

Original Paper

Open Access

Factors associated with adequate opioid management in pediatric patients admitted to a university hospital

Luís Gustavo LUZ , Livia Pena SILVEIRA , Ronara Camila GROIA-VELOSO ,
Renata Rezende MENEZES , Livia Pereira MACHADO 

Hospital das Clínicas, Universidade Federal de Minas Gerais, Belo Horizonte, Brasil.

Corresponding author: Luz LG, luis_gustavo07@hotmail.com.br

Submitted: 16-01-2025 Resubmitted: 30-06-2025 Accepted: 30-06-2025

Double blind peer review

Abstract

Objective: To describe the factors associated with the appropriate management of opioids in pediatric patients admitted to a university hospital ward. **Methods:** This was a cross-sectional study of 75 patients. Demographic, clinical and pharmacotherapeutic data were collected from the prescription system and electronic medical records. Adequate opioid management was defined as the prescription of schedule dose opioid, rescue doses and drugs to manage adverse reactions to opioids. Quantitative variables were described using medians and interquartile ranges and categorical variables were expressed as absolute and relative frequencies. The association between adequate pain management and the independent variables was analyzed univariately using Pearson's chi-square test. For univariate analysis, the magnitude of the association was expressed by the odds ratio with a 95% confidence interval. **Results:** Of the 75 patients included in the study, 42 (56%) were female. The main comorbidities found were in the Neoplasms group (19; 25%). The median number of comorbidities per patient and length of stay was 3 diseases/patient and 17 days of hospitalization. Around 50% (n=40) of the patients were followed up by the Pediatric Palliative Care Clinic (PPCC) and only 9% (n=7) received opioid-related pharmaceutical intervention. The drug tramadol was the most prevalent (42; 56%). Rescue dosing was found for 36% (n=27) of patients and 49% (n=37) received polyethylene glycol and lactulose for management of opioid-induced constipation. Adequate opioid management was identified in 20% of patients and this variable had a statistically significant association for patients with a length of stay ≥ 17 days, for patients with three or more comorbidities, those who were discharged from hospital and those patients followed up by the CCPP. **Conclusion:** The multiprofessional team is essential for adequate care in highly complex pediatric patients, especially with regard to the adequate use of opioids.

Keywords: analgesics, opioid; integrative palliative care; hospitalized children

Fatores associados ao manejo adequado de opioides em pacientes pediátricos internados em um hospital universitário

Resumo

Objetivo: Descrever os fatores associados ao manejo adequado de opioides em pacientes pediátricos internados em uma enfermaria de um hospital universitário. **Métodos:** Trata-se de um estudo transversal, realizado com 75 pacientes. Os dados demográficos, clínicos e farmacoterapêuticos foram coletados a partir de sistema de prescrição e prontuários eletrônicos. O manejo adequado de opioides foi definido como prescrição de opioide em dose de horário, dose de resgate e de medicamentos para manejo das reações adversas aos opioides. As variáveis quantitativas foram descritas a partir de mediana e intervalo interquartil e as categóricas expressas na forma de frequência absoluta e relativa. A associação entre manejo adequado da dor e as variáveis independentes foi realizada por meio da análise univariada utilizando-se o teste de qui-quadrado de Pearson. Para análise univariada, a magnitude da associação foi expressa pelo odds ratio com intervalo de confiança de 95%. **Resultados:** Dos 75 pacientes incluídos no estudo, 42 (56%) eram do sexo feminino. As principais comorbidades encontradas foram do grupo Neoplasias (19; 25%). A mediana de número de comorbidades por pacientes e tempo de internação foi de 3 doenças/paciente e 17 dias de internação. Cerca de 50% (n=40) dos pacientes foram acompanhados pela Clínica de Cuidados Paliativos Pediátricos (CCPP) e, em apenas 9% (n=7), houve intervenção farmacêutica relacionada ao opioide. O medicamento tramadol foi o mais prevalente (42; 56%). A dose de resgate foi encontrada para 36% (n=27) dos pacientes e 49% (n=37) receberam polietilenoglicol e lactulose para manejo de constipação induzida por opioides. O manejo adequado de opioide foi identificado em 20% dos pacientes e essa variável obteve uma associação estatisticamente significativa para pacientes com tempo de internação ≥ 17 dias, para pacientes com três ou mais comorbidades, aqueles que tiveram alta hospitalar e aqueles pacientes acompanhados pela CCPP. **Conclusão:** A equipe multiprofissional é essencial para uma assistência adequada em pacientes pediátricos de alta complexidade, principalmente no que se refere ao uso adequado de opioides.

Palavras-chave: analgésicos opioides, cuidados paliativos integrativos, criança hospitalizada.



Introduction

Pain is defined as an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage. The inability to verbally communicate pain does not negate the possibility that an individual experiences it or requires appropriate treatment for its relief. In other words, the inability to report pain does not prevent its neurophysiological processing, which occurs simultaneously with child development.^{1,2} According to the World Health Organization (WHO), chronic pain in children is described as a significant global public health concern.³

Early painful stimuli can cause increased pain sensitivity during child development, progression to chronic pain, or negative interference of the child within social or family contexts.⁴ Additionally, exposure to pain early in life is associated with opioid misuse, lower educational attainment, mental health diagnoses, and a higher risk of pain in adulthood.³

In Brazil, the National Council for the Rights of Children and Adolescents (CONANDA) guarantees the right not to feel pain when means to avoid it exist. Its treatment involves identification and quantification through scales according to cognitive development, non-pharmacological measures, as well as the use of safe analgesic medications, including opioid therapy, which is one of the pillars for clinical pain management in hospitalized patients.^{4,5} Healthcare professionals need to understand developmental stages, age group variations, and multiple causal factors beyond tissue injury to properly use assessment tools and pain management strategies according to these specificities.⁶

A variety of opioid medications are available for pain treatment in pediatrics, and these are recommended by the WHO in combination with non-opioid analgesics for managing moderate to severe pain resulting from acute and chronic pain syndromes. However, opioid analgesics are associated with adverse effects such as nausea, itching, paralytic ileus, urinary retention, sedation, and respiratory depression.⁷

Thus, it is important to evaluate the adequacy of opioid treatment to guide more effective interventions tailored to the specificities of pediatric patients, aiming to achieve optimized and safe pharmacotherapy.⁸ Therefore, the objective of this study was to describe the profile of opioid prescriptions as well as factors associated with the appropriate management of opioids in pediatric patients admitted to the wards of a university hospital.

Methods

Study Design and Setting

This is a cross-sectional study conducted in pediatric inpatient units of a university hospital in Belo Horizonte, Minas Gerais, between October and December 2023. The study was carried out in a public hospital that serves as a municipal and state reference center for the care of patients with medium and high complexity diseases. The pediatric beds are divided among the emergency department (12 beds), inpatient wards (67 beds), and intensive care unit (10 beds).

Study Population

Inclusion criteria were patients aged between 28 days and 17 years and 11 months, admitted to the pediatric wards from October to December 2023, who were receiving any opioid medication.

Exclusion criteria included patients with incomplete medical records and/or those hospitalized for less than 24 hours. Thus, from a total of 76 patients who met the previously outlined selection criteria, 75 were included in the study. The only excluded patient had an incomplete medical record. Pediatric patients admitted to the Emergency Department and Pediatric Intensive Care Unit were not included in this study.

Sample Size Calculation

The sample size was calculated using the OpenEpi software (www.OpenEpi.com), based on the number of monthly admissions to each pediatric ward in 2023, according to data from the institution's management system. Thus, a minimum sample size of 74 patients was established to conduct the present study, considering a 95% confidence interval.

Data Collection and Study Variables

Data collection was conducted from October 1, 2023, to December 31, 2023. The data source for all study variables was the electronic prescription and medical record system, the University Hospital Management Application (AGHU).

The study's dependent variable was appropriate opioid management, which, for this study, was defined as the simultaneous prescription of a scheduled opioid dose (dose at established regular intervals), a rescue dose, and medications for the management of opioid-related adverse reactions.⁹

The independent variables were divided into: demographic (sex and age); clinical (comorbidities, length of hospital stay, clinical outcome, whether the patient was followed by the Pediatric Palliative Care Clinic, and whether there was a pharmaceutical intervention); pharmacotherapeutic (opioid prescribed, frequency and dose, initial and final, whether a rescue dose was prescribed, any dose adjustments, pain scale assessments and which professional recorded them, prescription of adjuvant analgesics, management of adverse reactions, concomitant opioid use, and dose adjustments).

Opioid doses were analyzed based on the patient's weight. In the search for adverse reactions related to opioid use, the presence of prescriptions for antihistamines, laxatives, and naloxone was assessed.

The opioids included in the study were: morphine, tramadol, and methadone, in their various pharmaceutical forms, all of which are part of the institution's medication formulary. There were no missing data for any of the study variables.

The initial opioid was defined as the first opioid prescribed for the patient's pain management. The final opioid was defined as the last one prescribed prior to the patient's outcome.

Data Analysis

Statistical analysis was performed using SPSS software, version 25.0. Quantitative variables were described using median and interquartile range (IQR), while categorical variables were expressed as absolute frequency (n) and relative frequency (%). The normality of variable distribution was assessed using the Kolmogorov-Smirnov test.

The association between appropriate pain management and independent variables was evaluated through univariate analysis using Pearson's chi-square test. Categorical variables (age, length of hospital stay, and number of comorbidities) were dichotomized by the median for this analysis. The magnitude of association was expressed as odds ratio (OR) with a 95% confidence interval (CI).

Ethical Considerations

This study is part of the research project entitled "*Safety in the medication use process with a focus on clinical pharmacy in the hospital setting*," approved by the Research Ethics Committee of the Federal University of Minas Gerais (CAAE: 80169717.4.0000.5149, approval number: 4.009.388).

Results

During the study period, a total of 76 potentially eligible patients were identified. However, 1 patient was excluded due to missing data in the medical record. Thus, our sample consisted of 75 pediatric inpatients using opioids in the pediatric wards, of whom 42 (56%) were female, with a median age of 7 years, as shown in Table 1. The main comorbidities found, according to ICD-10 classification, were from the Neoplasms group (19 patients; 25%), followed by Diseases of the Digestive System and Congenital Malformations, each with 14 patients (18.7%).

The median number of comorbidities per patient and length of hospital stay were 3 conditions per patient and 17 days of hospitalization, respectively. Approximately 81% (n=61) of patients were discharged as their clinical outcome, just over 50% (n=40) were followed by the Pediatric Palliative Care Clinic (PPCC), and only 9% (n=7) had a pharmaceutical intervention related to opioid use (Table 1).

Regarding the initial opioid, tramadol was the most frequently prescribed (42 patients; 56%), followed by methadone (21; 28%) and morphine (12; 16%). All initial doses were correctly prescribed according to the institutional protocol (Figure 1). The same medications were identified as the final opioid choice (Table 2). Regarding frequency of administration, most prescriptions were marked as "at the physician's discretion" or "as needed" (34 patients; 45%).

A rescue dose was prescribed for 36% (n=27) of patients, and all were prescribed appropriately. In approximately 87% (n=65) of cases, there was a dose modification, either an increase, decrease, or suspension. Only 4% (n=3) of patients used combined opioids, meaning more than one opioid was used simultaneously. Additionally, 33% (n=25) used adjuvant analgesics, the most common being the anticonvulsant gabapentin (19 patients; 76%). Half of the patients (n=37) received polyethylene glycol (PEG) or lactulose for the management of opioid-induced constipation; these were the only medication classes identified for adverse reaction management. Approximately 67% (n=50) of patients had their pain assessed and

documented in their medical records. In most cases (96%), this was done by the nursing team, with the Visual Analog Scale (VAS) being the most frequently used tool (14 patients; 28%), followed by the FACES scale (13; 26%) and the Numeric Rating Scale (11; 22%).

Withdrawal syndrome was reported in the medical record for only one patient (1%), and only two patients had dose adjustments, one due to renal function (1%) and the other due to hepatic function (1%).

The percentage of appropriate opioid management identified in this study was 20% (n=15). In the univariate analysis (Table 3), a positive and statistically significant association with appropriate opioid management was observed for patients with a hospital stay ≥ 17 days, three or more comorbidities, those who were discharged, and those followed by the PPCC, with p-values of 0.021 (OR: 4.571), 0.005 (OR: 5.500), 0.028 (OR: 0.231), and 0.021 (OR: 4.571), respectively.

Table 1. Demographic and clinical characteristics of the 75 pediatric patients using opioids hospitalized in a university hospital.

Demographic Characteristics	Value	
Sex, n (%)		
Female	42	(56)
Male	33	(44)
Age, Median (IQR)	7	(7-9)
Clinical Characteristics		
CID-10, n (%)		
II Neoplasms (Tumors)	19	(25.3)
XI Diseases of the digestive system	14	(18.7)
XVII Congenital malformations, deformations, and chromosomal abnormalities	14	(18.7)
Number of Comorbidities, median (IQR)	3	(0-9)
Length of Hospital Stay, median (IQR)	17	(2-91)
Patients Discharged, n (%)	61	(81.3)
Patients Followed by the PCC (Palliative Care Clinic), n (%)	40	(53.3)
Pharmaceutical Intervention Related to Opioids, n (%)	7	(9.3)

PCC: Palliative Care Clinic; IQR: Interquartile Range

Figure 1. Recommended opioid doses at the institution

Medication	Route of Administrator	Standardized Dose at the Institution
Tramadol	Oral, Sublingual, Intravenous, Subcutaneous	1–2 mg/kg every 4–6 hours (max: 50–100 mg per dose)
Morphine	Oral, Sublingual	Start: 0.15–0.3 mg/kg every 4 hours (max 10 mg)
Morphine	Intravenous	Start: 0.05–0.1 mg/kg every 4 hours (max 2.5–5 mg per dose)
Morphine	Intravenous – continuous infusion	Total daily dose by continuous infusion over 24 hours or 10–20 mcg/kg/hour (maximum 0.5–1 mg/hour as initial dose)
Methadone	Oral, Sublingual	Start: 0.05–0.1 mg/kg (max 2.5–5 mg) every 8–12 hours (on the first day, the total daily dose can be divided into 4 doses)
Methadone	Intravenous, Subcutaneous	Start: 0.04–0.08 mg/kg (max 2–4 mg) every 8–12 hours

Table 2. Pharmacotherapeutic characteristics of the 75 pediatric patients using opioids hospitalized in a university hospital

Pharmacotherapeutic Variables	Value	
Initial Opioid, n (%)		
Tramadol	42	(56)
Methadone	21	(28)
Morphine	12	(16)
Initial Dose Appropriate, n (%)	75	(100)
Final Opioid, n (%)		
Tramadol	43	(57.3)
Methadone	17	(22.7)
Morphine	15	(20)
Final Dose Appropriate, n (%)	75	(100)
Use of Rescue Opioid, n (%)	27	(36)
Rescue Opioid Dose Appropriate, n (%)	27	(100)
Change in Opioid Prescription, n (%)	65	(86.7)
Combined Use of Opioids, n (%)	3	(4)
Use of Adjuvant Analgesics, n (%)	25	(33.3)
Constipation Management, n (%)	37	(49.3)
Pain Scale Recorded, n (%)	50	(66.7)
Pain Scale Recorded by Nursing Staff, n (%)	48	(96)

Discussion

Pain is a commonly reported symptom among hospitalized pediatric patients. School-aged children and adolescents (4–17 years) who suffer from acute or persistent pain face numerous challenges, such as long periods of hospitalization, frequent readmissions, adverse reactions to pharmacological therapy, interruption of daily activities (such as school absenteeism), difficulties in understanding their diagnosis, and emotional distress due to separation from family members during hospital stays.¹⁰ In addition, these patients are at high risk of developing internalizing symptoms in response to pain, such as fear, depression, and anxiety.¹¹

In their systematic review, King et al. (2011) showed that general pain was more frequently reported in girls than in boys, and they also found an interaction between age and sex, with higher prevalence rates for girls aged 6–7 years (36%) and boys aged 8–10 years (30%) - findings similar to those of the present study.¹¹

This study found that neoplastic diseases were the leading comorbidities associated with hospitalization. Cancer pain is described as “total pain,” as it encompasses multiple dimensions—physical, emotional, and spiritual.¹⁰ It is estimated that over 80% of hospitalized children with cancer experience pain, and relief is achievable through the appropriate use of medications following the WHO analgesic ladder.

Table 3. Univariate analysis of factors associated with adequate opioid management in pediatric patients hospitalized in a university hospital.

Description Variable	Adequate Management		Univariate Analysis	
	Frequency		OR ¹ (95% CI)	p-value
	Yes	No		
Sex			2.573 (0.736 – 8.992)	0.131
Female	11 (73.3%)	31 (51.7%)		
Male	4 (26.7%)	29 (48.3%)		
Age ≥ 7 years			1.500 (0.475 – 4.739)	0.488
Yes	9 (60.0%)	30 (50.0%)		
No	6 (40.0%)	30 (50.0%)		
Length of Hospital Stay ≥ 17 days			4.571 (1.170 – 17.865)	0.021
Yes	12 (80.0%)	28 (46.7%)		
No	3 (20.0%)	32 (53.3%)		
Number of Comorbidities ≥ 3			5.500 (1.554 – 19.468)	0.005
Yes	11 (73.3%)	20 (33.3%)		
No	4 (26.7%)	40 (66.7%)		
Patients Discharged			0.231 (0.065 – 0.824)	0.028
Yes	9 (60.0%)	52 (86.7%)		
No	6 (40.0%)	8 (13.3%)		
Combined Use of Opioids			2.071 (0.175 – 24.499)	0.493
Yes	1 (6.7%)	2 (3.3%)		
No	14 (93.3%)	58 (96.7%)		
Patients Followed by the PCC ²			4.571 (1.170 – 17.865)	0.021
Yes	12 (80.0%)	28 (46.7%)		
No	3 (20.0%)	32 (53.3%)		
Patients with pharmaceutical intervention			3.500 (0.692 – 17.714)	0.138
Yes	3 (20.0%)	4 (6.7%)		
No	12 (80.0%)	56 (93.3%)		

¹OR: Odds Ratio; ²PCC: Pediatric Palliative Care Clinic

This ladder was adapted in 2012 for pediatric populations and includes two steps: the first, for “mild pain,” recommends the administration of non-opioid medications along with adjuvant therapies; the second step, for “moderate to severe pain,” recommends the administration of opioids, non-opioids, and adjuvant therapies.^{13,14}

In the present study, tramadol was the most frequently prescribed opioid. This finding can be explained by the multimodal analgesia strategy adopted by the institution, which is based on the appropriate use of non-pharmacological therapies, non-opioid medications, and, when necessary, opioid medications. This is consistent with the observed prevalence of prescriptions written “at the physician’s discretion” or “as needed,” meaning opioids were administered only when pain was not adequately controlled with non-opioid therapies.¹⁵

It is noteworthy that morphine was infrequently used during the study period, which contradicts WHO recommendations that consider it a first-line strong opioid for the treatment of persistent moderate to severe pain in children. One hypothesis for the underuse of morphine may be fear and lack of knowledge regarding opioid use in pediatric patients, which creates a barrier to effective pain relief. The risks associated with serious side effects and mortality due to medication errors are real but are substantially preventable through proper education in pain management and the implementation of appropriate risk management systems.¹⁴

Adjuvant medications have a primary indication other than pain management but may be co-administered with analgesics to enhance pain relief. Various categories of medications have been investigated for their potential as adjuvants in the treatment of persistent pain and in specific cases such as neuropathic pain, bone pain, and pain associated with muscle spasms.¹⁴ In this study, there was a predominance of the anticonvulsant gabapentin as an adjuvant analgesic, used for the relief of neuropathic pain.¹⁶ This differs from the findings of Carvalho *et al.* (2022), in which, even though 25.9% of patients reported severe pain, only 0.4% used gabapentin as an adjuvant.¹⁷

Pain management should be centered on the patient’s needs, based on assessments of pain intensity along with the pain narrative obtained through communication with the child and their family. However, some authors highlight this as a challenging step, as it requires the use of appropriate tools and theoretical knowledge about pain concepts and child development.¹⁸ Among self-report scales, the Visual Analog Scale (VAS) is the most commonly used, being recommended for children over the age of six who are capable of perceiving, quantifying, and reporting pain, which is consistent with the results found in this study.¹⁹

In the context of appropriate pain management, it is essential to prescribe rescue doses for breakthrough pain—defined as episodes of increased pain intensity despite stable baseline pain—or preventively before painful procedures, such as bathing or dressing changes. In addition, prophylactic use of laxatives should be initiated for all patients receiving opioids, as constipation is a common adverse effect of both strong and weak opioids, for which tolerance does not develop.⁹⁻²⁰ However, in the present study, it was observed that only half of the patients were receiving laxatives (PEG and lactulose), and fewer than half had a rescue dose prescribed.

Regarding appropriate management, a positive and statistically significant association was found among patients with three or more comorbidities. This result reflects a more complex, multidisciplinary, and coordinated follow-up for patients with multimorbidities—who require care from various specialties to ensure that all of their healthcare needs, including medication management, are addressed.²¹

The study also demonstrated a positive association between appropriate opioid management and hospital stays of 17 days or more, as well as between appropriate opioid management and patients who were discharged during the study period. Children and adolescents with complex chronic health conditions require longer hospital stays due to medical care needs that involve clinical decisions, social aspects, and discharge planning. In such cases, close follow-up and parent/caregiver education are crucial, as families must adapt to a new care routine and reorganize their household structure.^{22,23} The multidisciplinary team can guide families through the discharge process on how to handle multiple conditions, manage medical equipment, administer medications correctly, identify warning signs, and promote healthy lifestyle habits. Thus, hospital discharge also represents an opportunity to improve the child’s quality of life, making a holistic approach essential in this context.^{23,24}

Follow-up by the Pediatric Palliative Care Clinic (PPCC) was also associated with appropriate opioid management. This can be defined as comprehensive and dynamic care addressing the child’s body, mind, and spirit. Among the various symptoms affecting children in the final stages of life or diagnosed with chronic progressive diseases with potentially unfavorable or fatal outcomes, pain is the most frequently reported, significantly impairing quality of life. Therefore, its management must be prioritized in care planning.^{25,26}

One of the essential professionals in the PPCC team is the pharmacist, who can assist with interventions aimed at optimizing and increasing the safety of opioid treatment. Additionally, this professional can contribute to reducing hospital length of stay and alleviating pain in patients receiving opioids.²⁷ In this study, the number of pharmaceutical interventions was low, which correlates with the shortage of pharmacy staff at the study site, potentially resulting in increased workload and consequently fewer recorded interventions. This highlights the need for dedicated clinical pharmacists to provide pharmacotherapeutic follow-up for pediatric patients in palliative care.

This study has some inherent limitations typical of retrospective designs, such as the use of secondary data, which may introduce bias due to possible incomplete medical records. However, efforts were made to minimize these biases by excluding patients with missing data and performing a sample size calculation to ensure a more reliable and representative study population, especially since the study was conducted in a high-complexity hospital. Furthermore, it was not possible to present outcome data related to appropriate pain management, such as pain assessment results, patient satisfaction, or quality of life, since these were not documented in medical records. Thus, further studies using other methodologies are needed to evaluate these outcomes.

It is worth emphasizing that this is an innovative study, being the first to identify factors associated with appropriate opioid management in pediatric patients at a high-complexity hospital. The study also holds great relevance as its findings may contribute to improving clinical practices and medication safety in this age group.

Conclusion

This study demonstrated a positive association between appropriate opioid management and patients with a hospital stay of 17 days or more, patients with three or more comorbidities, patients discharged from the hospital, and those followed by the PPCC. Additionally, a high frequency of tramadol use and a low number of pharmaceutical interventions were observed. A multidisciplinary team is essential to provide adequate care for high-complexity pediatric patients, especially regarding the appropriate use of opioids.

Funding Sources

This research received no funding.

Contributors

Luz LG and Silveira LP collected the data. Groia-Veloso RC performed data analysis and interpretation. All authors contributed to the conception and design of the study, data interpretation, and manuscript writing. Silveira LP and Groia-Veloso RC critically revised the manuscript's content. All authors approved the final version of the manuscript.

Conflict of Interest Statement

The authors declare no conflicts of interest related to this article.

References

1. DeSantana JM, Perissinotti DM, Junior JO, et al. Definição de dor revisada após quatro décadas. *Braz J Pain*. 2020;3(3):197-198. doi:10.5935/2595-0118.20200191.
2. Doca FNP. A dor pediátrica no contexto de internação em hospitais públicos do Distrito Federal (DF). Brasília: Universidade de Brasília;2014.
3. Lambarth A, Katsoulis M, Ju C, et al. Prevalence of chronic pain or analgesic use in children and young people and its long-term impact on substance misuse, mental illness, and prescription opioid use: a retrospective longitudinal cohort study. *Lancet Reg Health Eur*. 2023;35:100763. doi:10.1016/j.lanepe.2023.100763
4. Binotto NS, Gabani FL, Júnior AL, et al. Implantação de protocolo para tratamento farmacológico da dor na criança hospitalizada. *Braz J Pain*. 2021;4(2):124-9. doi: 10.5935/2595-0118.20210024.
5. Fields HL. O dilema do médico: analgésicos opiáceos e dor crônica. *Neuron*. 2011;69(4):591-4. doi:10.1016/j.neuron.2011.02.001.
6. Doca FN, Costa-Junior AL, Finley GA, et al. Pain in pediatric inpatients: Prevalence, characteristics, and management. *Psicol Neurosci*. 2017;10(4):394-403. doi: 10.1037/pne0000094.
7. O'Donnell FT, Rosen KR. Pediatric pain management: a review. *Mo Med*. 2014;111(3):231-237.
8. Matson KL, Johnson PN, Tran V, et al. Opioid Use in Children. *J Pediatr Pharmacol Ther*. 2019;24(1):72-75. doi:10.5863/1551-6776-24.1.72
9. Hauer J, Duncan J, Scullion BF. Pediatric pain and symptom management guidelines. Boston: Dana Farber Cancer Institute/ Boston Children's Hospital Pediatric Advanced Care Team;2014.
10. Nóbrega RD, Collet N, Gomes IP, et al. Criança em idade escolar hospitalizada: significado da condição crônica. *Texto Contexto Enferm*. 2010;19(3):425-33. doi: 10.1590/s0104-07072010000300003
11. King S, Chambers CT, Huguet A, et al. The epidemiology of chronic pain in children and adolescents revisited: a systematic review. *Pain*. 2011;152(12):2729-2738. doi:10.1016/j.pain.2011.07.016
12. Morete MC, Minson F. Instrumentos para a avaliação da dor em pacientes oncológicos. *Rev Dor*. 2010;11(1):74-80.
13. Araújo CM, Oliveira BM, Silva YP. Avaliação e tratamento da dor em oncologia pediátrica. *Rev Med Minas Gerais*. 2012;22(Supl 7):S22-S31.
14. World Health Organization (WHO). Guidelines on the Pharmacological Treatment of Persisting Pain in Children with Medical Illnesses. Geneva: WHO;2012
15. Martins TP, Souza DM, Souza DM. Uso da anestesia multimodal no tratamento da dor pós-operatória. *Braz J Pain*. 2023;6(4). doi:10.5935/2595-0118.20230075-pt.
16. Toste S, Palhau L, Amorim R. Dor Neuropática em Idade Pediátrica Neuropathic Pain in Children. *Rev Soc Port Med Fis Reabil*. 2015; Vol27; Nº1.
17. Carvalho JA, Souza DM, Domingues F, et al. Manejo da dor em crianças hospitalizadas: Estudo transversal. *Rev Esc Enferm USP*. 2022;56:e20220008. doi:10.1590/1980-220x-reeusp-2022-0008pt.
18. American Academy of Pediatrics. Committee on Hospital Care and Child Life Council: Child Life Services. *Pediatrics*. 2014;133(5):1471-1478. doi:10.1542/peds.2014-0556.
19. Santos SL, Souza DM, Machado KC, et al. Escalas de avaliação da dor em pacientes pediátricos. *Rev Cad Pedagóg*. 2024;21(10):e9633. doi: 10.54033/cadpedv21n10-296.
20. Parikh JM, Amolenda P, Rutledge J, et al. An update on the safety of prescribing opioids in pediatrics. *Expert Opin Drug Saf*. 2019;18(2),127-143. doi: 10.1080/14740338.2019.1571037

21. Leach KF, Stack NJ, Jones S. Optimizing the multidisciplinary team to enhance care coordination across the continuum for children with medical complexity. *Curr Probl Pediatr Adolesc Health Care.* 2021;51(12):101128. doi:10.1016/j.cppeds.2021.101128
22. Moreira MCN, Albernaz LV, Sá MRC, et al. Recomendações para uma linha de cuidados para crianças e adolescentes com condições crônicas complexas de saúde. *Cad Saude Publica.* 2017;33(11):e00189516. doi:10.1590/0102-311X00189516
23. Klein K, Issi HB, Souza NS, et al. Dehospitalization of technology-dependent children: the perspective of the multiprofessional health team. *Rev Gaucha Enferm.* 2021;42:e20200305. doi:10.1590/1983-1447.2021.20200305
24. Peeler A, Nelson K, Agrawalla V, et al. Living with multimorbidity: A qualitative exploration of shared experiences of patients, family caregivers, and healthcare professionals in managing symptoms in the United States. *J Adv Nurs.* 2024;80(6):2525-2539. doi:10.1111/jan.15998
25. Sociedade Brasileira de Pediatria. Cuidados paliativos pediátricos: o que são e qual sua importância? Cuidando da criança em todos os momentos. Departamento Científico de Medicina da Dor e Cuidados Paliativos; 2021.
26. da Costa TF, Ceolim MF. A enfermagem nos cuidados paliativos à criança e adolescente com câncer: revisão integrativa da literatura. *Rev Gaucha Enferm.* 2010;31(4):776-784. doi:10.1590/s1983-14472010000400023.
27. Wiese JRP, Gonçalves SA. A importância do profissional farmacêutico no acompanhamento de pacientes oncológicos em cuidados paliativos: uma revisão integrativa. *RECIMA21.* 2023;4(11):e4114378. doi:10.47820/recima21.v4i11.4378.