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Original Article

# Risk factors that influence the intensity of pain present in the immediate postoperative period

## Fatores de risco que influenciam a intensidade da dor presente no pós-operatório imediato

**Sabrina da Silva Nascimento[I]*, Gabriela Elisa Hirsch[I], Caroline Renz Pretto[I], Karine Raquel Kleibert[I], Christiane de Fátima Colet[I], Eniva Miladi Fernandes Stumm[I]**

## Abstract

**Objective:** To evaluate the influence of risk factors for immediate postoperative pain (IPP). **Methods:** The study was conducted with 336 patients treated at the Post Anesthetic Recovery Unit (PARU) of a general hospital. Sociodemographic and clinical data were obtained with a questionnaire and pain was assessed by the McGill questionnaire (reduced form), both assessed at admission and discharge from PARU. **Results:** 64.1% of patients older than 60 years reported no pain at discharge from the PARU; 59.5% and 56.9% of those undergoing closed surgery reported pain on admission and discharge, respectively; longer surgeries caused pain in 52.5% of patients and 25% of diabetics reported pain on admission; fewer patients using 7 or more medications reported pain at both times. **Conclusion:** Age, type and time of surgery, number of medications and comorbidities influence in pain on IPP.

**Keywords:** Pain management; Postoperative care; Pharmacological treatment

## Resumo

**Objetivo:** avaliar a influência de fatores de risco para a dor no pós-operatório imediato (POI). **Métodos**: estudo realizado com 336 pacientes atendidos em Unidade de Recuperação Pós-anestésica (URPA) de um hospital geral. Dados sócio-demográficos e clínicos foram obtidos com questionário e a dor foi avaliada por questionário McGill (forma reduzida), ambos avaliados na admissão e alta da URPA. **Resultados:** 64,1% dos pacientes maiores de 60 anos não relataram dor na alta da URPA; 59,5% e 56,9% daqueles submetidos a cirurgias fechadas relataram dor na admissão e alta, respectivamente; cirurgias mais longas causaram dor em 52,5% dos pacientes e 25% dos diabéticos relataram dor na admissão; menos pacientes que usaram 7 ou mais medicamentos relataram dor em ambos os momentos. **Conclusão:** Idade, tipo e tempo de cirurgia, número de medicamentos e comorbidades influenciam a dor do POI.

**Palavras-chave:** Manejo da dor; Cuidado pós-operatório; Tratamento farmacológico

[I]Universidade do Noroeste do Estado do Rio Grande do Sul ROR , Ijui, RS, Brasil

***Corresponding author:**

Sabrina da Silva Nascimento
Programa de Pós-graduação em Atenção Integral à Saúde - Universidade do Noroeste do Estado do Rio Grande do Sul
sasanascimento8@hotmail.com

Mailing address:
Rua do Comércio n° 3000 , Bairro: Universitário, Cidade: Ijuí, Estado: RS, CEP: 98.700-000

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## INTRODUCTION

Postoperative pain (POP) is the most frequent type of acute pain, manifesting as moderate or severe[1]. Research shows that approximately 80% of patients undergoing surgery may suffer from POP[2], being more intense in the immediate postoperative period (IPP)[3]. A study by the American Society of Anesthesiology[1] shows that 78.2% of POP episodes occur within the first 24 hours.

The experience of pain is associated with the individual characteristics of each patient. Many factors are still being investigated and among those already elucidated stand out: comorbidities, which must be identified before surgery[4]; sex, whose characteristics are determined by biological, psychological, educational and social aspects; and social differences may justify distinct responses to pain[5]. In addition to the above, the variables: age, smoking, history of depressive symptoms, history of anxiety symptoms, sleep difficulties, higher body mass index and presence of preoperative pain, are significant preoperative predictors of unsatisfactory control of postoperative pain[6].

The proper management of POI is a challenge for health professionals. Knowledge of scientific evidence on pharmacological and non-pharmacological modalities, in addition to providing effective pain reduction, allows for the reduction of doses of drugs used, side effects, length of hospital stay, in addition to optimizing patient recovery and reducing costs hospitals. In addition, multimodal therapy is more effective than when not used in combination[7]. It is noteworthy that the therapy available for the treatment of POP is wide and the appropriate choice of drug and doses, route of administration, and its adverse effects are critical for treating pain effectively. Thus, it is necessary to know the available therapeutic modalities to select the best one for each patient[8]. However, studies about the influence of individual and socio-demographic factors, pharmacological and comorbidities on POP are still scarce. Thus, the present study evaluated the influence of this factors on pain in patients in IPP.

## METHODS

This is a cross-sectional analytical study with a quantitative approach, developed at the Post Anesthetic Recovery Unit (PARU) of a size IV hospital in northwestern Rio Grande do Sul/ Brazil. A total of 336 patients with POP participated in the study. Approximately 463 surgeries are performed at this hospital monthly. The number of monthly surgeries performed at the hospital in the year prior to the beginning of the study was used for the sample calculation considering 95% confidence level and 5% sampling error.

The inclusion criteria were: to be in the PARU, in IPP, conscious, oriented and verbalizing. In order to evaluate whether the patients were oriented, four questions were

asked, related to the name, date of birth, age and address, which were checked with the medical record. Patients undergoing any kind of surgery were included. Patients younger than 18 years or who stayed less than one hour in the PARU were excluded.

Data were collected between March and April 2016. A form with socio-demographic variables was used to obtain data such as gender, age, marital status, education, treatment modality, type and time of surgery, time in PARU. Pain was evaluated using McGill pain questionnaire (reduced form), validated for the Portuguese language[9], using the Numerical Pain Scale (NPS) that evaluates the Present Pain Intensity. The McGill questionnaire measures the pain perceived at the time of its application. The NPS was applied to the patients during the stay in the PARU, by trained interviewers, at admission (evaluated up to 30 minutes after the patient's entry into the PARU) and at discharge of the patient from PARU (evaluated 30 minutes before the patient leaving the PARU). For purposes of analysis, the pain was dichotomized in "absence of pain" and "presence of pain".

This research adopted the pain concept of the International Association for the Study of Pain[10], which defines it as an unpleasant sensory and emotional experience, associated with real or potential tissue damage, always subjective.

The number of medications used to treat pain in the IPP was obtained through access to medical records. Only drugs with an analgesic and anti-inflammatory purpose were considered.

The data were analyzed with descriptive and analytical statistics, using SPSS software version 21.0. In order to associate Present Pain Intensity at admission and discharge with socio-demographic, pharmacological and comorbid variables, the chi-square test and the Student's t-test were used. Significant difference was considered present when p value was smaller than 0.05 ($p \leq 0.05$).

All participants agreed to participate in the study signing the Informed Consent Form. This study comprised a larger interinstitutional project entitled "Evaluation of pain, stress and coping in patients and families in hospital" and was approved by the Research Ethics Committee of UNIJUÍ, Opinion number 427,613. Our research followed the guidelines of the Declaration of Helsinki and Tokyo for human experimentation.

## RESULTS

Regarding the sociodemographic data of the patients (Table 1), only an association between pain and age of over than 60 years old at discharge from the PARU ($p= 0.029$) was found, where more patients over 60 years old reported no pain.

**Table 1** – Socio-demographic data of the patients and association with pain in the IPP

| Variables | IPP at admission | | | IPP at discharge | | |
|---|---|---|---|---|---|---|
| | Without pain n (%) | With pain n (%) | p | Without pain n (%) | With pain n (%) | p |
| Age | | | | | | |
| 18 - 59 years old (n=258) | 147 (56.9) | 111 (43.1) | | 129 (50.0) | 129 (50.0) | 0.029* |
| ≥ 60 years old (n=78) | 51 (65.4) | 27 (34.6) | 0.186 | 50 (64.1) | 28 (35.9) | |
| Gender | | | | | | |
| Male (n=105) | 66 (62.8) | 39 (37.2) | | 60 (57.1) | 45 (42.9) | 0.583 |
| Female (n=231) | 131 (56.7) | 100 (43.3) | 0.612 | 118 (51.1) | 113 (48.9) | |
| Marital status | | | | | | |
| Married (n=219) | 130 (59.4) | 89 (40.6) | | 116 (52.9) | 103 (47.1) | 0.951 |
| Single (n=117) | 68 (58.1) | 49 (41.9) | 0.679 | 63 (53.8) | 54 (46.2) | |
| Schooling | | | | | | |
| Low[a] (n=180) | 105 (58.3) | 75 (41.7) | | 105 (58.3) | 75 (41.7) | 0.237 |
| High[b] (n=156) | 93 (59.6) | 63 (40.4) | 0.687 | 81 (51.9) | 75 (48.1) | |

Source: Research Authors, 2018
Note: a= until complete Elementary School, b = High school or above, IPP = Intensity of Present Pain, * Chi-square test, considered significant p <0,05.

Table 2 shows that more patients submitted to closed surgeries reported pain on admission and discharge from PARU (p= 0.001 for both). Statistical association was also observed between surgeries lasting less than 2.5 hours and absence of pain on PARU admission (p= 0.017).

Regarding the medications used by patients from intraoperative period to discharge from PARU, the mean of medications used among patients who reported no pain was higher than those who reported pain (7.78 ± 2.92 and 6.46 ± 2.94, respectively; p< 0.001). Still, 87.5% of patients used multimodal analgesia, with no significant difference in pain for those who used only one analgesic drug (p = 0.768). However, there was a difference in the time of surgery between the patients who used multimodal analgesia and those who did not use (p <0.05), which may indicate a relation with surgical complexity.

Regarding comorbidities, an association was found between patients diagnosed with Diabetes mellitus (DM) and absence of pain at the PARU admission (Table 3, p = 0.050).

**Table 2** – Surgical and pharmacological data of the patients and association with pain in the IPP

| Variables | IPP at admission | | | IPP at discharge | | |
|---|---|---|---|---|---|---|
| | Without pain n (%) | With pain n (%) | p | Without pain n (%) | With pain n (%) | p |
| Surgery type | | | | | | |
| Open (n=183) | 136 (74.3) | 47 (25.7) | 0.001* | 113 (61.7) | 70 (38.3) | 0.001* |
| Closed (n=153) | 62 (40.5) | 91 (59.5) | | 66 (43.1) | 87 (56.9) | |
| Surgery time | | | | | | |
| < 2,5 hours (n=256) | 160 (62.5) | 96 (37.5) | 0.017* | 137 (53.5) | 119 (46.5) | 0.874 |
| > 2,5 hours (n=80) | 38 (47.5) | 42 (52.5) | | 42 (52.5) | 38 (47.5) | |
| Previous surgery | | | | | | |
| Yes (n=245) | 141 (57.5) | 104 (42.5) | 0.656 | 132 (53.9) | 113(46.1) | 0.313 |
| No (n=89) | 56 (62.9) | 33 (37.1) | | 47 (52.8) | 42 (47.2) | |
| Time in PARU | | | | | | |
| < 6 hours (n=278) | 162 (58.2) | 116 (41.8) | 0.593 | 142 (51.1) | 136 (48.9) | 0.078 |
| > 6 hours(n=58) | 36 (62.1) | 22 (37.9) | | 37 (63.8) | 21 (36.2) | |
| Total medicines used | | | | | | |
| <7 (n=142) | 71 (50.0) | 71 (50.0) | 0.003* | 66 (46.5) | 76 (53.5) | 0.034* |
| >7 (n=194) | 125 (64.4) | 64 (35.6) | | 110 (56.7) | 79 (43.2) | |

Source: Research Authors, 2018
Note: IPP= Intensity of Present Pain, PARU= Post anesthetic recovery unit, * Chi-square test, considered significant p <0,05.

**Table 3** – More prevalent comorbidities in patients and association with pain in the IPP

| Variables | IPP at admission | | | IPP at discharge | | |
|---|---|---|---|---|---|---|
| | Without pain n (%) | With pain n (%) | p | Without pain n (%) | Variables | Without pain n (%) |
| DM | | | | | | |
| Yes (n=32) | 24 (75.0) | 8 (25.0) | 0.050* | 18 (56.3) | 14 (43.7) | 0.723 |
| No (n=304) | 174 (57.2) | 130 (42.8) | | 161 (52.9) | 143 (47.1) | |
| CD | | | | | | |
| Yes (n=2) | 1 (50.0) | 1 (50.0) | 0.797 | 2 (100.0) | 0 (0) | 0.184 |
| No (n=334) | 197 (58.9) | 137 (41.1) | | 177 (53.0) | 157 (47.0) | |
| SAH | | | | | | |
| Yes (n=218) | 129 (59.2) | 89 (40.8) | 0.901 | 117 (53.7) | 101 (46.3) | 0.843 |
| No (n=118) | 69 (58.5) | 49 (41.5) | | 62 (52.6) | 56 (47.4) | |
| NEO | | | | | | |
| Yes (n=25) | 12 (48) | 13 (52) | 0.367 | 13 (52) | 12 (48) | 0.558 |
| No (n=310) | 185 (59.7) | 125 (40.3) | | 166 (53.5) | 144 (46.5) | |

Source: Research Authors, 2018
Note: DM= Diabetes mellitus, CD= Cardiovascular disease, SAH= Systemic Arterial Hypertension, NEO= Neoplasia, IPP= Intensity of Present Pain, * Chi-square test, considered significant p <0,05

## DISCUSSION

The analysis of the drugs used by the patients participating in this study shows that the mean of medications used among patients who reported no pain was higher than those who reported pain. This result affirms the proposal of the World Health Organization (WHO) that recommends multimodal analgesia, which is an association of drugs with distinct pharmacodynamics, that works in different places of the painful transmission and provides quality analgesia, adapted to the need and intensity of pain characteristics of each patient[11] .

In addition to this, multimodal analgesia inhibits pain through different ways, acting in different receptors, and the expected effect is due to the sum of the individual effects, and the risk of adverse events are smaller considering that the doses of each drug of the association is lower[12]. However, it is important to make a careful analysis of the interaction between the medications used and factors associated with POP, which may influence their safety and efficacy.

In places where there are no protocols and services for pain monitoring, such as in the PARU researched here, the choice of medications can occur from the individual experiences of each prescriber. In this context, the clinical protocols aim to reduce the patient's pain efficiently in the IPP, and the lack of these protocols makes it difficult to prescribe analgesics[13].

Optimal postoperative pain management requires an understanding of the pathophysiology of pain, methods available to reduce pain, invasiveness of the procedure and patient factors associated with increased pain[14]. Our study showed that closed surgeries (admission and discharge) and more than 2.5 hours (admission) caused pain in more patients at PARU. This result was contradictory as it is expected that smaller surgeries cause less pain to the patients. Unlike our result, a retrospective study with patients who underwent surgical treatment of patellar fractures with open and closed reductions, found no difference in the analogue for pain[15]. Therefore, it is important that hospitals standardize medications, anesthetic techniques and treatments, according to the types of approach, open or closed, because these variations result in different pain intensities due to the damage caused during the surgical procedure and the subjectivity of each individual[13].

This study also showed that more patients with DM reported no pain at the admission of PARU. This disease is associated with absence of pain, unlike patients with other comorbidities for which no significant differences were observed. This result may be related to peripheral neuropathy, the most common and disabling chronic complication of diabetes, related to changes in sensation of pain. High blood glucose reduces the ability to eliminate free radicals and compromises the metabolism of several cells, especially neurons, and as

the picture worsens, there may be a reduction in protective sensitivity and pain, justifying the lower incidence of pain in diabetic patients[16].

Research indicates that age can also influence in postoperative pain[17]. Our results showed that more participants older than 60 years of age reported no pain at discharge from the PARU. This may also be related to the pharmacokinetics of drugs in elderly patients, since renal excretion is modified due to a decrease in the number of functioning nephrons and local blood flow, reduction of drug elimination and prolongation of their half-life, which may increase toxic effects[18], and contribute to the maintenance of analgesia.

In this study there was a predominance of female participants. Similar data were found in research at a university hospital with patients undergoing different surgical procedures, in which 68% were women[19], corroborating our results. On the other hand, in patients undergoing surgery in Florida, there was a slightly higher prevalence of men[17], as well as in Hospital das Clínicas, Faculdade de Medicina da UNESP, in Botucatu [20].

Regarding the variable "marital status", no difference was observed between the number of patients who felt pain. Different from this result, Poleshuck and Green[21] affirm that interpersonal relationships may help as a risk or protective factor in the perception of pain and that healthy relationships contribute to decrease pain sensation.

In the present study, the interference of the other factors beyond the potentiation of effects on multimodal analgesia and other classes of medications not evaluated, being a limitation. In addition, the influence of surgical complexity on pain has not been evaluated either.

## CONCLUSION

At the end of this study, it was concluded that age, time and type of surgery, number of medications and comorbidities influence the pain. The results of this investigation can be used to instigate professionals who work in a surgical center and other hospital units, in the care of patients with pain, as well as assist in the discussions and implementation of protocols for adequate pain management with inclusion of the pharmacist and, thus, qualify the care to individuals undergoing surgical procedures.

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## STATEMENTS

### Authorship Contribution

**Sabrina da Silva Nascimento**
General Pharmacist. Master in Comprehensive Health Care, Postgraduate Program in Comprehensive Health Care - Universidade do Noroeste do Estado do Rio Grande do Sul (UNIJUÍ)
https://orcid.org/0000-0002-1742-1915 • sasanascimento8@hotmail.com
Contributions: Conceptualization; Research; Formal Analysis; Writing – review and editing

**Gabriela Elisa Hirsch**
Post-doctorate from the Postgraduate Program in Comprehensive Health Care (PPGAIS; Master's) from the Universidade do Noroeste do Estado do Rio Grande do Sul (UNIJUÍ)
https://orcid.org/0000-0001-5815-2347• ehgabis@yahoo.com.br
Contributions: Research; Formal Analysis; Writing – review and editing

**Caroline Renz Pretto**
Nurse graduated from the Regional University of the Northwest of the State of Rio Grande do Sul - UNIJUÍ (2009). Specialist in Intensive Care Nursing from UNIJUÍ (2011). Specialist in Pharmacology and Drug Interaction from the International University Center of Curitiba/PR UNINTER (2012). Specialist in Family Health from the Open University of the Unified Health System and Federal University of Health Sciences of Porto Alegre - UNA SUS/UFCSPA (2013).
https://orcid.org/0000-0002-6925-7969 • carol.renzpretto@gmail.com
Contributions: Conceptualization; Research; Formal Analysis; Writing – review and editing

**Karine Raquel Kleibert**
Master in Comprehensive Health Care UNIJUÍ/UNICRUZ. Pharmacist graduated from the Regional University of the Northwest of the State of Rio Grande do Sul (2021). Administration technician from the Farroupilha Federal Institute - Santo Augusto Campus.
https://orcid.org/0000-0001-7511-1977 • karine.u.k@hotmail.com
Contributions: Conceptualization; Research; Formal Analysis; Writing – review and editing

**Christiane de Fátima Colet**
Graduated in Pharmacy from the Regional University of the Northwest of the State of Rio Grande do Sul (UNIJUÍ), completed in 2005. Master's and PhD in Pharmaceutical Sciences from the Postgraduate Program in Pharmaceutical Sciences at the Federal University of Rio Grande do Sul.
https://orcid.org/0000-0003-2023-5088 • christiane.colet@unijui.edu.br
Contributions: Conceptualization; Research; Formal Analysis; Writing – review and editing

**Eniva Miladi Fernandes Stumm**
Graduated in Nursing and Obstetrics from the Federal University of Pelotas (1982), Master's in Administration from the Federal University of Rio Grande do Sul (2000) and Doctorate in Sciences from the Federal University of São Paulo (2014).
https://orcid.org/0000-0001-6169-0453 • eniva@unijui.edu.br
Contributions: Conceptualization; Research; Formal Analysis; Writing – review and editing

## Conflict of Interest

The authors have declared no conflict of interest.

## Ethics committee approval

This study is part of the interinstitutional research project "Evaluation of pain, stress and coping in patients and family members in the hospital setting". All ethical aspects governing research involving people were observed, according to Resolution 466/12 of the Ministry of Health, and the project was approved by the Research Ethics Committee, CAAE No. 20835613.6.0000.5350, Consolidated Opinion No. 427.613/2013. All participants were informed about the objectives of the research and signed the Free and Informed Consent Form (FICF).

## Availability of research data and other materials

Research data and other materials can be obtained by contacting the authors.

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