The main drawback of providing feedback is the need for patients to record their data about physical activity and for care providers to monitor patients over time, which can be time-consuming. However, feedback could be delivered not only with face-to face consultation, but also with phone calls, mobile-based applications or wearable technologies.

- 5) We strongly recommend extending the care after the weight loss phase of lifestyle interventions by providing individual or group counselling to foster maintenance of lifestyle changes. (Strength of the recommendation: strong; confidence of the recommendation: high)

Explanations: Since a high number of patients regain weight after the weight loss phase, identifying methods to enhance the long-term outcomes of lifestyle interventions is crucial. Lifestyle treatments should include a weight loss phase of 1 to 3 months with frequent contact with the multidisciplinary team with the aim to achieve a weight reduction of approximately 10% (52). After this period, the contacts with the multidisciplinary team should be maintained for at least 1 year. Extending the care is expected to produce a small but significant effect on weight and BMI at 12 months, whereas evidence regarding longer-term outcomes seem to be more scarce and need to be documented (53,54). The frequency of contact with the multidisciplinary team can be reduced (e.g. once per month) compared to the weight loss phase. Methods to extend the rehabilitation include scheduling face-to-face visits, phone calls or organizing group sessions.

- 6) During the weight loss phase, consider prescribing a high protein diet (~30% of total caloric intake) as the nutritional component of the lifestyle program to overweight or obese patients without history or symptoms of kidney disease. When treating patients with dyslipidemia or kidney disease, consider prescribing a low-fat diet. (Strength of the recommendation: conditional; confidence of the recommendation: low)

Explanations: High protein-low carbohydrate diets (<30% proteins) have been proposed as alternative diets to low fat - high carbohydrate diets since they are claimed to be associated with more pronounced changes in body composition through loss in body fat and with positive effects on cholesterol levels, fasting glucose and insulin sensitivity. High protein diets have shown to be more effective than high-carbohydrates or standard protein diets in terms of weight loss, waist circumference, body fat percentage and triglycerides, even if they are associated with a less marked reduction of systolic blood pressure. Overall, confidence in these results is low. Confidence is higher for the estimates of the effects of these diets on weight and triglycerides (high confidence) and on body fat percentage (moderate confidence). These treatments should be applied with caution since claims about potential adverse effects have been reported. In particular, high protein intake is associated with detrimental effects in patients with existing kidney dysfunction and might be related to increased chronic kidney disfunctions in previously healthy individuals (55,56). We therefore recommend screening for chronic kidney disease before suggesting a high protein diet and not to prescribe it long term. Low fat diets are to be preferred in the cases in which high protein diets are contraindicated.

- 7) When treating non-dyslipidemic overweight or obese patients or patients without kidney disease, consider prescribing a very-low carbohydrate intake (< 20% of total caloric intake) during the weight loss period in order to achieve a more pronounced weight loss. (Strength of the recommendation: conditional; confidence of the recommendation: moderate)

Explanations: Very low carbohydrate diets are considered as an alternative to low fat or isocaloric diets since they are claimed to produce a more pronounced weight loss and to have positive metabolic effects, especially in patients with type 2 diabetes. Very low carbohydrate diets are associated with greater changes in weight, BMI, waist circumference, triglycerides and diastolic blood pressure when compared to low fat diets. However, they are also associated with a less favorable lipidic profile. Overall, certainty of evidence is high. Since low-fat diets and high protein diets are associated with similar results, the former can therefore be considered as an alternative approach to the latter when treating patients with dyslipidemia. Very low carbohydrate diets can be less acceptable by patients compared to isocaloric diets and, since the difference with other diets are small and are associated with worse total cholesterol and LDL levels.

Therefore, choice between these diets should be performed considering patients' preference.

- 8) We conditionally recommend against prescribing calorie restriction below the patient's total energy expenditure during the weight loss phase of the lifestyle intervention. (Strength of the recommendation: conditional; confidence of the recommendation: low)

Explanations: Prescription of calorie intake below what is needed for weight maintenance is a cornerstone of most of the diets for weight loss in overweight or obese patients. However, unrestricted diets, i.e. diets whose beneficial effect is due to restriction of either carbohydrates, proteins or fats, are associated with more marked effect with regards to weight, BMI and triglycerides levels when compared to restricted diets. The effect size of these difference is small and, overall, certainty of evidence was low. Therefore, we recommend that daily intake of calories during the weight loss phase should be calculated considering the patient's total energy expenditure and that it should be individualized based on nutritional and physical activity habits, presence of comorbidities and previous dieting attempts.

- 9) We recommend against prescribing low-glycemic load diets rather than low-fat or high-protein diets. (Strength of the recommendation: conditional; confidence of the recommendation: very low)

Explanations: Although low-glycemic load diets are considered as promising dietary approaches for the rehabilitation of obesity (57), when medium-to-long term outcomes are considered these diets did not show larger effects than conventional low-fat or high-protein diets. Overall, the quality of evidence was very low. Even if long-term adherence is similar to other diets (58), it is possible that the restriction of food types of low-glycemic load diets makes it more difficult for patients to also reduce the caloric intake (59). More studies are needed to assess the efficacy of these diets and to identify techniques or modifications that might enhance adherence to the dietary advice.

- 10) We conditionally recommend prescribing aerobic training programs rather than strength training programs, in particular when reduction of blood pressure is a rehabilitation target; whereas strength training should be preferred when reduction

of insulin is a treatment aim. Choice between strength and aerobic training programs should be made also considering patient's preferences. (Strength of the recommendation: conditional; confidence of the recommendation: very low)

Explanations: Aerobic training is the optimal mode of exercise, as it helps reducing weight and fat mass while being less time- and resource-consuming for the patients, since it can be done in non-expensive ways, such as brisk walking or cycling. Compared to strength training, it showed to be associated with stronger changes in systolic blood pressure (moderate effects) and is therefore indicated when reduction of this risk factor is a treatment target. Overall, confidence in these estimates is very low. Aerobic training is considered safe and, in particular during the maintenance phase, can be executed without supervision. Strength training is associated with more marked improvement in fasting insulin. Since there are no differences between strength and aerobic training in critical outcomes, patient's preference should be considered in the choice between these two treatments.

11) We strongly recommend prescribing at least 150 minutes/week of moderate-intensity exercise during lifestyle programs. (Strength of the recommendation: strong; confidence of the recommendation: high)

Explanations: The GDG decided to provide a strong recommendation regarding the total duration of exercise since increasing the amount of exercise to 150 minutes/week is associated with more marked reduction in weight and BMI compared to exercise programs with lower frequency. Exercise can be diluted in 3 to 5 days per week. Increasing exercise frequency was considered safe and was not associated with treatment non-adherence. We recommend suggesting patients to maintain these physical activity levels in the long term. Overall, quality of evidence was moderate. In addition, the GDG recommends against high intensity exercise since it is not required to achieve weight loss, it is not associated with improvement in risk of incurring in cardiovascular diseases and could be burdensome for patients. In addition, there is evidence that unaccustomed high-intensity exercise can be associated with cardiac events and, as a consequence, medical evaluation prior to prescription is needed (60,61). Therefore, we recommend moderate-intensity exercise such as brisk walking, cycling, swimming or use of treadmills at an intensity inferior than 70% of the age-predicted maximal heart rate.

12) We recommend against combining aerobic and strength training when planning the exercise component of lifestyle interventions. (Strength of the recommendation: conditional; confidence of the recommendation: very low)

Explanations: Physical activity combining aerobic and strength exercises was hypothesized to be more effective than aerobic or strength training alone, since it could provide the benefits of both in terms of anthropometric and functional outcomes (62,63). Nonetheless, the combination of these two exercise modalities did not result in better outcomes compared to aerobic training alone. Since it might be burdensome for most patients in terms of time and resource use, requires supervision and provides no additional benefit, combination of aerobic and strength training was not recommended for the rehabilitation of obesity. Overall, certainty of evidence was very low.

13) We strongly recommend providing Cognitive Behavioral Therapy (CBT)-based treatments as the behavioral component of lifestyle interventions to reduce weight and depression symptoms. (Strength of the recommendation: strong; confidence of the recommendation: moderate)

Explanations: CBT is a form of psychotherapy aimed at facilitating behavioral change through cognitive restructuring and skill training. In the context of obesity rehabilitation, this approach aims at helping the development of coping strategies and problem-solving skills, enhancing self-efficacy, improving stimulus control and fostering social activation. In addition, since obesity and depression have a bidirectional association (64), CBT-based treatments also address the cognitions that might sustain both conditions and enhances processes, such as the development of self-efficacy, that are crucial to trigger a positive response by the patient. Compared to standard behavioral treatments, CBT-based treatments were associated with more marked reduction of weight and depression levels (small effect size). Certainty of evidence of the effects on weight and depression was moderate. Certainty of evidence of the lack of effects on BMI was very low. CBT-based treatments can be implemented with individual or group sessions. These treatments might not be indicated for patients with lack of motivation to undergo a psychological treatment.

14) We strongly recommend providing cognitive-behavioral therapy for patients with obesity and comorbid binge eating disorder to reduce binge eating days and depression symptoms. (Strength of the recommendation: strong; confidence of the recommendation: moderate)

Explanations: Binge eating disorder is a condition characterized by uncontrollable episodes of ingestion of a very large quantity of food in a very limited period of time accompanied by a deep sensation of loss of control (65). Such condition should be diagnosed as early as possible since it might impede weight loss, is associated with a worse metabolic and inflammatory profile and, along with obesity, is intertwined with depression (66,67). CBT-based treatments were developed to address obesity and comorbid binge eating disorder by changing dysfunctional cognitions regarding shape, weight and dieting and their relationships with the underlying self-schemas. CBT-based treatments should be preferred over standard behavioral treatments since they reduce binge eating days and depression levels. Overall, certainty of evidence was high. No differences were detected comparing cognitive-behavioral treatments administered individually or in group sessions (68).

## DISCUSSION

As a recent scoping review pointed out, the best practices regarding the rehabilitation of patients with overweight and obesity were still to be defined (69). Given the increasing prevalence of these conditions worldwide and the conceptual shift of considering and treating them as chronic diseases instead of reversible acute conditions (70), specific rehabilitation-focused and evidence-based recommendations were needed. This manuscript presents the first guidelines developed for this purpose. Their relevance lies in the fact that they have been specifically developed for rehabilitative settings and following a rigorous and transparent methodology.

These guidelines strongly encourage to implement the three main interventions, namely diet, physical activity and cognitive behavioral interventions, within comprehensive multidisciplinary and individualized rehabilitation programs. Even if such comprehensive programs have been long advocated, efforts are still needed to further improve their availability (14,71,72). Furthermore, a cultural and organizational shift is

still needed in different rehabilitation settings where patients might also be obese, in order to recognize obesity as a disease, to follow the best practices to treat this condition, and to screen for mental health issues potentially hindering adaptive lifestyle changes (14,73).

Special consideration should be given to overweight or obese patients undergoing rehabilitation after acute events. In these settings, the rehabilitation programs outlined by these guidelines should be carefully adapted based on the clinical conditions of the patient and on treatment priorities. Familiarizing physicians with the multidisciplinary clinical aspects of overweight and obesity might contribute to improve quality and effectiveness of their rehabilitative approaches.

The overall aim of rehabilitation programs for overweight and obesity should be to improve the patients' quality of life (15). Surprisingly, only few studies included in the reviews which were used to formulate the above recommendations reported data about this outcome. Although it is established that patients with obesity suffer from reduced quality of life (74,75), mainly from the impact of comorbidities, lack of randomized controlled trials assessing it might suggest that few treatments are specifically developed to address this outcome. Due to the chronic nature of obesity, it is warranted that future rehabilitation programs and research studies fill this gap.

These guidelines were endorsed by the International Society of Physical and Rehabilitation Medicine (ISPRM) and by the European Society of Physical and Rehabilitation Medicine (ESPRM). They will be spread by the ISPRM with summary documents for clinicians. The following step will be their implementation and evaluation in clinical practice, which will involve the evaluation of the cost-effectiveness of the proposed rehabilitation treatments and the monitoring of the implementation of each recommendation, with an assessment of the barriers for its application. This could enable to plan education for professional development focused on patient-centered rehabilitation through comprehensive multidisciplinary programs that should be promoted within the field of PRM specialty.

## CONCLUSIONS

We recommend providing comprehensive multidisciplinary and multiprofessional lifestyle interventions tailored according to the characteristics of the patient. These interventions should be extended to support the patient in the long term. The nutritional component of these treatments should include diets with either a high-protein or a low-fat content. We recommend suggesting frequent moderate aerobic exercise, which should be maintained as a part of the patient lifestyle. Finally, we recommend providing individual or group cognitive-behavioral interventions to help achieve a more pronounced weight loss and to address comorbidities such as depression and binge eating disorder.

### REFERENCES

1. World Health Organization. Obesity and overweight [Internet]. 2020 [cited 2020 Mar 31].
2. The GBD 2015 Obesity Collaborators. Health Effects of Overweight and Obesity in 195 Countries over 25 Years. *N Engl J Med*. 2017;377(1):13–27.
3. Marques A, Peralta M, Naia A, Loureiro N, de Matos MG. Prevalence of adult overweight and obesity in 20 European countries, 2014. *Eur J Public Health*. 2018;28(2):295–300.
4. Hruby A, Hu FB. The Epidemiology of Obesity: A Big Picture. *Pharmacoeconomics*. 2015;33(7):673–89.
5. Goh L-Y, Goh K-L. Obesity: An epidemiological perspective from Asia and its relationship to gastrointestinal and liver cancers. *J Gastroenterol Hepatol*. 2013;28(S4):54–8.
6. Yach D, Stuckler D, Brownell KD. Epidemiologic and economic consequences of the global epidemics of obesity and diabetes. *Nat Med*. 2006;12(1):62–6.
7. Heymsfield SB, Wadden TA. Mechanisms, pathophysiology, and management of obesity. *N Engl J Med*. 2017;376(3):254–66.
8. Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: a systematic



- review and meta-analysis. *BMC Public Health*. 2009;9:88.
9. Bray GA, Heisel WE, Afshin A, Jensen MD, Dietz WH, Long M, et al. The science of obesity management: An endocrine society scientific statement. *Endocr Rev*. 2018;39(2):79–132.
  10. Berkowitz RI, Fabricatore AN. Obesity, psychiatric status, and psychiatric medications. *Psychiatr Clin North Am*. 2011;34(4):747–64.
  11. Forhan M, Gill S V. Obesity, functional mobility and quality of life. *Best Pract Res Clin Endocrinol Metab*. 2013;27(2):129–37.
  12. Singh-Manoux A, Sabia S, Bouillon K, Brunner EJ, Grodstein F, Elbaz A, et al. Association of body mass index and waist circumference with successful aging. *Obesity (Silver Spring)*. 2013/12/06. 2014;22(4):1172–8.
  13. Raggi A, Brunani A, Sirtori A, Liuzzi A, Berselli ME, Villa V, et al. Obesity-related disability: key factors identified by the International Classification of Functioning, Disability and Health. *Disabil Rehabil*. 2010;32(24):2028–34.
  14. Capodaglio P, Ventura G, Petroni ML, Cau N, Brunani A. Prevalence and burden of obesity in Rehabilitation Units in Italy: A survey. *European Journal of Physical and Rehabilitation Medicine*. 2019.
  15. Capodaglio P, Ilieva E, Oral A, Kiekens C, Negrini S, Varela Donoso E, et al. Evidence-based position paper on Physical and Rehabilitation Medicine (PRM) professional practice for people with obesity and related comorbidities. The European PRM position (UEMS PRM Section). *Eur J Phys Rehabil Med*. 2017;53(4):611–24.
  16. 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. *Circulation*. 2014;129(25\_suppl\_2):S102–38.
  17. National Institute for Health and Care Excellence. Obesity: identification, assessment and management | Guidance and guidelines | NICE. National Institute of Clinical Excellence Guideline. 2014.

18. Yumuk V, Tsigos C, Fried M, Schindler K, Busetto L, Micic D, et al. European Guidelines for Obesity Management in Adults. *Obes Facts*. 2015/12/05. 2015;8(6):402–24.
19. Apovian CM, Aronne LJ, Bessesen DH, McDonnell ME, Murad MH, Pagotto U, et al. Pharmacological management of obesity: an endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2015;100(2):342–62.
20. Capodaglio P, Brunani A, Giustini A, Negrini S, Saraceni VM, Akyuz G, et al. Disability in obesity with comorbidities. A perspective from the PRM Societies. *Eur J Phys Rehabil Med*. 2014;50(2):129–32.
21. World Health Organization. WHO handbook for guideline development. 2nd editio. Geneva; 2014.
22. Guyatt G, Oxman AD, Akl EA, Kunz R, Vist G, Brozek J, et al. GRADE guidelines: 1. Introduction - GRADE evidence profiles and summary of findings tables. *J Clin Epidemiol*. 2011;64(4):383–94.
23. Guyatt GH, Oxman AD, Kunz R, Atkins D, Brozek J, Vist G, et al. GRADE guidelines: 2. Framing the question and deciding on important outcomes. *J Clin Epidemiol*. 2011;64(4):395–400.
24. Wing RR, Lang W, Wadden TA, Safford M, Knowler WC, Bertoni AG, et al. Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. *Diabetes Care*. 2011/05/18. 2011;34(7):1481–6.
25. Johnson WD, Brashear MM, Gupta AK, Rood JC, Ryan DH. Incremental weight loss improves cardiometabolic risk in extremely obese adults. *Am J Med*. 2011;124(10):931–8.
26. Ryan DH, Yockey SR. Weight Loss and Improvement in Comorbidity: Differences at 5%, 10%, 15%, and Over. *Curr Obes Rep*. 2017;6(2):187–94.
27. Wang Y, Rimm EB, Stampfer MJ, Willett WC, Hu FB. Comparison of abdominal adiposity and overall obesity in predicting risk of type 2 diabetes among men. *Am J Clin Nutr*. 2005;81(3):555–63.

28. Han TS, Richmond P, Avenell A, Lean ME. Waist circumference reduction and cardiovascular benefits during weight loss in women. *Int J Obes Relat Metab Disord.* 1997;21(2):127–34.
29. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan—a web and mobile app for systematic reviews. *Syst Rev.* 2016;5(1):210.
30. Cheng SH, Augustin C, Bethel A, Gill D, Anzaroot S, Brun J, et al. Using machine learning to advance synthesis and use of conservation and environmental evidence. *Conserv Biol.* 2018;32(4):762–4.
31. Higgins JPT, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, et al. The Cochrane Collaboration’s tool for assessing risk of bias in randomised trials. *BMJ.* 2011;343:d5928.
32. Higgins J, Green S. *Cochrane Handbook for systematic reviews of interventions version 5.1.0.* In: The Cochrane Collaboration. 2011. p. 2–3.
33. Viechtbauer W. Conducting meta-analyses in {R} with the {metafor} package. *J Stat Softw.* 2010;36(3):1–48.
34. GRADEpro GDT. *GRADEpro Guideline Development Tool.* McMaster University (developed by Evidence Prime, Inc.); 2015.
35. Guyatt GH, Oxman AD, Vist G, Kunz R, Brozek J, Alonso-Coello P, et al. *GRADE guidelines: 4. Rating the quality of evidence - Study limitations (risk of bias).* *J Clin Epidemiol.* 2011;64(4):407–15.
36. Guyatt GH, Oxman AD, Kunz R, Woodcock J, Brozek J, Helfand M, et al. *GRADE guidelines: 7. Rating the quality of evidence - Inconsistency.* *J Clin Epidemiol.* 2011;
37. Guyatt GH, Oxman AD, Kunz R, Woodcock J, Brozek J, Helfand M, et al. *GRADE guidelines: 8. Rating the quality of evidence - Indirectness.* *J Clin Epidemiol.* 2011;64(12):1303–10.
38. Guyatt GH, Oxman AD, Kunz R, Brozek J, Alonso-Coello P, Rind D, et al. *GRADE guidelines 6. Rating the quality of evidence--imprecision.* *J Clin*

- Epidemiol. 2011;64(12):1283–93.
39. Guyatt GH, Oxman AD, Montori V, Vist G, Kunz R, Brozek J, et al. GRADE guidelines: 5. Rating the quality of evidence--publication bias. *J Clin Epidemiol.* 2011;64(12):1277–82.
  40. Andrews J, Guyatt G, Oxman AD, Alderson P, Dahm P, Falck-Ytter Y, et al. GRADE guidelines: 14. Going from evidence to recommendations: The significance and presentation of recommendations. *J Clin Epidemiol.* 2013;66(7):719–25.
  41. Dalkey N, Helmer O. An experimental application of the Delphi method to the use of experts. *Manage Sci.* 1963;9(3):458–67.
  42. Taylor RM, Feltbower RG, Aslam N, Raine R, Whelan JS, Gibson F. Modified international e-Delphi survey to define healthcare professional competencies for working with teenagers and young adults with cancer. *BMJ Open.* 2016;6(5):e011361–e011361.
  43. Brouwers MC, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, et al. AGREE II: Advancing guideline development, reporting and evaluation in health care. *J Clin Epidemiol.* 2010;63(12):1308–11.
  44. Nurkkala M, Kaikkonen K, Vanhala ML, Karhunen L, Keränen A-M, Korpelainen R. Lifestyle intervention has a beneficial effect on eating behavior and long-term weight loss in obese adults. *Eat Behav.* 2015;
  45. Lindström J, Peltonen M, Eriksson JG, Ilanne-Parikka P, Aunola S, Keinänen-Kiukaanniemi S, et al. Improved lifestyle and decreased diabetes risk over 13 years: Long-term follow-up of the randomised Finnish Diabetes Prevention Study (DPS). *Diabetologia.* 2013;56(2):284–93.
  46. Radl K, Iannuale C, Boccia S. A systematic review of the cost-effectiveness of lifestyle modification as primary prevention intervention for type 2 diabetes mellitus. *Epidemiol Biostat Public Heal.* 2013 [cited 2019 Jul 1];10(2).
  47. Hersey JC, Khavjou O, Strange LB, Atkinson RL, Blair SN, Campbell S, et al. The efficacy and cost-effectiveness of a community weight management

- intervention: A randomized controlled trial of the health weight management demonstration. *Prev Med (Baltim)*. 2012;54(1):42–9.
48. Harvey-Berino J, West D, Krukowski R, Prewitt E, VanBiervliet A, Ashikaga T, et al. Internet delivered behavioral obesity treatment. *Prev Med (Baltim)*. 2010;51(2):123–8.
  49. Castelnuovo G, Manzoni GM, Pietrabissa G, Corti S, Giusti EM, Molinari E, et al. Obesity and outpatient rehabilitation using mobile technologies: The potential mHealth approach. *Front Psychol*. 2014;5(JUN).
  50. Butryn ML, Phelan S, Hill JO, Wing RR. Consistent self-monitoring of weight: a key component of successful weight loss maintenance. *Obesity (Silver Spring)*. 2007;15(12):3091–6.
  51. Shuger SL, Barry VW, Sui X, McClain A, Hand GA, Wilcox S, et al. Electronic feedback in a diet- and physical activity-based lifestyle intervention for weight loss: A randomized controlled trial. *Int J Behav Nutr Phys Act*. 2011;8:1–8.
  52. Rossner S. Defining success in obesity management. *Int J Obes Relat Metab Disord*. 1997;21 Suppl 1:S2-4.
  53. Young MD, Callister R, Collins CE, Plotnikoff RC, Aguiar EJ, Morgan PJ. Efficacy of a gender-tailored intervention to prevent weight regain in men over 3 years: A weight loss maintenance RCT. *Obesity*. 2017;25(1):56–65.
  54. Mai K, Brachs M, Leupelt V, Jumpertz-von Schwartzberg R, Maurer L, Grüters-Kieslich A, et al. Effects of a combined dietary, exercise and behavioral intervention and sympathetic system on body weight maintenance after intended weight loss: Results of a randomized controlled trial. *Metabolism*. 2018;83:60–7.
  55. Kamper A-L, Strandgaard S. Long-Term Effects of High-Protein Diets on Renal Function. *Annu Rev Nutr*. 2017;37:347–69.
  56. Marckmann P, Osther P, Pedersen AN, Jespersen B. High-protein diets and renal health. *J Ren Nutr*. 2015;25(1):1–5.
  57. Thomas D, Elliott EJ, Baur L. Low glycaemic index or low glycaemic load diets

- for overweight and obesity. *Cochrane Database Syst Rev.* 2007;(3).
58. McMillan-Price J, Petocz P, Atkinson F, O'Neill K, Samman S, Steinbeck K, et al. Comparison of 4 diets of varying glycemic load on weight loss and cardiovascular risk reduction in overweight and obese young adults: A randomized controlled trial. *Arch Intern Med.* 2006;
59. Das S, Gilhooly C, Golden J, Pittas A, Fuss P, Cheatham R, et al. Long-term effects of 2 energy-restricted diets differing in glycemic load on dietary adherence, body composition, and metabolism in CALERIE: a 1-y randomized controlled trial. *Am J Clin Nutr.* 2007;85(4):1023–30.
60. Roy MC, Meredith-Jones KA, Osborne HR, Williams SM, Brown RC, Jospe MR, et al. The importance of medical assessment prior to high-intensity interval training. Vol. 131, *The New Zealand medical journal.* New Zealand; 2018. p. 100–2.
61. Thompson PD, Franklin BA, Balady GJ, Blair SN, Corrado D, Estes NAM 3rd, et al. Exercise and acute cardiovascular events placing the risks into perspective: a scientific statement from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism and the Council on Clinical Cardiology. *Circulation.* 2007;115(17):2358–68.
62. Schwingshackl L, Dias S, Strasser B, Hoffmann G. Impact of different training modalities on anthropometric and metabolic characteristics in overweight/obese subjects: a systematic review and network meta-analysis. *PLoS One.* 2013;8(12):e82853.
63. Lambers S, van Laethem C, van Acker K, Calders P. Influence of combined exercise training on indices of obesity, diabetes and cardiovascular risk in type 2 diabetes patients. *Clin Rehabil.* 2008;22(6):483–92.
64. Luppino FS, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BWJH, et al. Overweight, Obesity, and Depression: A Systematic Review and Meta-analysis of Longitudinal Studies. *JAMA Psychiatry.* 2010;67(3):220–9.
65. American Psychiatric Association. Diagnostic and statistical manual of mental

- disorders (DSM-5®). American Psychiatric Pub; 2013.
66. Succurro E, Segura-Garcia C, Ruffo M, Caroleo M, Rania M, Aloï M, et al. Obese Patients With a Binge Eating Disorder Have an Unfavorable Metabolic and Inflammatory Profile. *Medicine (Baltimore)*. 2015;94(52).
  67. Yanovski SZ. Binge eating disorder and obesity in 2003: could treating an eating disorder have a positive effect on the obesity epidemic? *Int J Eat Disord*. 2003;34 Suppl:S117-20.
  68. Ricca V, Castellini G, Mannucci E, Lo Sauro C, Ravaldi C, Rotella CM, et al. Comparison of individual and group cognitive behavioral therapy for binge eating disorder. A randomized, three-year follow-up study. *Appetite*. 2010;55(3):656–65.
  69. Seida JC, Sharma AM, Johnson JA, Forhan M. Hospital rehabilitation for patients with obesity: a scoping review. *Disabil Rehabil*. 2018;40(2):125–34.
  70. Kyle TK, Dhurandhar EJ, Allison DB. Regarding Obesity as a Disease: Evolving Policies and Their Implications. *Endocrinol Metab Clin North Am*. 2016;45(3):511–20.
  71. Rosa Fortin M-M, Brown C, Ball GDC, Chanoine J-P, Langlois M-F. Weight management in Canada: an environmental scan of health services for adults with obesity. *BMC Health Serv Res*. 2014;14:69.
  72. Uerlich MF, Yumuk V, Finer N, Basdevant A, Visscher TLS. Obesity Management in Europe: Current Status and Objectives for the Future. *Obes Facts*. 2016/08/20. 2016;9(4):273–83.
  73. Kaplan LM, Golden A, Jinnett K, Kolotkin RL, Kyle TK, Look M, et al. Perceptions of Barriers to Effective Obesity Care: Results from the National ACTION Study. *Obesity*. 2018;26(1):61–9.
  74. Yancy WSJ, Olsen MK, Westman EC, Bosworth HB, Edelman D. Relationship between obesity and health-related quality of life in men. *Obes Res*. 2002;10(10):1057–64.

75. Park S. Pathways linking obesity to health-related quality of life. *Qual Life Res.* 2017;26(8):2209–18.

### NOTES

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**Table 1.** List of abbreviations

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BMI	Body Mass Index
CBT	Cognitive Behavioral Therapy
ESPRM	European Society of Physical and Rehabilitation Medicine
GDG	Guideline Development Group
HbA1c	Glycated Hemoglobin
HOMA-IR	Homeostatic Model Assessment of Insulin Resistance
hs-CRP	High-sensitivity C-reactive Protein
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HDL	High-Density Lipoprotein
ISPRM	International Society of Physical and Rehabilitation Medicine
LDL	Low-Density Lipoprotein
PICO	Population, Intervention, Comparison, Outcome
PRM	Physical and Rehabilitation Medicine
VO <sub>2</sub> max	Maximum rate of oxygen consumption
WHO	World Health Organization

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**Table 2.** BMI cutoff values for identification of overweight, obesity and obesity classes in adults

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18.5 to < 25	Normal range
25 to < 30	Overweight range
30 to < 35	Obese range (class I)
35 to < 40	Obese range (class II)
≥ 40	Obese range (class III)

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1

**Table 3.** Summary of the ISPRM/ESPRM recommendations for the management of obesity

<b>Intervention</b>	<b>Comparator</b>	<b>Favors Intervention</b>	<b>Certainty</b>	<b>Favors comparator</b>	<b>Certainty</b>	<b>Strength of the recommendation</b>	<b>Confidence</b>
1 Lifestyle interventions including diet, exercise and behavioral treatment	Control conditions, usual care	Weight	High	None		Strongly in favour	Moderate
		BMI	High				
		WC	Moderate				
		Body fat percentage	Low				
		Total cholesterol	Moderate				
		HDL	High				
		Triglycerides	High				
		SBP	High				
		DBP	High				
		Glucose	High				
Insulin	Moderate						
2- Web-based lifestyle interventions	Face-to-face lifestyle interventions	Body fat percentage	Very low	Weight	Moderate	Conditionally against	Moderate
3 interventions		Weight	Moderate	None			

	Usual care, no treatment or information only	BMI Body fat percentage SBP DBP Glucose	Moderate Low Moderate Moderate Moderate				
4	Mobile applications-based lifestyle interventions	Control conditions, usual care, no treatment	Total cholesterol	Low	None	Conditionally against	Low
5	Providing feedback about weight loss and physical activity during a lifestyle intervention	Not providing feedback	Weight WC	Low Moderate	None	Conditionally in favour	Low
6	Extending care after weight loss phase providing individual or group counselling and monitoring	Not extending care after weight loss	Weight BMI	High High	None	Strongly in favour	Moderate
			Weight	High	SBP	High	Low

7- High protein diets	High carbohydrates	WC	Low			Conditionally in	
8 (~30% of total caloric intake)	diets	Body fat percentage	Moderate			favour	
		Tryglicerides	High				
	Low fat diets	None		None			
9 Very low carbohydrates diets (~10% of total caloric intake)	Low fat diets	Weight	High	Total cholesterol	High	Conditionally in favour	High
		BMI	High	LDL	High		
		WC	High				
		HDL	High				
		Tryglicerides	High				
		DBP	Moderate				
10 Unrestricted diet regimens	Calorie-restricted diets	None		Weight	Low	Conditionally against	Low
				BMI	Low		
				Tryglicerides	Low		
11 Low glycemc load diets	Low fat or high protein diets	None		None		Conditionally against	Very low
12 Aerobic training	Strength training	SBP	Very low	Insulin	Very low	Conditionally in favour	Very low

13	Aerobic and strength training	Aerobic training only	None		None	Conditionally against	Very low
14	High-intensity exercise	Moderate-intensity exercise	VO <sub>2</sub> peak	High	None	Conditionally against	Very low
15	Exercise at higher frequency	Exercise at lower frequency	Weight BMI	Moderate Moderate	None	Strongly in favour	Moderate
16	Cognitive behavioral therapy	Standard behavioral therapy	Weight Depression	Moderate Moderate	None	Strongly in favour	Moderate
17	Cognitive behavioral therapy for binge-eaters	Standard behavioral therapy	Binge-eating days Depression Anxiety	High High Very low	None	Strongly in favour	Moderate

*Note.* Abbreviations: BMI: Body Mass Index; WC: Waist Circumference; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure

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