



Original Article

## NURSING DIAGNOSES, INTERVENTIONS AND OUTCOMES IN THE BARIATRIC SURGERY POSTOPERATIVE CARE

*DIAGNÓSTICOS, INTERVENÇÕES E RESULTADOS DE ENFERMAGEM NO PÓS-OPERATÓRIO DE CIRURGIA BARIÁTRICA*

*DIAGNÓSTICOS, INTERVENCIONES Y RESULTADOS DE ENFERMERÍA EN EL POSTOPERATORIO DE CIRUGÍA BARIÁTRICA*

Rosa Aparecida Nogueira Moreira<sup>1</sup>, Lívia Moreira Barros<sup>2</sup>, Andrea Bezerra Rodrigues<sup>3</sup>, Joselany Áfio Caetano<sup>3</sup>

One aimed to identify the nursing diagnoses of the cardiovascular/pulmonary response class belonging to the activity/rest domain, according to the taxonomy II of NANDA-I in patients in the bariatric surgery immediate postoperative period and propose the interventions and nursing outcomes according to the Nursing Interventions Classification and the Nursing Outcomes Classification. This exploratory and cross-sectional study was carried out from July 2010 to June 2011 with 59 patients in the bariatric surgery immediate postoperative period. The most frequent nursing diagnoses were: Ineffective Peripheral Tissue Perfusion; Decreased Cardiac Output; Activity Intolerance; Risk for Decreased Cardiac Tissue Perfusion; and Risk for Ineffective Renal Perfusion. A nursing care plan was constructed with 16 interventions and 10 expected outcomes. The choice of appropriate interventions decreases hospitalization time and consequently the cardiopulmonary complications in the postoperative period. Another important issue is the standardization of language in the construction of the diagnoses and outcomes, which improves nursing documentation.

**Descriptors:** Nursing Process; Bariatric Surgery; Obesidad Mórbida; Cuidados Pós-Operatórios.

Objetivou-se identificar os diagnósticos de enfermagem da classe respostas cardiovasculares/pulmonares pertencentes ao domínio atividade/repouso, segundo a taxonomia II da NANDA-I em pacientes no pós-operatório imediato de cirurgia bariátrica e propor as intervenções e os resultados de enfermagem de acordo com a *Nursing Interventions Classification* e a *Nursing Outcomes Classification*. Estudo exploratório e transversal, realizado de julho de 2010 a junho de 2011 com 59 pacientes no pós-operatório imediato de cirurgia bariátrica. Os principais diagnósticos de enfermagem foram: Perfusão Tissular Periférica Ineficaz, Débito Cardíaco Diminuído, Intolerância à Atividade, Perfusão Tissular Cardíaca Diminuída e Risco de Perfusão Renal Ineficaz. Um plano assistencial de enfermagem foi elaborado com 10 resultados e 16 intervenções. A escolha das intervenções adequadas diminui o tempo de internação e consequentemente as complicações cardiopulmonares no pós-operatório. Outro ponto importante é a padronização da linguagem na construção dos diagnósticos e resultados, o que favorece a documentação de enfermagem.

**Descritores:** Processos de Enfermagem; Cirurgia Bariátrica; Obesidade Mórbida; Cuidados Pós-Operatórios.

El objetivo fue identificar diagnósticos de enfermería de la clase respuestas cardiovasculares/pulmonares pertenecientes al dominio actividad/descanso, según la taxonomía II de la NANDA-I, en pacientes en postoperatorio inmediato de cirugía bariátrica y proponer intervenciones y resultados de enfermería según la *Nursing Interventions Classification* y *Nursing Outcomes Classification*. Estudio exploratorio, transversal, de julio de 2010 y junio de 2011, con 59 pacientes en postoperatorio inmediato de cirugía bariátrica. Los diagnósticos de enfermería fueron más frecuentes: Perfusión Tissular Periférica Ineficaz, Disminución del Gasto Cardíaco, Intolerancia a la Actividad, Disminución de Perfusión Tissular Cardíaca y Riesgo de Perfusión Renal Ineficaz. Se ha elaborado plan de atención de enfermería con 10 resultados y 16 intervenciones. La elección de intervenciones apropiadas disminuye el tiempo de hospitalización y las complicaciones cardiopulmonares en postoperatorio. Otra cuestión importante es la estandarización del lenguaje en la construcción de diagnósticos y resultados, lo que mejora la documentación de enfermería.

**Descritores:** Procesos de Enfermería; Cirugía Bariátrica; Obesidad; Obesidad Mórbida.

<sup>1</sup>Nurse, Master's Degree in Nursing. Fortaleza, CE, Brazil. E-mail: nogueiramoreira@bol.com.br

<sup>2</sup>Nurse, Master's Degree student at the Post-Graduation Program, Federal University of Ceará (Universidade Federal do Ceará – UFC). Fortaleza, CE, Brazil. E-mail: livia.moreirab@hotmail.com

<sup>3</sup>Nurse, Associate Professor, Department of Nursing, Federal University of Ceará (Universidade Federal do Ceará – UFC). Fortaleza, CE, Brazil. E-mail: andreabrodrigues@gmail.com, joselany@ufc.br

Corresponding author: Nogueira Rosa Aparecida Moreira

Address: Rua Isaac Amaral, 112 - Ap 601 - Dionísio Torres. CEP: 60130-120. Fortaleza, CE, Brazil. E-mail: nogueiramoreira@bol.com.br

## INTRODUCTION

The bariatric surgery has been the main treatment for weight reduction and improvement of comorbidities associated with obesity. In Brazil, the advance of surgical techniques and surgery popularization has promoted the expansion of nursing care for this clientele<sup>(1)</sup>. The perioperative period is considered critical due to comorbidities that individuals have, in addition to complications such as infections, thromboembolism, suture dehiscence, fistulas, intestinal obstruction, abscesses and pneumonia<sup>(2)</sup>.

Faced with this situation, one understands the complexity of care required by these individuals during this period, due to their health conditions that suffer frequent changes and require constant nursing interventions. These should be documented in order to restore the patient, relieving pain, preventing postoperative complications, promoting the recovery and preparation for hospital discharge<sup>(3)</sup>.

Thus, the method that guides clinical judgment and decision making is called the Nursing Process (NP), constituted by the following steps: research or data collection, nursing diagnosis, planning, implementation of nursing interventions and evaluation of results presented by the patient, family or community on the procedures adopted<sup>(4)</sup>.

In care practice with the patient in the postoperative bariatric surgery, one was faced with a difficulty, not solved by specific literature: the lack of a nursing diagnosis profile in patients who have undergone bariatric surgery. In addition to this knowledge gap, assistance to these patients in a referral hospital in Ceará is only subsidized by the care plan and the nursing evolution. Thus, it can be stated that the method is not a process, by the absence of an important link, which is the Nursing Diagnosis (ND), therefore the prioritization of actions and the prescription of postoperative bariatric surgery may not correspond to the real needs. Moreover, if these needs are not

identified by nurses, certainly the quality of nursing care will be harmed.

In this sense, some questions have emerged: what nursing diagnoses from the cardiovascular/pulmonary response class are present in patients after a bariatric surgery? What are the proposed outcomes and nursing interventions for the patient on post-bariatric surgery period?

The rationale of this study is the need to implement the systematization of nursing care for this population, in order to ensure personal assistance, geared to the real needs of each patient. Knowledge about the nursing diagnoses from the most frequent cardiopulmonary response class will enable a better, more specific and effective nursing plan for patients during the postoperative health services that perform this procedure. Studies on the classification system of nursing interventions, such as the NIC may allow the deepening of their knowledge, because there are few studies in the setting of care to patients after bariatric surgery. One also expects to contribute to studies on the NOC, because working with a rating that measures results enables to identify the quality and effectiveness of care.

The results may also stimulate the knowledge development, skill and competence of active nurses in this area. With this, it is hoped to contribute to improve the quality of care provided to patients undergoing bariatric surgery, providing also the profile of the clientele and nursing linguistic uniformity. The research may help to develop protocols for nursing interventions and to plan continuing education programs, develop competences and skills in professional nursing, in order to make the nursing interventions resolving.

Thus, this study has the following objectives: identify the nursing diagnoses of the cardiovascular/pulmonary response class belonging to the activity/rest domain, according to the Taxonomy II of NANDA-I<sup>(5)</sup> in patients at the immediate postoperative

bariatric surgery period and propose interventions and nursing outcomes according to the Nursing Interventions Classifications (NIC)<sup>(6)</sup> and Nursing Outcomes Classification (NOC)<sup>(7)</sup>.

## METHOD

This is a descriptive, cross-sectional study carried out from June 2010 to June 2011 in a hospital in the city of Fortaleza-CE, which is a reference for bariatric surgery in this state. The institution has been performing bariatric surgery since 2002, with a monthly frequency of eight surgeries, a number of 571 surgeries in total, until December 2012.

According to the information system from the place studied, two surgeries per week are performed, which culminates in a population of less than 200 people when considering a survey of 12 months. Therefore, there was no statistical calculation sample. Even so, the research is valid, since we selected all patients who underwent bariatric surgery during the data collection period and who met the inclusion criteria established: to be in the immediate postoperative period up to 72 hours, when patients are still hospitalized<sup>(8)</sup>. The exclusion criteria were having previous medical diagnosis of heart and lung disease, affecting the patient's clinical evaluation.

Thus, the study population comprised 62 patients who had a diagnosis of obesity or morbid obesity and one or more comorbidities, of both sexes, who were experiencing the immediate postoperative period. Three of these patients were excluded for not having medical conditions to participate in the research, resulting in a non-probabilistic sample of 59 patients.

In the institution where the study was conducted, there is a ward with two beds reserved for patients undergoing bariatric surgery. Data were collected in this environment with all the patients who agreed to participate in the study after being informed about the objectives. Data collection occurred from the interview,

physical examination and consultation to the patient's chart.

One applied a structured instrument developed according to the Taxonomy II of NANDA-I from the defining characteristics, related factors and risk factors of the 13 nursing diagnoses from the cardiovascular/pulmonary class. It is noteworthy that this instrument has been subjected to the process of content validation by three nurse specialists in critical care to patients in recovery after anesthesia, in order to verify their compliance with the objectives. One conducted a pre-test of the instrument with 20 patients who underwent bariatric surgery, revealing the impossibility of obtaining test results of gasometry and electrocardiogram, as the service did not have the gasometry equipment, neither was it part of the protocol conducting electrocardiograms. One highlights those patients were not included in the study sample either.

The diagnoses from the cardiovascular/pulmonary class present in patients of this study were subjected to validation by three judges, who inferred the nursing diagnoses separately from a spreadsheet that contained clinical data, defining characteristics and factors related to diagnoses. It is noteworthy that the judges have had a minimum experience of five years in assistance.

The criteria adopted for the inference of the diagnoses were: the presence of a single defining characteristic would not result in the presence of nursing diagnosis; and the presence of diagnosis excludes the diagnosis of equivalent risk. The diagnoses validation consisted of percentage of agreement and of the Kappa coefficient, which is used to evaluate the reliability of the agreement between two measurements of the same individual and the level of statistical significance adopted was 5%.

It was consistent among evaluators the inference of the diagnoses: Decreased Cardiac Output, Ineffective Breathing Patterns, Intolerance to activity, Dysfunctional Response to Ventilatory Weaning, Risk of Decreased

Cardiac Tissue Perfusion, Risk of Ineffective Renal Perfusion and Ineffective Peripheral Tissue Perfusion. However, in this study one will analyze only those diagnoses that had a frequency greater than 70% among the patients, and then built a relationship with their defining characteristics and related factors or risk to subsequently propose outcomes (NOC) and interventions (NIC).

In this research, one respected ethical and legal guidelines to be followed in investigations involving human subjects, as required by the Resolution 196/1996, from the National Health Council (Conselho Nacional de Saúde). Therefore, the project was approved by the Ethics Committee of the institution under paragraph number 294/2009.

## RESULTS

At first, one presented the data resulting from the patients profile after bariatric surgery taken into the nursing ward of the field research hospital.

There was a predominance of females (84.8%) in this group with an average age of  $35.3 \pm 10.2$ , while among men was  $30.9 \pm 8.4$ . The characteristics observed do not vary proportionally regarding sex ( $p > 0.05$ ). Women were slightly older compared to men: 33 (64%) were younger than 36 years old, and 18 (36%) were 36 years old or over, while in the male group, six (66.6%) were under the age of 36 and three (33.3%) were 36 years old or older, not being statistically significant.

Regarding the Body Mass Index (BMI), one noted that the average of men ( $51.2 \pm 9$ ) was equal to the women's ( $46.4 \pm 5.8$ ) ( $p = 0.092$ ). This result is confirmed when the diagnosis is evaluated, where 100%

of men had a diagnosis of morbid obesity and, among women, there were 48 (96%). The prevalence of Diabetes Mellitus among women was of 20% (10), and 11.1% (1) among men. The prevalence of hypertension among women was of 56% (28) and, among men, 44.4% (22). Laparoscopy was the most adopted surgical technique among women with 48 (96%), while among men, eight (88.9%).

In this study, one identified 13 nursing diagnoses from the class cardiovascular/pulmonary responses in postoperative of bariatric surgery, being six real and seven risky. The frequency of actual diagnoses was: Ineffective Peripheral Tissue Perfusion (78%), decreased cardiac output (76.3%), activity intolerance (74.6%), Impaired Spontaneous Ventilation (66.1%), Ineffective Breathing Patterns (47.5%) and the Dysfunctional Response to Ventilatory Weaning (44.1%). As for the risk diagnoses, the frequencies were: Decreased Cardiac Tissue Perfusion (86.4%), Risk of Ineffective Renal Perfusion (72.9%), Risk of Ineffective Brain Tissue Perfusion (52.5%), Risk of activity Intolerance (45.8%), Risk of Gastrointestinal Ineffective Perfusion (30.5%) and Risk of bleeding (3.3%).

The nursing diagnoses of these patients who achieved percentage above 70% are shown in Chart 1, 2 and 3, concomitant to the expected results and nursing interventions identified among the 59 cases studied, while the risk diagnoses are in Chart 4 and 5.

**Chart 1** - Nursing diagnosis Ineffective Peripheral Tissue Perfusion: expected results and main interventions according to the link among NANDA-I, NIC and NOC present in patients after bariatric surgery postoperative period. Fortaleza, Brazil, 2013.

Defining characteristics	Related factors	Expected results	Nursing interventions/activities
Edema, paresthesia and decreased pulses.	Hypertension, smoking, obesity, inactivity, immobility	Tissue perfusion: peripheral	<ul style="list-style-type: none"> <li>- Peripheral sensitivity control: Monitor paresthesia (numbness, tingling, hyperesthesia, hypoesthesia);</li> <li>Control the discrimination between sharp and blunt, hot and cold;</li> <li>Examine the skin for changes in integrity.</li> <li>- Monitoring of vital signs: Monitor color, temperature and the skin moisture;</li> <li>Control presence of peripheral cyanosis;</li> <li>Observe the presence and quality of pulses.</li> <li>- Control of liquids: Keep track of intake and output;</li> <li>Administer diuretics as appropriate;</li> <li>Monitor laboratory findings to fluid retention (hematocrit, sodium, osmolality);</li> <li>Evaluate overload indicators / fluid retention (edema, jugular venous distention etc.).</li> </ul>

**Chart 2** - Nursing diagnosis of Decreased Cardiac Output expected results and main interventions according to the link among NANDA-I, NIC and NOC present in patients after bariatric surgery. Fortaleza, Brazil, in 2013

Defining characteristics	Related factors	Expected results	Nursing interventions/activities
Edema, cough, fatigue, decreased pulses, orthopnea, anxiety, oliguria, dyspnea, and changes in blood pressure readings measured by auscultation, cold and clammy skin, prolonged peripheral capillary perfusion	Changed pre-and afterload	Respiratory status: ventilation, vital signs and peripheral tissue perfusion	<ul style="list-style-type: none"> <li>- Control of fluid/electrolytes: Keep track of intake and output;</li> <li>Evaluate overload indicators/water retention;</li> <li>Control intravenous drip solutions rigorously;</li> <li>Evaluate the location and extent of swelling;</li> <li>Monitor sodium for dilutional hyponatremia;</li> <li>Monitor vital signs.</li> <li>- Cardiac care: Register cardiac arrhythmias;</li> <li>Monitor the presence of dyspnea, orthopnea, tachypnea.</li> <li>- Oxygen therapy: Check oxygen saturation;</li> <li>Carry out supplemental oxygen;</li> <li>Monitor patient's anxiety.</li> <li>- Reduction of anxiety: Providing quiet and comfortable environment;</li> <li>Reassure the patient.</li> </ul>

**Chart 3 - Nursing Diagnosis Activity Intolerance:** expected results and main interventions according to the link among NANDA-I, NIC and NOC present in patients after bariatric surgery. Fortaleza, Brazil, in 2013

Defining characteristics	Factors related	Expected results	Nursing interventions/activities
Reported fatigue, discomfort on exertion, abnormal blood pressure response to activity, dyspnea on exertion and reporting of weakness	Bed rest, sedentary lifestyle and immobility	Tolerance to activity, vital signs and Knowledge: fall prevention energy conservation	<ul style="list-style-type: none"> <li>- Exercise therapy: muscle control: Collaborate with the physiotherapist exercise program; Help patients to sit/stand according to the exercise protocol.</li> <li>- Energy control: Encourage verbalization of feelings about the limitations; Organize physical activities that compete for oxygen supply.</li> <li>- Control of the environment: Facilitate hygiene measures; Create a safe environment, keeping personal and bell close; Keep quiet environment to reduce anxiety.</li> <li>- Watch out for bed rest: Place mattress pyramidal or other appropriate; Monitor the condition of the skin; Turn the patient, at least every two hours; Apply anti-embolism stockings.</li> <li>- Oxygen therapy: Check oxygen saturation; Administer supplemental oxygen; Monitor patient's anxiety.</li> </ul>

**Chart 4 - Nursing diagnosis Risk of Decreased Cardiac Tissue Perfusion:** expected results and key interventions, according to the link among NANDA I, NIC and NOC present in patients after bariatric surgery. Fortaleza, Brazil, 2013

Risk factors	Expected results	Nursing interventions/activities
Diabetes mellitus, hypertension, hypoxia, and family history of coronary artery disease, hyperlipidemia.	Tissue perfusion: cardiac vital signs and respiratory status: ventilation	<ul style="list-style-type: none"> <li>- Monitoring of vital signs: Monitor blood pressure, pulse, breathing pattern and observe trends; Check pulses' presence and quality; Control the presence of peripheral and central cyanosis; Follow color and skin temperature.</li> <li>- Cardiac care: Evaluate chest pain (intensity, location, radiation, duration, precipitating and relief factors); Document cardiac arrhythmias; Guide the patient to immediately report chest discomfort; Check signs and symptoms of respiratory failure.</li> <li>- Laboratory tests at the bedside: Monitor laboratory data when it is appropriate (cardiac enzymes, electrolyte levels). Interpretation of laboratory data: Monitor results of sequence tests in search of trends and extreme changes (blood glucose, total cholesterol and fraction).</li> </ul>

**Chart 5 - Nursing diagnosis Risk of Ineffective Renal Perfusion:** expected results and main interventions, according to the link among NANDA I, NIC and NOC present in patients after bariatric surgery. Fortaleza, Brazil, 2013

Risk factors	Expected results	Nursing interventions/activities
Hypoxia, hypertension, hyperlipidemia, mellitus diabetes	Renal function, vital signs and tissue perfusion: abdominal organs	<ul style="list-style-type: none"> <li>- Laboratory data interpretation: Monitor serum urea, creatinine and electrolytes; Ascertain total cholesterol and glucose levels.</li> <li>Control of fluid/electrolytes: Monitor serum electrolyte levels and those relevant to fluid retention; Observe signs and symptoms of fluid electrolyte imbalance: cramps, arrhythmias, neurological disorders, edema etc..; Keep a detailed record of intake and elimination; Monitor kidney failure symptoms (edema, neurological changes, changes in blood pressure etc.).</li> </ul>

By making the connection among nursing diagnoses and classification of nursing interventions and outcomes, it was noticed that some interventions are repeated, ie, the diagnoses are interconnected and, therefore, interventions also appear interconnected. It should be enhanced that links are only guides, as the nurse assesses the patient's condition, for adjusting both the interventions and the results to the diagnosis, in order to adapt them to each patient's reality.

## DISCUSSION

The recognition of the most frequent nursing diagnoses, besides facilitating the creation of a "bridge" between the complex clinical data and nursing care, can drive the creation of specific protocols to the nursing care to these patients, as well as serve as a vehicle for change and transformation of clinical practice<sup>(9)</sup>. One observes that this activity requires specific nursing skills and strict attention, especially for detecting changes in health status and patients' specific needs<sup>(10)</sup>.

Thus, the diagnostic identification represents an efficient clinical judgment from the professional, which also involves the proper choice of interventions, including careful prioritization of goals to be reached in care planning, which is essential in nursing practice, especially in the case of professionals working with obese patients.

The most frequent nursing diagnoses were: risk for decreased cardiac tissue perfusion, ineffective peripheral tissue perfusion, decreased cardiac output, activity intolerance and risk for ineffective renal perfusion. The clinical condition of overweight/obesity, sedentary lifestyle and immobility appear as important clinical factors associated with the inference of the ND ineffective peripheral tissue perfusion, decreased cardiac output, activity intolerance and risk for decreased cardiac tissue perfusion<sup>(9)</sup>.

The ND Ineffective Peripheral Tissue Perfusion refers to the reduction in blood flow to the periphery,

which can harm health<sup>(5)</sup>. Edema was one of the most frequent defining characteristics of this diagnosis, being common in morbidly obese due to high pressure on right ventricular filling or increased intra-abdominal pressure<sup>(11)</sup>.

The professional must be aware of changes in the skin color, especially cyanosis of the extremities, identifying the cause of vasoconstriction and ischemia of the peripheral regions<sup>(12)</sup>. Nursing interventions reported in the literature for the ND Ineffective Peripheral Tissue Perfusion are: oxygen therapy, water intake control, walking encouragement and increased activity, investigation of bleeding signs, monitoring vital signs every 4 hours, shock prevention, pressure ulcers prevention and skin supervision<sup>(13)</sup>.

The defining characteristics associated with the ND Decreased Cardiac Output are detected during the nurse's evaluation, when one performs a physical examination by checking heart rate, breathing pattern, blood pressure, urine output and peripheral edema evaluation, as well as in the interview, ascertaining symptoms that are present as defining characteristics of the diagnosis, such as the presence of anxiety, fatigue and dyspnea<sup>(5)</sup>.

One of the main complications that may occur in the immediate postoperative period are changes in cardiac output due to changes in contractility, of the pre- and afterload<sup>(12)</sup>. These variations may be identified by monitoring the heart rate and rhythm, for blood pressure measurements, central venous pressure, left atrial pressure and also by clinical observations<sup>(14)</sup>. In the institution under study, the patient in postoperative period even in the recovery room and on the ward has no invasive hemodynamic monitoring. Basic and non-invasive monitoring is essential for proper care of these patients and for the perception of early onset of complications.

Thus, the diagnosis decreased cardiac output was present in this study, having as related factors altered

pre-and afterload. The related factor changed preload has the following defining characteristics: jugular venous distension, edema, fatigue, and murmurs. On the other hand, the defining characteristics for the related factor changed afterload are: dyspnea, changes in skin color, oliguria, cold and clammy skin, prolonged peripheral tissue perfusion, decreased peripheral pulses, changes in blood pressure readings<sup>(5)</sup>.

Excess of adipose tissue increases the metabolic demands of the cells, causing the excessive oxygen consumption, which contributes to a left ventricular hypertrophy. In these patients, there are also increased levels of renin and aldosterone and mineralocorticoid and catecholamine, causing fluid overload, ie, increased preload<sup>(15)</sup>.

The evaluation of the cardiovascular system presents challenges in obese subjects such as the presence of classical symptoms of unreliable cardiac failure, such as jugular venous distention, hepatomegaly, and peripheral edema so that excess of adipose tissue can alter these clinical conditions. Thus, in addition to understanding the challenges of the physical examination in patients with obesity, the priorities of nursing care for patients include monitoring of intake/output of fluids, check vital signs with attention to the proper choice of the cuff on a blood pressure check, counting the respiratory rate in a minute and auscultation in a noise-free environment<sup>(16)</sup>.

Other nursing care procedures for patients with the nursing diagnosis decreased cardiac output are: bleeding control, shock, hypovolemia, interpretation of laboratory tests including electrolytes and coagulation, anxiety reduction, fluids monitoring, and other care measures, in order to save and restore the myocardial function<sup>(17)</sup>.

The nursing diagnosis Activity Intolerance refers to Domain 4, Activity/Rest, Class 4 - Cardiovascular/Pulmonary Answers, and is related to exercise, activity, leisure, recreation and ability to

perform activities of daily living<sup>(5)</sup>. This diagnosis had a frequency percentage of 74.6% and is defined as a state when the individual experiences insufficient physiological or psychological energy to endure or complete daily activities<sup>(5)</sup>. Therefore, there is a need for a balance between production and consumption of energy that can be obtained by nutrients, water, rest and motivation<sup>(18)</sup>.

Dyspnea on exertion and edema of the lower limbs often occur in obese individuals. Dyspnea on exertion is a defining characteristic of the nursing diagnosis Activity Intolerance, caused by increased ventilatory demand<sup>(11)</sup>. The activity intolerance prevents the patient from performing simple actions, such as ambulation and personal hygiene. This limitation presented in the research participants may impair postoperative recovery and facilitate the development of complications, such as pressure ulcers.

Patients with the risk of having a diagnosis Decreased Cardiac Tissue Perfusion, showed alterations in cardiac blood flow capable of compromising health. The risk indices for life, linked to obesity, such as hypertension and coronary artery disease increase progressively with increasing body weight. About 60% of obese patients have hypertension. According to these concepts, even in the absence of clinical symptoms, obese patients require careful cardiovascular research. Prospective epidemiological study has suggested a link between obesity and coronary artery disease<sup>(19)</sup>.

By diagnosing this situation, the nurse has a very important role in the prevention and treatment actions of the major complications. It is necessary to develop strategies that can assist the nursing care staff, optimizing the quality of patients' care.

The ND Risk of Ineffective Renal Perfusion refers to the change in pressure existing volume within the arteries with resultant reduction in blood flow. The prevalence of acute renal failure is 50% in the post-bariatric surgery, and the major causes: hypovolemia, occlusion tubular acidosis and increase in free

radicals<sup>(20)</sup>. Risk for Ineffective Renal Perfusion may be related to decreased cardiac output, since renal function is closely influenced by cardiac function. Changes in the volume and aspect of diuresis promote decreased oxygenation resulting in inadequate blood circulation in the kidneys<sup>(14)</sup>.

Obesity has adverse effects on most of the body systems, especially in the cardiovascular, respiratory, neurological and immune systems. The perioperative nursing should seek greater knowledge of nursing care to the bariatric patient in order to develop strategies that optimize the effectiveness of the assistance<sup>(21)</sup>. Most interventions to diagnoses identified were located in the basic physiological domains (eg, control of fluids and electrolytes and care with bed rest) and complex (such as oxygen and respiratory monitoring), since the patient population is the physiological point of view, unstable and prone to complications.

It should be noted that links are only guides because the nurse should assess the patient's condition for adjusting interventions to diagnosis as the results, in order to adapt them to the reality of each patient. Links, therefore, are not prescriptive and do not replace the clinical judgment of the nurse.

## CONCLUSION

It was found that there is a prevalence of obesity among women aged from 20 to 39 years old, the period of greatest reproductive performance. Furthermore, about 90% of the participants were in a state of morbid obesity (obesity degree III). The association between obesity and comorbidity was present in 56.9%, which strengthens obesity as a risk factor for many diseases, especially cardiovascular ones.

Regarding the nursing diagnoses identified in patients in the immediate postoperative bariatric surgery, based on the Taxonomy II of NANDA-I, it was identified five nursing diagnoses often above 70%: risk

of decreased cardiac tissue perfusion, ineffective peripheral tissue perfusion, decreased cardiac output, and activity intolerance risk for ineffective renal perfusion. Aiming at the identification of the nursing diagnoses of cardiovascular/pulmonary class, a nursing care plan was elaborated with expected outcomes, according to the classification NOC, and interventions and activities, according to the NIC.

Besides the important contribution in the recognition of human responses in this population, there is the professional's capacity to take advantage of this information, given the scarcity of research with nursing diagnoses in patients undergoing bariatric surgery.

This study may provide grants that support nursing actions in daily practice. It is the nurse's responsibility to offer quality work supported by the use of the nursing process. The importance of new studies that provide further analysis of the diagnoses listed in this survey must be also emphasized. As limitations, it could be seen that these results were related to the population with specific characteristics, and can only be extended to similar groups. The environment and the treatment team also differ from one location to another, and patients respond to these conditions.

## ACKNOWLEDGMENTS

The National Council of Scientific and Technological Development. Barros LM Former Scientific Initiation scholarship holder.

## COLLABORATIONS

Moreira RAN, Barros LM and Caetano JA contributed to the conception, analysis, interpretation of data, article drafting and final approval of the version to be published. Rodrigues AB contributed to the article drafting and final approval of the version to be published.

## REFERENCES

1. Felix LG, Soares MJGO, Nóbrega MML. Protocolo de assistência de enfermagem ao paciente em pré e pós-operatório de cirurgia bariátrica. *Rev Bras Enferm.* 2012; 65(1):83-91.
2. Sociedade Brasileira de Cirurgia Bariátrica. Cirurgia bariátrica e metabólica: pós-operatório [Internet]. 2010 [citado 2012 out 10]. Disponível em: <http://www.sbcbr.org.br/cbariatica.asp?menu=9>
3. Felix LG, Soares MJGO, Nóbrega MML. Processo de enfermagem fundamentado na teoria do autocuidado de Orem a um paciente submetido à cirurgia bariátrica. *Rev Enferm UFPE On line.* [periódico na internet] 2009 [citado 2012 jan 10];3(4):814-22. Disponível em: <http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/viewArticle/89>
4. Alfaro-Lefevre R. Aplicação do processo de enfermagem – uma ferramenta para o pensamento crítico. 7ª ed. Porto Alegre: Artmed; 2010.
5. NANDA Internacional. Diagnósticos de enfermagem da NANDA: definições e classificação 2012-2014. Porto Alegre: Artmed; 2013.
6. Bulechek GM, Dochterman MJ, Butcher H. Classificação das Intervenções de Enfermagem - NIC. 5ª ed. São Paulo: Elsevier; 2010.
7. Johnson M, Mass M, Moorhead S. Classificação dos Resultados de Enfermagem – NOC. 3ª ed. Porto Alegre: Artmed; 2008.
8. Barth MM, Jenson CE. Postoperative nursing care of gastric bypass patients. *Am J Crit Care.* 2006; 15(4):378-87.
9. Nunciaroni AT, Gallani MCBJ, Agondi RF, Rodrigues RCM, Castro LT. Caracterização dos diagnósticos de enfermagem de pacientes internados em uma unidade de cardiologia. *Rev Gaúcha Enferm.* 2012; 33(1):32-41.
10. Pascoal LM, Souza VEC, Montoril MH, Rocha DH, Lopes MVO, Sampaio FAA. Indicadores de troca de gases prejudicada em pacientes com doenças cardiovasculares segundo a NOC. *Rev Rene.* 2009; 10(4):96-102.
11. Freitas MC, Pereira RF, Guedes MVC. Diagnósticos de enfermagem em idosos dependentes residentes em uma instituição de longa permanência em Fortaleza-CE. *Ciênc Cuid Saúde.* 2010; 9(3):518-26.
12. Milhomem ACM, Mantelli FF, Lima GAV, Bachion MM, Munari DB. Diagnósticos de enfermagem identificados em pessoas com diabetes tipo 2 mediante abordagem baseada no Modelo de Orem. *Rev Eletr Enf [periódico na internet]* 2008 [citado 2012 jan 20];10(2):321-36. Disponível em: <http://www.revistas.ufg.br/index.php/fen/article/view/8031>
13. Barbosa PMK, Guimarães AA, Santos VC, Anjos KF. Troca de gases prejudicada: intervenções de enfermagem. *C&D - Rev Eletr Fainor.* [periódico na internet] 2009 [citado 2010 jan 25];2(1):33-45. Disponível em: <http://srv02.fainor.com.br/revista237/index.php/memorias/article/view/60/44>
14. Smeltzer SC, Bare BG, organizadoras. Brunner & Suddarth tratado de enfermagem médico-cirúrgica. 12ª ed. Rio de Janeiro: Guanabara Koogan; 2011.
15. Mulligan K, Khatami H, Schwarz JM, Sakkas GK, DePaolo AM, Tai VW. The effects of recombinant human leptin on visceral fat, dyslipidemia, and insulin resistance in patients with human immunodeficiency virus: associated lipodystrophy and hypoleptinemia. *J Clin Endocrinol Metab.* 2009; 94(4):1137-44.
16. Phillips J. Care of the Bariatric Patient in Acute Care. *J Radiol Nurs.* 2013;32(1):21-31.
17. Silva EA, Flexa F, Zanella MT. Abdominal obesity, insulin resistance and hypertension: impact on left ventricular mass and function in women. *Arq Bras Cardiol.* 2007; 89(2):86-92.
18. Nalin TR, Lima GMP, Dias BVB. Protocolo de assistência para pacientes em uso de circulação extracorpórea baseado nos diagnósticos de

enfermagem de Nanda e intervenções de NIC. Rev Multidiscip Saúde. 2010; 2(3):27-51.

19. Poirier P, Alpert MA, Fleisher LA, Thompson PD, Sugerman HJ, Burke LE, et al. Cardiovascular evaluation and management of severely obese patients undergoing surgery: a science advisory from the American Heart Association. Circulation. 2009; 120(1):86-95.

20. Nascimento ERP, Hilsendegen BR, Neth C, Belaveny GM, Bertencello KCG. Classificação de risco na emergência: avaliação da equipe de enfermagem. Rev Enferm UERJ. 2011; 19(1):84-8.

21. Nell JA. Perioperative nursing care of the patient undergoing bariatric revision surgery. AORN J. 2013; 97(2):210-29.