Original article

Bariatric surgeries performed by the Brazilian National Health System in residents of the Metropolitan Region of Porto Alegre, Rio Grande do Sul, Brazil, 2010-2016*

doi: 10.5123/S1679-49742018000200008

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Abstract

Objective: to characterize caracterize by Brazilian National Health System (SUS) hospitalizations for bariatric surgeries in residents of the Metropolitan Region of Porto Alegre, RS, Brazil, from 2010 to 2016. **Methods**: data analysis of the National Hospital Information System (SIH/SUS); calculation of indicators by sex, age groups, use of Intensive Care Unit and hospitalization expenses; the target population were patients aged 15 years and older. **Results**: there were 1,249 hospitalizations (178.4/year; 5.4/100 thousand inhab./year), and the average age was 41.3±10.3 years old (average±standard deviation); the female sex was more prevalent (85.0%) and the age group 35-39 years accounted for 234 cases (18.7%); 227 patients (18.2%) needed ICU; there were 2 (0.2%) deaths; the mean for hospital stay was 5.1±3.2 days; the average annual expense was BRL1,073.830.29±223,791.48; and the average cost for hospitalization was BRL6,018.26±851,34 (BRL1,171.03/day). **Conclusion**: bariatric surgeries were characterized as procedures undergone by young female adults, with relatively frequent use of ICU and low fatality.

Keywords: Obesity; Bariatric Surgery; Hospitalizations; Unified Health System.

*Article based on a master's thesis to be presented as partial requirement to obtain the master's title in Public Health at the Federal University of Rio Grande do Sul (UFRGS).

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Introduction

Obesity is, probably, one of the oldest chronic diseases in the world, with a record of its appearance in Egyptian mummies and Greek sculptures.[1] Obesity is understood as the abnormal and excessive accumulation of fat in the body, potentially harmful to health.[2]

The World Health Organization (WHO) classifies overweight and obesity through body mass index (BMI), which is obtained by dividing the weight by the height squared: BMI = weight/height². Overweight is defined when the BMI is equal to or greater than 25kg/m², and obesity, if greater than or equal to 30kg/m². Both are considered the sixth main risk factor for death in the world. Each year, it is estimated that the number of adult deaths due to overweight and obesity reaches about 3.4 million.[2]

> *Porto Alegre is the second Brazilian capital in number of overweight or obese adults (54% in this age group), losing only to Cuiabá.*

In the state of Rio Grande do Sul, 56.8% of the male population and 51.6% of the female population aged 20 or over are overweight or obese.[3] In the same age group, 15.9% of the population and 19.6% of the female population is obese. Porto Alegre is the second Brazilian capital in number of overweight or obese adults (54% in this age group), losing only to Cuiabá. In terms of obesity, the capital of Rio Grande do Sul ranks on the eleventh position, with 18% of its adult population being obese.[4]

Few conventional treatments for obesity are effective for long-term sustained weight loss:[5] 95% of patients end up regaining their initial weight in two years.[5,6]

The indication of bariatric surgery has been growing lately,[6] being considered an effective method in the treatment of morbid obesity and long-term weight control,[5,7] and has been equally effective in the treatment of metabolic syndrome[8] and type 2 diabetes *mellitus*.[2,9-11]

In 1999, gastroplasty was included among the procedures covered by the Brazilian National Health System (SUS). Currently, the criteria for the indication of surgery covered by the public network are established in Administrative Rule GM/MS No. 424, dated March 19th, 2013:[12]

- individuals presenting BMI> 50kg/m²;
- individuals presenting BMI> 40kg/m², with or without comorbidities, without success in the longitudinal clinical treatment performed in Primary Health Care and/or Specialized Outpatient Care for at least two years, and who have followed clinical protocols; and
- individuals with a BMI>35 kg/m² and comorbidities, such as high cardiovascular risk, diabetes *mellitus* and/or difficult to control systemic arterial hypertension, sleep apnea, degenerative joint diseases, unsuccessful in longitudinal clinical treatment performed for at least two years, and who have followed clinical protocols.

Brazil is the second nation in the world in number of bariatric surgeries (approximately 80 thousand procedures/year), behind only the United States of America. The growth of this procedure in the country in the last ten years was of 300%.[7] From 2001 to 2010, 24,342 bariatric surgeries were performed by SUS. The Southeast (10,268) and South (9,734) regions were the ones that performed most surgeries at the public health system.[13]

Considering the fast global epidemiological growth of obesity, the inefficiency of conventional treatments for the disease and the increased indication of bariatric surgery as an alternative to effective treatment intervention, the objective of this study was to characterize hospitalizations at SUS for bariatric surgeries in the Metropolitan Region of Porto Alegre, RS (MRPA, RS), in the period from 2010 to 2016, by analyzing data from SUS Hospital Information System, calculation of indicators by sex, age groups, use of an intensive care unit (ICU) and hospitalization expenses.

Methods

This is a quantitative, descriptive analysis based on secondary data. The data source consisted of the public archives of SUS National Hospital Information System (SIH/SUS), prefix RD (reduced), corresponding to the period between January 2010 and December 2016, available at the information site of the IT Department of SUS (www.datasus.saude.gov.br). A total of 2,268 files were analyzed, referring to 7 years x 12 months x 27 federation units, as there could have been hospitalizations outside the area of residence. The processing period is equal to the month prior to the

presentation of the Inpatient Hospital Authorization (IHA) for billing, generally corresponding to the month of hospital discharge.[14]

The SIH/SUS uses as main instrument of data collection the IHA, which presents two models: (i) IHA-1, or of Normal type, for data of identification of the patient and registry of the set of medical procedures and diagnostic services performed; and (ii) IHA-5, or long-stay, for data from chronic or psychiatric patients in need of continuity of treatment.[15]

For the physical dimensioning 'admissions' or 'hospitalizations', we considered the paid IHA of the Normal type (IHA-1). However, for the financial dimensioning, long-stay IHA (IHA-5) was included, because the patient's costs on IHA-1 continues.

Data tabulation and analysis were performed using the Microsoft Excel® application. The analysis plan addressed all the hospitalizations of users whose main diagnosis at the time of admission to SUS was obesity – Code E66, of the 10th Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) – and who performed at least one of the following procedures (SUS codes):

- Gastrectomy with or without duodenal switch (code 04.07.01.012-2);
- Gastric bypass (code 04.07.01.017-3);
- Vertical banded gastroplasty (code 04.07.01.018-1); and
- Sleeve gastrectomy (code 04.07.01.036-0).

The average amount of hospitalizations in the period was determined by sex and age group. The crude population coefficients of hospitalizations were calculated from the annual averages of the period, multiplied by 100 thousand inhabitants and divided by the resident target population (15 or more years of age) projected for 2013, intermediate year of the period, projection based on the Demographic Census of 2010.[16]

With regard to the calculation of standardized hospitalization coefficients, the target population used was the one projected for the age of 15 or more years, considering the criteria for the surgical indication valid in the period of this study. These criteria, established by Administrative Rule GM/MS No. 425/2013,[17] include young people aged between 16 and 18 years (after specific evaluation) and adults over 65 (after risk-benefit assessment). The municipal gross coefficients were standardized with a population of 15 years of age or older residing in the Metropolitan Region of Porto Alegre, according to sex, distributed in 5-year age groups.

The average length of stay was calculated by dividing the total number of hospitalization days by the number of hospitalizations.

The Metropolitan Region of Porto Alegre is composed of 34 municipalities: Alvorada, Araricá, Arroio dos Ratos, Cachoeirinha, Campo Bom, Canoas, Capela de Santana, Charqueadas, Dois Irmãos, Eldorado do Sul, Estância Velha, Esteio, Glorinha, Gravataí, Guaíba , Ivoti, Montenegro, New Hartz, Nova Santa Rita, Novo Hamburgo, Parobé, Portão, Porto Alegre, Rolante, Santo Antônio da Patrulha, São Jerônimo, São Leopoldo, São Sebastião do Caí, Sapiranga, Sapucaia do Sul, Taquara, Triumph and Viamão.[16]

Regarding ethical aspects, the RD files of SIH/SUS are of public domain, available on the Internet and disseminated by the Ministry of Health in order to guarantee confidentiality, preserving the identity of the users of the Brazilian National Health System.

Results

In the Metropolitan Region of Porto Alegre, during the study period (2010-2016), there were 1,249 hospitalizations in public hospitals (SUS), identified as of residents of the same region, where the main diagnosis was obesity – ICD-10: E66 – and who underwent bariatric surgery. This total corresponded to 178.4±23.7 admissions/year (mean±standard deviation) or 5.4 hospitalizations/100 thousand inhabitants/year (4.8/100 thousand in 2010 to 5.2/100 thousand in 2016, with a maximum of 6.5/100 thousand in 2014). The mean age of the patients was 41.3±10.3 years.

There were 1,062 admissions of female patients (85.0%), whose mean age was 41.5±10.2 years, whilst the 187 male patients (15.0%) had a mean age of 40.0±10.8 years. The age group from 35 to 39 years was the one with the highest number of cases, 234 (18.7%, 10.8/100 thousand inhabitants/year), followed by 30 to 34 years, with 207 hospitalizations (16.6%, 8.2/100 thousand inhabitants/year) (Table 1). The highest concentration of hospitalizations corresponded to patients from 30 to 49 years (802 hospitalizations, 64.2%). Among female patients, the highest coefficient of hospitalization was found in the

age group 35-39, with 18.3/100 thousand inhabitants/year (201 hospitalizations, 18.9%). With regard to male patients, the highest hospitalization coefficient was in the range of 40-44 years, with 3.4/100 thousand inhabitants/year (32 hospitalizations, 17.1%).

The most frequent procedure was gastric bypass (1,198 interventions, 95.9%) and the least performed was vertical sleeve gastrectomy (18; 1.4%). No vertical banded gastroplasty procedures were performed.

The municipality with the most hospitalized residents was Porto Alegre, with 613 hospitalizations (49.1%), followed by Canoas with 177 (14.2%), Alvorada with 43 (3.4%) and Viamão with 38 (3.0%) (Table 2).

However, the highest coefficient of hospitalization was observed in the municipality of Glorinha (17.8/100 thousand inhabitants/year), followed by the municipalities of Capela de Santana and Araricá, both with a coefficient of 10.6/100 thousand inhabitants/year, and Canoas (9.5/100 thousand inhabitants/year). The municipality that presented the lowest coefficient was São Leopoldo (0.7/100 thousand inhabitants/year).

The mean hospital stay was 5.1±3.2 days, being 5.3±3.7 days for males and 5.1±3.1 days for females. The lowest mean time of hospitalization corresponded to the age group from 20 to 24 years, with 4.2±1.5 days; and the peak of hospital admissions of 7.2±7.0 days, at the age of 65 to 69 years.

The total cost of hospitalizations for SUS, referring to the procedures analyzed in the period from 2010 to 2016, was BRL7,516,812.03, which corresponds to BRL1,073,830.29±223,791.48 (mean±standard deviation) per year, or 0.33% of the expenditures of the public health system with hospitalizations in the same age group in the area studied. The average cost for hospitalization reached BRL6,018.26 ± 851.34 (Table 3), or BRL1,171.03 per day. Cost of gastrectomy with or without duodenal switch, on average, BRL5,921.88±613.28; vertical sleeve gastrectomy, BRL5,986.29±73.09; and gastric bypass, BRL6,021.40±863.08.

Of the 1,249 patients who underwent bariatric surgery, 527 (42.2%) were admitted to one hospital (hospital 'A') and the others were distributed into three (Table 4). There was a need for ICU use in 227 hospitalizations (18.2%) and only 2 (0.2%) deaths, both of female patients and in different hospitals ('B' and 'D'),

The highest percentage of ICU use (79.9%) was found in hospital 'D', which performed the fewest procedures. Hospital 'A' represented the highest total cost for SUS (BRL3,072,785.89), performing the

Table 1 – Hospitalizations and coefficients per 100 thousand inhab./year of residents of the Metropolitan Region of Porto Alegre, Rio Grande do Sul, admitted due to obesitya and with the performance of bariatric surgery in the public health network, per age group, according to sex, 2010-2016

Age groups (in years)	Female			Male			Total		
	n	%	Coefficient	n	%	Coefficient	n	%	Coefficient
15-19	3	0.3	0.3	3	1.6	0.2	6	0.5	0.3
20-24	28	2.6	2.4	9	4.8	0.8	37	3.0	1.6
25-29	92	8.7	7.4	16	8.6	1.3	108	8.6	4.3
30-34	170	16.0	13.4	37	19.8	2.9	207	16.6	8.2
35-39	201	18.9	18.3	33	17.6	3.1	234	18.7	10.8
40-44	155	14.6	15.5	32	17.1	3.4	187	15.0	9.6
45-49	155	14.6	15.0	19	10.2	2.0	174	13.9	8.8
50-54	118	11.1	11.5	16	8.6	1.8	134	10.7	7.0
55-59	99	9.3	11.2	12	6.4	1.6	111	8.9	6.8
60-64	33	3.1	4.6	7	3.7	1.2	40	3.2	3.1
65-69	7	0.7	1.3	3	1.6	0.7	10	0.8	1.1
70-74	1	0.1	0.3	–	–	–	1	0.1	0.2
Total	1,062	100.0	8.7	187	100.0	1.7	1,249	100.0	5.4

a) International Statistical Classification of Diseases and Related Health Problems: 10th Revision - ICD 10 - E66.

Table 2 – Hospitalizations and coefficients standardized by 100 thousand inhab./year of residents oh the Metropolitan Region of Porto Alegre, Rio Grande do Sul, admitted due to obesity a and with the performance of bariatric surgery in the public health network, per municipality of residence, according to sex, 2010-2016

Municipality of residence	Female		Male		Total	
	n	Coefficient	n	Coefficient	n	Coefficient
Alvorada	37	6.7	6	1.2	43	4.0
Araricá	3	21.3	–	–	3	10.6
Arroio dos Ratos	1	2.6	–	–	1	1.4
Cachoeirinha	17	4.7	4	1.2	21	3.0
Campo Bom	12	6.3	3	1.6	15	4.0
Canoas	152	15.7	25	2.8	177	9.5
Capela de Santana	7	21.1	–	–	7	10.6
Charqueadas	13	14.0	2	1.4	15	7.0
Dois Irmãos	4	4.2	–	–	4	2.1
Eldorado do Sul	12	12.0	–	–	12	6.1
Estância Velha	20	15.2	1	0.8	21	8.1
Esteio	14	5.8	3	1.4	17	3.7
Glorinha	7	36.5	–	–	7	17.8
Gravataí	26	3.4	4	0.6	30	2.0
Guaíba	17	6.0	5	1.9	22	4.1
Igrejinha	11	11.6	2	2.1	13	6.9
Ivoti	8	11.7	1	1.6	9	6.7
Montenegro	9	5.2	1	0.6	10	2.9
Nova Hartz	3	5.9	1	1.8	4	3.9
Nova Santa Rita	5	7.5	–	–	5	3.8
Novo Hamburgo	26	3.6	7	1.0	33	2.4
Parobé	11	7.0	2	1.3	13	4.2
Portão	6	6.4	2	2.2	8	4.3
Porto Alegre	518	11.8	95	2.5	613	7.5
Rolante	6	10.7	–	–	6	5.4
Santo Antônio da Patrulha	8	6.8	3	3.0	11	4.9
São Jerônimo	5	8.0	1	1.6	6	4.7
São Leopoldo	7	1.1	2	0.3	9	0.7
São Sebastião do Caí	7	11.0	2	3.0	9	7.2
Sapiranga	19	8.5	2	1.0	21	4.9
Sapucaia do Sul	12	3.1	1	0.3	13	1.7
Taquara	19	12.3	6	4.0	25	8.3
Triunfo	6	8.4	2	3.0	8	5.7
Viamão	34	4.9	4	0.6	38	2.9
Total	1,062	8.7	187	1.7	1,249	5.4

a) International Statistical Classification of Diseases and Related Health Problems: 10th Revision - ICD 10 - E66.
Note:
Coefficients standardized by the direct method, calculated using as standard-population, individuals aged 15 or over (in 5-year groups), according to sex, residents of the Metropolitan Region of Porto Alegre, RS.

Table 3 – Costs per hospitalization (BRL) of residents of the Metropolitan Region of Porto Alegre, Rio Grande do Sul, admitted due to obesity[a] and with the performance of bariatric surgery in the public health network, per age group, according to sex, 2010-2016

Age group (in years)	Female		Male		Total	
	Average cost	Standard-deviation	Average cost	Standard-deviation	Average cost	Standard-deviation
15-19	5,775.80	431.44	5,814.03	429.44	5,794.92	430.87
20-24	5,782.86	507.97	5,838.26	471.70	5,796.34	499.96
25-29	5,923.65	798.94	5,934.71	705.83	5,925.29	785.86
30-34	6,016.69	895.94	6,190.28	650.76	6,047.71	859.85
35-39	5,976.32	834.95	6,242.17	793.80	6,013.81	834.41
40-44	6,164.11	1,048.15	5,922.09	733.24	6,122.70	1,005.45
45-49	5,945.78	739.19	6,022.33	1,486.57	5,954.14	853.59
50-54	6,061.78	925.37	6,026.01	425.31	6,057.51	880.80
55-59	6,035.02	794.77	6,308.87	623.36	6,064.62	782.70
60-64	5,858.72	592.37	5,935.96	340.25	5,872.24	557.33
65-69	6,153.56	797.49	6,232.00	38.70	6,177.09	668.53
70-74	6,034.16	0.00	–	–	6,034.16	0.00
Total	6,008.04	860.19	6,076.34	796.71	6,018.26	851.34

a) International Statistical Classification of Diseases and Related Health Problems: 10th Revision - ICD 10 - E66.

largest portion of surgeries, although it had the second highest average hospitalization value (BRL5,830.71). The lowest total expenditure occurred in hospital 'D' (BRL1,343,344.48) (Table 5), with 14.7% of the procedures, although this hospital had the highest average hospitalization value (BRL7,300.79).

Examining the average cost of hospitalization with and without ICU use per hospital, the 'D' hospital, with the lowest number of procedures performed and the highest percentage of ICU use, had the highest values: BRL7,579.92 with the use of ICUs; and BRL6,191.81 without the use of ICUs (Table 5).

Discussion

In the period studied, from 2010 to 2016, the 1,249 hospitalizations occurred in public hospitals (SUS) among residents of the Metropolitan Region of Porto Alegre represented, on average, 178.4 admissions/year (5.4/100 thousand inhabitants/year), an increase of 40.1% With regard to the annual average for the 2008-2010 period, of 127.3 hospitalizations per year (3.1/100 thousand inhabitants/year) and of 74.2% over the rate per 100 thousand people/year.

The predominance of females (85.0%) was compatible with other studies, which demonstrate that the majority of hospitalizations for bariatric surgery refer to women.[18-23]

Porto Alegre, center of the Metropolitan Region, is among the state capitals with the highest prevalence of overweight or obese adult population (54.1%), reaching 62.1% in males and 47.5% in females. The prevalence of obese adults in the capital of Rio Grande do Sul was of 17.7%, being 18.5% men and 17.1% women.[4] It is expected that this pattern will be repeated in the Metropolitan Region.

Although the prevalence of overweight and obesity was higher in the male population of Porto Alegre, representing 49.1% of the surgeries studied, hospitalizations for bariatric surgery were five times more frequent in female patients (8.7 x 1.7/100 thousand inhabitants/year). A study conducted in the USA, where 1,368 patients who were candidates for bariatric surgery were followed up over four years, revealed that women were four times more likely to seek bariatric surgery than men.[23]

The average hospital stay (5.1 days) in the period 2010-2016 was reduced by 15% when compared to the 2008-2010 triennium of 6.0 days. A study covering all Brazilian regions, with data from 2001 to 2010, found an average of hospital stay closer to this - 6.1 days - in patients who underwent bariatric surgery at SUS.[13] It is

Table 4 – Hospitalizations and use of ICU a per residents of the Metropolitan Region of Porto Alegre, Rio Grande do Sul, admitted due to obesity[a] and with the performance of bariatric surgery in the public health network, per hospital, 2010-2016

Hospital	Hospitalizations (A)		Use of ICU[a] (B)		% of use of ICU[a] (B/A)
	n	%	n	%	
Hospital A	527	42.2	44	19.3	8.3
Hospital B	273	21.9	1	0.4	0.4
Hospital C	265	21.2	35	15.4	13.2
Hospital D	184	14.7	147	64.7	79.9
Total	1,249	100.0	227	100.0	18.2

a) ICU: intensive care unit.
b) International Statistical Classification of Diseases and Related Health Problems: 10th Revision - ICD 10 - E66.

Table 5 – Cost per hospitalization (BRL) of residents of the Metropolitan Region of Porto Alegre, Rio Grande do Sul, admitted due to obesity[a] and with the performance of bariatric surgery in the public health network, per hospital, according to use or not of ICU,[b] 2010-2016

Hospital	Hospitalization with use of ICU[b]		Hospitalization without the use of ICU[b]		Total	
	Cost per hospitalization	Standard-deviation	Cost per hospitalization	Standard-deviation	Cost per hospitalization	Standard-deviation
Hospital A	5,906.38	415.99	5,823.82	558.76	5,830.71	548.74
Hospital B	6,828.96	0.00	5,736.54	480.20	5,740.54	483.85
Hospital C	6,132.80	1,111.94	5,734.20	444.48	5,786.85	594.12
Hospital D	7,579.92	1,072.24	6,191.81	425.61	7,300.79	1,124.50
Total	7,029.10	1,238.36	5,793.74	517.47	6,018.26	851.34

a) International Statistical Classification of Diseases and Related Health Problems: 10th Revision - ICD 10 - E66.
b) ICU: intensive care unit.

possible that this reduction stems from improvements in surgical techniques and/or greater experience of the health teams.

The most frequent procedure was gastric bypass (484; 92.5%), as well as in the 2008-2010 triennium, in the same geographical area.[18] The findings corroborate data from the Brazilian Society of Bariatric and Metabolic Surgery, according to which the technique stands out as the most used in Brazil, representing 75% of the surgeries performed here. In the USA, the same technique also stands out as the most used method: 88% of the procedures performed in the country.[24] Currently, this intervention is considered the gold standard of surgical treatment of morbid obesity,[25] being the most used technique in the world.[26, 27]

The percentage of use of intensive care units was not uniformly distributed among the hospitals analyzed. The hospital that performed the least interventions answered for 64.7% of the cases of ICU admission, and presented 147 (79.9%) ICU uses in 184 hospitalizations. Possibly, these findings are due to the effect of the volume of procedures in the experience of the surgical team, if not to some routine of this institution. Such variation between the institutions would merit specific research.

Studies that report indications for ICU admission in the postoperative period of bariatric surgery and its prevalence are scarce. Some of them show variability from 6 to 24% of patients undergoing bariatric surgery requiring ICU for more than 24 hours.[28]

The average cost of hospitalizations for SUS with the procedures analyzed from 2010 to 2016 was BRL6,018.26, or 18.6% higher than the three-year period 2008-2010 (BRL5,075.73).[18] The cost of hospitalization in hospital 'A' (BRL5,830.71) was higher than that verified in the same institution by another study carried out in 2011 on patients undergoing gastric bypass from SUS (BRL5,179.00).[19]

A study was carried out with data from all regions of the country for the decade 2001-2010 obtained, as an average value for hospitalization at SUS in 2010, BRL5,467.99.[13] No studies were found that allowed comparing the expenses with bariatric surgery and the expenses with actions of promotion and prevention of obesity at SUS, denoting the difficulty of research in this field.

Regarding fatality, the present study identified only 2 deaths (0.2%). In the 2008-2010 triennium, in the same geographic region, 1 death (0.3%) was recorded, also of a female patient, aged 45-49 years, after gastric bypass.[18] In a study directed to all Brazilian regions, the in-hospital mortality rate at SUS was of 0.55% in the period from 2001 to 2010.[13] The perioperative mortality rate of bariatric surgery is between 0.3 and 1.6%,[29] corroborating the findings in the two periods studied in the Metropolitan Region of Porto Alegre, 2008-2010[18] and 2010-2016.

Regarding the limitations of this study, it should be emphasized those resulting from the use of databases of SUS Hospital Information System - SIH/SUS -, prepared for administrative functions. Readmissions and/or manipulations are possible, in view of the administrative/accounting objective of the system, as well as coding or diagnostic errors.

The number of hospitalizations at SUS for bariatric surgery tends to increase in the coming years, due to several factors, such as epidemiological changes and increased access due to changes in standardization. Among these changes, we highlight the GM/MS Ordinance No. 424 dated 19th March 2013,[12] which redefined the guidelines for the organization of prevention and treatment of overweight and obesity as the priority care line of the Health Care Network for Chronic Diseases, GM/MS No. 425 dated 19th March 2013,[17] which increased the minimum and maximum limits of the age allowed for the surgery, in addition to including new procedures, and GM/MS Ordinance No. 5 dated 31st January 2017,[30] to which it was possible to incorporate the procedure of bariatric surgery by video laparoscopy in the Brazilian National Health System.

It should be emphasized that surgical treatment is only part of the comprehensive treatment of obesity, initially based on health promotion and longitudinal clinical care.[17] Therefore, the planning of public policies aimed at health promotion, prevention, treatment and recovery of morbid obesity is essential.

Authors' contributions

Carvalho AS and Rosa RS contributed to the conception and design of the study, analysis and interpretation of data, writing and critical review of the intellectual content of the manuscript. Both authors approved the final version of the manuscript and declared to be responsible for all aspects of the study, ensuring its accuracy and integrity.

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Received on 29/08/2017
Approved on 22/01/2018