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## Risk of falls in the postoperative period of videolaparoscopies and laparotomies

### Risco de quedas no pós-operatório de videolaparoscopias e laparotomias

### Riesgo de caídas en el postoperatorio de video laparoscopias y laparotomías

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## ABSTRACT

**Objective:** To compare the risk of falls using the Morse Fall Scale (MFS) of patients undergoing laparotomy and video laparoscopy. **Methods:** This is a cross-sectional, descriptive, and observational study, carried out between March and July 2019, in the surgical clinic of a public university hospital in Curitiba, Paraná, Brazil. A questionnaire developed by the authors was applied on the first postoperative day of abdominal surgery, and the risk of falls was assessed using the MFS. **Results:** 102 patients submitted to abdominal surgeries participated, 58 videolaparoscopies, 27 laparotomies, and 17 bariatric surgeries. The mean age was 50.34 ( $\pm 15.11$ ), 70 (68.63%) were female, and 32 (31.37%) were male. The statistical analysis showed the high risk of falls in bariatric surgeries, so that the association of it with the Body Mass Index (BMI) observed that the higher the BMI, the higher the risk of falls. Thus, an increased risk of falls was also observed in the association of BMI and age. The domains that showed statistically significant differences between the groups were history of falls, secondary diagnosis, and gait/transfer. **Conclusion:** The risk of falls in the patients evaluated was related to the type of surgery and pre-existing risk factors. In addition, it increases proportionally to the patient's age and BMI.

**Descriptors:** Patient safety; Quality assurance of health care; Hospitalization; Risk assessment; Physical therapy.

## RESUMO

**Objetivo:** Comparar o risco de quedas por meio da Morse Fall Scale (MFS) de pacientes submetidos a laparotomia e videolaparoscopia. **Métodos:** Trata-se de um estudo transversal, descritivo e observacional, realizado entre março e julho de 2019, na clínica cirúrgica de um hospital público universitário, situado em Curitiba, Paraná, Brasil. Aplicou-se um questionário desenvolvido pelos autores no primeiro dia de pós-operatório de cirurgia abdominal e avaliou-se o risco de quedas por meio do MFS. **Resultados:** Participaram 102 pacientes submetidos a cirurgias abdominais, 58 videolaparoscopias, 27 laparotomias e 17 bariátricas. A média de idade apresentou-se como de 50,34 ( $\pm 15,11$ ), sendo 70 (68,63%) do sexo feminino e 32 (31,37%) do



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sexo masculino. A análise estatística evidenciou o alto risco de quedas nas cirurgias bariátricas, de maneira que a associação do risco com o Índice de Massa Corporal (IMC) observou que quanto maior o IMC mais alto o risco de quedas. Dessa forma, também se observou um aumento do risco de quedas na associação do IMC e a idade. Os domínios que demonstraram diferenças estatisticamente significativas entre os grupos eram o histórico de quedas, o diagnóstico secundário e a marcha/transferência. **Conclusão:** O risco de quedas nos pacientes avaliados mostrou relação com o tipo de cirurgia e com fatores de risco preexistentes, além disso, aumenta-se proporcionalmente à idade do paciente e ao IMC.

**Descriptores:** Segurança do Paciente; Garantia da Qualidade dos Cuidados de Saúde; Hospitalização; Medição de Risco; Fisioterapia.

## RESUMEN

**Objetivo:** Comparar el riesgo de caídas a través del Morse Fall Scale (MFS) de pacientes sometidos a laparotomía y video laparoscopia. **Métodos:** Se trata de un estudio transversal, descriptivo y observacional realizado entre marzo y julio de 2019 en la clínica quirúrgica de un hospital público universitario de Curitiba, Paraná, Brasil. Se aplicó una encuesta desarrollada por los autores en el primer día del postoperatorio de cirugía abdominal y se evaluó el riesgo de caídas a través del MFS. **Resultados:** Han participado 102 pacientes sometidos a cirugías abdominales, 58 video laparoscopias, 27 laparotomías e 17 cirugías bariátricas. La media de edad se presentó de 50,34 ( $\pm 15,11$ ) con 70 (68,63%) personas del sexo femenino y 32 (31,37%) del sexo masculino. El análisis estadístico evidenció el elevado riesgo de caídas en las cirugías bariátricas de manera que en la asociación entre el riesgo y el Índice de Masa Corporal (IMC) se observó que al mayor IMC más alto es el riesgo de caídas. De esa manera, también se ha percibido un aumento del riesgo de caídas en la asociación entre el IMC y la edad. Los dominios que demostraron diferencias estadísticamente significativas entre los grupos eran el histórico de caídas, el diagnóstico secundario y la marcha/transferencia. **Conclusión:** El riesgo de caídas de los pacientes evaluados mostró relación entre el tipo de cirugía y los factores de riesgo preexistentes, además de eso, se aumenta en proporción con la edad del paciente y el IMC.

**Descriptores:** Seguridad del Paciente; Garantía de la Calidad de Atención de Salud; Hospitalización; Medición de Riesgo; Especialidad de Fisioterapia.

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## INTRODUCTION

The performance of surgical procedures has increased exponentially in recent years, with abdominal surgeries being one of the most frequently performed procedures<sup>(1,2)</sup>. Concomitantly, there is an increase in the number of surgical procedures performed through laparoscopy<sup>(3)</sup>. This is mainly because laparotomies cause a large postoperative wound, in addition to prolonged exposure of the abdominal cavity during the surgical procedure, thus increasing the risk of infections<sup>(4)</sup>. Whereas laparoscopies, due to their minimally invasive nature, are related to shorter hospital stays and lower incidence of adverse reactions, in addition to enabling an earlier return to daily activities, being, therefore, a more advantageous procedure<sup>(5,6)</sup>.

The postoperative period is associated with several complications inherent to the surgical procedure and its repercussions, among them the risk of falls<sup>(7)</sup>. These falls represent the most prevalent adverse events among hospitalized patients<sup>(8)</sup>, with rates ranging from 1.4 to 13 per thousand patients a day<sup>(9,10)</sup>. The key to reducing the risk of falls is understanding risk and preventive factors, which can be used to set goals for intervention<sup>(11)</sup>. Among the principles of the National Health Promotion Policy (PNPS), the following stand out in this aspect: autonomy, which refers to the identification of potentialities and the development of capacities, enabling conscious choices by individuals and communities about their actions and trajectories<sup>(12)</sup>.

In hospital environment, the risks of falling represent one of the concerns of health institutions since they can result in complications such as increased hospitalization, reduced functionality, morbidity, mortality and contribute significantly to the increase in hospital costs<sup>(13,14)</sup>. Due to their magnitude and prevention possibilities, adverse events are a public health problem<sup>(15)</sup>.

It is known that the principal risk factor associated with falling in hospitalized adult patients is the patient's age, specifically, elderly over 65 years of age. Other psycho cognitive factors, such as depression or anxiety; factors related to health conditions, such as previous stroke, bladder and/or bowel incontinence, postural hypotension, dizziness, arthritis, osteoporosis, and metabolic conditions; functionality-related factors such as muscle weakness and lower limb amputation; and factors related to sensory impairment, body balance, use of certain medications, severe obesity and previous history of falls; in addition to environmental aspects and human resources that also represent risk factors for falls in these patients<sup>(16,17)</sup>. It is also known that  $BMI \geq 25\text{kg/m}^2$  (characterizing overweight and obesity) can impair balance, thus predisposing to falls<sup>(18)</sup>.

Particularly patients undergoing abdominal surgeries often require the use of drains and probes, which in turn can hinder the mobility and locomotion of patients. It, along with insecurity, fear of pain, moving the drain, and the patient's discomfort when moving, predispose even more to the risk of falls<sup>(19)</sup>.

Anchored in PNPS principles, fall prevention reflects positively on the principle of empowerment, which refers to the intervention process, aiming at stimulating individuals and collectives to acquire control of decisions and choices of lifestyles appropriate to their socio-economic and cultural conditions, thus seeking to promote the health of the user in the postoperative period, acting by the PNPS founding value of respect for diversity<sup>(12)</sup>.

Considering the incidence of falls and their possible repercussions both for the patients' health and for the hospital services, and given the scarcity in the literature relating the risk of falls and comparing it to laparotomies and videolaparoscopies, as well as, identifying the risk factors for this specific population, the importance of this study is highlighted. Therefore, this study aimed to compare the risk of falls using the Morse Fall Scale (MFS) in patients undergoing laparotomy and videolaparoscopy.

## METHODS

It is a cross-sectional, descriptive, and observational study carried out at a tertiary level university hospital, providing exclusive care through the Unified Health System (SUS), located in Curitiba, Paraná, Brazil, in the Surgical Clinic inpatient unit. Data collection took place between March and July 2019, and the sample was chosen by convenience consisted of 102 participants. The inclusion criteria were patients on the first postoperative day of videolaparoscopy and laparotomic surgeries, admitted to the surgical clinic unit, over 18 years of age, of both genders, and who agreed to participate in the research. Patients who were previously dependent and/or had hernias were excluded.

Data collection was performed by a single researcher using a questionnaire prepared by the authors, aimed to assess sociodemographic profiles such as patient identification, age, sex, marital status, education, profession, habits such as smoking and alcoholism consumption, in addition to comorbidities.

We observed the information regarding height, weight, type of surgery, and the time of surgery from the medical record of the research participant. A formula used to calculate BMI was given as body weight in kg divided by height squared in kg/m<sup>2</sup><sup>(20)</sup>.

The Morse Fall Scale<sup>(21)</sup> was applied to verify the risk of falls. This scale is composed of six domains: history of falls; secondary diagnosis; walking aid; intravenous device; gait and mental status. Each of the criteria indicated receives a score ranging from 0 to 30 points. Based on the score obtained, the risk of falls is classified according to the cutoff points, described as follows: 0 to 24 points: low risk; 25 to 44 points: medium risk; above 45 points: high risk of falls<sup>(22,23)</sup>.

Subsequently, the classification of the nutritional status was carried out based on the BMI, and for this, the cut off values proposed by the World Health Organization (WHO) for adults were used<sup>(24)</sup>, which considered as underweight BMI<18,5 kg/m<sup>2</sup>; normal weight 18,5<BMI<25 kg/m<sup>2</sup>; overweight 25<BMI<30 kg/m<sup>2</sup> and obesity BMI>30 kg/m<sup>2</sup>. Since there is no reference standard for the elderly in Brazil<sup>(25)</sup> and aiming to classify them, the cut off points recommended by the Pan American Health Organization (PAHO) were used, where: underweight has a BMI <23 kg/ m<sup>2</sup>; eutrophy 23<BMI<28 kg/m<sup>2</sup>; overweight 28<BMI<30 kg/m<sup>2</sup> and obesity BMI>30 kg/m<sup>2</sup>. As a result of the aging process, there are physiological changes, such as loss of muscle mass and an increase in central adiposity, which causes the elderly to have generally a greater amount of body fat. Therefore, using cutoff points similar to those of adults should not be considered in the aging process<sup>(26)</sup>.

We chose to separate the patients undergoing bariatric surgery into a different group from the videolaparoscopic and laparotomies surgeries. This fact is justified by the huge differences regarding the reason for the surgical procedure, such as cancer, acute abdomen, cholecystitis, and appendicitis, besides the analysis that associated the risk of falls with the BMI of the research participants.

For the statistical evaluation, a descriptive data analysis was performed (tables of absolute frequencies and relative frequencies, mean, standard deviation, and confidence interval). Thus, to compare two or more independent samples populations, the Kruskal-Wallis nonparametric test was used, in which the data were analyzed using the IBM SPSS Statistic v.25 software, to verify the statistical significance by adopting alpha = 5%.

Finally, this research was approved by the Ethics Committee of the Hospital Complex of Clinics of the Federal University of Paraná, under Opinion nº. 2,186,424.

## RESULTS

102 participants who underwent abdominal surgeries between March and July 2019 were evaluated. Among the surgical procedures assessed, 58 videolaparoscopies, 27 laparotomies, and 17 bariatric surgeries were performed by open and closed approaches.

With a mean age of 50.34 ( $\pm 15.11$ ), adults represent the highest proportion, with 69 (67.65%) and 33 (32.35%) elderly. Regarding gender, there was a higher prevalence of females, with 70 (68.63%), while males accounted for 32 (31.37%) of the patients. Thus, the most reported comorbidities are as follows: obesity (25.85%), systemic arterial hypertension (SAH) (24.49%); diabetes (17.01%); and dyslipidemia (12.24%) among others (Table I). 21 participants (36.21%) in videolaparoscopies, 10 (37.04%) in laparotomies, and 7 (41.18%) in bariatric practiced physical activity.

Table I - Descriptive analysis of variables according to demographic, socioeconomic and behavioral characteristics. Curitiba, Paraná, Brazil, 2019.

Variables	Categories	Videolaparoscopies (n= 58)	Laparotomies (n= 27)	Bariatric (n= 17)	Total (n= 102)
<b>Demographics</b>					
<b>Age</b>	Age	50.6 ( $\pm 15.88$ )	50.89 ( $\pm 14.68$ )	48.59 ( $\pm 13.71$ )	50.34 ( $\pm 15.11$ )
	Adult	37 (63.79%)	19 (70.37%)	13 (76.47%)	69 (67.65%)
	Elderly	21 (36.21%)	8 (29.63%)	4 (23.53%)	33 (32.35%)
<b>Gender</b>	Female	70 (68.63%)	12 (44.44%)	13 (76.47%)	70 (68.63%)
	Male	32 (31.37%)	15 (55.56%)	4 (23.53%)	32 (31.37%)
<b>Education</b>	Incomplete Elementary School	26 (44.83%)	10 (37.04%)	8 (47.06%)	44 (43.14%)
	Complete primary education	6 (10.34%)	2 (7.41%)	1 (5.88%)	9 (8.82%)
	Incomplete high school	2 (3.45%)	1 (3.70%)	2 (11.76%)	5 (4.90%)
	Complete high school	18 (31.03%)	8 (29.63%)	4 (23.53%)	30 (29.41%)
	Incomplete Higher Education	3 (5.17%)	1 (3.7%)	0 (0%)	4 (3.92%)
	Complete Higher Education	3 (5.17%)	5 (18.52%)	1 (5.88%)	9 (8.82%)
	Postgraduate studies	0 (0%)	0 (0%)	1 (5.88%)	1 (0.98%)
<b>Socioeconomic</b>					
<b>Profession</b>	Performs paid activity	37 (63.79%)	20 (74.07%)	12 (70.59%)	69 (67.65%)
	Does not perform paid activity	5 (8.62%)	1 (3.70%)	4 (23.53%)	10 (9.80%)
	Retired	16 (27.59%)	6 (22.22%)	1 (5.88%)	23 (22.55%)
<b>Marital status</b>	Single	11 (18.97%)	8 (29.63%)	5 (29.41%)	24 (23.53%)
	Married	30 (51.72%)	15 (55.56%)	9 (52.94%)	54 (52.94%)
	Divorced	10 (17.24%)	3 (11.11%)	1 (5.88%)	14 (13.73%)
	Widower	7 (12.07%)	1 (3.70%)	2 (11.76%)	10 (9.80%)
<b>Behavioral</b>	Smoker	12 (54.55%)	8 (57.14%)	3 (42.86%)	23 (53.49%)
	Ex-Smoker	8 (36.36%)	5 (35.71%)	3 (42.86%)	16 (69.57%)
	Alcoholism	2 (9.09%)	1 (7.14%)	1 (14.29%)	4 (9.30%)
<b>Comorbidities</b>	Diabetes	14 (18.18%)	3 (12.00%)	8 (17.78%)	25 (17.01 %)
	Dyslipidemia	12 (15.58%)	2 (8.00%)	4 (8.89%)	18 (12.24%)
	HAS	21 (27.27%)	8 (32.00%)	7 (15.56%)	36 (24.49%)
	Asthma	2 (2.60%)	2 (8.00%)	3 (17.65%)	7 (4.76%)
	COPD	1 (1.72%)	0 (0%)	1 (2.22%)	2 (1.36%)
	hypothyroidism	11 (14.29%)	2 (8.00%)	4 (8.89%)	17 (11.56%)
	hyperthyroidism	1 (1.72%)	0 (0%)	0 (0%)	1 (0.68%)
	Heart diseases	1 (1.72%)	1 (4.00%)	1 (2.22%)	3 (2.04%)
	Obesity	14 (18.18%)	7 (28.00%)	17 (37.78%)	38 (25.85%)

SAH: systemic arterial hypertension; COPD: chronic obstructive pulmonary disease

Regarding the type of surgery, in the videolaparoscopic route (n=58), there was a predominance of cholecystectomy 46 (79.31%), followed by appendectomy 7 (12.07%), exploratory laparoscopy 3 (5.17%), and rectosigmoidectomy 1 (1.72%).

In the laparostomic route (n=27) the following surgeries were performed: laparotomy 7 (25.93%), appendectomy 4 (14.81%), jejunostomy 2 (7.41%), hepatectomy 2 (7.41%), partial enterectomy 2 (7.41%), abdominoperineal

amputation of the rectum 2 (7.41%), intestinal reconstruction 2 (7.41%), cholecystectomy 1 (3.7%), appendectomy 1 (3.7%), pancreatic tumor enucleation 1 (3.7%), laparotomy associated with colectomy 1 (3.7%), colostomy 1 (3.7%) and abdominal wall tumor resection 1 (3.7%).

Regarding bariatric surgeries (n=17), 13 (76.47%) open bypass gastroplasties, 3 (17.65%) closed bypass gastroplasties and 1 (5.88%) sleeve gastrectomy (5.88%) were performed.

When the risk of falls was analyzed using the MFS, there was a statistically significant difference between surgical approaches and the risk of falls ( $p=0.006$ ). Thus, bariatric surgeries had a higher risk of falls when compared to videolaparoscopes and laparotomies (Figure 1).

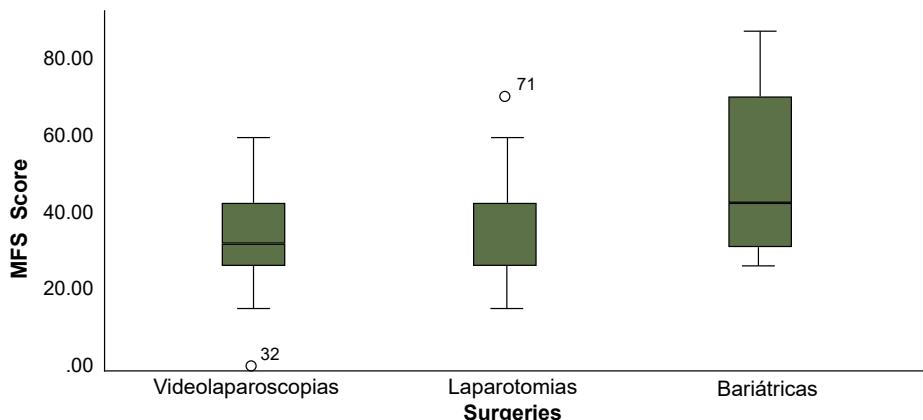


Figure 1 - Morse Fall Scale (MFS) score demonstration according to the surgical procedure, Curitiba, Paraná, Brazil, 2019.

Regarding the total MFS score, the mean score was 37.3 ( $\pm 13.6$ ) points, characterizing an average risk of falls. Regarding the access routes, there was an average risk of falls in videolaparoscopies, which scored 34.7 ( $\pm 11.2$ ) and in laparotomy 35.6 ( $\pm 12.5$ ), while bariatric surgeries were considered to be large, had a high risk of falls, totalling 48.8 ( $\pm 17.4$ ) points.

The domains of the MFS with statistically significant aggregation represent the history of falls, secondary diagnosis, and gait transference (Table II).

Table II - Domains of the Morse Speech Scale, Curitiba, Paraná, Brazil, 2019.

Domain of Morse Fall Scale	Videolaparoscopies (n=58)	Laparotomies (n=27)	Bariatric (n=17)	Value-p
<b>Fall history (n=102)</b>				
No	53 (91%)	26 (96%)	12 (70%)	0.021*
Yes	5 (9%)	1 (4%)	5 (30%)	
<b>Secondary diagnosis (n=102)</b>				
No	35 (60%)	19 (70%)	3 (18%)	0.002*
Yes	23 (40%)	8 (30%)	14 (82%)	
<b>Walking (n=102)</b>				
None / bedridden / assisted by a health professional	57 (98%)	25 (94%)	17 (100%)	0.262
Crutches / Cane / Walker	1 (2%)	1 (3%)	0 (0%)	
Furniture / wall	0 (0%)	1 (3%)	0 (0%)	
<b>Intravenous Device (n=102)</b>				
No	1 (2%)	1 (4%)	20	0.678
Yes	57 (98%)	26 (96%)	0 (0%)	
<b>Gait/transference (n=102)</b>				
Normal / no walking. bedridden. Wheelchair	35 (60%)	4 (15%)	3 (18%)	0.001*
Weak	23 (40%)	21 (78%)	14 (82%)	
Committed / staggering	0 (0%)	2 (7%)	0 (0%)	
<b>Mental status (n=102)</b>				
Oriented / capable as to their capacity / limitation	57 (98%)	26 (96%)	16 (95%)	0.649
Overestimates capacity / forgets limitations	1 (2%)	1 (4%)	1 (5%)	

\* Statistically significant results for the Kruskal-Wallis test. p-value<0.05

Considering the high risk of falls in bariatric surgeries, when the risk is associated with BMI, an increased risk was observed according to the highest BMI, represented in Figure 2 of simple dispersion.

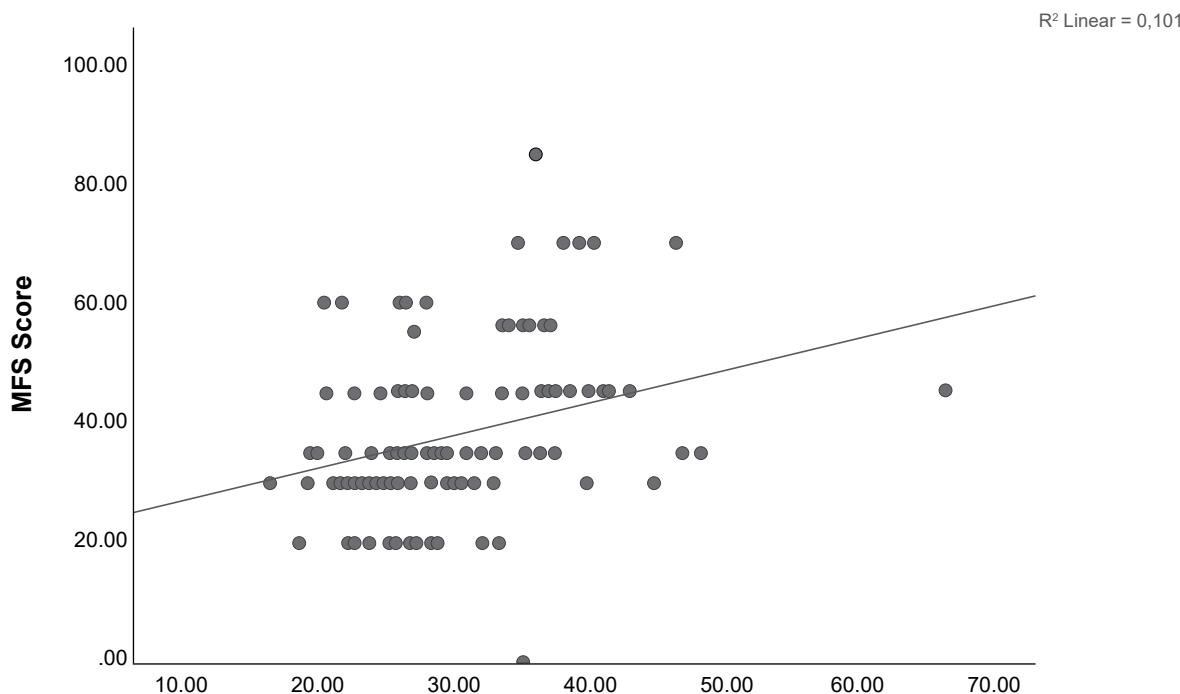
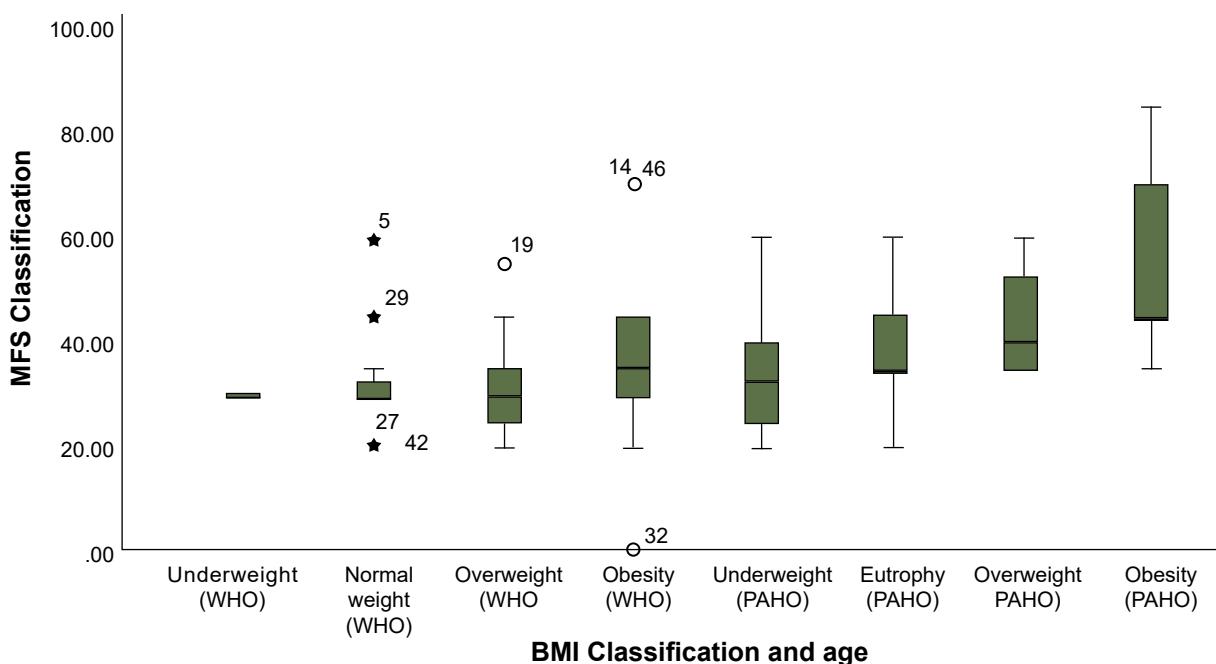


Figure 2 - Simple scatter with Morse Fall Scale (MFS) adjustment line by Body Mass Index (BMI), Curitiba, Paraná, Brazil, 2019.

When the association between the risk of falls with BMI and age was performed, using the WHO BMI classifications for the adult population and the PAHO BMI classifications for the elderly population being divided into two smaller and larger groups 60 years old; there was a significant increase in the risk of falls proportionally to BMI and age, that is, the older the age and the higher the BMI, the greater the risk of falls, as shown in Figure 3.



MFS: Morse FallScale; WHO: World Health Organization; PAHO: Pan American Health Organization; BMI: body mass index  
Figure 3 - Relationship between risk of falls, BMI and age, Curitiba, Paraná, Brazil, 2019.

## DISCUSSION

In this study, the demographic and socioeconomic variables survey showed a mean of age between 50 and 34 years, predominantly females, incomplete primary education and married marital status, as well as their involvement, having also been reported in similar studies<sup>(16,27)</sup>.

There are indeed similar studies on the risk and incidence of falls in hospitalized patients, but what differs from the results found in the current research is that such research<sup>(10,28,29)</sup> showed males as the most affected, and average age 58.1 years old.

Also, about the most affected gender, there was a lot of divergence between the studies that address the issue presented here, although part of the available literature indicates that both genders are affected equivalently<sup>(10,28,29)</sup>.

Concerning age, the sample analyzed in this research showed a similar mean to that found in equivalent analyses<sup>(28,29)</sup>, although better results were observed than those of other investigations. In this regard, it is believed that the results were possibly better because it was an adult population, while other verified studies included the elderly in their analyses. It is necessary to consider that the risk factors for falls in the elderly are higher and may be due to syncope, pre-syncope, cardiovascular and neurological diseases, such as epilepsy, Parkinson's disease, dementia and dependence on activities of daily living, inadequate use of several simultaneous medications, medications that depress the Central Nervous System or that act on the cardiocirculatory system, systemic diseases added to sensorineural degeneration, in addition to neuromuscular alterations<sup>(28)</sup>.

As for the education and marital status evidenced in this essay, the data are corroborated to the findings of the literature available on the subject, where was observed the prevalence of participants with incomplete primary education and married participants<sup>(13,30)</sup>.

The behavioral variables and the comorbidities most reported in this study, such as smoking, diabetes mellitus, hypertension, obesity, and physical activity, showed similar results to the research that pointed out hypertension, diabetes, heart diseases, and hypothyroidism as the main comorbidities evidenced<sup>(16)</sup>.

In a similar investigation in a philanthropic hospital in Ceará, the main risk factors for falls in patients admitted to the Medical Clinic and that were related to patient characteristics were listed. These factors ranged from physiological problems such as medication use to the fact of being inserted into a risky environment. The following factors were also highlighted as contributing factors to the risk of falls: age above 65 years, use of assistive devices, history of falling, anaemia, insomnia, postoperative period, difficulty in walking, reduced strength in the extremities, impaired balance, lack of knowledge of the environment, insufficient non-slip material in the bathrooms and pharmacological agents<sup>(29)</sup>.

A report published by the National Health Surveillance Agency (ANVISA) on adverse event reporting identified 272,689 incidents nationwide from April 2019 to April 2020. Of these, 93.7% happened in the hospital environment, and 11.2% corresponded to the patient falling<sup>(31)</sup>.

The postoperative period is considered a risk period for falling, regardless of the access route<sup>(29,32)</sup>. It should be noted that any surgical procedure increases the risk of falls as it affects the patient's mobility and memory due to the use of drugs for sedation<sup>(32)</sup>, pain control, and others<sup>(13)</sup>.

The length of hospital stay also interferes with the risk of falls since the longer the hospital stays, the higher the risk of falls<sup>(10)</sup>. The occurrence of falls in the hospital environment, besides contributing to a decrease in quality of life, is associated with an increase in mortality rates and hospitalization time and costs<sup>(29)</sup>. In this sense, the implementation of protocols and predictive scales is recommended, such as the Morse<sup>(33)</sup>.

In the present study, the risk of falls assessment using the Morse Fall Scale showed statistical significance between the different types of surgery, with bariatric surgeries presenting the highest risk for falls.

The research on screen proved a strong association between the risk of falls, high BMI, and advanced age, as it is in line with related research, which indicated the association between obesity and increased risk of falls in the elderly<sup>(34)</sup>. Although falls are considered multifactorial, some designs report that older and obese adults have a higher rate of falls<sup>(35)</sup>. Thus, the application of the MFS showed a mean risk of falls of 37.3 points ( $\pm 13.6$ ) in both videolaparoscopies and laparotomy. However, bariatric surgeries presented a high risk of falls, being the domains of history of falls, secondary diagnosis, and gait transference that presented statistical significance. Thus, the results presented reflect what is stated in the scientific literature<sup>(16)</sup>.

According to data from the World Health Organization (WHO), it is estimated that 37.7 million serious falls occur every year, requiring medical attention, and approximately 646,000 deaths per year resulting from falls, being considered the second leading cause of accidental deaths worldwide<sup>(36)</sup>. Thinking from this data, therefore, the identification and possible elimination of a risk factor reduces the probability of a fall.

Therefore, assessing the risk of falls is of fundamental importance to achieving the goals of reducing safety incidents during hospitalization, according to WHO and Ministry of Health guidelines, for example, with the National Patient Safety Program established in Brazil in 2013. These actions have driven changes in health care, teaching, and research practices. Thus, using specific tools to identify patients with greater susceptibility to falling can be an ally in incidents prevention.

The limitations of the current study include the non-evaluation of the length of hospital stay, since the cut-off is restricted to the 1st postoperative day, as well as not measuring the muscle strength, vision, and hearing, aspects that interfere in the balance and consequently in a greater or lesser risk of falls. Suggestions for future studies should be considered, such as using the MFS to assess patients daily, considering sector and clinical changes, length of hospital stay, and changes in strategies to avoid possible incidents involving patient safety. Another suggestion would be to analyze the drugs associated with the risk of falls and compare them with the risk of delirium and confusion resulting from hospitalization and the use of drugs.

## CONCLUSION

It was identified in this study that patients undergoing videolaparoscopies and laparotomies had a medium risk of falls, while patients undergoing bariatric surgery showed a high risk of falling. Among the factors that showed statistically significant differences between the groups analyzed were: history of falls, secondary diagnosis and gait/transfer.

Thus, it was found that the risk of falls increases proportionally to the increase in BMI and age, in addition to being related to an increased risk of falls, the type of surgery performed, and the pre-existence of risk factors.

## CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest in the study.

## CONTRIBUTIONS

**Michele Matias dos Santos** contributed to the elaboration and design of the study; analysis and interpretation of results; and writing and critically reviewing the content of the manuscript. **Bianca Alves de Lima, Luana Pereira Paz** and **Natália de Paiva da Silva** contributed to the writing and critical review of the manuscript content. **Ângela Luiza Cunha Legey, Regina Helena Senff Gomes** and **Arlete Ana Motter** contributed to the elaboration and design of the study; and with the writing and critical review of the manuscript content. All authors approved the final version of the manuscript.

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