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ABCDEFS FOCUSED ON OBESITY NUTROLOGY CARE

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ABSTRACT

This article aims to systematize the Nutrology care, alerting the main points to be evaluated during anamnesis with emphasis on eating habits, physical examination and laboratory evaluation, medications in use and/or needed for treatment, level of physical activity, evaluation of the patient's feelings and desires, in addition to the quality of sleep (ABCDEFS). This systematization may facilitate the orientation of lifestyle changes that can contribute to a better quality of life.

KEYWORDS: Lifestyle, Diet quality, Nutrology assessment.

INTRODUCTION

Comprehensive nutritional assessment is important but can often be neglected. Nutrology teaching in medical schools must increase since many physicians do not know how to guide patients about lifestyle changes and health promotion. The objective of this tutorial is to systematize the clinical and nutrology care focused on a patient centered care approach using the ABCDEFS bundle:

- **A:** Alimentation
- **B:** Body
- **C:** Chemistry
- **D:** Drugs
- **E:** Exercise
- **F:** Feelings
- **S**: Sleep

The next lines will discuss and propose a systematic method of Nutrology assessment and management in clinical practice.

Alimentation

For most of us "diet" means weight loss rather than primarily the quality of nutrition and health[1]. Nutritional counseling must enhance the focus on nutrients with food-oriented education. However, it is well known that medical students are not trained in clinical nutrition, so they may not be able to advise patients on healthy eating.[1]

Health professionals need to engage patients into health habits. Being able to recommend lifestyle changes and prescribe a healthy diet for the treatment of patients, would help to reduce the incidence of metabolic syndrome, obesity, type 2 diabetes (T2D), mortality from cardiovascular disease (CVD), mortality from cancer, age-related cognitive decline and overall mortality.[2]

Dietary patterns that support health include the Dietary Approaches to Stop Hypertension (DASH), the Mediterranean diet, the plant-based food or vegetarian diet, the 2015 Dietary Guidelines for Americans and the Healthy Eating Plate.[3] All of them focus on eating more unprocessed or minimally processed foods and less ultra-processed or processed ones. Having an unhealthy diet increases risk factors for disability and premature death.[2,4] Currently, some authors propose a new food pyramid focused on improving lifestyle habits and promoting health (Figure 1).[5]

Assessment of food intake, as well as its quality and amount, is an important step in Nutrology. Some tools can be used like diet software, or some specific

questionaries can be applied as the 24-hour recall, Food and nutrient intakes diaries from 3-day and Food Frequency Questionnaire.[6,7]

Diet quality can be assessed by Dietary Quality Index or Indicators (DQIs) as: The Healthy Eating Index (HEI)[8], the Diet Quality Index (DQI)[9], the Healthy Diet Indicator (HDI)[10] and the Mediterranean Diet Score (MDS)[11] and the Diet Inflammatory Index (DII)[12] These indices evaluate the diet according to the consumption recommendations of major health agencies such as the American guide, the DASH diet, the Mediterranean diet or the plant-based diet.[5] The amount of consumption of macronutrients and micronutrients such as: saturated fat, polyunsaturated fat, cholesterol, high biological value proteins, simple and complex carbohydrates, fruits, vegetables, grain seeds, fruits, fiber, sodium and calcium are evaluated. These indices are scored according to frequency or are aggregated an index of risk of inducing inflammation.[13]

Recognizing and analyzing the consumption and/or eating habits of the patient allows the nutrologist to be able to guide an improvement in the eating habits of patients, in order to prevent/treat weight gain and reduce the risk of diabetes, high blood pressure, atherosclerotic diseases and cancer.[2,5]

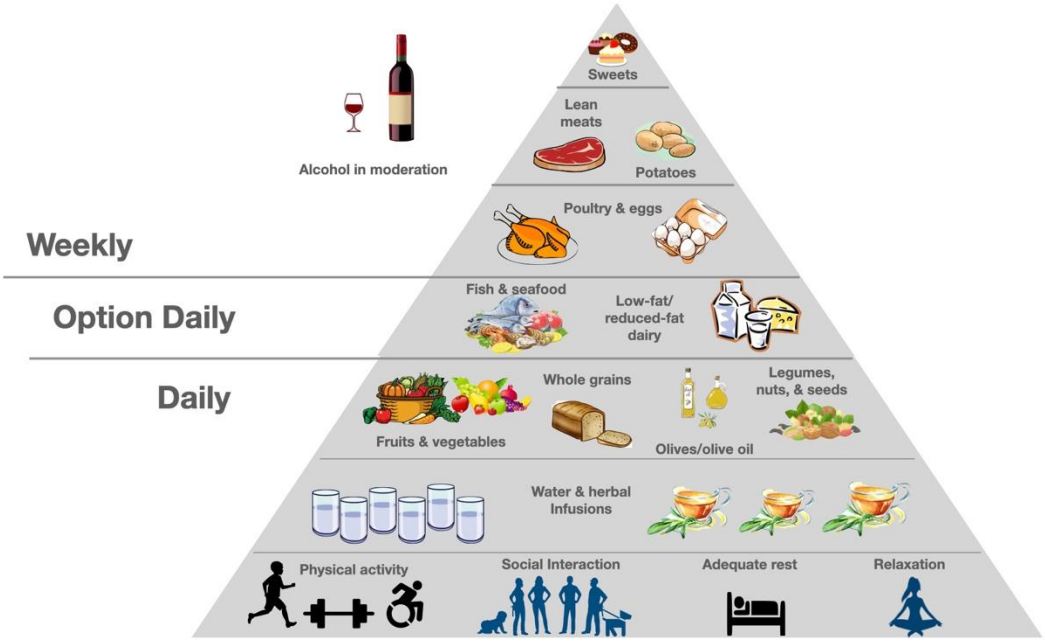


Figure 01: Generalized healthy diet and lifestyle pyramid, which includes Physical activity, social interaction, adequate rest (sleep), relaxation. Daily hydration, whole grains, fruits, vegetables, legumes, olive oils, nuts, seeds, option daily fish and seafood, low-fat dairy. Eat more unprocessed or minimally processed foods and less ultra-processed or processed ones. Adapted from Cena et al. Nutrients. 2020.[5]

Body

Body Composition

Body mass index [BMI = total body weight (kg) /height^2 (m)] is widely used as a surrogate measure for body fatness, due to the simplicity of anthropometric methods and the widespread availability of techniques to assess it, but it does not allow the precise measure of body fat.[14]

There are many medical devices that assess body composition, muscle quality and quantity .These devices can be used as diagnostic tool or as clinical follow-up. Nowadays there are many medical devices able to assess and analyses body composition, which are validated and have advantages and disadvantages (Table 01).[15-17]

Table 1: Comparative evaluation of methods.

Characteristic	US	BIA	CT	DXA
Population	Broad spectrum	Broad spectrum	Cancer; abdominal surgery; patients who have already had exam	Not intubated
Contraindication	No	Pregnant	Not used exclusively for body composition assessment because of radiation exposition	Intubated
Low cost	+++	+++	+	+
Safety profile	+++	+++	++	++
Replicability	++	++	+++	++
Accuracy	++	++	+++	+++

The manly techniques are: Dual energy x-ray absorptiometry (DXA), computed tomography (CT), magnetic resonance imaging (MRI), ultrasonography (US) and multifrequency segmental electrical bioimpedance (MFS-BIA).[23] These devices allow analyzing body compartments and evaluated muscle

quantity and quality.[15-17] Some indexes can be measured or calculate such as: Fat Free Mass (FFM); Fat Mass (MG); Skeletal Muscle (SM); Skeletal Muscle Index (SM); Fat Free Mass Index (FFMI); Fat Mass Index (FMI); Appendicular Lean Mass (ALM) and Appendicular Skeletal Muscle Index (ASMI).

These measures or indices allow measuring the excess or deficit of lean or fat mass[18] (TABLES 02 e 03).[18-22] Diagnostic steps to assess malnutrition[18,19], obesity[18], cachexia and/or sarcopenia.[19,21,22] Based on FFMI and FMI, subjects can be categorized as:

a) Lean mass and fat mass deficit - Wasting, cachexia
b) Deficit of lean mass and adequate fat mass - Sarcopenia
c) Lean Mass Deficit and Increased Fat Mass - Sarcopenic Obesity
d) Adequate lean mass and reduced fat mass - Constitutional thinness
e) Adequate lean mass and adequate fat mass – Adequate body composition
f) Adequate lean mass and increased fat mass - Overweight/obesity
g) Increased lean mass and reduced/adequate fat mass – Athletic
h) Increased lean mass and increased fat mass – Overweight/obesity "athletic" or "strong"

Table 02: Categories of Body Mass Index, Free-Fat Mass Index and Fat Mass Index.

Body Mass Index Kg/m^2	Grade (G)	Free Fat Mas Index (FFMI) Kg/m^2		Fat Mass Index (FMI) Kg/m^2		Categories of FFMI and FMI
		Male	Female	Male	Female	
≥ 40	Obesity G3					
35-39.9	Obesity G2					
30-34.9	Obesity G1	NA	NA	≥8.3	≥11.8	Very High
25-29.9	Overweight	≥19.8	≥16.8	5.2-8.2	8.2-11.7	High
18.5-24.9	Normal range	16.7-19.7	14.7-16.7	1.8-5.1	3.9-8,1	Normal
17 – 18.4	Underweight G1 or mild	≤16.6	≤4.5	≤1.7	≤3.8	Low
16-16.9	Underweight G2 or moderate					
< 16	Underweight G3 or severe					

NA: Not applicable: very high fat-free mass index does not indicate increased risk. Adapted from Kyle, et al, 2004[18]

Table 03: Cutoff points for Low Muscle Mass.

Muscle Mass Assesment	Male	Female
Skeletal muscle index (height) by SF-BIA kg/m$^{2\,(a)}$	High risk ≤ 8.5 Moderate Risk 8.51-10.75	High risk < 5.75 Moderate Risk 5.76-6.75
Appendicular Skeletal Muscle Index (ASMI kg/m^2)	<7.26	< 5.25
ASMI, kg/m^2 (EWGSOP2)[b] ASMI, kg/m^2 (Brazilian population)[c]	< 7 < 7.5	< 6 < 5.5
ASMI, kg/m^2 (AWGS)[d] DXA BIA	 < 7 < 7	 <5.4 <5.7
Free Fat Mass Index (FFMI, kg/m^2)	< 17	< 15
Appendicular Lean Mass (ALM,Kg): ASM[c]	< 21,4 < 20	< 14,1 < 15
Appendicular Leam muscle mass adjusted for BMI= ALM/BMI	< 0.725	< 0.591

DXA: Dual-energy X-ray absorptiometry. BIA: Bioelectrical impedance analysis; BMI: Body Mass Index. ASM: Appendicular Skeletal Muscle.
[a]Janssen et al, 2004[21]
[b]EWGSOP recommendations focus on European populations and use of normative references (healthy young adults).[20]
[c]Barbosa-Silva T et al. COMO VAI? Study[22]
[d]Recommendations from *Asian Working Group for Sarcopenia* para asiáticos[23] *Adapted from Cederholm T et al., 2019[19]*

Body Image Distortion or Dissatisfaction

Body image distortion may be assessed an useful tool to be applied is the Stunkar Figure Rating Scale[24] or others adapted, as suggested by Ralp-Nearman et al (Figure 02).[25,26] Doctors must show the figure to the patient and ask with whom he/she mostly looks like. This strategy allows the identification of possible patients at risk for eating disorders such as anorexia and/or bulimia nervosa, binge eating disorders, orthorexia, and "bigorexia"/vigorexia (muscle dysmorphia). When suspecting these disorders, some questionnaires can be applied: Eating Attitudes Test-26 (EAT-26)[27] and the Binge Eating Scale (BES).[28]

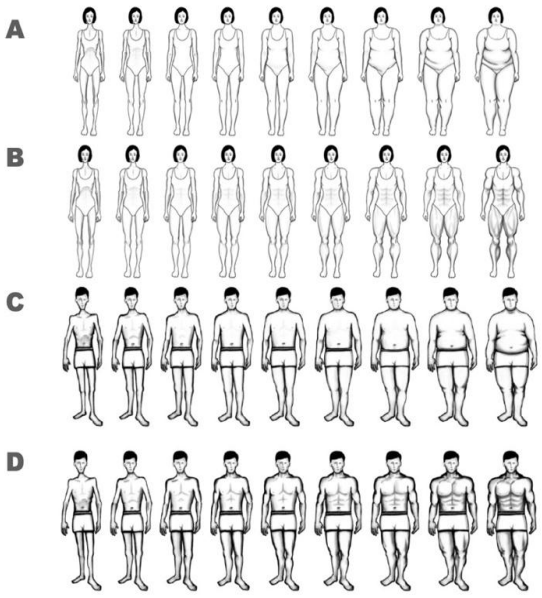


Figure 02: Tools used for assessment of body image distortion or dissatisfaction. A) Women assessment adapted from Stunkard Figure Rating Scale[24]; B) Women Fit Scale assessment adapted from Ralp-Nearman[25]; C) Men assessment adapted from Stunkard Figure Rating Scale[24]; D) Men Fit Scale assessment adapted from Ralp-Nearman.[26]

Body Functionality

First step in body functionality is strength assessment: handgrip is one of tools that can be used, patient is asked do sit comfortably with the shoulder adducted and neutrally rotated, with the elbow towards/against the body and flexed at 90 degrees, and the forearm and wrist in a neutral position. And after place the hand dynamometer in the participant's hand, and request that he/she squeeze with maximum strength; cut-offs of low strength is less than 27 kg for men andl16 kg for women. Other method less expensive is the chair stand test, patient is requested to sit-to-stand for 5-times, he/she fails if the time is more then 15 seconds. If one of these are altered sarcopenia is probable.[20]

Second step is done when body lean mass is assessed, if low sarcopenia is confirmed (Table 03).[20] Third step is assessing sarcopenia severity, measures of physical performance can be made with the following tests: 4 meters gait speed (cut-off > 0.8 m/s), Timed-up-and-go test (cut-off $\geq$ 20 seconds), Short physical performance battery (cut-off $\leq$8 point score) and 400 m walk test (cut-off non-completion or $\geq$6 min for completion).[20]

Chemistry Panel Test

Chemistry panels are tests used to assess person's health status. There is no gold-standard biochemical measure that allows evaluating the whole nutritional status of patients. Thus, assessment of nutritional status is a sum of clinical signs[29], anthropometric measures, muscle mass quantity and quality, food intake and clinical condition.[19] Further complementary exams/tests must be ordered according to the clinical complaints of the patients, associated with anamnesis, physical examination and diagnostic hypotheses. These tests can be obtained by analysis of blood/plasma, urine (single sample and/or 24-hour collection), feces, genetic tests, respiratory tests (hydrogen breath test) and gas exchange and respiratory coefficient analyses (indirect calorimetry).[29-31]

Monitoring nutritional and metabolic status is recommended to everyone who is receiving diet counseling, nutritional support or being supplemented or taking medicines. The laboratorial parameters or indicators can be set as a comprehensive metabolic panel (CMP - e.g. hemoglobin, glucose, liver function test etc.) and specific ones (e.g Pro-hormone converstase-1).

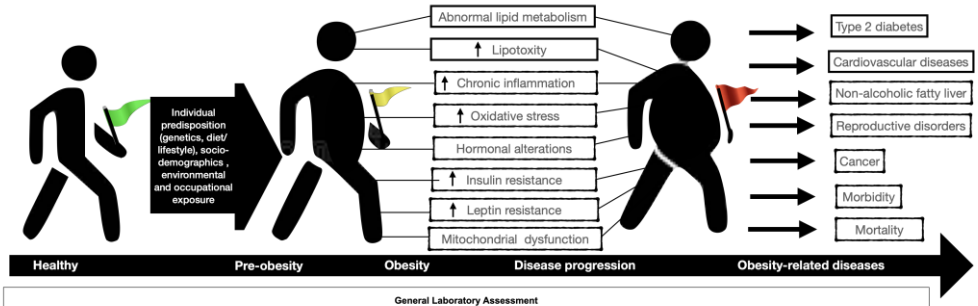
New methods of assessment are becoming more accessible and affordable in clinical practice as biomarks[32] and metabolomics.[33]

There are a number of subtypes of biomarkers: diagnostic, monitoring, pharmacodynamic/response, safety, susceptibility/risk, predictive and, prognostic.[32] Prognostic biomarkers are associated with differential disease outcomes, but predictive biomarkers discriminate those who will respond or not respond to therapy.[32,34]

Metabolomics assessment is made by a biological sample using mass spectrometry (MS) or nuclear magnetic resonance spectroscopy (NMR) are necessary. Substances thar arise from metabolism of micronutrients and macronutrients can be measured in different body fluids.[33,35]

Metabolome reflects the genome, transcriptome and proteome, as well as their interactions with the environment.[35] It is a means of studying an individual's life course experiences and genetic influences ("metabotype").[33] Individual's nutrition intake and the effects of gut flora, unique patterns can be identified that are characteristic of specific processes such as sepsis or inflammation, and some specific patterns can be predictive of outcome.[33,35]

Chronic diseases such as diabetes, hypertension, cardiovascular disease, obesity, cancer can be considered a pandemic. Metabolic dysregulation is being recognized as a major contributor to these metabolic or non-metabolic diseases.[36] Successful sequencing of the human genome seemed to herald a new era of personalized medicine, in which genomic variation would be used to predict the impact of specific therapeutic interventions, leading to optimal disease management in a given individual.[33,35] Recent technological advances now allow high-resolution screening of the human metabolome.[33,35,36] Figure 03 shows general laboratory obesity assessment (biomarkers) and "omics" pathway.[37,38,39]



General Laboratory Assessment								
Fasting blood glucose; lipid profile (total cholesterol, HDL-cholesterol, LDL -cholesterol, triglycerides); liver function (AST, ALT, Gamma-GT), with the liver investigation (ultrasound, biopsy), if elevated liver enzymes; kidney function (creatinine); index of inflammation (Homocysteine , C-reactive protein -CRP, ferritin); uric acid(blood), if gout; Thyroid assessment; cardiovascular assessment (ergometrias, echocardiography), if indicated; sleep apnea investigation, if indicated; endocrine investigations (Cushing , hypothalamic disease), if indicated								
Clinical signs	Young age onset Hyperphagia Red Hair Hypopigmentation Extreme weight difference between family members	Young age of onset Dysmorphic features Developmental delay Autipphropathyms or ADD Short stature (Poly-)syndactyly Retinal abnormalities Severe myopia Congental deafness	Cranial radiotherapy / Head trauma/Surgery Neurological abnormalities Hyperphagia Decreased vision	Acne Hisurtism Irregular menses Achathosis nigricans Erectile dysfunction Post-pregnancy Menopause	Bradycardia Muscle weakness Cushing features History of radiotherapy or severe head trauma	Weight increase related to ignition or dose increase of a drug with weight gain as a potential adverse effect	Severe repeated bige-eatinf with or without inadequate compensation behavior Depressive complaints	Unheathy food intake LLacjk of exercise Avarenfe sleep < 7 hs Disturbed sleep Snoring/apnea Shift week Alcohol use Stress Smoking cessation Sociocultural background Meal timing Sedentary lifestyke
Causes	**(Mono)genetic or syndrome**		**Hypothalamic**	**Endocrine**		**Medication**	**Mental disorders**	**Lifestyle**
Examples	Defect or deficiency: MCR4 Leptin (Resistance) POMC Pro-hormone converstase-1	Prader Willi Bardet Biedl Allbright 16p11.2 deletion	Post-radiaion therapy Post-surgery Hypothalamic tumor Malformation	PCOS Hypogondanism Post pregnancy Weight retention Menopause	(Cyclic) Cushing's syndrome Hypothyroidism Groth hormone deficiency	Antidepressants Antipsychotic s Anti-epileptics (Local) corticosteroids (Some) Beta-blockers Insulin	Binge-eating disorders Bulimia Nervosa Depression Other specified feeding and eating disorders	Hypercaloric intake Sedentarism Alcohol anuse Nocturnal eating (OSA) Repeated (very) low caloric diets with yo-yo effect
Omics Biomarks of Obesity	**Genomics**	**Epigenomics**	**Transcriptomics**	**Proteomics**	**Metabolomics**	**Glycomics**	**Lipidomics**	**Microbiomics**
Future & Research	**Genome** DNA sequence, gene polymorphism polygenic risk scores	**Epigenome** DNA methylation, DNA methylation pattern	**Transcriptome** Protein-coding RNAs (mRNAs) and non-coding RNAs (mRNAs and incRNAs	**Proteome** Protein and post-translational modifications	**Metabolome** Low-molecular-weight metabolites (e.g. amino acids, peptides, organic acids, carbohydrates, lipids	**Glycome** Glycans and protein glycosylation patterns	**Lipidome** Fatty acyls, glycerolipids, glycerophospholipids, sphingolipids, sterols, and prenols	**Microbiome** Gut microbiota composition and function

Figure 03: Obesity Pathway from Healthy (green flag) to obesity-related diseases (red flag). Recognizing underlying causes of obesity in adults allows a specific and individualized assessment and management of obesity. HDL, high-density lipoprotein; LDL, Low-density lipoprotein; AST, aspartate aminotransferase; ALT, alanine aminotransferase; Gamma-GT, Gamma-glutamyl transferase; ADD, attention deficit disorder; PCOS, polycystic ovarian syndrome; MC4R, melanocortin 4 receptor; POMC, proopiomelanocortin; PPI, proton pump inhibitors; OC, oral contraceptives; OSA, obstructive sleep apnea; OSFED, other specified feeding and eating disorders. Adapted from Aleksandrova K et al., 2020; Durrer Schutz D, et al, 2019 and van der Valk ESet al, 2018.

Drugs & Supplements

Drugs used chronically can interfere with the absorption of some nutrients, as well as lead to metabolic changes. Box 01 shows some medications that can contribute to weight gain.[39] Therefore, it is important to ask the patient about use and abuse of medications, supplements and multivitamins and minerals.

All supplementations should be prescribed when the usual diet does not meet the recommended daily needs for the patient according to age and clinical condition, or when laboratory screening tests demonstrate insufficiency or deficiency.

In order to facilitate adherence to treatment, advise the patient on dosage, administration times and duration of treatment. Physicians might avoid polypharmacy, as may be harmful combined drug and dose can be a strategy to help prescription and patient's adherence.[40] Table 04 shows some drugs that can contribute to weight loss.

Metabolic disorders such as hyperglycemia, hyperlipidemia, cardiovascular diseases, systemic arterial hypertension and obesity should be treated with lifestyle changes, regular exercise and if indicated associated to medication. Table 04 summarize drugs that can be used to reduce weight.

BOX 01: Drug that can promote weight gain[39]
Antidepressants: Citalopram, Mirtazapine, Amitrypitiline **Antipsychotics:** Olanzapine, Lithium, Clozapine, Quetiapine, Risperidon, Ziprasidone **Anti-epileptics:** Carbamazepine, Gabapentin, Valproic acid **Anti-diabetics** Insulin, Sulfonylureas derivates. Glytazones **Anti-hypertensives:** Alfa-adrenegic blockers, Beta-adrenergic blockers **Corticosteroids:** Systemic corticosteroids, Local corticosteroids **Others:** Proton pump Inhibitors, Protease inhibitors, Antihistamines

Table 04: A summary of anti-obesity drugs for long-term use approved by FDA (Consider anti-obesity drugs as an adjunct to lifestyle intervention)

BMI ≥ 30 kg/m^2 or BMI ≥ 27 kg/m^2 + co-morbidities (BMI ≥ 25 kg/m^2 or BMI ≥ 23 kg/m^2 + co-morbidities for Asians)					
Drugs	Application	Mechanism of Action	Main adverse effect	Indications	Contraindications
Orlistat	60 or 120 mg TID during or with 1 of a fat-contain meal	Gatrointestinal and a pancreatic lipase inhibitor, decrease lipid absorption	Oily stools, oily spotting, fecal urgency, fecal incontinence, hyper-- defecation, flatus with discharge, deficiency in vitamins A, D, E, and K	Hypertension Chronic kidney disease, Depression and anxiety	Pregnancy, cholestasis, malabsorption
Phentermine/ topiramate	3.75/23 mg QD for 14 days and then 7.5/46 mg QD; if < 3% weight loss is achieved at 12 weeks, increase to 11.25/69 mg QD for 14 days, followed by 15/92 mg QD; discontinue gradually if <	NE agonist/GABA agonist, glutamate antagonist; suppress appetite	Paresthesia, dry mouth, constipation, insomnia, dysgeusia, anxiety, depression, increases heart rate	Moderate hepatic impairment, Hypertension	Pregnancy, uncontrolled HTN, CVD CKD, glaucoma, hyperthyroidism patients on MAOIs

	5% weight loss is achieved at 12 weeks with the highest dose				
Naltrexon/ bupropion	8/90 mg for 7 days; BID for 7 days; 2 tablets in the morning and 1 tablet in the evening for 7 days; and 2 tablets BID thereafter	Opioid receptor antagonist/- dopamine agonist and NE reuptake inhibitor; increase satiety, suppress appetite	Nausea, headache, constipation, dizziness, vomiting, dry mouth	Moderate hepatic impairment Depression and anxiety	Pregnancy, uncontrolled HTN, seizure, anorexia or bulimia nervosa, abrupt discontinuation of alcohol, benzodiazepines, barbiturates or antiepileptic drugs, other bupropion-containing drugs, opioids or opiate agonists, MAOIs
Liraglutide	0.6 mg subcutaneous injection QD, increase by 0.6 mg weekly to a daily target dose of 3 mg	Glucagon-like peptide-1 agonist; slow gastric emptying, increase satiety, decrease food reward	Nausea, diarrhea, constipation, vomiting, dyspepsia	Type 2 diabetes mellitus CVD NASH/PCOS Obstructive sleep apnea, Hypertension, Chronic kidney disease, Depression and anxiety (may be used)	Pregnancy, personal or family history of medullary thyroid carcinoma or type 2 MEN
Semaglutide	0.25 mg once weekly for the first 4 weeks, with the dose increased every 4 weeks to reach the maintenance dose of 2.4 mg weekly by week 16	Glucagon-like peptide-1 agonist; slow gastric emptying, increase satiety, decrease food reward	Gastro- intestinal disorders (typically nausea, diarrhea, vomiting, and constipation) Gallbladder-related disorders (mostly choleli- thiasis)	Type 2 diabetes mellitus CVD NASH/PCOS Obstructive sleep apnea, Hypertension, Chronic kidney disease, Depression and anxiety (may be used)	Pregnancy, personal or family history of medullary thyroid carcinoma or type 2 MEN

BMI, body mass index; BID, twice daily; CKD, chronic kidney disease; CVD, cardiovascular disease; FDA, Food and Drug Administration; GABA, gamma-aminobutyric acid; HTN, hypertension; MAOI, monoamine oxidase inhibitors; MEN, multiple endocrine neoplasia; NE, norepinephrine; QD, once daily; TID, three times per day; XR, extended-release; CVD, cardiovascular dis- ease; NASH, non-alcoholic steatohepatitis; PCOS, polycystic ovary syndrome. Adapted from Tak YJ et al. 2021[41] and Son JW, et al., 2020.[42] Wilding JPH, et al., 2021.[43]

Exercise

Sedentary lifestyle is associated to diseases and also increases the levels of stress, depression, and anxiety.[44] Physical activity is a simple and effective way to avoid these adverse effects and assure a better and healthy life span.[44]

The American College of Sports Medicine (ACSM)[45] recommends 150 minutes per week of cardiorespiratory exercises and 20-30 minutes twice a week of resistance, flexibility and proprioception, which means 60 minutes, not necessarily consecutive.[45] Strength exercises play an essential role in health because they promote muscle hypertrophy, power gain, and improved physical performance.[46] Lack of time is not a reasonable excuse for being sedentary. If we think about time, it will be noticed that at least 210 of 10,080 minutes of the whole week ("**2%"**) is necessary to prevent or delay the onset of chronic diseases. Being physically active means investing in quality of life during **at least 2%** of our week time.

Weight Loss

The American College of Sports Medicine[47] recommends Physical Activity (PA) to prevent weight gain. PA of 150 to 250 min/wk with an energy equivalent of 1200 to 2000 kcal/wk will prevent weight gain greater than 3% in most adults. Thus, to promote weight loss an increasement of time important and necessary: PA less than 150 min/wk promotes minimal weight loss, more than 150 min/wk results in modest weight loss of 2–3 kg and between 225–420 min/wk results in 5- to 7.5-kg

weight loss, and a dose–response exists. For weight maintenance after weight loss, some studies support the value of 200- 300-min/wk PA during weight maintenance to reduce weight regain after weight loss, and it seems that 'more is better.'[47]

Ludgren et al[48] designed a study to meet the World Health Organization (WHO) recommendations on physical activity for health of a minimum of 150 minutes per week of moderate-intensity aerobic physical activity, or 75 minutes per week of vigorous-intensity aerobic physical activity, or an equivalent combination of both. All groups followed a low diet for 8 weeks (800kcal). After 8 weeks, they were randomized in four groups (placebo, exercise, liraglutide and exercise plus liraglutide) for one year. Results obtained of loss of body fat was similar in the group of exercise and in the ones of liraglutide (-1,8% vs. -1,6%) and weight loss was higher in the liraglutide group (-10,9 % vs. -13,4%). Both associated promote more body fat loss (-3,5%) and weight (-15,7%) during follow up. The exercise group alone promoted a significant increasement in lean body mass, not observed in the other groups.[48]

Non-adherence to ACSM recommendation is frequently observed and the mainly identified barriers are **lack of time,** poor motivation, negative thoughts/mood social pressures, gender norms and expectations, uncomfortable with appearance, health and physical limitations, **non-enjoyment of exercise,** socio-economic constraints, safety concerns.[49] Thus, Arciero et al[50].; proposed PRISE protocol, which is based on 4 days of structured exercise per week and is an acrostic that means[50]:

- "P": timed-daily *protein*-pacing intake (20–30 g/serving, 4–6 meals meals/day, every 3 hour)
- "R": *resistance* training (whole body, sets/exercise 10–15 reps 5–7set, Monday)
- "I": *interval anaerobic sprint* training (30 s/4 min rest, Tuesday)
- "S" *stretching* (flexibility, restorative) training (≤60 min, whole body, Thursday)
- "E": *endurance* aerobic (≥60 min, Friday)

PRISE protocol can be effective in improving physical performance outcomes (strength, endurance, flexibility, balance), body composition (total and abdominal fat), and cardiometabolic health (systolic blood pressure, blood glucose, LDL, total cholesterol, adiponectin) in middle-aged overweight adults.[51]

Exercise is likely to be a very effective strategy for weight loss maintenance (WLM) for those individuals who are able to implement and maintain it during whole life.[52] WLM may be affected by compensatory behaviors or by Inter-individual variability in the response to exercise, although this inter-individual variability is poorly understood, some authors suggest a very complex situation, with origins in the genetic or epigenetic predisposition, spontaneous compensatory behaviors, or other environmental, socioeconomic and psychological factors that affect eating and physical activity behaviors.[52]

Feelings

Health is a physical and mental well-being, this status should be evaluated in patients who need lifestyle improvement or modification, mainly if physiologic or behaviors disorders act as "triggers" that can be an obstacle and may difficult compliance.

Anxiety, depression and fatigue are clinical conditions that might interfere with eating habits, thus must be treated by a multidisciplinary team. Scales can be used – such as the HAMILTON DEPRESSION ASSESSMENT SCALE (HAM-D 21 items)[53] or Chalder Fatigue Scale.[54] It is important to recognize the patient's wishes, since his or her autonomy must be respected, as well as the patient's desire, the only exception is in patients with severe depression, whose denial of treatment may be related to the depressive condition, or when the patient is at risk of death. The patient's expectations regarding the treatment must be known, as well as the actions necessary for the success of the treatment to be fully clarified, discussed and understood by the patient. Strategies proposed by Lifestyle Medicine as the SMART criteria can be applied.[55] The **SMART** criteria are: **S**pecific · **M**easureable · **A**ction oriented · **R**ealistic · **T**imed. To reach his/her destination the patient will develop a set of short-term goals or action steps.[55] These actions may be helpful in lifestyle modification.

Assessment of patient' satisfaction with lifestyle modification may be useful and may help to compliance. Diet Satisfaction Score (Table 05)[56] has been validated and may be useful clinical toll for assessing diet satisfaction and has the potential to predict adherence.[56]

Table 05: Diet Satisfaction Score.[56]

Item	Answer
1. I feel hungry while following this diet [a]	
2. I have cravings for foods that are not allowed on my diet [a]	
3. Meal preparation is easy	
4. It is easy to follow this diet at home	
5. It is easy to follow this diet away from home	
6. This diet offers enough variety for me to enjoy what I'm eating	
7. This diet is affordable for me	

8. I feel physically well following this diet	
9. I am satisfied with this diet's impact on my [condition][b]	
10. I could follow this diet forever	
For each item, please choose the answer that best describes your attitude or behavior over the last 2 weeks of following your diet. All response choices are: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. Total score is found by taking the mean of all available items, giving a total score between 1 and 5, with a high score representing greater satisfaction of a diet. [a]Reverse scored. [b]Condition based on participant's reason for following diet (eg, weight loss, heart health, diabetes prevention, etc.	

Sleep

The National Sleep Foundation recommends a sleep duration 7–9 h for adults (26–64 y of age) and 7– 8 h for older adults (> 65 y of age) is necessary for optimal health and quality of life, whereas a duration of < 6 h for adults and 5–6 h for older adults is insufficient.[57]

Sleep disturbances are prevalent worldwide and can be a mix of acute or chronic problems with excessive wake after sleep onset (WASO), low sleep efficiency (SE), short total sleep time (TST), prolonged sleep onset latency (SOL), or poor sleep quality based on subjective and/or objective assessments.[57] Questionnaires like the **Pittsburgh Sleep Quality Index** can be applied to these patients who have sleep problems.[59] If sleep disturbance is due obstructive sleep apnea - specific treatment must be implement (weight loss intervention, continuous positive airway pressure (CPAP) and/or, surgery if clinical management fails.[60]

Assessment, diagnosis, management and treatments of sleep disturbance are necessary and can be managed by any physician. If this disturbance is not recognized and neither treated may predispose to chronic disease non transmissible: obesity, diabetes *mellitus*, insulin resistance, high blood-pressure, cardiovascular disease, stress, inflammation, infection, dysbiosis, psychiatric or/and neurodegenerative disorders and poorer physical performance.[61,62] Figure 04 shows mechanisms of potential dietary and no-dietary pathway associating short sleep duration and obesity.[62]

Once recognized those if sleep disturbance, these patients should try techniques that contemplate sleep hygiene: regular physical activity, reduce stress/worry, relaxation techniques, minimize noise in their sleeping environment, regular bed- and/or wake-times, avoid naps of greater than 30 minutes, drink less caffeine beverages, avoidance of nicotine use, alcohol intake (range from complete abstinence to avoidance of excessive use just before bedtime).[58]

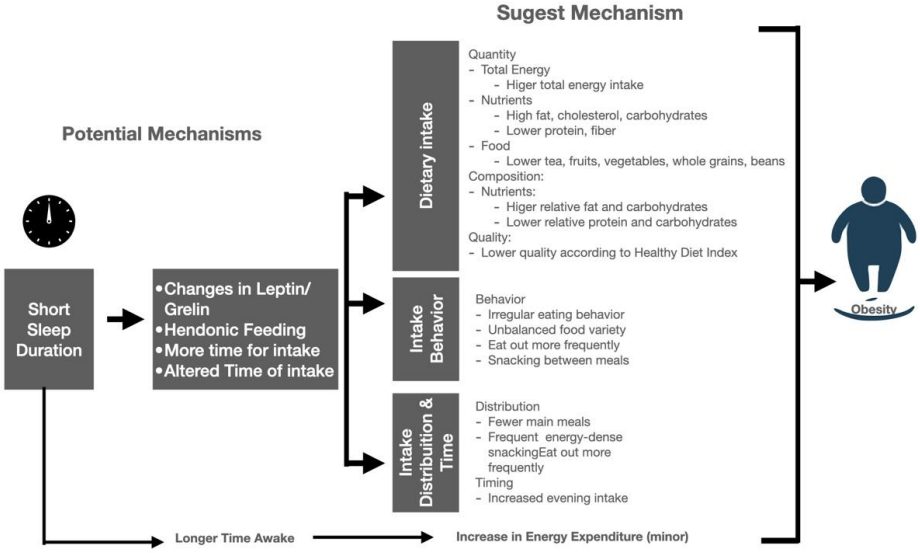
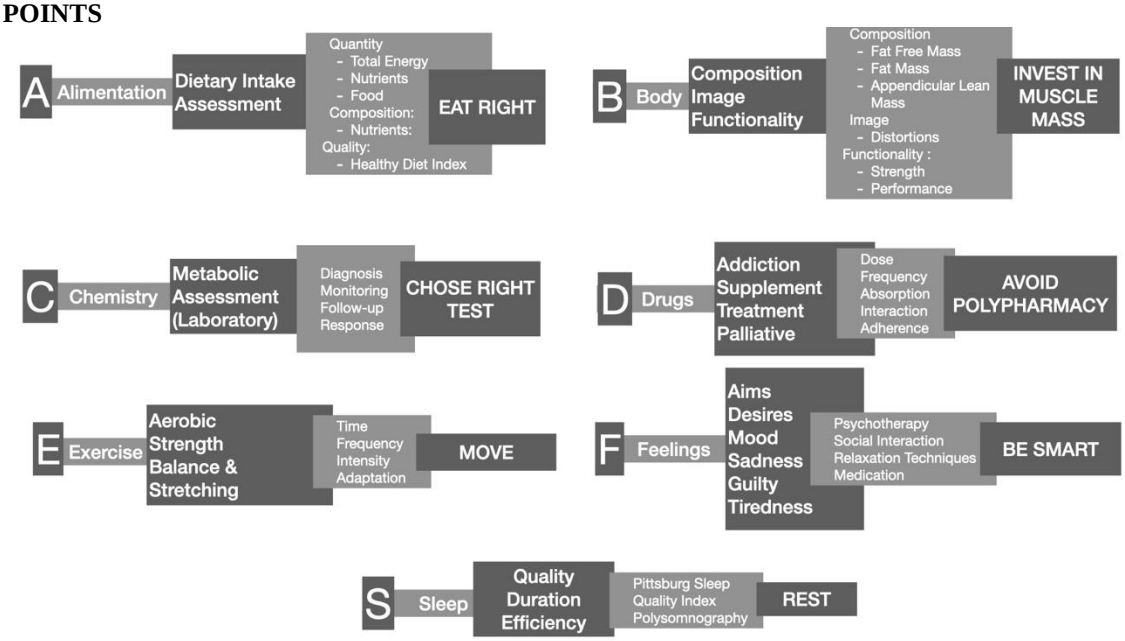


Figure 04: Diagram of potential dietary and no-dietary pathway leading from short sleep duration to obesity. Adapted from Hanssan et al, 2015.[62]

KEY POINTS



CONCLUSIONS

Nutritional assessment of the patient is extremely important, thus an unhealthy lifestyle habits can compromise quality of life of patients and increase the risk of chronic degenerative diseases.[2,9] Training physicians according to protocols tends to minimize errors and allow for the creation of operational processes of assessment in order to guarantee a better and individualized care. In this article the ABCDEFS was proposed, focused on Obesity Nutrology care: assessment, diagnosis and management, but the authors agree that ABCDEFS can be applied in whole nutrology care: ambulatorial and inpatients.

Glossary

Nutrology: a medical specialty in Brazil focused on nutritional care, the physician is nutrologist.

The 24-hour recall (R24h): consists of describing and quantifying in a medical consultation all foods and beverages consumed by the patient on the day before the appointment/interview.

Food and nutrient diaries intakes from 3-day: consists of describing and quantifying in a medical consultation all foods and beverages consumed by the patient for 3 days.

Food Frequency Questionnaire (FFQ): is a method that allows you to assess the patient's usual diet history - it assesses how often and how much of selected food items or specific food groups included in a list are consumed during a reference period.

Fat Free Mass (FFM): obtained by subtracting the total body weight from the fat mass, kilograms (kg). Includes skeletal muscle mass, total body water (intra and extracellular), bone mass and minerals.

Fat Mass (MG): the amount of fat in kilograms

Skeletal Muscle (SM): total skeletal muscle mass in kg

Skeletal Muscle Index (SM): obtained by dividing the SM in kg by the square of the height in meters (kg/m^2)

Fat Free Mass Index (FFMI): obtained by dividing the FFM in kg by the square of the height in meters (kg/m^2)

Fat Mass Index (FMI): obtained by dividing the MG in kg by the square of the height in meters (kg/m^2)

Appendicular Lean Mass (ALM): obtained by the sum of the musculature of the upper and lower limbs in kg.

Appendicular Skeletal Muscle Index (ASMII): obtained by dividing the ALM in kg by the square of the height in meters (kg/m^2)

Biomarks: "a defined characteristic that is measured as an indicator of normal biological processes, pathogenic processes or responses to an exposure or intervention".[34]

Metabolomics: is the systematic study of all metabolites (molecules <10 kDa) comprising carbohydrates, amino acids, organic acids, nucleotides and lipids.[35]

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