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The Role of the Nurse in the Obesity Clinic: A Practical Guideline

Short running title: Nurse in Obesity Clinic

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Abstract

Obesity is a major public health problem, and its trend is increasing worldwide. Interventions to effectively treat obesity and its related diseases are advocated. Given the complexity of obesity management, nurses need specific core skills to work in the Obesity Clinic and can act as key players in the multidisciplinary team of the Obesity Clinic. To provide practical guidelines for nurses working in Obesity Clinic for effective management of obesity and its related diseases, the current evidence on the role nurses in the obesity clinic was reviewed. Nurses can play a pivotal role in the management of patients with obesity and associated diseases that may require a stricter follow-up than usual care. Given the complexity of the treatment of obesity and its comorbidity, nurses should receive a specific training for: 1) methods and tools to effectively treat obesity and obesity-related disease, 2) patients and families education on nutrition, lifestyle changes, and prevention/management of obesity-related diseases; 3) motivation of patients towards adherence to treatment to achieve their specific goals.

This manuscript highlights the need of specific core skills for nurses working in the Obesity Clinic.

Key words: Obesity, Nursing care, Obesity clinic, Type 2 diabetes, Hypertension.

Introduction

In recent years, the role of the nurse and the way they are educated has changed considerably. In the past, they were mainly deputed to implement medical prescriptions and to ensure patients primary care (food delivery, bathing, and changing beds). The current role includes expert clinical practice, consultation, education, clinical leadership, and research [1].

Moreover, it has been shown that nurses spend more time with patients than physicians and other health professionals. Indeed, a recent study evaluated the interactions among healthcare workers and patients monitoring the percentage of time each worker spent in hospital locations and activities using badges and trackers [2]. The results showed that nurses spent almost 80% of their time with patients -in their rooms or at a nursing desk immediately outside a patient room. Conversely, physicians were mainly located in the physicians' workroom, and they spent only 13% of their time with patients. In addition, the nurse-patient interaction represents a cornerstone of nursing science and high-quality nursing care [3]. Therapeutic communication between patients and nurses is essential in ensuring clarity in the provision of care, to mitigate medical errors and enhance patient safety [4].

Therefore, nurses have more responsibilities and autonomy, and their specific skills contribute to the healthcare team for the achievement of patient well-being.

Nurses usually work in the hospital wards but also in the outpatient clinics. In these settings, nurse can play a pivotal role in the adequate management of chronic diseases that may require strict follow-up and constant monitoring.

Obesity is recognized as a chronic disease that associates with several comorbidities [5, 6], as type 2 diabetes mellitus (T2DM), hypertension, dyslipidemia, cardiovascular diseases (CVD) (mainly coronary heart disease and stroke) sleep apnea syndrome [7, 8], metabolic

syndrome [9], hypovitaminosis D [10-12], polycystic ovary syndrome [13, 14], and some cancers [15, 16]. These comorbidities reduce the quality of life and life span and increase public health cost [17]. Although, several efforts have been made to obtain weight loss, the trend of obesity is increasing, particularly in young individuals and in middle-income countries [17]. Of interest, a very recently meta-analysis showed that also the shift work can be associated with several adverse health outcomes including increased adiposity [18]. Therefore, new strategies to effectively treat obesity and its related diseases are advocated, beyond diet, physical activity and drug therapy [19-23].

Obesity clinics were set-up to provide more tailored treatments for individuals with obesity and to ensure long-lasting lifestyle changes. Given the complexity of obesity management, a multidisciplinary team is required (physicians, psychologists, dietitians, and nurses).

Our manuscript aims to highlight the importance of nurses as member of the Obesity Clinic team. In addition, practical guidelines will be provided for the management of obesity and its related diseases in clinical practice.

Nursing care for obesity

Patients with obesity may present several comorbidities that may require more intensive nursing care than that provided in a general care unit. Therefore, nurses should receive special training, which includes notions of anatomy, physiology, anatomical pathologies associated with obesity, psychological and sensitivity issues. This will allow nurse to have deep knowledge of all features that characterize obesity and core skills to manage patients with obesity safely and effectively.

First, patients with obesity, particularly those with severe obesity, may present skin diseases (i.e., grazes, infections, rashes, or ulcerations) [24, 25]. The nurse should be aware that the part of the body that require special attention are perineum, breast folds, abdominal and leg folds. The skin of these patients often appears unhealthy, has pressure sores, redness due to the presence of microorganisms, and is not very clean, especially in particular areas of the body [26].

In addition, individuals with obesity may need walking assistance when they must sit on the couch during the outpatient visit to avoid accidental falls that could have harmful consequences.

On the other hand, to offer good assistance nurse should be provided with appropriate devices (i.e., the sphygmomanometer sleeve must be of adequate measures to be able to detect blood pressure (BP)) and operating techniques (i.e., correct handling of loads, suitable scales, and other devices) [27].

In patients with obesity, nursing procedures may require much more time than in normal weight patient. As an example, blood sampling is more difficult is obese since it may be difficult to find adequate veins immediately [26]. Over physical needs, patients with obesity may have mental and emotional needs that nurses must keep in mind when planning care. Therefore, nurses should create a therapeutic relationship, based on trust, commitment,

empathy, support, and non-judgmental attitude. Moreover, to ensure the achievement of therapeutic goals, nurses should make a careful assessment of the patient's background (i.e., occupation, socio-economic status, family members or caregiver). Indeed, it has been demonstrated that patient and family involvement in decision making is associated to better physical and emotional outcomes, and with higher personal health maintenance and adhere to therapeutic treatments [28].

In clinical practice, nurses manage the clinical evaluation of the patient with obesity and his/her adherence to dietary and pharmacological therapy. The clinical evaluation includes the medical history, physical examination, evaluation of lifestyle habits, psychological status, and laboratory evaluation.

As for medical history, the nurse should [29]:

- Explore body weight changes over time (from birth to actual body weight), genetic factors, exogenous stimuli and events that led to weight gain and specific changes in body weight.
- Examine the reasons for weight gain: physiological aspects, drugs, decreased physical activity and psychological problems. It is necessary to identify whether patients are in a “dynamic phase” of weight loss or gain, or a “maintenance phase” where body weight is stable.
- Evaluate previous treatments, including traditional hypocaloric diet, very-low-carbohydrates ketogenic diet, bariatric surgery etc., and their effects (i.e., initial success, failure, weigh regain, and “yo-yo effect”.
- Define the individual lifestyle, in particular physical activity as well as inactivity and sedentary behavior.
- Explore the family history of obesity and cardiometabolic diseases.

- Analyze the psychological impact of the negative image of the body, the desired body weight or shape and, above all, the motivation to change lifestyle and behavior.
- Analyze eating disorders, depression, anxiety, stress, poor sleep quality.
- Explore food intake and behavioral profile with the nutritionist. Duration, timing, and composition of meals, portion sizes, and number of dishes eaten for meals, nutritional "errors", alcohol consumption.

The physical examination needs specific skills to use tools that allow to detect the following measurements:

- Body weight and height. Weight is measured without shoes and heavy outer garments using an appropriate calibrated balanced beam scale or electronic scale. Height is measured with the back of the head, shoulder blades, buttocks and heels touching the stadiometer.
- Body mass index (BMI) that is calculated as body weight, expressed in kilograms divided by the height, expressed in meters squared (kg/m^2). The World Health Organization (WHO) defines an adult who has a BMI 25.0-29.9 kg/m^2 as overweight - an adult who has a BMI of 30.0 kg/m^2 or higher is considered obese. BMI 30.0-34.9 kg/m^2 = 1st degree of obesity; BMI 35.0-39.9 kg/m^2 = 2nd degree of obesity; BMI greater than 40.0 kg/m^2 = 3rd degree of obesity [30].
- Waist circumference. Waist circumference is an indicator of abdominal fat and it represent a useful predictor of cardio-metabolic diseases [31]. It is measured at the end of a normal exhalation in the horizontal plane halfway between the upper iliac crest and the lower edge of the last rib, using a measuring tape positioned horizontally around the abdomen and without compressing the skin [30].

- BP. After about 10 minutes of rest in a sitting position. The assessment is performed using a cuff size (XXL) adapted to the circumference of the upper part of the patient's arm.
- Examination of the skin and monitoring vital signs. Respiratory rate requires evaluation since very often these patients have difficulty in gas exchange and respiratory insufficiency due to the increase in the adipose component in the chest wall.

Nurses should also evaluate the clinical signs of major comorbidities in patients with obesity (metabolic syndrome, T2DM, and CVD). Therefore, some laboratory tests performed by the nurse through the collection of venous blood are part of the basic evaluation. The standard recommended blood tests should include fasting glucose and insulin, lipid profile (total, HDL and LDL cholesterol, triglyceride), liver enzymes (GOT, GPT, Gamma GT) [29].

Besides, the nursing intervention is necessary in health education, lifestyle, behavioral therapy, and nutrition [32]. More in details, nurses should help nutritionist to explain how to recover physiological sensations of hunger and satiety and select the appropriate foods on a normal-sized plate, considering that a quarter of the area is covered by a source of protein and the rest by starchy- or other unrefined carbohydrate foods, as well as fruits and vegetables. As for physical activity, the nurse should motivate the patient. All patients should be advised to walk at least 40 minutes, possibly at moderate intensity. Walking does not require specific equipment, it can be done anywhere and, finally, the patient can decide the intensity of the exercise according to its possibilities [29].

In daily practice, some tools are used to endorse patient motivation. As an example, the "Motivational Interviewing" is a communication technique that allows to strengthen the

patient's motivation and to stimulate his involvement towards a behavioral change. Motivation is essential if long-term change is to be sustained in the long term [33].

Lastly, nurses might be aware of specific issues related to anti-obesity drugs therapy and drug therapy of comorbidities. Anti-obesity drugs are suitable for patients with severe obesity or overweight with comorbidities (particularly, T2DM). It can complement lifestyle changes but can never be used alone. Notably, weight loss drugs should not be used in pregnancy, lactation, and childhood. The goals for this therapy are a 5% weight loss in non-diabetic patients and > 3% weight loss in diabetic patients and should be achieved after 3-month treatment. If patient do not achieve this goal, the anti-obesity drug should be interrupted [33].

To date, only 3 drugs received approval for clinical use in obesity management in Europe: orlistat, Bupropion/Naltrexone, and Liraglutide.

Orlistat is a potent and selective inhibitor of pancreatic lipase that reduces intestinal absorption of fat. The drug is at a dose of 60 mg/day and a prescription dosage of 120 mg/day. Both forms are given before each (fatty) meal and produce a moderate weight loss. However, it may cause small decreases in fat-soluble vitamins; thus, a multivitamin complement can be recommended [33].

Bupropion/Naltrexone combines two centrally acting medications. Bupropion is a nonselective inhibitor of dopamine and norepinephrine transporters used for treating depression and to aid smoking cessation. Naltrexone is an opioid receptor antagonist widely used to treat alcohol and opiate dependence syndromes. The recommended dosage is 16 mg Naltrexone/180 mg Bupropion twice a day. The most common reported adverse events are nausea, headache, dizziness, insomnia, and vomiting, and can induce therapy discontinuation [19].

Liraglutide is a glucagon-like peptide 1 analogue (GLP-1) and induces an increase of insulin secretion by the pancreas, thus, sending satiety signals to the brain. It is injectable and lasts 24 h. It is already used to treat T2DM with a dose of 0.8–1.8 mg/day. Liraglutide should be administered by subcutaneous injection. It is generally well tolerated, but it can lead nausea and vomiting [19].

Educational intervention by skilled nurses plays a key role in the practice of subcutaneous injections to reduces adverse effects such as bruising, hematomas, pain, lipodystrophies. Practical suggestions may be summarized in 3 key aspects [34, 35]:

- the injection site. The recommended sites for subcutaneous injections are abdomen, thighs and buttocks.
- the injection technique. For repeated subcutaneous the "same time, same site" rule may be useful. It consists in combining each moment of administration to a specific site. It is also useful to divide each site into quadrants and every day repeat the rule by moving the insertion point a few centimeters clockwise within the quadrant. Finally, it is recommended to alternate the right and left side.
- the choice of the needle. The choice of the needle should consider the patient's body, the type of drug and the psychological factor. For Liraglutide, needles should be up to 8 mm long and thin up to 32 G (0.25 / 0.23 mm.). For needles of 6 mm or more, the plica (or "pinch") technique must be performed or inserted at an angle of 45 °.

In conclusion, the main critical points related to the assistance of patients with obesity can be summarized in these points:

- need to increase skilled nursing staff in the Obesity clinic,
- lack and difficulty of using the equipment,
- relationships with patients and their caregivers.

Nursing care for T2DM

Obesity is a major risk factor for T2DM and the combination of the two diseases represents a real epidemic worldwide, for which the WHO coined the term "diabesity". Most patients with T2DM are obese, and obesity itself causes some degree of insulin resistance defined as a state in which greater than normal amounts of insulin are required to produce a normal biological response, thus representing a risk factor for the onset of T2DM.

The pathogenesis of T2DM is poorly understood, but both genetic and environmental factors, including obesity play a pivotal role. T2DM is characterized by insulin resistance and a relative (rather than absolute) insulin deficiency [36].

The nurse plays a role in managing diabetes from the first moment. At the time of the diagnosis, nurses should advice patients on how to prevent and control hypo- or hyperglycemia, provide therapeutic and dietary indications, especially on the Mediterranean diet [37], and reinforce patient's motivation to avoid therapy discontinuation. Besides, some patients may require insulin therapy [38]. The endocrinologist chooses the type of insulin, the dosage, and the duration of the treatment; however, it is up to the nurse to ensure the correct application of the prescriptions. The usual prescribed insulin regimen is "basal bolus" with basal insulin and rapid analogue insulin for meals. The programmed insulin for meals is adjusted with the correction algorithm in relation to the controlled pre-glucose concentrations. In addition, patients need to be trained for injection techniques to reduce the risks associated with the use of insulin therapy. The recommended sites for basal insulin are thighs, buttocks, and arms. Buttocks presents slow absorption rate and should be used for the injection of insulin that requires protracted duration). Arms and thighs are medium/fast absorption site and should be used for long- lasting insulin. The correct rotation of the injection sites, the non-reuse of the needles, the correct pinch

technique are essential factors to ensure optimal insulin absorption and to control glycemic variability. One of the complications closely related to the injection technique is localized lipodystrophy, characterized by the loss of subcutaneous fat localized to sites of insulin injection. This condition may lead to hypoglycemia and greater glycemic variability [38].

Nursing care plan consists in training the patients to:

- use of insulin pen and injection technique,
- detect blood glucose concentrations,
- fill-in blood glucose diary,
- recognize and treat hypoglycemia,
- communicate and agree on the customized range values for that patient,
- verify learning and techniques.

These theoretical and practical information allow safe and effective self-care practices in patients with diabetes. Indeed, it has been reported that nurses play a pivotal role more likely to promote a better blood glucose control. In a randomized controlled two-arm parallel study, 142 adults with T2DM were randomized to either the usual diabetes care (control group) or the usual care plus a nurse-led diabetes self-management education (intervention group). After 12-weeks, patients in the intervention group showed significant improvement in HbA1c, BP, and body weight loss than the control group. Notably, the beneficial effect of nurse education lasted until 24-weeks post randomization leading to sustained improvements in clinical and lifestyle [32].

The nurse plays a significant role in the prevention of diabetes complications, in particular the diabetic foot [39]. Patients with diabetes need an accurate feet care that may require the involvement of family members or caregivers. For the prevention of the diabetic foot, patients should be trained to:

- wash the feet daily with neutral soap and warm water (avoid foot baths),

- moisture the skin with lanolin creams,
- check the feet daily using a mirror,
- avoid iodine and alcohol tinctures because they can dehydrate the skin,
- avoid the use of calluses, metal files and pointed scissors,
- avoid direct heat sources (e.g., heating pads).
- not to walk barefoot,
- use comfortable closed leather shoes (not sandals, clogs and flip flops),
- wear seamless cotton or wool socks,
- change socks and shoes often.

Nurses can be involved also in the treatment of diabetic foot ulcers and infections, that include mechanical and chemical debridement, edema and the reduction of load pressure using suitable devices and advanced dressings.

Nursing care for hypertension

Patients with obesity have increased risk of cardiovascular diseases that is mediated, at least in part, by increased BP, with a systolic blood pressure (SBP) equal to/ greater than 140 mmHg and a diastolic blood pressure (DBP) equal to/ greater than 90 mmHg. Arterial hypertension can be defined as grade 1 (BP values between 140/90 and 159/99 mmHg), grade 2 (BP values between 160/100 and 179/109 mmHg), or grade 3 (BP values beyond 180/110 mmHg) [40].

Notably, the prevalence and severity of hypertension increase as the BMI increases, since obesity can increase in systemic vascular resistance, which contribute to the development of hypertension [41]. It is known that adipose tissue contributes to the increase in circulating levels of angiotensin II (AngII) and aldosterone observed in obesity and potentially alters the metabolism of AngII to Ang1–7. Moreover, the activation of Renin-Angiotensin-Aldosterone System (RAAS) is an important mediator of elevated blood pressure associated with obesity, that underlines the importance of weight loss as an antihypertensive strategy in hypertensive individuals with obesity [42].

Both obesity and hypertension increase the activity of the left ventricle through several hemodynamic mechanisms. Therefore, patients with obesity and hypertension have an increased long-term risk of heart failure. In fact, it has been estimated that at least 75% of cases of arterial hypertension can be triggered to overweight or obesity [41].

BP control is often challenging for patients, as they do not monitor BP frequently or correctly and may forget antihypertensive drugs. However, it has been shown that nurses education can increase BP control in real-life settings [43, 44]. In a randomized controlled trial, two groups of patients with arterial hypertension were assigned to normal medical care (n = 76) and the other group usual medical care plus nurse care (n = 74) for 6 months. At the end of the intervention, patients receiving additional nurse care had a greater

reduction of BP that the other group [44]. Similarly, in the study by Cooper and colleagues, a 15-months coaching by nurses induce a significant BP reduction in a cohort of individuals at high-risk or with hypertension [45].

In clinical practice, nursing care consist in:

- educating patients to correct self-measurement of BP. They should measure BP at rest in a sitting or lying position, in the morning and in the evening. They should also be asked to fill in a daily diary with BP values to monitor BP variation during the day.
- monitoring adherence to drug therapy (also through telephone counseling).
- promoting correct lifestyles (physical activity, healthy nutrition, reducing alcohol and smoking).

Nursing care for childhood obesity

The prevalence of childhood obesity is almost 19% and affected about 14.4 million children and adolescents worldwide. Children with obesity are more likely to become adults with obesity, with greater risk of obesity-related disease in adulthood [46]. Indeed, children with obesity may have high BP and lipids, impaired glucose tolerance, insulin resistance, fatty liver disease that can lead to early T2DM and CVD [47]. In addition, children with obesity may experience, breathing problems (i.e., asthma and sleep apnea), joint problems and musculoskeletal discomfort, but also psychological problems, such as anxiety and depression [48, 49].

Notably, the diagnosis of overweight and obesity in children and adolescents is more complex than in adults. In fact, constant weight and height changes during growth do not allow a correct diagnosis of obesity or overweight.

In daily clinical practice, it is sufficient to refer to the BMI percentile curves: a value higher than 85° percentile is an overweight index, while higher than 90° percentile is an obesity index. It is also possible to calculate the percentage of BMI by calculating the difference between the actual BMI and the reference BMI (50° percentile of the reference curves) and then dividing the data by the square height [47]. During growth, an increase of one or two curves of weight should be considered as a potential trend towards obesity.

Growth stages at risk of obesity are [48]:

- Birth. A low weight for the gestational age associated with a rapid weight gain favor the development of early and complicated obesity.
- The first year of life. Prolonged breastfeeding prevents the development of obesity, while early weaning and protein-rich diet promote overweight.

- 4-6 years. A rapid weight gain is associated with an early accumulation of fat (early adiposity rebound) and therefore with obesity.
- Puberty. Being overweight at puberty or rapid weight gain associate with higher obesity risk.

The management of childhood obesity does not require low-calorie diets. Children and adolescent are encouraged towards lifestyle changes, favoring healthy eating habits and physical activity. Personalized programs are managed by a multidisciplinary team (pediatrician, dietician, psychologist, and nurse) with the active involvement of the young patient.

Several studies demonstrated that interventions involving nurses to treat childhood obesity led to significant reductions in BMI, and BMI percentiles [50, 51].

Conclusions

Nurses can play a pivotal role in the management of patients with chronic diseases, particularly in individuals with obesity and associated diseases that may require a stricter follow-up than usual care (figure 1). Given the complexity of the treatment of obesity and its comorbidity, nurses should receive a specific training for: 1) methods and tools to effectively treat obesity and obesity-related disease, 2) patients and families education on nutrition, lifestyle changes, and prevention/management of obesity-related diseases; 3) motivation of patients towards adherence to treatment to achieve their specific goals. Thus, nurses will serve as key players in the multidisciplinary team of the Obesity Clinic.

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Abbreviations: Type 2 diabetes mellitus (T2DM); cardiovascular diseases (CVD), blood pressure (BP); body mass index (BMI); glucagon-like peptide 1 analogue (GLP-1); systolic blood pressure (SBP); diastolic blood pressure (DBP); Renin-Angiotensin-Aldosterone System (RAAS)-

TITLES OF FIGURES

Figure 1. Key points for the nursing care in the Obesity Clinic.