

## Assessment of bariatric surgery results



*Avaliação dos resultados da cirurgia bariátrica*

*Evaluación de los resultados de la cirugía bariátrica*

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DOI: <http://dx.doi.org/10.1590/1983-1447.2015.01.47694>

### ABSTRACT

The objective was to evaluate the results of bariatric surgery in patients in the late postoperative period using the Bariatric Analysis and Reporting Outcome System (BAROS). This cross-sectional study was conducted from November 2011 to June 2012 at a hospital in the state of Ceará, Brazil. Data were collected from 92 patients using the BAROS protocol, which analyzes weight loss, improved comorbidities, complications, reoperations and Quality of Life (QoL). Data were analysed using the chi-squared test, Fischer's exact test and the Mann-Whitney test. There was a reduction in the Body Mass Index ( $47.2 \pm 6.8 \text{ kg/m}^2$  in the pre-operative and  $31.3 \pm 5.0 \text{ kg/m}^2$  after surgery,  $p < 0.001$ ). The comorbidity with the highest resolution was arterial hypertension ( $p < 0.001$ ), and QV improved in 94.6% of patients. The main complications were hair loss, incisional hernia and cholelithiasis. The surgery provided satisfactory weight loss and improvements in the comorbidities associated to a better QL. Use of the BAROS protocol allows nurses to plan interventions and maintain the good results.

**Keywords:** Obesity, morbid. Bariatric surgery. Nursing.

### RESUMO

Objetivou-se avaliar os resultados da cirurgia bariátrica em pacientes no pós-operatório tardio com o protocolo Bariatric Analysis and Reporting Outcome System (BAROS). Estudo transversal realizado no período de novembro de 2011 e junho de 2012 em um hospital do Estado do Ceará-Brasil. A coleta dos dados ocorreu com 92 pacientes por meio do Protocolo BAROS, o qual analisa: perda de peso, melhora das comorbidades, ocorrência de complicações, necessidade de reoperações e Qualidade de Vida (QV). Para análise dos dados, utilizaram-se os testes estatísticos Qui-Quadrado, Exato de Fischer e Mann-Whitney. Houve redução no Índice de Massa Corporal ( $47,2 \pm 6,8 \text{ kg/m}^2$  no pré-operatório e  $31,3 \pm 5,0 \text{ kg/m}^2$  após a cirurgia,  $p < 0,001$ ). A comorbidade que teve maior resolução foi a hipertensão arterial ( $p < 0,001$ ), e a QV melhorou em 94,6% pacientes. As principais complicações foram queda de cabelo, hérnia incisional e colelitíase. A cirurgia proporcionou perda de peso satisfatória e melhora das comorbidades associada ao aumento da QV. O uso do protocolo BAROS pelo enfermeiro permite o planejamento de intervenções que possibilitem a manutenção dos bons resultados.

**Palavras-chave:** Obesidade mórbida. Cirurgia bariátrica. Enfermagem.

### RESUMEN

El objetivo fue evaluar los resultados de cirugías bariátricas en pacientes postoperatorio tardío a partir del protocolo Bariatric Analysis and Reporting Outcome System (BAROS). Estudio transversal realizado entre noviembre de 2011 y junio de 2012 en un hospital del estado de Ceará-Brasil. La recolección de datos ocurrió en 92 pacientes con el Protocolo BAROS, que analiza: la pérdida de peso, mejora de las comorbidades, complicaciones, reintervenciones y calidad de vida. Para el análisis de los datos, se utilizó las pruebas estadísticas chi-cuadrado, prueba exacta de Fisher y de Mann-Whitney. Hubo una reducción en el índice de masa corporal ( $47,2 \pm 6,8 \text{ kg/m}^2$  en el preoperatorio y  $31,3 \pm 5,0 \text{ kg/m}^2$  después de la cirugía,  $p < 0,001$ ). La comorbilidad que tuvo una resolución más alta fue la hipertensión ( $p < 0,001$ ) y la calidad de vida mejoró en un 94,6% de los pacientes. Las principales complicaciones fueron la caída del cabello, la hernia incisional y colelitiasis. La cirugía proporcionó pérdida de peso satisfactorio y la mejora de las comorbidades asociadas al aumento de la calidad de vida. El uso del protocolo BAROS por el enfermero, permiten planificar las intervenciones que posibiliten el mantenimiento de buenos resultados.

**Palabras clave:** Obesidad mórbida. Cirugía bariátrica. Enfermería.

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## ■ INTRODUCTION

Currently, bariatric surgery is the best treatment for morbid obesity. It complements the practice of other therapies to control weight and the comorbidities associated to excessive adiposity. In addition to providing long-term sustainable weight loss, this surgical procedure also improves metabolism, which helps to resolve various diseases and promotes biopsychosocial well-being<sup>(1-2)</sup>.

This treatment should be indicated for individuals who have a Body Mass Index (BMI)  $\geq 40$  kg/m<sup>2</sup> or  $\geq 35$  kg/m<sup>2</sup> with some comorbidity, and who are motivated and aware of the life-style changes required after surgery<sup>(2-3)</sup>. The good results obtained during the first years must be seen by these patients as the stimulus needed to change their living habits. Thus, the initial incentives motivated by weight loss should subsequently focus on practicing physical activity, healthy eating and postoperative follow-up to ensure the persistence of favourable results<sup>(4)</sup>.

To assess the success of treatment, periodic follow-up is required after the surgical intervention. This follow-up should include the analysis of weight loss, changes in comorbidities and quality of life, and the occurrence of complications and reoperations<sup>(5)</sup>. Weight loss is considered one of the main parameters to define the success of bariatric surgery, and there is a consensus among researchers that the criterion for this evaluation is an excess weight loss (% EWL) percentage of at least 50% with weight loss maintenance over the years<sup>(6-7)</sup>.

Oria and Moorehead (1998) developed the Bariatric Analysis and Reporting Outcome System (BAROS). This protocol is internationally recognized for its practicality and efficiency, and is currently considered the only instrument that allows a complete and objective assessment of the results of bariatric surgery<sup>(8-9)</sup>.

In recent years, nursing has been extending its practices for this specific population. Thus, the use of instruments like the BAROS enables nurses to obtain information on patients' adaptation during the postoperative follow-up and directs the actions of care.

Nursing care at this stage should be geared toward patient recovery and wellness in a short time span. This care should also focus on preventing complications and increasing self-care, which will result in a better postoperative experience with best results in terms of weight loss, comorbidity resolution and quality of life.

Thus, in order to reinforce the importance of continued care for patients during the postoperative period, the research question was: what are the results in the late postoperative period of bariatric surgery with the use of BAROS?

The growing number of achievements of bariatric surgery<sup>(1)</sup> strengthens and justifies the conduct of this study, considering the need for knowledge of the benefits achieved with this treatment for controlling obesity and improving the health of patients.

In order to reinforce the importance of continuity of care for patients during the postoperative period, the question was: what are the results obtained in the late postoperative period of bariatric surgery with the use of the BAROS? The growing number of achievements of bariatric surgery<sup>(1)</sup> strengthens and justifies the conduct of this study, considering the need for knowledge of the benefits achieved with this treatment for controlling obesity and improving the health of patients.

Consequently, the aim of this study was to assess the results of bariatric surgery in patients in the late post-operative period based on the Bariatric Analysis and Reporting Outcome System (BAROS).

## ■ METHOD

This cross-sectional study was conducted between November 2011 and June 2012 at a benchmark hospital in bariatric surgery for the Unified Health System (SUS) in the state of Ceará, Brazil.

The target public was 570 patients of the Obesity Programme of the State of Ceará, who were experiencing post-operative care for bariatric surgery. The late post-operative period starts seven days after surgery and can last weeks or months. This period represents healing time and the prevention of complications.

This convenience sample consisted of 92 patients who attended consultations with the multi-disciplinary team during the data collection period. The inclusion criteria was patients aged 18 or over who had been in the post-operative period for at least three months. This period was established to approach patients when they were initiating the practice of physical activities and a special diet. Furthermore, Ordinance 492/SAS of the Ministry of Health, which establishes standards for licensing and authorizing High Complexity Care Units for Patients with Severe Obesity and Guidelines for the Care of Patients with Severe Obesity recommends the use of the BAROS for assessing the success of surgery and considers that the full protocol should be applied from the 3<sup>rd</sup> month of the post-operative period<sup>(10)</sup>.

Exclusion criteria were patients with a cognitive limitation that could compromise the response of the data collection instrument and patients that were not registered in the institution's obesity programme. Data were collected by completing an instrument with clinical-epidemiological in-

formation (sex, age, type of surgery, time of post-operative period, weight, height, and pre- and postoperative Body Mass Index (BMI)), a questionnaire on post-operative quality of life, and the BAROS. The domains evaluated in the BAROS are weight loss (percentage of excess weight loss), clinical evaluation (by identifying improvements or the resolution of comorbidities, such as heart disease, SAH, DM, osteoporosis, infertility and sleep apnea) and quality of life evaluation (with the Moorehead-Ardelt Questionnaire II)<sup>(5,8)</sup>.

Weight loss was evaluated using %EWL, where data from a population study of the Metropolitan Life Insurance Company<sup>(11)</sup> is used as an ideal weight parameter. According to these results, %EWL is classified into five groups: weight gain (score -1), 0 to 24% (score 0), 25 to 49% (score 1), 50 to 74% (score 2) and 75 to 100% (score 3)<sup>(5)</sup>.

If patients present any disease in the preoperative period (arterial hypertension, diabetes mellitus II, cardiovascular disease, dyslipidemia, obstructive sleep apnea, osteoarthritis and infertility), aggravations to these comorbidities are evaluated in the post-operative period as follows: aggravated (score -1), unaltered (score 0), improved (score 1), one of the more serious comorbidities was resolved and others improved (score 2) and all main comorbidities were resolved and the others improved (score 3). Patients who did not present preoperative comorbidities are classified as unchanged and receive score zero<sup>(5)</sup>.

To assess the quality of life, the Moorehead-Oria Quality of Life Questionnaire II was used (QoL-II), with the following six variables: 1) self-esteem, 2) physical activity, 3) social relations, 4) job satisfaction, 5) pleasure related to sexuality, and 6) eating behaviour. Each variable is worth 0.5 points, totalling 3 points for the quality of life domain. Once the scores are added, quality of life is classified as very reduced (-3 to -2.1 points), reduced (-2 to -1.1 points), unchanged (-1 to 1 points), improved (1.1 to 2 points) and improved (2.1 to 3 points)<sup>(5)</sup>.

Postoperative complications are classified as clinical, surgical, greater, lesser, early or late<sup>(5)</sup>. Regardless of the number of complications, -0.2 points are deducted for greater complications and -1 point is deducted for greater complications. If the patient has one lesser and one greater complication, -1 point is deducted for these complications<sup>(5)</sup>. In case of reoperation due to the occurrence of a complication, the score is zero. Patients who do not present complications receive a zero score. If a patient requires a reoperation, 1 point is deducted from the total score<sup>(5)</sup>.

After completing the BAROS data and the questionnaire, each patient receives a score. According to the final score, the surgical evolution of patients is classified as insufficient (0 or less points), acceptable (0 to 1.5 points), good

(1.6 to 3 points), very good (3 to 4.5 points) and excellent (4.6 to 6 points). For patients with comorbidity, the classification is as follows: insufficient (1 or less), acceptable (1.1 to 3 points), good (3.1 to 5 points), very good (5.1 to 7 points) and excellent (7.1 to 9 points)<sup>(5)</sup>.

Data were arranged on tables and graphs with absolute frequencies and percentages, and analysed using the Statistical Package for the Social Sciences (SPSS) version 19. Differences between proportions were assessed using the chi-squared test and Fischer's exact test, and differences between continuous variables were assessed using the Mann-Whitney test. The Wilcoxon test for paired samples was used to compare BMI of patients in the postoperative period with the preoperative period and post-surgical period. BMI was classified according to criteria established by the World Health Organization (WHO)<sup>(12)</sup>. The adopted significance level was 5% and the confidence interval was 95%.

The patients were invited to participate in the study, given all due explanations and asked to sign an informed consent statement. This study was approved by the Human Research Ethics Committee of the institution (CEP538/2011).

## ■ RESULTS

Of the 92 patients who participated in this study, 82.6% (76) were women. In relation to age, most patients, 33.7% (31), were between 29 and 38 years old, with an average age of  $40.53 \pm 10.03$  and an age range of 22 to 70 years. A total of 43.4% (40) had been in the postoperative period for 7 to 24 months, which represented the period of greater weight loss.

In relation to the surgical technique, 53.3% (49) of patients had been operated via videolaparoscopy, while 46.7% (43) underwent open or conventional surgery. In the institutions where the study was conducted, the adopted surgical technique was Fobi-Capella, which was via laparoscopy or open until 2010, and is currently only via laparoscopy. Thus, the predominance of videolaparoscopy is justified in the results of this study.

The first domain assessed in the BAROS was weight loss. The minimum difference between pre-surgery weight and current weight was 35.4 kg and the maximum difference was 98.3 kg. Patients presented a satisfactory weight loss, where 35.9% (33) had a %EWL of 75-100%, 47.8% (44) had a %EWL of 50-74%, and 15.2% (14) had a %EWL of 5-49%. Only 1.1% (1) presented weight loss of between 0 and 24%.

Table 1 shows the BMI classification of patients of the Obesity Programme of the State of Ceará.

Prior to surgery, 7.6% (7) of patients presented class II obesity and 92.4% (85) presented class I obesity. Minimum

BMI was 35.1 kg/m<sup>2</sup>, maximum BMI was 74.2 kg/m<sup>2</sup> and average BMI was 47.2 ± 6.8 kg/m<sup>2</sup>. In the postoperative period, there was a change in this profile, given that 37% (34) of patients were overweight, 35.9% (33) were obese and 5.4% (5) had a normal BMI.

Class II obesity in 15.2% (14) of patients and class III obesity in 6.5% (6) of patients in the postoperative period is related to the fact that severely obese individuals with a BMI above 55 kg/m<sup>2</sup> managed to lose weight and reduce their BMI level to a lesser class of obesity, which is evidently considered an important achievement. In the postoperative period, minimum BMI was 23.8 kg/m<sup>2</sup>, maximum BMI was 49.8 kg/m<sup>2</sup>, and average BMI was 31.3 ± 5.0 kg/m<sup>2</sup>.

There was a difference of 15.9 kg/m<sup>2</sup> in the BMI of patients between the pre- and postoperative periods (p<0.001).

Of the 92 patients, 59.8% (55) presented comorbidities in the pre-surgical period. Of these patients, 40% (22) had more than one comorbidity, which supports the fact that obesity is a risk factor for the occurrence of several associated diseases. The most prevalent of these diseases was SAH, with a prevalence of 50% (46) among the patients (p<0.001). The second most prevalent were DM 2 and dyslipidemia, with a frequency of 13% (12) and a value of p=0.001 each.

Table 2 shows the characterization of comorbidities of patients in pre- and postoperative period.

**Table 1.** Distribution of BMI classification of patients who underwent bariatric surgery of the Obesity Programme of the State of Ceará (n=92), Fortaleza-CE, Brazil, 2012.

BMI Classification	Pre-Surgical		Post-Surgical		p-value*
	n	%	n	%	
Normal	0	0.0	5	5.4	<0.001
Overweight	0	0.0	34	37.0	
Obesity I	0	0.0	33	35.9	
Obesity II	7	7.6	14	15.2	
Obesity III	85	92.4	6	6.5	
Average (SD)	47.2 (6.8)		31.3 (5.0)		

Source: Research data.

\* Wilcoxon test for paired samples (pre-surgical and post-surgical).

**Table 2.** Characterization of the clinical conditions of patients in the Obesity Programme of the State of Ceará who underwent bariatric surgery (n = 92). Fortaleza-CE, Brazil, 2012.

Variables	Postoperative period					
	Comorbidity in the Pre-surgical period		Total	Comorbidity in the Post-surgical period		Total
	Yes	No		Yes	No	
SAH	46 (50%)	46 (50%)	92	1 (1.1%)	91 (98.9%)	92
DM 2	12 (13%)	80 (87%)	92	2 (2.2%)	90 (97.8%)	92
Dyslipidemia	12 (13%)	80 (87%)	92	1 (1.1%)	91 (98.9%)	92
Cardiovascular disease	7 (7.6%)	85 (92.4%)	92	2 (2.2%)	90 (97.8%)	92
Osteoarthritis	4 (4.3%)	88 (95.7%)	92	1 (1.1%)	91 (98.9%)	92
Sleep Apnea	7 (7.6%)	85 (92.4%)	92	1 (1.1%)	91 (98.9%)	92
Infertility	2 (2.2%)	90 (97.8%)	92	1 (1.1%)	91 (98.9%)	92

Source: Research data.

Note: Systemic Arterial Hypertension (SAH); Diabetes Mellitus type 2 (DM 2).

SAH had a prevalence of 50% (46) in the preoperative period. Of this 50%, 97.8% (45) stopped taking medication in the postoperative period and were only following a diet and exercising. DM 2 also presented good results with surgery, considering that 13% (12) of patients had this disease. In the postoperative period, 83.3% (10) did not use medication and 16.7% (2) controlled the disease with oral hypoglycaemic drugs. In relation to dyslipidemia, 13% (12) of patients presented this comorbidity in the preoperative period, while in the postoperative period, 83.3% (91.7) resolved this comorbidity and 8.3% (1) showed an improvement with medication (table 2).

In the postoperative group, 75% (69) considered that their quality of life had considerably improved after surgery, 19.6% (18) felt that their QoL had improved and only 5.4% (5) patients classified their QoL as unchanged. None of the patients classified their QoL as bad or very bad ( $p < 0.001$ ).

Based on the BAROS, the scope for complications is classified in three ways: greater complications; lesser complications and lesser with greater complications. Of the participating patients, 67.4% (62) developed some type of complication. However, most of these complications - 51.6% (32) - were identified as being lesser. Vomiting in the immediate postoperative period occurred as a lesser, early complication, while anaemia, hair loss and nutritional deficiency occurred as lesser late complications. Greater complications presented a frequency of 19.4% (12). An early greater complication was a case of suture dehiscence, while lesser late complications were cholelithiasis and incisional hernia. The occurrence of a lesser complication with a greater complication was identified in 29% (18) of patients.

The main complication mentioned by 74.2% (46) of patients was hair loss. Incisional hernia and cholelithiasis also occurred with 30.6% (19) and 16.1% (10) of patients, respec-

tively. Anaemia was reported by 30.6% (19) of patients, and nutritional deficiency by 11.3% (7) of patients. Other complications were depression, oesophageal stricture, vomiting in the immediate postoperative period, gallstones, anxiety, dumping syndrome and suture dehiscence.

Analysis also showed that 32.6% (30) of patients required reoperation. These reoperations were necessary due to the presence of complications such as hernia, cholelithiasis and oesophageal stricture. Table 3 shows the association of the two main causes of reoperations and the adopted surgical technique.

The need for reoperation was statistically significant for incisional hernia associated to the open surgical technique ( $p < 0.001$ ).

Based on the BAROS, patients showed good results in relation to bariatric surgery. In relation to final scores, 44 (47.8%) classified the success of surgery as excellent, 39 (42.4%) as very good, eight (8.7%) as good, and one (1.1%) as acceptable.

## ■ DISCUSSION

In Brazil, the most widely used bariatric surgery technique is laparoscopic Roux-en-Y Gastric Bypass (LRYGB) known as Fobi-Capella because it favours 40% long-term weight loss in relation to the initial weight. It also reduces the occurrence of important nutritional and metabolic alterations, allowing patients to improve their quality of life both physically and emotionally<sup>(13)</sup>.

Among the patients that underwent bariatric surgery, there was a difference of 15.9 kg/m<sup>2</sup> between the pre- and post-surgical BMI, which indicates a satisfactory improvement to obesity. These results corroborate the findings of another study that verified a significant reduction in BMI

**Table 3.** Distribution of the occurrence of complications that led to reoperation according to technique of patients in the postoperative period of the Obesity Programme of the State of Ceará (n = 92), Fortaleza-CE, Brazil, 2012.

Complications		Surgical Technique		Total	p-value*
		Open	Video		
Hernia	Yes	18 (19.5%)	1 (1.1%)	19 (20.6%)	<0.001
	No	26 (28.3%)	47 (51.1%)	73 (79.4%)	
Total		44 (47.8%)	48 (52.2%)	92 (100%)	
Cholelithiasis	Yes	4 (4.3%)	6 (6.5%)	10 (10.9%)	0.742
	No	40 (43.6%)	42 (45.6%)	82 (89.1%)	
Total		44 (47.8%)	48 (52.2%)	92 (100%)	

Source: Research data.

\* Fisher's Exact Test

after bariatric surgery, with an average of 49.56 kg/m<sup>2</sup> before surgery and 28.3 kg/m<sup>2</sup> (6) in the postoperative period.

Depending on the type of surgery, weight loss tends to be more intense during the first six months and stabilizes after two years, with chances of weight gain after reaching this plateau (14). This stresses the role of nurses in the assessment of patient evolution and the provision of health education to help patients reach the weight loss goals.

A study that assessed QoL of patients before and after bariatric surgery in the Brazilian public health system showed that after surgery, 82.2% of patients considered their quality of life as being good or very good, which contrasted the 40% of patients who expressed the same opinion during the preoperative period (15). These findings confirm that an improved quality of life is fundamental for the success of bariatric surgery, which often transforms the lives of obese individuals (16).

In the pre- and postoperative period, nurses can assess the patient's QoL and use this information to compare changes before and after surgery. The use of questionnaires provides precise information on how patients analyze their biopsychosocial well-being. For this reason, nursing professionals should familiarize themselves with the wide range of available instruments that assess QoL and implement these instruments in their practice. This attitude would ensure that interventions are more focused on patient needs and will subsequently improve the quality of care.

Early identification and treatment of possible complications are essential for the obtainment of good results, and the assessment of these results is important during patient follow-up by the multi-professional team (17). To reduce immediate and late postoperative complications, patients should be instructed on all the aspects of care during this period, which include nutrition, physical activity, hygiene and surgical risks (18-19).

Preparing patients positively influences their adaptation to postoperative conduct, considering that patients will be more aware of entire process of the perioperative period. This knowledge helps patients clarify doubts and queries on the potential of weight loss, diet phases, the benefits of physical activity, possible complications and the possibility of regaining weight.

In Spain, a study evaluated 162 patients before surgery and two days after surgery. Of the 162 patients, 94.7% had a final score of good and excellent in the BAROS (20). In Brazil, the BAROS was used in some studies to verify the success of bariatric surgery and the quality of life of patients after surgery.

In São Paulo, a study assessed the results of surgery and the relationship of these results with quality of life, weight

loss and comorbidity resolution over several postoperative periods. The study showed that the qualitative results of the BAROS were very good or excellent in 90% of all the evaluated periods (4).

Another study in São Paulo that assessed the quality of life of patients who underwent bariatric surgery found that 93% of patients scored good, very good and excellent (15).

In this study, the results ranged from good to excellent, corroborating with the findings in literature. These results suggest that the use of instruments such as the BAROS by nurses in the care process favours the planning of nursing actions when providing patient care (7).

This emphasizes the importance of nursing care, especially during the postoperative period, since it is the first moment of the patient's adaptation to a new lifestyle. Nurses must therefore extend their participation in care and guidance on the changes in lifestyle, as this participation is essential for the success of surgery and the well-being of patients.

## ■ CONCLUSION

The application of the BAROS on patients who underwent bariatric surgery to determine the success of this procedure showed that bariatric surgery provides satisfactory weight loss, reduces BMI and enables the resolution and/or improvement of associated comorbidities, which has a positive impact on the quality of life of patients. However, despite the success and efficiency of this treatment, the participants of this study did present some complications. It is therefore important for healthcare professionals to know the possible complications and their signs and symptoms.

Consequently, this study contributes to the science of nursing by shedding new light on the fundamental importance of the nurses' role in the multidisciplinary team for the provision of quality care for patients and their families during the entire perioperative period.

Limitations of this study are associated to insufficient time to monitor patients for a specific period in a longitudinal study, from the moment they entered the institution to at least six months into the postoperative period, which would have provided a more reliable analysis.

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Received: 05.06.2014

Approved: 10.02.2015