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SPECIAL ARTICLE

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)

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ABSTRACT

INTRODUCTION: The WHO world health statistics report in 2015 shows that in Europe the overall obesity rate among adults is 21.5% in males and 24.5% in females. Obesity has important consequences for morbidity, disability and quality of life. The aim of the paper was to improve physical and rehabilitation medicine physicians' professional practice for the rehabilitation of patients with obesity and related comorbidities.
EVIDENCE ACQUISITION: A systematic review of the literature and a Consensus procedure by means of a Delphi method process has been performed involving the delegates of all European countries represented in the UEMS PRM Section.
EVIDENCE SYNTHESIS: The systematic literature review is reported together with the 13 recommendations from the Delphi procedure.
CONCLUSIONS: The professional role of PRM physicians in obesity is to propose a complete PRM treatment for the patients considering the comorbidities, impairments, activity limitations and participation restrictions, providing medical care and leadership to the multidisciplinary team, coordinating the individual PRM project developed in team in agreement with the patient and his family/care givers.

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Key words: Obesity - Disability evaluation - Rehabilitation.

Introduction

Obesity is a metabolic disease (ICD-10 code E66) that has reached epidemic proportions. The World Health Organization (WHO) has declared obesity as the largest global chronic health problem in adults. Obesity is a gateway to ill health, and it has become one of the leading causes of disability and death, affecting not only adults but also children and adolescents worldwide.[1-3] The WHO world health statistics report in 2015

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shows that in the European region the overall obesity rate among adults is 21.5% in males and 24.5% in females.[4] An increase to 36.9% and to 38.0% in 2013 in the proportion of men and women, respectively, whose body mass index (BMI) was greater than 25 were noted in the Global Burden of Disease Study.[5] Obesity has important consequences for morbidity, disability and health-related quality of life. Obesity entails a higher risk of developing type 2 diabetes, cardiovascular diseases, obstructive sleep apnea syndrome and obesity hypoventilation syndrome, several common forms of cancer, osteoarthritis and other health problems including musculoskeletal pain.[6-10] Prevention of obesity is prospectively very important, but the challenge is rather the progression of the disabilities already present posing a significant challenge for Physical and Rehabilitation Medicine (PRM) specialists. The health and economic burden resulting from obesity and its consequences is not only based on mortality and the financial costs of hospital admissions and treatment of comorbidities, but also on significant ensuing disability with limitations in functioning which are well documented in the International Classification of Functioning (ICF) Core Sets for Obesity.[11] Disability burden attributable to obesity is substantial, high BMI accounting for 3.8% of worldwide disability adjusted life years in 2010 [12] with 134 million years in 2013 as the leading risk factor almost in all world regions.[13]

Today there is no uniformity among different countries across Europe and in the world in the PRM approach. The existing documents in Europe are clinical guidelines for the treatment and management of obesity in the hospital and in the long term. Physiotherapy interventions are usually not explicitly and specifically included in the existing clinical guide lines about the treatment of obese patients. The availability of evidence of effectiveness of interventions refers only to combined interventions (diet, physical activity, behavioural therapy, pharmacological therapy, bariatric surgery) and not to specific PRM interventions. For these reasons the European Union of Medical Specialists (UEMS) - PRM Section decided to develop one of its evidence based position papers (EBPPs) on obesity and related comorbidities, representing the official position of the European Union. The aim of the paper is to improve PRM specialists' professional practice for patients with obesity and related comorbidities.

Evidence acquisition

Literature search

This paper has been developed according to the Methodology defined by the Professional Practice Committee of the UEMS-PRM Section.[7] The systematic review of the literature has been performed in PubMed the 6th of February, 2016. A library scientist conducted an extensive *a priori* literature search for articles related to obesity and rehabilitation.

The search included articles extracted from the following databases: MEDLINE, EMBASE (Current Contents), SPORTDiscus, SUM, Scopus, CINAHL, AMED, BIOMED, PubMed, ERIC, the Cochrane Controlled Trials, and PEDro. A hand search of the reference lists of potential case-control studies (CCSs) also was performed. The 4 strings used for the first selection are reported in Appendix I. Two reviewers (CP and BA, in the Acknowledgments) performed the selection at each stage. The subsequent Consensus with Delphi procedure has followed the 4 steps proposed by the Methodology paper.[14]

Evidence synthsis

The criterion for including the studies has been the professional relevance for PRM physicians as judged by the author CP and by BA cited in the Acknowledgements, with the author resolving conflicts. The Strengh of Evidence (SoE) and the Strength of Recommendation (SoR) are given according to the Methodology paper.

The PubMed search (string 1 to 3) evidenced the following papers: a total of 462 papers (231 from string 1, 110 from string 2, 121 from string 3), from which we excluded 319 titles not relevant to PRM, and considered 143 titles for abstract review (69 from string 1, 42 from string 2, 32 from string 3) (Figure 1).

The Cochrane search (string 4) provided 2 systematic reviews and 110 RCTs (10-year time), from which we selected 32 titles and 8 abstracts. The latter overlapped with the abstracts found in the PubMed search.

We then excluded 82 abstracts not relevant to PRM and included for paper review 61 papers.

Twenty-one papers (10 from string 1 and 11 from string 3) out of the 61 plus 8 additional papers (5 European clinical guidelines, 1 American clinical guideline and 3 expert papers) were considered to produce this EBPP (Appendix II).

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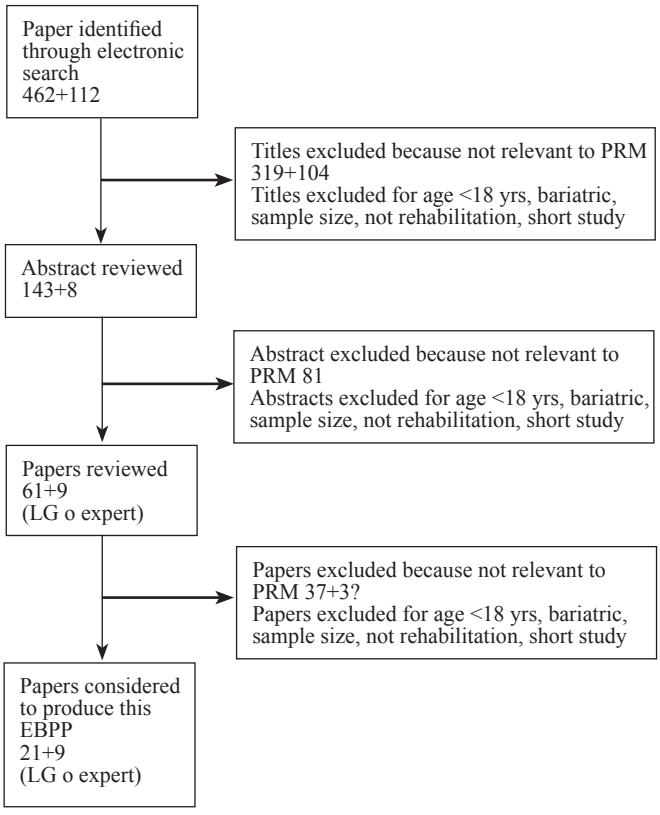

Figure 1.—Flow chart of papers selection.

The 6 existing clinical guidelines are intended for the treatment and management of obesity in the hospital and in the long term but are not to serve as a standard of care. They are of particular interest to those working in primary care, secondary and tertiary weight management services and those involved in management of services for long term conditions especially diabetes and cardiovascular disease. The 3 key treatments considered in the guidelines (we have excluded bariatric surgery and pharmacological interventions) are: nutrition, physical exercise and behavioral therapy (Table I).

These treatments are complementary and have to be offered to the patient at the same time. The combination of these 3 treatments has been proved to be more effective than single treatment.

The only 2 papers specifically referring to physiotherapy interventions are the Italian Guidelines and the Ottawa Clinical Practice Guidelines (Appendix II).

The Italian document provides the following recommendations:

— "*the rehabilitation pathway of the obese patient should be characterized by the integration of nutritional, physical/functional rehabilitation (physiotherapy, therapeutic exercise, physical reconditioning, adapted physical activity), psycho-educational (therapeutic education and short focused psychotherapeutic interventions), rehabilitative nursing interventions*" (Level: IV; Strength of Recommendation: A).

— "*The intensity of the rehabilitative intervention should depend on the level of severity and comorbidities, frailty of the psychic status, degree of disability and quality of life of the patient*" (Level: VI; Strength of Recommendation: A).

The Ottawa Panel found evidence to support the use of diet or physical activity/physiotherapy programs for the overall management of osteoarthritis of the knee in obese patients. Results of positive recommendations (grades A and C) from included studies with high methodological quality (Jadad scale score 3) indicate that diet or physical activity programs were promising for:

— short-term (6-month) pain relief (2 grade A recommendations, 6 grade C recommendations);

— long-term follow-up (18-month) pain relief (3 grade C recommendations);

— improvement of torque (2 grade C recommendations);

— functional status (2 grade A recommendations, 2 grade C recommendations);

— self-efficacy (2 grade A recommendations, 2 grade C recommendations);

— endurance (2 grade A recommendations);

— mobility (1 grade A recommendation, 3 grade C recommendations);

— psychological well-being (2 grade A recommendations, 1 grade C recommendation).

The Ottawa Panel recommends reducing weight prior to the implementation of weight-bearing exercise to maintain joint integrity and to avoid joint disease and dysfunction and the inclusion of diet or physical activity programs in the management of ostheoarthritis among individuals who are obese.

Consensus

Overall general recommendation

The professional role of PRM physicians in rehabilitation of persons with obesity and related condi-

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TABLE I.—*Summary of the recommended 3 key-treatments in the existing European Guidelines.*

	Nutrition	Behavioral	Physical exercise
NICE (2014)	600 kcal/day deficit low-fat diets, in combination with expert support and intensive follow-up. Low-calorie diets (800-1600 kcal/day) are less likely to be nutritionally complete. Only consider very-low-calorie diets, as part of multi-component program for rapidly losing weight (for example, people who need joint replacement surgery or who are seeking fertility services)	Self-monitoring of behavior and progress stimulus control goal setting slowing rate of eating ensuring social support. Encourage to increase physical activity even if they do not lose weight because of the other health benefits, reduce amount of time spent inactive	At least 30 min moderate intensity physical activity 5 days/week. 1 session or several sessions lasting 10 min or more. To prevent obesity, 45-60 minutes moderate-intensity activity/day. People who have been obese and have lost weight may need 60-90 min activity/day to avoid regaining weight. Activities that can be incorporated into everyday life. Consider person's current physical fitness
Scottish (2010)	600 kcal/day energy deficit, individually tailored	A combination of active support for diet plus behavioral therapy (problem solving, relapse prevention, stimulus control, dealing with problem situations, assertion, and behavior chain analysis) is effective for weight loss at 12 months. Self monitoring stimulus control cognitive restructuring (modifying unhelpful thoughts/thinking patterns) goal setting problem solving assertiveness training slowing the rate of eating reinforcement of changes relapse prevention	Physical activity approximately 1,800-2,500 kcal/week (225-300 min/week at moderate intensity)
German (2007)	Reduction fat intake only: daily energy deficit about 500 kcal. The fat intake is reduced to about 60 grams per day and the consumption of carbohydrates not limited. Average weight loss of 3.2 -4.3 kg over 6 months. For moderately energy-reduced varied diet, energy deficit 500-800 kcal/ day. Carbohydrates and protein are also reduced. Average of 5.1 kg over12 months can be successfully lost	bolster motivation to comply with the nutrition and exercise recommendations, for long-term weight reduction or stabilization. Self-observation of eating, drinking and exercise habits. Gradual introduction of flexible, controlled eating habits. Learning stimulus control techniques to decrease eating impulses. Use of positive reinforcement in order to strengthen new eating habits and prevent relapse. Social support relapse prophylaxis and management	5 hours additional physical activity per week (additional energy consumption of 2500 kcal/week). To stabilize weight, 3-5 h/ week of increased activity (at least 1500 kcal). Training intensity at 75% of the maximum heart rate if no contraindications. Combination of endurance with muscle building training.
Italian (2010)	Depending on energy consumption, 500 e 1000 kcal caloric restriction.	Behavioral therapy + life style changes more effective than life style changes only. Techniques: therapeutic alliance and adherence, motivation, problem solving, empowerment, narrative medicine.	150-250 min a week induce modest loss (2.3 kg in 6-12 months), 250-400 min a week a 5.0-7.5 kg reduction in 6-12 months. To prevent regain 200 min a week of moderate intensity physical activity.
European (2015)	Balanced hypocaloric diets result in clinically meaningful weight loss. An emphasis on the macronutrient proportion (low fat, low carbohydrate or high protein etc.) has not proved better than a balanced hypocaloric diet, except for low-glycaemic load diets. Beneficial effects on reducing risk factors for cardiovascular disease and type 2 diabetes as well as on promoting adherence. A 15-30% decrease in energy	Reduce sedentary behavior and increase daily activities. Patients should be advised and helped in undertaking (or increasing) physical activity. Exercise advice must be tailored to the patient's ability and health and focus on a gradual increase to levels that are safe. Cognitive-behavioral therapy includes self-monitoring, techniques controlling the process of eating, stimulus control	Additive benefits of combining exercise with caloric restriction on reducing body weight and body fat and preservation of FFM as compared to diet alone. Aerobic training is the optimal mode of exercise for reducing fat mass and body mass while a programme including resistance training is least 150 min/week of moderate aerobic training is the optimal mode of exercise for reducing fat mass and body mass while a

(Continues)

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TABLE I.—*Summary of the recommended 3 key-treatments in the existing European Guidelines (continues).*

Nutrition	Behavioral	Physical exercise
(calorie) intake from habitual intake appropriate. Recommended energy deficit of 600 kcal/day will predict a weight loss of about 0.5 kg weekly. Low-calorie diets have an energy content between 800 and 1200 kcal/day. VLCDs usually provide less than 800 kcal/day and may be used only as part of a comprehensive programme under supervision. Unsuitable as a sole source of nutrition for children and adolescents, pregnant or lactating women and the elderly. Meal replacement diets (substitution of one or two daily meal portions by VLCD) may contribute to nutritionally well-balanced diet and weight loss maintenance.	and re-enforcement as well as cognitive and relaxation techniques. CBT can be provided not only by registered psychologists but also by other trained health professionals such as physicians, dieticians, exercise physiologists or psychiatrists. Physicians should recognize where psychological or psychiatric issues interfere with successful obesity management, *e.g.* depression. Psychological support and/or treatment will then form an integral part of management; in special cases (anxiety, depression and stress), referral to a specialist may be indicated.	program including resistance training is needed for increasing lean mass At least 150 min/week of moderate aerobic exercise with three weekly sessions of resistance exercise.

tions includes provision of rehabilitation diagnosis and treatment emphasizing function and quality of life, medical care of the existing comorbidities, prescription of bariatric aids for independence, leadership to the multidisciplinary rehabilitation team bringing a distinctive holistic perspective to the patient care process, developing rehabilitation protocols in different settings in relation to the phases of instability of the condition and taking charge of the return-to-home (avoidance of environmental barriers, prescription of mobility/transferring aids) and return-to-work phases.

RECOMMENDATIONS ON PRM PHYSICIANS' ROLE IN MEDICAL DIAGNOSIS ACCORDING TO ICD

It is recommended that PRM physicians dealing with obesity and comorbidities gain specific and wide expertise in the specific medical diagnoses and treatment approaches of these patients. They should work in team with other specialties to develop the required PRM treatments. It is also important for PRM physicians to consider obesity risk in people with long-term disabilities already in rehabilitation.

RECOMMENDATIONS ON PRM PHYSICIANS' ROLE IN PRM DIAGNOSIS ACCORDING TO ICF

In the diagnostic phase, an assessment of motor function (muscular strength, balance, endurance) and cardiorespiratory capacity, disability, health-related quality of life, musculoskeletal pain and other chronic pain conditions and limitations should be performed (Level: III; Strength of Recommendation: A).

RECOMMENDATIONS ON PRM PHYSICIANS' ROLE IN PRM ASSESSMENT ACCORDING TO ICF

The rehabilitation plan should be developed according to the ICF model. PRM treatment should be regularly assessed through a complete PRM assessment including evaluation of disease, comorbidity and impairment but also activity limitations and participation restrictions due to health condition and/or treatments, taking into account contextual factors, including environmental and personal factors.

RECOMMENDATIONS ON PRM MANAGEMENT AND PROCESS

*Inclusion criteria (*e.g. *when and why to prescribe PRM interventions).*—PRM interventions should be proposed when functional capacity and quality of life are reduced due to excessive body mass and presence of disabling comorbidities. Specific PRM interventions are to be prescribed aimed at minimizing joint loads, improve muscle strength, balance, endurance and conditioning, maximizing motor, cardiorespiratory function and independence also with prescription of assistive technologies and ergonomic solutions. Admission to inpatient programs should be granted even in the

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absence of an acute event, based on severity of disability and clinical appropriateness. (Level: III; Strength of Recommendation: A).

Recommendations on project definition (definition of the overall aims and strategy of PRM interventions)

It is recommended that the PRM programme is proposed in centers where all the team (PRM physician, physiotherapist, occupational therapist, trainer, dietician, psychologist, endocrinologist and other specialties) is present. The integrated individual rehabilitation programme encompasses different areas of intervention and short- and long-term goals:

1) Nutritional intervention finalized to: restore correct eating habits (quality, quantity) in the long term; achieve a weight loss of at least 5% of the initial body weight in the short term and 10% in the long term with significant reduction of the fat mass and maintenance/increase of the lean mass.

2) Motor/functional rehabilitation programme (see "PRM interventions").

3) Therapeutic education and psychotherapeutic interventions targeted to: acknowledge the real needs of the patients; correct the false beliefs on nutrition and physical activity; train self-control and management in eating, physical activity, stress and anxiety (self-monitoring of eating, physical activity and weight, stimulus control, problem solving, cognitive restructuration); improve illness behavior.

4) Rehabilitative nursing, interventions performed by occupational therapists, physiotherapists and nurses and targeted to: improve patients' responses to chronic conditions, disability and pathological life styles; increase the social and environmental supports and compensations; protect and stimulate the functional and relational capacities in order to optimize participation to rehabilitation activities and health care programs (Level: IV; Strength of Recommendation: A).

Recommendations on team work (professionals involved and specific modalities of team work)

An interdisciplinary team is mandatory for effective implementation of rehabilitation for obesity-related disability. The integration of several medical specialties, including clinical nutrition, endocrinology, psychiatry, physical and rehabilitation medicine, cardiology, pneumology and different health professions, including dietitians, psychologists, physiotherapists, occupational therapists and nurses is required. The PRM physician brings a distinctive holistic perspective to the patient care process, with a particular focus on all dimensions of functioning involving body structures and functions, activities and participation, and contextual factors, whereas members of other disciplines treat particular ICF body structures and functions. The patient and his family are part of the team. For possible surgical options, a bariatric surgeon must be part of the team as well.

Recommendations on PRM interventions

It is recommended that PRM interventions include physical reconditioning with adapted physical activity, motor rehabilitation finalized at improving hypotonic and hypotrophic muscles due to disuse; restore range of motion; improve cardio-circulatory and respiratory capacities; physical modalities or other procedures for pain reduction

Recommendations on outcome criteria

It is recommended that the following outcome criteria are used: 1) nutritional outcomes (reduce BMI, body weight, LDL cholesterol, improve body composition); 2) motor/functional outcomes (reduce pain, improve physical capacities, function, activities of daily living and tolerance to effort); 3) behavioral and psychological outcomes (improve quality of life, correct nutritional and physical behavior etc.).

Recommendations on length/duration/intensity of treatment (overall practical PRM approach)

It is recommended that the intensity and duration of the interventions depend on the level of severity and comorbidities, frailty of the psychological status, degree of disability and quality of life of the patient (Level: IV; Strength of Recommendation: A).

Inpatient or specialised extra hospital rehabilitation facilities (up to 1-month stay) admit patients with disabilities susceptible of modifications which require specialized medical rehabilitative and therapeutic care in

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terms of complexity and/or duration of rehabilitative interventions provided by the health care professionals and the rehabilitation team.

Outpatient rehabilitation is characterized by a moderate need for clinical therapeutic care and by high demands of supportive interventions for the patients undergoing treatment.

Recommendations on discharge criteria (e.g. when and why to end PRM interventions)

It is recommended that patients stay in rehabilitation until reduction of disability (scales, questionnaires etc.), improvement in functional capacity (scales, functional tests), clinical steady state and reduction of clinical risk factors are reached. Rehabilitation transition settings, including community settings, should be considered after discharge for the delivery of PRM interventions for favourable long-term outcomes.

Recommendations on follow-up

A multidisciplinary (dietician, PRM specialist, endocrinologist, psychologist) follow-up at regular intervals based on the individual's specific situation and eventually a prescription of outpatient PRM interventions in different settings are recommended in the long-term phase.

Recommendations on future research on PRM professional practice

The leading role of the PRM specialists in this field should translate into providing new evidences of the effectiveness of specific PRM interventions on functioning and quality of life of obese patients with comorbid conditions. ICF compatible evaluation instruments should be implemented. Evidence-based methods to generate the patient's own activity and self-responsibility (web-based feedback and training) should also be implemented.[15-17]

Discussion

The environment where the inpatient rehabilitation programmes are held should be structurally and ergonomically adequate and safe for both patients and staff alike, with the adequate presence of bariatric aids and lifting/transferring devices according to the number of obese inpatients.

Not being specifically related to an acute event, the intensity of the interventions should depend on the level of severity and comorbidities, frailty of the psychological status, degree of disability and quality of life of the patient. Using the ICF, it appears that the most impaired functions are included in chapter b2 — sensory functions and pain, and chapter b7 — neuromusculoskeletal and movement-related functions; the most impaired structures are related to chapter s8 — skin and related structures. The most limited activities are included in chapters d2 — general tasks and demands and d4 — mobility. The most extended facilitators are within chapter e1 — products and technology; chapter e2 — natural environment and human-made changes to environment, describes the barriers.[18]

A multidimensional approach able to provide front line assessment and preventive strategies, risk stratification, and disease management is needed. For that purpose a team approach and the integration of several medical specialties, including clinical nutrition, endocrinology, psychiatry, psychology, rehabilitation medicine, and different health professions, including dietitians, psychologists, physiotherapists, occupational therapists and nurses is required. It is therefore mandatory to assess quality of life, disability, motor function (muscle strength, balance, tolerance to effort) and musculoskeletal problems (articular pain, limitations of the range of motion). Multidimensional rehabilitation can also be applied to complicated bariatric surgery patients in both the preoperative and postoperative period. Patients with chronic pain who may not have been alleviated after surgery may benefit from PRM interventions with special considerations for this specific group of individuals.[10]

There is a need for multiple settings in relation to the phases of instability of the condition.[19, 20] The model of organisation for long-term PRM depends on the existing traditions of the country.

Intensive (inpatient or specialised extra hospital facilities) rehabilitation interventions are directed to the recovery of major disabilities susceptible of modifications which require specialized medical rehabilitative and therapeutic care in terms of complexity.

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Outpatient rehabilitation is characterized by a moderate need for clinical therapeutic care and by high demands of supportive interventions for the patients undergoing treatment. PRM physicians should also take into account that higher rates of obesity are observed in persons with disabilities as reported in the World Report on Disability.[21] Overweight and obesity prevention programs may also be adapted to persons living with a disability such as spinal cord injury.[22] A systematic review pointed to the effectiveness of physical activity/exercise including strength training with a duration exceeding 15 minutes in the short-term in children with disabilities.[23]

Conclusions

The PRM physician is responsible for the functional and social assessment of persons with obesity with related comorbidities and for setting up a comprehensive strategy — a PRM problem-oriented program of care. It should include education of the patients, exercise, physical modalities, occupational therapy, aids and orthoses, pharmacological interventions and proper advice to refer to surgical interventions when the conservative approach is ineffective.

PRM physicians, guided by the ICF, are in a position to be helpful to these patients largely. Although there are a number of effective PRM interventions based on scientific evidence for the treatment of patients with obesity with related comorbidities there seems to be a need for more high-quality trials in this field. Especially studies on activities and participation and environmental factors (*i.e.* work) components of the ICF are required to enable PRM physicians to make evidence-based decisions on treatments to ensure the best care of their patients.

The specialty of PRM is well qualified to address the problems of chronicity and obesity in particular.[24] For many PRM physicians, however, the prescription of exercise for obese individuals will be venturing into a different realm of practice, beyond their ordinary experience. Some may feel the need to reinforce and further develop their skills in specific areas of exercise and nutrition application for these populations. PRM in general will benefit from widespread education and research efforts in this area.

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APPENDIX

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APPENDIX I.—*The 4 strings used for first selection (continues).*

rehabiliteringsbroms[All Fields] OR rehabiliteringscenter[All Fields] OR rehabiliteringscentrum[All Fields] OR rehabiliteringsenhet[All Fields] OR rehabiliteringsenheten[All Fields] OR rehabiliteringsevnen[All Fields] OR rehabiliteringsforlob[All Fields] OR rehabiliteringsforlop[All Fields] OR rehabiliteringsforsok[All Fields] OR rehabiliteringsfragan[All Fields] OR rehabiliteringsfragor[All Fields] OR rehabiliteringsgarantin[All Fields] OR rehabiliteringsinsatser[All Fields] OR rehabiliteringsinsatserna[All Fields] OR rehabiliteringsinstrument[All Fields] OR rehabiliteringskedjan[All Fields] OR rehabiliteringsklinik[All Fields] OR rehabiliteringskliniken[All Fields] OR rehabiliteringskurs[All Fields] OR rehabiliteringslakare[All Fields] OR rehabiliteringsmedicin[All Fields] OR rehabiliteringsmedicinare[All Fields] OR rehabiliteringsmedicinska[All Fields] OR rehabiliteringsmedicinskt[All Fields] OR rehabiliteringsmedverkan[All Fields] OR rehabiliteringsmessig[All Fields] OR rehabiliteringsmessige[All Fields] OR rehabiliteringsmetod[All Fields] OR rehabiliteringsomradet[All Fields] OR rehabiliteringsopphold[All Fields] OR rehabiliteringspasienter[All Fields] OR rehabiliteringspenger[All Fields] OR rehabiliteringspersonal[All Fields] OR rehabiliteringspionjar[All Fields] OR rehabiliteringsplasser[All Fields] OR rehabiliteringspotentiale[All Fields] OR rehabiliteringsproblem[All Fields] OR rehabiliteringsproblemet[All Fields] OR rehabiliteringsprognos[All Fields] OR rehabiliteringsprogram[All Fields] OR rehabiliteringsprogrammet[All Fields] OR rehabiliteringspsykiatrin[All Fields] OR rehabiliteringsrad[All Fields] OR rehabiliteringsradet[All Fields] OR rehabiliteringsresultat[All Fields] OR rehabiliteringsresurser[All Fields] OR rehabiliteringssenter[All Fields] OR rehabiliteringssenteret[All Fields] OR rehabiliteringssykehus[All Fields] OR rehabiliteringssystem[All Fields] OR rehabiliteringsteknik[All Fields] OR rehabiliteringstilbud[All Fields] OR rehabiliteringstraning[All Fields] OR rehabiliteringsverksamhet[All Fields] OR rehabiliteringsverksamheten[All Fields] OR rehabilites[All Fields] OR rehabilitiation[All Fields] OR rehabilitiative[All Fields] OR rehabilitier[All Fields] OR rehabilitierbaren[All Fields] OR rehabilitieren[All Fields] OR rehabilitierende[All Fields] OR rehabilitierenden[All Fields] OR rehabilitiert[All Fields] OR rehabilitierte[All Fields] OR rehabilitierten[All Fields] OR rehabilitierter[All Fields] OR rehabilitierung[All Fields] OR rehabilities[All Fields] OR rehabiliting[All Fields] OR rehabilition[All Fields] OR rehabilititation[All Fields] OR rehabilititave[All Fields] OR rehabilitive[All Fields] OR rehabilitiven[All Fields] OR rehabilitize[All Fields] OR rehabilitologist[All Fields] OR rehabilitology[All Fields] OR rehabilitons[All Fields] OR rehabilitory[All Fields] OR rehabilitovanych[All Fields] OR rehabilitowac[All Fields] OR rehabilitowanych[All Fields] OR rehabilitracji[All Fields] OR rehabilitranim[All Fields] OR rehabilitration[All Fields] OR rehabilittion[All Fields] OR rehabilitujacych[All Fields] OR rehabilituju[All Fields] OR rehability[All Fields] OR rehabilityoregon[All Fields] OR rehabilitzation[All Fields]) AND (diabete[All Fields] OR diabete's[All Fields] OR diabetec[All Fields] OR diabetecheskoi[All Fields] OR diabeted[All Fields] OR diabetees[All Fields] OR diabeteic[All Fields] OR diabeteics[All Fields] OR diabetekere[All Fields] OR diabetekseen[All Fields] OR diabeteksel ta[All Fields] OR diabeteksen[All Fields] OR diabeteksessa[All Fields] OR diabetelogical[All Fields] OR diabetelogie[All Fields] OR diabetelogy[All Fields] OR diabetelugano[All Fields] OR diabetem[All Fields] OR diabeten[All Fields] OR diabetenkosten[All Fields] OR diabeteology[All Fields] OR diabeteom[All Fields] OR diabeter[All Fields] OR diabeterelated[All Fields] OR diabetergestemd[All Fields] OR diabeterisiko[All Fields] OR diabeters[All Fields] OR diabetes[All Fields] OR diabetes'[All Fields] OR diabetes''[All Fields] OR diabetes'risk[All Fields] OR diabetes's[All Fields] OR diabetes,[All Fields] OR diabetes1[All Fields] OR diabetes3[All Fields] OR diabetes39[All Fields] OR diabetes64[All Fields] OR diabetes96[All Fields] OR diabetesa[All Fields] OR diabetesabteilung[All Fields] OR diabetesacidos[All Fields] OR diabetesadelaide[All Fields] OR diabetesahnliche[All Fields] OR diabetesaktion[All Fields] OR diabetesalfred[All Fields] OR diabetesambulanz[All Fields] OR diabetesambulanzen[All Fields] OR diabetesambulatorier[All Fields] OR diabetesambulatoriet[All Fields] OR diabetesambulatorium[All Fields] OR diabetesamerica[All Fields] OR diabetesand[All Fields] OR diabetesandendocrinology[All Fields] OR diabetesanyagcserere[All Fields] OR diabetesassistentin[All Fields] OR diabetesassociated[All Fields] OR diabetesatlas[All Fields] OR diabetesauslosung[All Fields] OR diabetesaustin[All Fields] OR diabetesaustralia[All Fields] OR diabetesbarn[All Fields] OR diabetesbarnmorska[All Fields] OR diabetesbb[All Fields] OR diabetesbehandeling[All Fields] OR diabetesbehandling[All Fields] OR diabetesbehandlingen[All Fields] OR diabetesbehandlugn[All Fields] OR diabetesbehandlung[All Fields] OR diabetesbekampfung[All Fields] OR diabetesben[All Fields] OR diabetesberater[All Fields] OR diabetesberaterin[All Fields] OR diabetesberatung[All Fields] OR diabetesbetreuung[All Fields] OR diabetesbewaltigung[All Fields] OR diabetesbezogene[All Fields] OR diabetesbirmingham[All Fields] OR diabetesblizard[All Fields] OR diabetesborn[All Fields] OR diabetescare[All Fields] OR diabetescarecenter[All Fields] OR diabetescareprogram[All Fields] OR diabetescenter[All Fields] OR diabetescentrum[All Fields] OR diabetescoach[All Fields] OR diabetescontrol[All Fields] OR diabetescontrole[All Fields] OR diabetescontroles[All Fields] OR diabetesdagen[All Fields] OR diabetesdagvard[All Fields] OR diabetesdauer[All Fields] OR diabetesde[All Fields] OR diabetesdebut[All Fields] OR diabetesdefinition[All Fields] OR diabetesdepartment[All Fields] OR diabetesdiaet[All Fields] OR diabetesdiagnose[All Fields] OR diabetesdiagnosen[All Fields] OR diabetesdiagnostik[All Fields] OR diabetesdiat[All Fields] OR diabetesdieet[All Fields] OR diabetesdigestivekidney[All Fields] OR diabetesdisc[All Fields] OR diabetesdispensar[All Fields] OR diabetesdivision[All Fields] OR diabetesdue[All Fields] OR diabetese[All Fields] OR diabeteseducatie[All Fields] OR diabeteseinstellung[All Fields] OR diabeteselisenstrasse[All Fields] OR diabetesendocrinology[All Fields] OR diabetesenheten[All Fields] OR diabetesentwicklung[All Fields] OR diabetesepidemien[All Fields] OR diabeteserhebung[All Fields] OR diabeteserkrankung[All Fields] OR diabeteserkrankungen[All Fields] OR diabeteses[All Fields] OR diabetesesben[All Fields] OR diabetesesek[All Fields] OR diabetesesekben[All Fields] OR diabeteseseken[All Fields] OR diabetesexercise[All Fields] OR diabetesexercised[All Fields] OR diabetesfalle[All Fields] OR diabetesfalles[All Fields] OR diabetesfederatie[All Fields] OR diabetesfiona[All Fields] OR diabetesflut[All Fields] OR diabetesforbund[All Fields] OR diabetesforbundet[All Fields] OR diabetesforekomst[All Fields] OR diabetesforeningen[All Fields] OR diabetesform[All Fields] OR diabetesformakban[All Fields] OR diabetesformen[All Fields] OR diabetesforms[All Fields] OR diabetesforschg[All Fields] OR diabetesforschung[All Fields] OR diabetesforschungsinsitutes[All Fields] OR diabetesforschungsinstitut[All Fields] OR diabetesforschungsinstitutes[All Fields] OR diabetesforschungsinstituts[All Fields] OR diabetesforskning[All Fields] OR diabetesforskningscentret[All Fields] OR diabetesforskningssenter[All Fields] OR diabetesforskningssenteret[All Fields] OR diabetesfrage[All Fields] OR diabetesfragen[All Fields] OR diabetesfrail[All Fields] OR diabetesfruhdiagnostik[All Fields] OR diabetesfruherkennung[All Fields] OR diabetesfruhstadien[All Fields] OR diabetesfuhrung[All Fields] OR diabetesfursorge[All Fields] OR diabetesgangran[All Fields] OR diabetesgeeni[All Fields] OR diabetesgefahrdeten[All Fields] OR diabetesgenes[All Fields] OR diabetesgenetikk[All Fields] OR diabetesgesellschaft[All Fields] OR diabetesgondozasban[All Fields] OR diabetesgondozo[All Fields] OR diabetesgravida[All Fields] OR diabetesgraviditet[All Fields] OR diabetesgruppen[All Fields] OR diabeteshaufigkeit[All Fields] OR diabetesheilung[All Fields] OR diabeteshellenic[All Fields] OR diabeteshereditat[All Fields] OR diabeteshistorie[All Fields] OR diabeteshoitajakoulutusta[All Fields] OR diabeteshulpmiddelen[All Fields] OR diabetesin[All Fields] OR diabetesincidensregister[All Fields] OR diabetesincidensstudien[All Fields] OR diabetesincontrol[All Fields] OR diabetesindia[All Fields] OR

(To be continued)

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APPENDIX I.—*The 4 strings used for first selection (continues).*

diabetesinduced[All Fields] OR diabetesinflammation[All Fields] OR diabetesinstitut[All Fields] OR diabetesinstitute[All Fields] OR diabetesinstruktion[All Fields] OR diabetesinsulin[All Fields] OR diabetesinterventions[All Fields] OR diabetesinterventionsstudie[All Fields] OR diabetesinzidenz[All Fields] OR diabetesinzidenzstudiengruppe[All Fields] OR diabetesis[All Fields] OR diabetesjapan[All Fields] OR diabeteskatarakt[All Fields] OR diabetesklinik[All Fields] OR diabetesklinikka[All Fields] OR diabeteskockazat[All Fields] OR diabeteskoloni[All Fields] OR diabeteskoma[All Fields] OR diabeteskomplikasjoner[All Fields] OR diabeteskomplikation[All Fields] OR diabeteskomplikationen[All Fields] OR diabeteskomplikationer[All Fields] OR diabeteskongress[All Fields] OR diabeteskontroll[All Fields] OR diabeteskontrolle[All Fields] OR diabeteskontrollen[All Fields] OR diabeteskost[All Fields] OR diabeteskosthold[All Fields] OR diabeteskranke[All Fields] OR diabeteskranken[All Fields] OR diabeteskurssi[All Fields] OR diabetesl[All Fields] OR diabeteslaake[All Fields] OR diabeteslaakkeen[All Fields] OR diabeteslaakkeet[All Fields] OR diabeteslaakkeiden[All Fields] OR diabeteslaboratoriet[All Fields] OR diabeteslakemedel[All Fields] OR diabetesliiton[All Fields] OR diabeteslijders[All Fields] OR diabeteslike[All Fields] OR diabeteslive[All Fields] OR diabetesludwig[All Fields] OR diabetesmanagement[All Fields] OR diabetesmanifestation[All Fields] OR diabetesmaske[All Fields] OR diabetesmedel[All Fields] OR diabetesmediciner[All Fields] OR diabetesmedikamente[All Fields] OR diabetesmeds[All Fields] OR diabetesmellitus[All Fields] OR diabetesmetabolic[All Fields] OR diabetesmetabolism[All Fields] OR diabetesmidler[All Fields] OR diabetesmikroangiopati[All Fields] OR diabetesmine[All Fields] OR diabetesmittel[All Fields] OR diabetesmittels[All Fields] OR diabetesmodell[All Fields] OR diabetesmodrar[All Fields] OR diabetesmolecular[All Fields] OR diabetesmorbidit[All Fields] OR diabetesmorbiditat[All Fields] OR diabetesmorbiditet[All Fields] OR diabetesmortalitat[All Fields] OR diabetesmottagning[All Fields] OR diabetesmottagningen[All Fields] OR diabetesnational[All Fields] OR diabetesnd[All Fields] OR diabetesne[All Fields] OR diabetesnefropati[All Fields] OR diabetesnet[All Fields] OR diabetesneuropathien[All Fields] OR diabetesneuropati[All Fields] OR diabetesnewfrontiers[All Fields] OR diabetesnotfalle[All Fields] OR diabetesnp[All Fields] OR diabetesnsw[All Fields] OR diabetesobesity[All Fields] OR diabetesom[All Fields] OR diabetesomsorg[All Fields] OR diabetesomsorgen[All Fields] OR diabetesoutcomequality[All Fields] OR diabetespasienter[All Fields] OR diabetespathogenese[All Fields] OR diabetespathogenesen[All Fields] OR diabetespatient[All Fields] OR diabetespatienten[All Fields] OR diabetespatienter[All Fields] OR diabetespatienters[All Fields] OR diabetespatogenesen[All Fields] OR diabetespflege[All Fields] OR diabetesplan[All Fields] OR diabetespoliklinikka[All Fields] OR diabetespoliklinikken[All Fields] OR diabetespolyneuropathie[All Fields] OR diabetespopulation[All Fields] OR diabetespotilaan[All Fields] OR diabetespraevalens[All Fields] OR diabetespravalenz[All Fields] OR diabetespravention[All Fields] OR diabetesprincess[All Fields] OR diabetesproblem[All Fields] OR diabetesprobleme[All Fields] OR diabetesproblemen[All Fields] OR diabetesproduced[All Fields] OR diabetesprone[All Fields] OR diabetespsychosen[All Fields] OR diabetespubs[All Fields] OR diabetesrask[All Fields] OR diabetesregister[All Fields] OR diabetesregisters[All Fields] OR diabetesregistret[All Fields] OR diabetesregulatie[All Fields] OR diabetesregulation[All Fields] OR diabetesregulationen[All Fields] OR diabetesregulering[All Fields] OR diabetesrekommendationer[All Fields] OR diabetesrelated[All Fields] OR diabetesrelaterade[All Fields] OR diabetesremission[All Fields] OR diabetesremissionen[All Fields] OR diabetesresearch[All Fields] OR diabetesretinopati[All Fields] OR diabetesrisiko[All Fields] OR diabetesrol[All Fields] OR diabetessar[All Fields] OR diabetesscenariosforjuniordoctors[All Fields] OR diabetesschilderung[All Fields] OR diabetesschulung[All Fields] OR diabetesschulungen[All Fields] OR diabetesschwerpunkpraxis[All Fields] OR diabetesschwerpunktpraxis[All Fields] OR diabetesschwestern[All Fields] OR diabetesscreening[All Fields] OR diabetesseinstellung[All Fields] OR diabetesshanghai[All Fields] OR diabetessimuleringsmodel[All Fields] OR diabetessituation[All Fields] OR diabetessjuka[All Fields] OR diabetessjukdomen[All Fields] OR diabetessjukdomens[All Fields] OR diabetessjukvard[All Fields] OR diabetesskola[All Fields] OR diabetesskole[All Fields] OR diabetesskolen[All Fields] OR diabetesskoterskan[All Fields] OR diabetesskoterskornas[All Fields] OR diabetessoftware[All Fields] OR diabetesspecific[All Fields] OR diabetesspecifikus[All Fields] OR diabetesspezifische[All Fields] OR diabetesst[All Fields] OR diabetesstadien[All Fields] OR diabetesstation[All Fields] OR diabetesstiftelsen[All Fields] OR diabetesstudie[All Fields] OR diabetesstudien[All Fields] OR diabetesstudy[All Fields] OR diabetesstuttgart[All Fields] OR diabetessuchaktionen[All Fields] OR diabetessuche[All Fields] OR diabetessuchprogramms[All Fields] OR diabetessurgeryinstitute[All Fields] OR diabetessuspekten[All Fields] OR diabetessystematic[All Fields] OR diabetesszel[All Fields] OR diabetesszures[All Fields] OR diabetesta[All Fields] OR diabetestalk[All Fields] OR diabetestechnologie[All Fields] OR diabetestechnology[All Fields] OR diabetesterapi[All Fields] OR diabetesterapis[All Fields] OR diabetesthe[All Fields] OR diabetestherapei[All Fields] OR diabetestherapie[All Fields] OR diabetestilfaelde[All Fields] OR diabetestipo[All Fields] OR diabetestodes[All Fields] OR diabetestrial[All Fields] OR diabetestuberkulose[All Fields] OR diabetestutkimuksen[All Fields] OR diabetestyp[All Fields] OR diabetestypen[All Fields] OR diabetestypische[All Fields] OR diabetestypischer[All Fields] OR diabetestyps[All Fields] OR diabetesuberwachung[All Fields] OR diabetesundersogelse[All Fields] OR diabetesungdomars[All Fields] OR diabetesuniversity[All Fields] OR diabetesursache[All Fields] OR diabetesursachen[All Fields] OR diabetesvandrejournal[All Fields] OR diabetesvard[All Fields] OR diabetesvarden[All Fields] OR diabetesverdachtigen[All Fields] OR diabetesvereniging[All Fields] OR diabetesverlauf[All Fields] OR diabetesvloedgolf[All Fields] OR diabetesvorkommen[All Fields] OR diabetesvorstadien[All Fields] OR diabetesweekly[All Fields] OR diabeteswelle[All Fields] OR diabetesxglucose[All Fields] OR diabetesz[All Fields] OR diabeteszambulancia[All Fields] OR diabeteszben[All Fields] OR diabeteszentrum[All Fields] OR diabeteszentrums[All Fields] OR diabeteszes[All Fields] OR diabeteszorg[All Fields] OR diabeteszt[All Fields] OR diabetetes[All Fields] OR diabetetogenesis[All Fields] OR diabetetogenic[All Fields] OR diabetets[All Fields] OR diabetetszentrum[All Fields] OR diabeteund[All Fields] OR diabetex[All Fields] OR diabetezentrum[All Fields]) AND Clinical Trial[ptyp]

String 2) PUBMED**:** obesit* AND rehabilit* AND ((Guideline[ptyp] OR Meta-Analysis[ptyp] OR Randomized Controlled Trial[ptyp] OR systematic[sb]))

String 3) PUBMED: "Obesity/rehabilitation"[Mesh] AND (Guideline[ptyp] OR Meta-Analysis[ptyp] OR Randomized Controlled Trial[ptyp] OR Review[ptyp] OR systematic[sb])

String 4) COCHRANE: http://onlinelibrary.wiley.com/cochranelibrary/search/mesh?searchRow.searchCriteria.meshTerm=%22Obesity%22&searchRow.searchOptions.qualifiers=Q000534&searchMesh=Lookup&searchRow.ordinal=0&hiddenFields.strategySortBy=last-modified-date%3Bdesc&hiddenFields.showStrategies=false&hiddenFields.containerId=&hiddenFields.etag=&hiddenFields.originalContainerId

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APPENDIX II.—*Papers retrieved from the search.*

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