

Epidemiological aspects of immediate postoperative pain in a tertiary hospital

Aspectos epidemiológicos da dor imediata pós-operatória em um hospital terciário

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ABSTRACT

BACKGROUND AND OBJECTIVES: Pain is a predominant symptom in the postoperative period and expected in any surgical service, being considered as a worldwide problem. Therefore, the aim of this study was to describe and analyze its epidemiological aspects, intensity, and predictors, for better management and predictability.

METHODS: This is a quantitative, retrospective and cross-sectional observational study, carried out in a tertiary hospital at Londrina-PR, in which medical records of post-surgical patients who responded to pain scales during their stay in the post-anesthetic recovery room were analyzed.

RESULTS: This study found that females are more likely to have postoperative pain and that younger patients are more susceptible, although not significantly. Mild pain predominated at rates greater than 60%, in which spinal blocks and gynecological/obstetric procedures were the most prevalent, in contrast to severe pain, which obtained higher percentages when general anesthesia and orthopedic surgeries were performed. In addition, an equation for predicting severe pain in the immediate postoperative period was obtained, based on the chosen anesthesia and the patient's age.

CONCLUSION: Less intense postoperative pain was more prevalent than other intensities, with anesthesia and the type of surgery being possible predictive factors, even if the harbinger of its severity was based on age and the anesthetic method.

Keywords: Acute pain, Epidemiology, Hospital anesthesia service, Medical records, Pain measurement.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor é um sintoma predominante no pós-operatório e é esperada em qualquer serviço cirúrgico, sendo considerada um problema mundial. Portanto, o objetivo deste estudo foi descrever e analisar seus aspectos epidemiológicos, intensidade e preditores, tendo em vista um melhor manejo e previsibilidade.

MÉTODOS: Estudo observacional quantitativo, retrospectivo e transversal, realizado em um hospital terciário no município de Londrina-PR, em que foram analisados prontuários de pacientes pós-cirúrgicos que responderam às escalas de dor durante permanência na sala de recuperação pós-anestésica.

RESULTADOS: Esta pesquisa constatou que o sexo feminino possui maior tendência em ter dor pós-operatória e que pacientes mais jovens são os mais suscetíveis, apesar de não apresentarem grande significância. A dor leve predominou com taxas superiores a 60%, sendo que bloqueios espinhais e procedimentos ginecológicos/obstétricos foram os mais prevalentes, em contraste com a dor intensa, que obteve maiores percentuais quando realizadas anestesia geral e cirurgias ortopédicas. Além disso, obteve-se uma equação preditora de dores intensas no pós-operatório imediato, baseada no tipo de anestesia e na idade do paciente.

CONCLUSÃO: A dor pós-operatória de menor intensidade foi mais prevalente que as outras intensidades, sendo a anestesia empregada e o tipo de cirurgia possíveis fatores preditores, mesmo que o prenúncio de sua severidade fosse baseado na idade e no método anestésico.

Descritores: Dor aguda, Epidemiologia, Medição da dor, Registros médicos, Serviço hospitalar de anestesia.

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HIGHLIGHTS

- Intensity assessed mainly through the verbal numeric scale (VNS)
- Prevalence in the 3rd decade of life

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INTRODUCTION

Pain is defined as the “fifth vital sign”¹ and can be described as “an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage”. In addition, pain has a subjective character²⁻⁶ that is due to previous individual experience, with the proportion of injured tissue being an independent factor in determining its magnitude³.

Pain is also present in the postoperative period and is expected in any surgical service^{3,7-9}, and its intensity is assessed mainly through the verbal numeric scale (VNS), which is widely used^{3,6}. However,

the current and previous conditions of the patient are determinant in the choice of the method used, providing other options, such as the visual analog scale (VAS) or the pain faces scale⁵, so that the absence of an adequate evaluation can provide inadequate and ineffective control^{4,9-12}, in addition to chronification⁸.

Moreover, recent studies have shown that immediate postoperative pain has a relatively high prevalence^{6,13,14}. In Africa, pain of moderate to severe intensity, at maximum levels, maintains proportions above 60%^{14,15}, while in countries such as the United States of North America (USA)⁹, Jordan¹⁰, the Netherlands¹⁶ and Brazil^{6,7}, only moderate pain prevails, which, despite regional differences, makes it possible to characterize it as a universal problem^{9,10}. However, there is still no standardization of relevant risk factors for the spread of the symptom¹⁵, as well as a scarcity of studies that seek possible mathematical formulas for its prediction¹⁷.

In light of the above, the aim of this study was to propose a statistical survey and analyze epidemiological aspects of immediate postoperative pain, focusing mainly on its intensity and its predictors, thus ensuring a better knowledge of its extent, possibility of management and predictability, especially for pain of moderate and severe intensity, given its evolution to chronic pain.

METHODS

This study is characterized as observational, quantitative, retrospective, cross-sectional and was developed during the period from February to October 2020 at *Hospital Evangélico de Londrina* (HEL), located in the city of Londrina-PR, with data collection from medical records for the period from January to December 2019.

The sample was selected from medical records of patients with a stay of at least 1 hour in the post-anesthetic recovery room, undergoing surgery performed at the hospital described and responding to VAS and VNS scales in the immediate postoperative period, without distinction of ethnicity or gender. Patients with a record of immediate referral to the Intensive Care Unit of the hospital in question, after the surgical procedure, aged less than 18 years and patients who had died reported in medical records, whether or not they were organ donors, were excluded from the analyzed sample.

Data from medical records were obtained from electronic collection by the electronic medical records software used by HEL and tabulated in electronic spreadsheets (Microsoft Excel[®] 2016), categorized by gender, age, surgical specialty, surgical risk classification by the American Society of Anesthesiologists (ASA), type of anesthesia, VNS and VAS. Patient's name and date of surgery, as well as time of entry and exit were omitted and not analyzed.

The variables were: surgical specialty and type of anesthesia, in addition to VNS and VAS divided into subcategories. The first variable had 14 subdivisions: orthopedics; neurosurgery; otorhinolaryngology and oral and maxillofacial surgery; general surgery; vascular surgery; ophthalmology; urology and nephrology; gynecology and obstetrics; head and neck surgery; cardiovascular surgery; thoracic surgery; plastic surgery; oncologic surgery; and anesthesiology procedures. The second variable described had 7

subdivisions, which were listed as: 1- general anesthesia; 2- general anesthesia associated with peripheral block; 3- peripheral blocks; 4- spinal blocks; 5- sedation; 6- sedation associated with local anesthesia; 7- local anesthesia. Finally, VNS and VAS, which have the role of describing the intensity of pain, were subdivided into 3 subcategories: mild, moderate and intense.

Ethical aspects

The present study was carried out after approval on April 26, 2020, by the Research Ethics Committee, Opinion Number 4,047,697, with consent signed by the participants, after a detailed explanation of its development, in accordance with Resolution No. 466/2012 of the Brazilian National Health Council (Conselho Nacional de Saúde) and the Declaration of Helsinki.

Statistical analysis

The SPSS[®] software version 26.0 was used for the statistical analysis of the data, through which the relative frequencies (number and percentage) and medians were calculated by the non-parametric test for each categorical and nominal variable (gender, ASA, type of anesthesia and surgery, VNS and VAS), as well as mean and frequency, these presented in figure 1 for the numerical variable (age).

In addition, correlation analyses were performed, with the elaboration of 2x2 matrices accounting for the discrete variables used for association analysis by the Chi-squared test, adopting a significance level (alpha) of 5%, and generated from the grouped and subcategorized samples.

In addition, a binary logistic regression was performed to verify whether the type of surgery, anesthesia, gender and age were predictors of more intense pain, aiming at a formula that would expose its predictability.

The statistical results were presented in descriptive tables, with frequencies and valid percentage for each variable, as well as the results of the correlation tests, describing the alpha and the number of degrees of freedom.

RESULTS

The data collection resulted in a total of 12,216 medical records for analysis, referring to the period already described, and 11,338 medical records of this total were eligible for the study, considering the inclusion and exclusion factors.

Frequency analysis provided descriptive statistics for general characteristics (gender, age and ASA) of the patients selected, resulting in a percentage of females equivalent to 72.3% of the medical records analyzed, compared to 27.7% of males (Table 1), with the 30-year age group being the most prominent (Figure 1), with a mean of 46.26 years (Table 2), and a predominance of ASA II (Table 3).

The frequencies related to the intensity of postoperative pain, measured by VNS and VAS, were also analyzed, which showed a predominance of mild pain with rates higher than 60% of the data obtained. However, the analysis also showed a large number of missing data in the medical records related to pain scales, with n=3,185, as can be seen in table 4.

Table 1. Intensity of postoperative pain according to gender

Variables	n	%	Intensity of pain (VNS)			p-value	M _d
			n	Light (%)	Moderate (%)		
Gender						0.074*	
Female	8.201	72.3	5.832	71.4	75.1	58.6	1
Male	3.137	27.7	2.321	28.6	24.9	41.4	1
Total	11.338	100	8.153				

VNS = verbal numeric scale; p = Pearson Chi-squared statistic. * Correlation is significant at the 0.05 level (2 ends); M_d = median

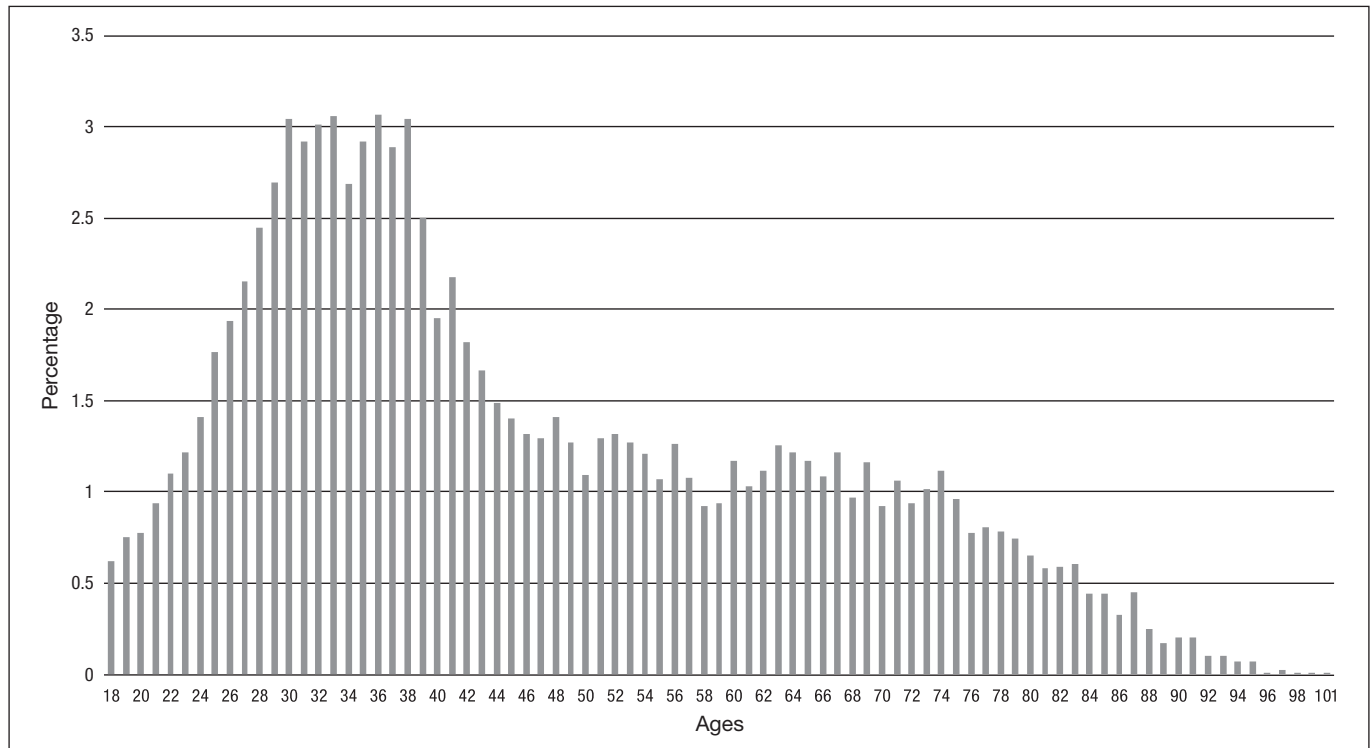


Figure 1. Distribution of patients' ages

Table 2. Descriptive statistics for Age

Variable	n	Minimum	Maximum	Mean	Mode	p-value	Significance
Age	11.338	18	101	46,26	36	-0,024'	0,029

p = Pearson Chi-squared statistic. *Correlation is significant at the 0.05 level (2 ends)

Table 3. Postoperative pain intensity according to ASA

Variables	n	%	Intensity of pain (VNS)			p-value	M _d
			n	Light (%)	Moderate (%)		
ASA						0.074*	
I	3.893	34.3	2.678	33	31.1	24.1	1
II	6.197	54.7	4.517	55.3	56.2	65.5	1
III	853	7.5	684	8.3	9.4	3.4	1
IV	70	0.6	54	0.7	0.2	0	1
V	1	0.0	1	0	0	0	1
Total	11.338	100	8.153				

ASA= American Society of Anesthesiologists; VNS = verbal numeric scale; p = Pearson Chi-squared statistic. * Correlation is significant at the 0.05 level (2 ends); M_d = median

Bivariable correlation was performed using the variables years of life and VNS, resulting in a weak and negative degree of significance between age and pain severity ($p = -0.024$; $p = 0.03$), described in table 2.

Table 4. Descriptive statistics of immediate postoperative pain intensity

Variables	n	%	Omissive cases	
			n	%
VNS			3.185	28.1
Light (1)	7.690	67.8		
Moderate (2)	434	3.8		
Intense (3)	29	0.3		
Total	8.153	79.1		
VAS			3.185	28.1
Light (1)	7.324	64.6		
Moderate (2)	785	6.9		
Intense (3)	44	0.4		
Total	8.153	79.1		

VNS= verbal numerical scale; VAS= visual analog scale

The Chi-squared test showed a present association between the numerical pain scale and: (a) the type of anesthesia [$\chi^2 (12) = 22.723$; $p = 0.03$] and (b) the type of surgery [$\chi^2 (26) = 69.122$; $p < 0.0001$], presented in tables 5 and 6, respectively. In addition, a correlation trend between the scale and gender was observed [$\chi^2 (2) = 5.2$; $p = 0.074$], with females showing higher rates in pain intensities compared to males (Table 1). The ASA variable showed no relationship with pain, see $p = 0.074$, and all correlated variables had a median (M_d) equivalent to 1.

Cross-tabulation for the variables gender, ASA, type of anesthesia and surgical specialty provided results regarding the estimated frequencies in relation to pain intensity, in which the categories of general anesthesia and orthopedic surgical procedures presented more severe pain compared to the others, with rates of 55.2% and 31%, respectively, while the percentage for mild and moderate pain was limited to spinal blocks (55.1%; 50.2%) and gynecological/obstetric surgeries (34.2%; 36.9%), as shown in tables 5 and 6. Regarding the gender variable, the tabulation confirmed the trend described by Pearson's correlation, and for ASA only confirmed the prevalence of ASA II.

Table 5. Intensity of postoperative pain according to the type of anesthesia

Variables	n	n	Intensity of pain (VNS)			p-value	M_d
			Light (%)	Moderate (%)	Intense (%)		
Type of Anesthesia						0.03*	
General (1) general + peripheral blocks	2.899	2.509	30.4	37.6	55.2		1
Peripheral (2)	57	48	0.6	0.7	0		1
Peripheral blocks (3)	702	421	5.2	4.1	10.3		1
Spinal blocks (4)	5.942	4.454	55.1	50.2	31		1
Sedation (5)	945	448	5.6	4.1	3.4		1
Sedation + local (6)	623	211	2.6	2.5	0		1
Local (7)	139	46	0.6	0.7	0		1
Total	11.307	8.137					1

VNS = verbal numeric scale; p = Pearson Chi-squared statistic. * Correlation is significant at the 0.05 level (2 ends); M_d = median

Table 6. Intensity of postoperative pain according to the type of surgery

Variables	n	n	Intensity of pain (VNS)			p-value	M_d
			Light (%)	Moderate (%)	Intense (%)		
Specialties						0.0001*	
Orthopaedics	2.121	1.644	20.2	19.6	31		1
Neurosurgery	505	342	4.1	6.2	3.4		1
Otorhinolaryngology / Oral and Maxillofacial Surgery	163	101	1.3	1.2	0		1
General Surgery	1.945	1.675	20.6	20.7	24.1		1
Vascular Surgery	905	461	5.8	2.8	3.4		1
Ophthalmology	353	17	0.2	0	0		1
Urology/Nephrology	858	632	7.9	5.3	10.3		1
Gynecology/Obstetrics	3.885	2.786	34.2	36.9	6.9		1
Head and Neck Surgery	36	36	0.4	0.7	0		1
Cardiovascular Surgery	211	198	2.3	4.8	10.3		1
Thoracic Surgery	37	36	0.4	0.7	3.4		1
Plastic Surgery	96	77	1	0.2	3.4		1
Oncology	139	98	1.3	0	3.4		1
Anesthesiology Procedures	50	24	0.3	0.9	0		1
Total	11.304	8.127					

VNS = verbal numeric scale; p = Pearson Chi-squared statistic. * Correlation is significant at the 0.05 level (2 ends); M_d = median

Finally, binary logistic regression was performed to verify whether the type of surgery, anesthesia, gender and age are predictors for moderate and severe pain, and the model containing the type of anesthesia and age was significant [$\chi^2(4) = 3527.13$; $p < 0.0001$; R^2 Nagelkerke = 0.008]. The equation describing this relationship is: $p(\text{moderate/severe pain}) = 2.71^{[-2.125 - 0.123 \times (\text{type of anesthesia}) - 0.008 \times (\text{age})]} / 1 + 2.71^{[-2.125 - 0.123 \times (\text{type of anesthesia}) - 0.008 \times (\text{age})]}$.

DISCUSSION

The present study revealed that of the 11,338 medical records analyzed, the vast majority were women (72.3%), young people (mean 46.26 years) and with ASA II (54.7%), characteristics consistent with the literature, being present in several studies^{6,7,14,15,18}. However, in this study there was no significant correlation with pain intensity, measured by VNS and VAS scales, with their frequencies showing a greater number of reports referring to mild pain, with rates above 60%, proven by the median value ($M_d=1$), which denotes the central tendency of intensity and thus contrasts the moderate to severe pain reported as the most frequent^{6,7,14,15}. This divergent fact from the literature may be explained by good perioperative control or early detection of the symptom, given the prevention of chronic pain, and this study did not analyze such factors.

Regarding the gender of the patients analyzed, women had higher percentages in the three types of intensity (mild, moderate and severe), compared to the opposite gender, however without an important difference between them ($p = 0.074$), which may characterize a greater tendency of the female gender to postoperative pain. This data can be explained by studies^{7,19} in which women seek to report the presence of pain and its intensity more frequently than men⁷, in addition to the fact that they have higher proportions of steroid hormones, which can bind to pain receptors and modulate neuronal excitation through interaction with neurotransmitters present in the pain pathway¹⁹.

In addition, the results showed that among women there was a prevalence of moderate pain (75%) compared to the general data provided by the pain scales. In similar studies^{6,18}, there was also a prevalence of females with moderate pain, which resulted in 80% of the 107 patients selected, even though the majority were male (43%), as also occurred in the study⁶ in which gender had a significant association with higher pain intensities, despite also presenting a greater number of men.

Regarding the age of patients, this study found a weak and negative correlation with pain intensity ($p = -0.024$; $p = 0.029$), and the occurrence of more intense pain in young patients was notable, in view of the negative p -value. A recent study¹⁴ indicated that younger patients experience pain to a greater extent than older patients, and this demographic characteristic was also not significant. A possible explanation²⁰ for this condition is that older patients have less activity in the signaling of pain pathways due to a physiological condition related to the aging process²⁰, however there is still little information and studies that seek this relationship¹⁵.

In addition, this study observed a strong association between pain scale and anesthetic choice ($p = 0.03$), as well as the specialty of the surgical procedure ($p < 0.0001$), being possible predictors

of its intensity to be considered in this article, since this data is already present in the literature^{6,14,16,17,21}.

Regarding frequencies, the results of this research revealed that general anesthesia and orthopedic surgeries had the highest percentages of severe pain (55.2% and 31%), similar to the literature^{6,7,16}, compared to spinal blocks and gynecological/obstetric surgeries, which had the highest percentages of mild and moderate pain, which may indicate a higher tendency of women with postoperative pain and prevalence of younger ages, also described in this article. These data differ from the findings of a study²⁰, which analyzed 1,062 women undergoing cesarean section and 78.4% presented moderate to severe intensity of postoperative pain, in addition to other studies^{14,21} that also presented the same result, one of which also described spinal blocks as the main cause¹⁴, a correlation that makes sense in relation to perioperative practice, given its short-lived effect, as well as factors associated with the patient himself and the technique itself, such as failures in the application and drug inefficiency²².

The present study provided a mathematical model that interprets the possibility of immediate postoperative pain of moderate to severe intensity, based on a constant ($e=2.71$) and on the predictors, type of anesthesia and age, found by the simple binary logistic regression analysis¹⁷ performed in this study, which is one of the most used for such function. When using the formula, the predictors should be replaced by the respective numbers, considering the type of anesthesia chosen: 1- general anesthesia; 2- general anesthesia associated with peripheral block; 3- peripheral block; 4- spinal block; 5- sedation; 6- sedation associated with local anesthesia; 7- local anesthesia. The result is given in a numbering ranging from 0 to 1, in which the greater proximity to 1 indicates greater likelihood of moderate to severe postoperative pain. Despite being a highly reliable method, there are still few studies on its use, and many models already proposed have not been effective in predicting the symptom¹⁷.

In view of this divergence in the literature on the prevalence, predictors and methods of pain assessment, studies would be needed that consider more variables related to pain, by means of a thorough categorization, also associated with the method of control and management, to determine its real incidence and determining factors. There is also a need for clinical studies using the mathematical equation to evaluate its effectiveness, in addition to new statistical analyzes with data from the same tertiary hospital, given the limitations present. One of them is related to the notes of the medical records, considering the omission of a large percentage of data referring to the intensity of pain, as well as the use of unidimensional methods for its evaluation, since these have the function of evaluating only the intensity, contrasting with the definition of the symptom: complex and subjective²³.

CONCLUSION

Although some results differ from the literature, this study leads to the deduction that lower intensity immediate postoperative pain was the most prevalent in the hospital analyzed. The type of anesthesia and the surgical specialty can be considered possible

predictors, although the anesthesia employed and the age provided a method to predict more intense pain in the immediate postoperative period, according to the mathematical operation.

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AUTHORS' CONTRIBUTIONS

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Statistical Analysis, Data Collection, Conceptualization, Resource Management, Project Management, Research, Methodology, Writing - Preparation of the Original, Writing - Review and Editing, Visualization

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