

# PATIENTS UNDERGOING BARIATRIC SURGERIES: FACTORS ASSOCIATED WITH POST-OPERATIVE COMPLICATIONS FROM THE SURGICAL SITE

*Pacientes submetidos a cirurgias bariátricas: fatores  
associados a complicações pós-operatórias de sítio cirúrgico*

*Pacientes sometidos a cirugías bariátricas: factores  
asociados con complicaciones postoperatorias del sitio quirúrgico*

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**ABSTRACT: Objective:** To verify the prevalence and the factors associated with postoperative surgical site complications in patients undergoing bariatric surgeries. **Method:** A cross-sectional, retrospective, analytical study with a quantitative approach. 197 cases of obese patients undergoing bariatric surgery were analyzed between January 2013 and January 2016 in Pernambuco, Brazil. Dichotomized variables were analyzed using the  $\chi^2$  test. The risk of complications was estimated by the *odds ratio* (OR). A significance of  $p < 0.05$  was assumed. **Results:** Among the 30 patients that made up the sample, 45 postoperative surgical site complications were observed. There was a higher incidence in individuals over 45 years of age (70.0%). The factors that stood out as possibly being associated with the outcomes were: an open surgical approach (OR = 5.35), the insertion of drains (OR = 4.48), and a postoperative period longer than 3 days of hospitalization (OR = 5.03). **Conclusion:** The following showed a high disposition for the development of complications from the surgical site: a high prevalence of seroma, the Roux-en-Y bypass surgical technique, the patient's age over 45 years old, a conventional/open surgical approach, the insertion of cavity drainage, and a hospitalization stay longer than 3 days.

**Keywords:** Postoperative complications. Bariatric surgery. Morbid obesity.

**RESUMO: Objetivo:** Verificar a prevalência e os fatores associados às complicações pós-operatórias de sítio cirúrgico em pacientes submetidos a cirurgias bariátricas. **Método:** Estudo transversal, retrospectivo, analítico, com abordagem quantitativa. Foram analisados 197 casos de pacientes obesos submetidos à cirurgia bariátrica entre janeiro de 2013 e janeiro de 2016 em Pernambuco, Brasil. As variáveis relacionadas dicotomizadas foram analisadas por teste do  $\chi^2$ . O risco de complicações foi estimado pela *odds ratio* (OR). Assumiu-se significância de  $p < 0,05$ . **Resultados:** Entre os 30 pacientes que compuseram a amostra, foram observadas 45 complicações pós-operatórias de sítio cirúrgico. Houve maior incidência nos indivíduos acima de 45 anos (70,0%). Dos fatores que poderiam estar associados aos desfechos, destacaram-se abordagem cirúrgica aberta (OR=5,35), inserção de drenos (OR=4,48) e período de tempo de pós-operatório superior a 3 dias de internação (OR=5,03). **Conclusão:** Comprovou-se maior prevalência de seroma como complicação de sítio cirúrgico, além da técnica cirúrgica (bypass em Y de Roux), faixa etária maior de 45 anos, tipo de abordagem cirúrgica convencional/aberta, presença de inserção de dreno cavitário e tempo de internação superior a 3 dias como predisponentes a um maior desenvolvimento de complicações.

**Palavras-chave:** Complicações pós-operatórias. Cirurgia bariátrica. Obesidade mórbida.

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**RESUMEN: Objetivo:** Verificar la prevalencia y los factores asociados con las complicaciones del sitio quirúrgico postoperatorio em pacientes sometidos a cirugías bariátricas. **Método:** Estudio transversal, retrospectivo y analítico con enfoque cuantitativo. Se analizaron 197 casos de pacientes obesos sometidos a cirugía bariátrica entre enero de 2013 y enero de 2016, em Pernambuco, Brasil. Las variables dicotomizadas se analizaron usando la prueba  $\chi^2$ . Le riesgo de complicaciones es estimó mediante la *odds ratio* (OR). Se asumió una significancia de  $p < 0,05$ . **Resultados:** entre los 30 pacientes em la muestra, 45 complicaciones postoperatorias fueran observadas en el sitio quirúrgico. Hubo una mayor incidencia em individuos mayores de 45 años (70,0%). Los factores que se destacaron como posiblemente asociados con los resultados fueron: un abordaje quirúrgico abierto (OR = 5,35), la inserción de drenajes (OR = 4,48), y un periodo postoperatorio mayor a 3 días de hospitalización (OR = 5,03). **Conclusión:** Los siguientes mostraron una alta disposición para el desarrollo de complicaciones del sitio quirúrgico: alta prevalencia de seroma, técnica quirúrgica de derivación Roux-em-Y, edad del paciente mayor de 45 años, abordaje quirúrgico convencional/abierto, inserción de denaje cavitario y hospitalización por más de 3 días.

**Palabras clave:** Complicaciones posoperatorias. Cirugía bariátrica. Obesidad mórbida.

## INTRODUCTION

Surgical intervention is only part of the comprehensive treatment for obesity, which is primarily based on health promotion and longitudinal clinical care. Healthcare costs are significantly higher for patients who treat obesity with surgical techniques than for those who treat it with noninvasive techniques. Therefore, it is essential to define safe criteria for the recommendation of surgery, to be sure that other approaches will fail, and to be in constant reflection about potential complications<sup>1,2</sup>.

Bariatric surgery is recommended for individuals who have: body mass index (BMI) > 50 kg / m<sup>2</sup>; BMI > 40 kg / m<sup>2</sup> with or without comorbidities and who have had no success from longitudinal clinical treatment for at least 2 years, and who have followed the clinical protocol; or patients with BMI > 35 kg / m<sup>2</sup>, with comorbidities such as diabetes mellitus (DM) and/or hypertension (HT), cardiovascular risks, sleep apnea, among others<sup>3</sup>.

The occurrence of postoperative complications, in general, is related to several factors, among them: associated clinical pathology, type of anesthesia, the stage of the illness that led to surgery, and postoperative care. Certain patients are at a greater risk of presenting complications due to their preoperative clinical state, as can be seen in obese individuals<sup>4</sup>.

Surgical site complications are important causes of immediate and delayed postoperative morbidity, especially post-laparotomy. The healing of surgical wounds in normal and healthy individuals occurs in an orderly sequence of physiological events, which include inflammation, epithelization, fibroplasia, and maturation. Mechanical failure or wound healing failure at the site of surgery may cause a rupture in its closure, leading to seroma, bruised area, wound dehiscence, or hernia. Other complications

include surgical site infections (SSI), hemorrhage and ischemia<sup>5</sup>. As such, obesity may make it difficult for the surgical incision to heal, as it is associated with an increased incidence of SSI, bruises, incisional hernias and complications in general<sup>6</sup>.

The appearance of postoperative fistulas is also a serious complication which may occur in patients undergoing an operative obesity treatment. Increased intraluminal pressure caused by distal stenosis, excessive tension in the suture line, tissue ischemia, and bruises are their predisposing factors<sup>7</sup>.

Bruises and seromas are collections of blood and serum, respectively. These are the most common surgical site complications and usually result from the failure of primary haemostasis or a hemorrhagic diathesis (e.g. anticoagulation), which may cause the surgical wound to open and predispose it to infection, once that bacteria will have access to deeper layers of the skin and can multiply in the stagnant fluid<sup>8</sup>.

Thus, recognizing characteristics that define an obese patient's particular complications in relation to post-surgical complications is beneficial to providing care, since it will guide nurses, who are an integral part of the multidisciplinary medical team, to investigate and diagnose clinical conditions and risk controls, indicating the possibility of uniting the organization and standardization of scientific language and the qualification nursing practice.

## OBJECTIVE

To verify the prevalence and factors associated with postoperative surgical site complications in patients undergoing bariatric surgeries.

## METHOD

This is a cross-sectional, retrospective, analytical study, with a quantitative approach, carried out at the *Hospital das Clínicas* (HC) of the *Universidade Federal de Pernambuco* (UFPE). The hospital is a reference for bariatric surgery in the state, and has received high-degree obesity patients since it began its activities in 1997. The hospital has ten rooms for large surgeries, and there is no room exclusively for digestive surgery.

The study sample was found through the census and was composed of all obese patients undergoing bariatric surgeries at the HC between January 2013 and January 2016. During the period, 220 surgeries were performed, and 197 patients were included in the study. The others were not available in the Medical Archive Service (*Serviço de Arquivo Médico* — SAME).

Initially, the names and records of the patients undergoing gastroplasties were identified by means of an active outpatient search, and then their medical records were collected in the SAME.

The instrument of collection was a form made up of a checklist that referred to the sociodemographic, clinical and surgical aspects of the study sample. Complications were considered when occurred up to 30 days after surgery.

BMI was the indicator used to estimate fat associated with body composition, since it is the most widely used measure in the world to classify individuals with obesity problems<sup>8</sup>. In the study, the degrees of obesity were considered according to the Ministry of Health (*Ministério da Saúde* — MS), which defines it as having a BMI equal to or greater than 30.0 kg/m<sup>2</sup>. They also subdivide it in terms of severity, related to the association of other morbidities. Thus: a BMI between 30.0 and 34.9 kg/m<sup>2</sup> indicates grade I obesity; a BMI between 35.0 and 39.9 kg/m<sup>2</sup> indicates a grade II obesity; and a BMI between 40.0 and 44.9 kg/m<sup>2</sup> indicates grade III obesity<sup>9</sup>. Individuals with a BMI > 45.0 kg/m<sup>2</sup> are considered to be super-obese<sup>3</sup>.

The software used to create the database and to perform statistical analyses was the Statistical Package for Social Sciences (SPSS) for Windows, version 17.0.

A descriptive statistical analysis was performed, which calculated simple and collective frequencies, mean, standard deviation and median. A comparison of the proportions of complications according to dichotomized related variables was performed using the  $\chi^2$  test. The risk of complications was estimated by the *odds ratio* (OR), which was presented with a 95% confidence interval (95%CI). A significance level was set for results with a value of  $p < 0.05$ .

The project was approved by the Research Ethics Committee of the *Universidade Federal de Pernambuco*, through CAAE 52533116.4.0000.5208.

## RESULTS

The sample evaluated in the study had a total of 197 patients undergoing bariatric surgeries. There was a prevalence of female subjects, with 77.2% women (152 patients). The age group of up to 45 years old was the most operated one, with 82.2% (162 patients), compared to patients over 45 years old ( $n=35$ ; 17.8%).

Of the patients who underwent surgery in the analyzed period, 59.9% ( $n=118$ ) had HT and 25.4% ( $n=50$ ) had DM. In addition, several comorbidities were observed, such as dyslipidemia in 11.7% ( $n=23$ ) of the individuals, chronic kidney disease in 1.5% ( $n=3$ ) of them, and other comorbidities in 10.7% ( $n=21$ ). The comorbidities presented could include more than one. Regarding BMI classification, 44.2% ( $n=87$ ) of the patients were classified as super-obese and 38.0% ( $n=75$ ) had grade III obesity. Among the remainders, 15.7% ( $n=31$ ) had grade II and 2.0% ( $n=4$ ) had grade I obesity. The mean BMI was 45.3 kg/m<sup>2</sup>, which characterizes high degrees of obesity.

With regard to the surgical techniques used, 51.3% ( $n=101$ ) underwent Roux-en-Y bypass and 48.7% ( $n=96$ ) underwent the sleeve. A videolaparoscopic approach was performed in 84.3% ( $n=166$ ) of the procedures. In addition, of the 197 patients analyzed, 20.3% ( $n=40$ ) reported intraoperative cavity drainage insertion. Of these, 75.0% ( $n=30$ ) used suction drains and 25.0% ( $n=10$ ) used active open drainage. The mean preoperative hospitalization time was 4.7 days ( $\pm 15.462$ ) and the mean number of days in the postoperative period was 4.2 days ( $\pm 6.591$ ). 58.9% ( $n=116$ ) of patients remained hospitalized for up to 3 days in the infirmary ward and 41.1% ( $n=81$ ) of them remained in inpatient care for more than 3 days in the unit. The data are described in Table 1.

With regard to complications, 2 complications were recorded for 6 patients and 3 complications for 1 of them, totaling 45 records of complications. The main complications from the surgical site shown in the study were bruises in 8.9% ( $n=4$ ), seroma in 31.1% ( $n=14$ ), hemorrhage in 4.4% ( $n=2$ ), ischemia in 2.2% ( $n=1$ ), infection in 6.7% ( $n=3$ ), incisional hernia in 15.5% ( $n=7$ ), fistula in 6.7% ( $n=3$ ), superficial dehiscence in 11.1% ( $n=5$ ), deep dehiscence in 11.1% ( $n=5$ ) and skin lesions in 2.2% ( $n=1$ ), with a total of 45 (15.2%) postoperative complications in surgical sites. The three cases of infection were superficial. Table 2 describes these complications.

Table 3 presents the analysis of dichotomous variables by OR for postoperative surgical site complications. For this calculation, the number of individuals who presented complications (30 patients) was considered, rather than the individual

**Table 1.** Characteristics of the patients undergoing bariatric surgery in the *Hospital das Clínicas* at the *Universidade Federal de Pernambuco*, 2013–2016.

Variables	n	%
Gender		
Female	152	77.2
Male	045	22.8
Age group (years old)		
Up to 45	162	82.2
Over 45	035	17.8
Comorbidities		
Diabetes	050	25.4
Hypertension	118	59.9
Dyslipidemia	023	11.7
Chronic kidney disease	003	1.5
Others	021	10.7
Body mass index		
30 to 34.9 kg/m <sup>2</sup> (stage I)	004	2.0
35 to 39.9 kg/m <sup>2</sup> (stage II)	031	15.7
40 to 44.9 kg/m <sup>2</sup> (stage III)	075	38.0
≥45 kg/m <sup>2</sup> (super-obese)	087	44.2
Surgical technique		
Y de Roux Bypass	101	51.3
Sleeve	096	48.7
Approach		
Videolaparoscopy	166	84.3
Open	031	15.7
Surgical time (hours)		
Up to 3	087	44.2
Over 3	110	55.8
Use of prophylactic antibiotics	196	99.5
Drain insertion	040	20.3
Surgical reapproach	008	4.1
Hospitalization in the intensive care unit	030	15.2
Post-operative in the infirmary (days)		
Up to 3	116	58.9
Over 3	081	41.1

complications (45 complications), since the same patient could present more than one complication.

It should be noted that patients who had more complications were older than 45 years of age ( $p=0.057$ ,  $OR=2.340$ ) and the surgical technique with the greatest evidence of complications was the Roux-en-Y bypass ( $p=0.0067$ ;  $OR=1.9000$ ). In addition, the variables that presented a significance level of  $p < 0.05$  were: surgical approach — the open approach had a greater occurrence of surgical site complications ( $p < 0.001$ ,  $OR=5.350$ ) —, drain insertion ( $p < 0.001$ ,  $OR=4.488$ ) and postoperative period ( $p < 0.001$ ,  $OR=5.030$ ). There was no significant association between the number of days hospitalized in the preoperative period and the occurrence of the outcome.

## DISCUSSION

When analyzing the occurrence of surgical site complications, 15.2% of patients who underwent the procedure presented some type of complication, the most common one being the seroma (31.1%). A systematic review including studies performed in the last decade presented a complication rate of 17.0%<sup>9</sup>.

The age group up to 45 years old was the most operated one (82.2% of surgeries) compared to the group over 45 years old (17.8%). However, when analyzing the association between age and the presence of complications, it was observed that patients older than 45 years of age had a higher number of postoperative surgical site complications, whose statistical analysis emphasizes a nearly significant value

**Table 2.** Complications from the surgical site among patients undergoing bariatric surgery in the *Hospital das Clínicas* at the *Universidade Federal de Pernambuco*, 2013–2016.

Complications*	n	%
Seroma	14	31.1
Incisional hernia	07	15.6
Superficial dehiscence	05	11.1
Deep dehiscence	05	11.1
Bruises	04	8.9
Infection	03	6.7
Fistula	03	6.7
Bleeding	02	4.4
Ischemia	01	2.2
Skin lesions	01	2.2
Total	45	15.2

\*One patient may present more than one complication.

( $p=0.057$ ,  $OR=2.340$ ). Studies show that the surgical treatment of obesity in individuals over 45 years of age remains controversial. Although the guidelines of the Brazilian Public Health System (*Sistema Único de Saúde — SUS*) do not consider age to be a limiting factor, a risk-benefit analysis of the procedure should be evaluated for each individual patient<sup>10,11</sup>.

In addition, the risk of comorbidities is related to BMI and advanced age. The higher the BMI and the age, the greater the

independent risks for diseases associated with being overweight and obese, as well as the greater number of risks of postoperative complications<sup>12</sup>. High numbers of comorbidities, such as hypertension (59.9%) and DM (25.4%), were found in the study. There is evidence that surgical complications do not increase specifically because of age, and it is a safe procedure for patients over 60 years old<sup>13</sup>. In other words, with age, comorbidities that increase risk may be present, but age alone is not a significant risk factor.

**Table 3.** The *odds ratio* for complications from the surgical site as a function of dichotomous variables of patients undergoing to bariatric surgery in the *Hospital das Clínicas* at the *Universidade Federal de Pernambuco*, 2013–2016.

Variables	No complications	Complications	OR (95%CI)	p-value
	n (%)	n (%)		
Gender				
Female	131 (86.20)	21 (13.80)	1.56 (0.66–3.69)	0.310
Male	36(80.00)	9 (20.00)		
Age group (years old)				
Up to 45	141 (87.00)	21 (12.90)	2.34 (0.96–5.64)	0.057
Over 45	26 (74.30)	9 (25.70)		
Diabetes mellitus				
Diabetes	40 (80.00)	10 (20.00)	1.58 (0.69–3.67)	0.277
No diabetes	127 (86.39)	20 (13.61)		
Hypertension				
Hypertension	70 (88.61)	9 (11.39)	1.68 (0.73–3.89)	0.221
No hypertension	97 (82.20)	21 (17.80)		
Surgical technique				
Y de Roux Bypass	81 (80.20)	20 (19.80)	1.90 (0.94–3.85)	0.067
Sleeve	86 (89.60)	10 (10.40)		
Approach				
Videolaparoscopy	151 (90.90)	15 (9.00)	5.35 (2.92–9.79)	<0.001
Open	16 (51.60)	15 (48.40)		
Surgical time (hours)				
Up to 3	101 (85.60)	17 (14.40)	0.87 (0.45–1.7)	0.695
Over 3	66 (83.50)	13 (16.40)		
Drain insertion				
Drains	24 (68.50)	11 (31.40)	4.48 (2.39–8.41)	<0.001
No drains	143 (92.20)	12 (7.70)		
Hospitalization in ICU				
Hospitalized	23 (76.60)	7 (23.30)	1.91 (0.73–4.94)	0.181
Not hospitalized	144 (86.20)	23 (13.70)		
Post-operative in the infirmary (days)				
Up to 3	108 (93.10)	8 (6.90)	5.03 (2.11–12.01)	<0.001
More than 3	59 (72.80)	22 (27.10)		

OR: *odds ratio*; 95%CI: 95% confidence interval; ICU: intensive care unit.

Regarding the increased risk of postoperative complications and BMI, there are controversies. In the present study, although there was a greater number of patients with grade III obesity and super-obesity, it was not possible to perform an association that demonstrated a higher incidence of complications in this group, as was observed in another national study<sup>14</sup>.

Options for surgery for obesity treatment include the Roux-en-Y bypass, vertical or sleeve gastrectomy, gastric banding, and the biliopancreatic bypass. Bypasses are the most performed procedure in Brazil and worldwide. Although they are widely performed, they are not free of complications<sup>14,15</sup>. The bypass and sleeve surgeries were chosen for analysis because they are the most common procedures in the hospital for the treatment of obesity. In the period studied, the performance of both procedures was similar. There were 51.3% bypasses and 48.7% sleeves. Furthermore, with the advances of minimally invasive surgery and the development of videolaparoscopic techniques, video surgery has become the most commonly one to be used worldwide<sup>5,16</sup>. As such, it was observed that more laparoscopic surgeries were performed in the present sample when compared to conventional/open procedures (84.3 versus 15.7%). Although requiring a greater learning curve and the development of advanced laparoscopic skills, the video technique presents significantly lower complications and mortality rates<sup>17</sup>.

With increased access to these surgeries, there are increased costs for obesity treatment. However, the cost with regard to the benefits the patient receives, makes them feasible and, considering the complications of the disease, it may be even lower<sup>18-20</sup>. Costs decrease over time and increase directly when surgical complications occur<sup>20</sup>. The longer the recommend surgeries take to be performed, the greater the costs and the preoperative risks<sup>21</sup>. In this segment, the study shows a high occurrence of postoperative surgical site complications in the Roux-en-Y bypass technique with 19.8% (OR=1.90), and a 48.4% rate (OR=5.35) of complications in the conventional/open approach.

A systematic review found reoperation rates of 6.7 to 24.0% for the Roux-en-Y bypass laparoscopy, and from 3.3 to 34.0% for the gastric sleeve<sup>22</sup>. Effects on comorbidities, complications, and additional surgical procedures were not different in the studies evaluated, except in a randomized clinical trial that found more gastroesophageal reflux among patients undergoing bypass surgeries<sup>22</sup>. Both procedures presented better results than the gastric band; however, biliopancreatic derivation was the technique associated with the best weight loss<sup>22</sup>. In another review, gastric banding was referred

to as the technique that least reduces body weight and results in fewer reoperations and fewer complications<sup>23</sup>. The present authors report, finally, that the complications are poorly described in the studies, which is reported in the same way in other systematic reviews. This justifies the difficulty of finding results that corroborate or diverge from the findings of this research<sup>22,23</sup>. The weight loss described in the literature is similar between the two techniques studied<sup>22,23</sup>

Drains were present in 17.8% of patients undergoing an operation, and their use was associated with a greater chance of postoperative surgical site complications (OR=4.48). The purpose of drain placement could not be assessed. However, it is understood that maintaining the suction drain for long periods of time does not prevent postoperative complications, including SSI<sup>2</sup>.

A retrospective study of 408 cases of Roux-en-Y gastric bypass and gastric sleeve surgery, using only the videolaparoscopic technique, showed that complications occurred in 7.3% of the sample. There was a significant increase in the risks for higher BMI on the preoperative period and on the day of surgery, for longer surgical time and fewer staples used<sup>16</sup>. The type of surgery, in the cited study, did not present a significant difference in the incidence of perioperative complications<sup>16</sup>.

To prevent complications, the hospital must have a protocol for thromboembolic prophylaxis, including adequate pneumatic boots and compression socks, as well as pharmacological therapy<sup>24-25</sup>. The most common complications are: pulmonary artery embolisms, bleeding and anastomosis fistulas, and marginal ulcers, which require the use of gastric shields for six months<sup>16</sup>.

An index that predicts values of postoperative complications from bariatric surgery, the Bariatric Surgery Index for Complications (BASIC), has yet to be translated and validated for Portuguese<sup>26</sup>. According to this index, patients are classified in: class I, when they present from zero to one risk factor; class II, two factors; and class III, with three or more risk factors<sup>26</sup>. In the index development study, complications varied significantly according to class, between 13.5, 21.6 and 31.4%, respectively<sup>26</sup>.

Specific perioperative care is fundamental and aims to prevent and assist in the treatment of possible complications, in addition to offer support from before the bariatric surgery and lasting postoperatively. As members of the multidisciplinary medical team, nurses must ensure that patients receive proper health care and education, helping them adapt to a new way of life. A recent study showed that patients who underwent a preoperative education process were discharged

in less time than the control group. On average, those who received the education were discharged on the first day after surgery, versus two days for the group that received no guidance, which highlights the role of nurses in this educational process and their performance<sup>27</sup>.

Finally, the present study presented the following as limitations: the type of collection (secondary data); the size of the sample in relation to the prevalence of events, which hindered other significant associations between the variables; and the fact that it was performed in a single hospital. The association between the type of drain (suction or active drainage) with the presence of infections or seroma was not tested. In addition, patients were not stratified into risk groups for complications before being included in the study.

## CONCLUSION

Among the 197 patients undergoing bariatric surgery that composed the sample, 30 of them had 45 complications. The following were predisposed variables to a higher development of complications: a higher prevalence of seroma as a complication from surgical site, the Roux-en-Y bypass surgical technique, the age range over 45 years old, conventional/open surgical approach, the presence of cavity drainage, and hospitalization time longer than 3 days.

Among this research's main contributions is the feedback given to the health services where the study was carried out. Furthermore, it helps prepare preventive action planning, by describing the main risk factors associated with complications of surgical wounds after bariatric surgeries.

The present study demonstrated the importance of a proper evaluation of these patients, and it is imperative that all of the criteria that may influence the appearance of post-operative complications from the surgical site be analyzed. The complications can lead to emotional problems and longer hospitalization time and elevated costs to the service, in addition to severe complications (which can cause a high number of deaths in this population).

Thus, the nursing team always needs to be attentive and help in the early identification of complications, as well as provide adequate care for the prevention and treatment of these complications.

This study serves to fill gaps in this area of research, as well as to encourage health managers to make resources available for the development of further studies on this issue. It is suggested that further research continue this investigation, evaluating other factors, such as the association between the type of drain and the type of infection, and enable the creation and validation of a systematized nursing care system for patients with complications from bariatric surgery.

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