Prevalencia de dolor en pacientes pediátricos bajo tratamiento oncológico en el Instituto Nacional de Cancerología – INC

Prevalence of pain in pediatric patients undergoing cancer treatment at the Colombian National Cancer Institute - INC.

Título corto: Prevalencia de dolor en pediatría - Prevalence of pain in pediatric

Resumen

Introducción: Los niños hospitalizados continúan experimentando dolor con intensidad moderada a severa en un 25-64% durante el ingreso hospitalario, a pesar de esto dicho síntoma en la población pediátrica es subdiagnosticado y subtratado.

Objetivo: Caracterizar la presencia de dolor durante las primeras 24 horas de ingreso a salas de hospitalización en pacientes entre los 3 a 17 años en tratamiento oncológico, hospitalizados en el INC de la ciudad de Bogotá.

Metodología: Estudio observacional descriptivo, retrospectivo. Se obtuvo la frecuencia de dolor en pacientes menores de 18 años en tratamiento oncológico, mediante la

revisión de historias clínicas para obtener la presencia de dolor durante las primeras 24 horas de ingreso a salas de hospitalización.

Resultados: Se incluyeron en total 193 pacientes pediátricos. La prevalencia de dolor en la población pediátrica durante las primeras 24 horas de hospitalización fue de 40.4% (IC95%: 33.4% a 47.7%). La escala de dolor más utilizada fue numérica análoga en el 67.9 % de los niños con una mediana de edad de 13 años (RIC=5). La mayoría de los niños presentó dolor leve (63.6%). Las causas de dolor reportadas fueron en la mayoría de los pacientes relacionado con la enfermedad de base (58 pacientes, 74.36%), seguido de procedimientos quirúrgicos (21.7%).

Conclusión: El dolor en los niños con enfermedades oncológicas es prevalente, por tanto, es imperante hacer una evaluación exhaustiva y temprana de este síntoma durante el acto médico, dado que durante años ha sido subdiagnosticado, y por lo tanto subtratado.

Palabras claves: Dolor, pediatría, prevalencia.

Abstract

Introduction: Hospitalized children continue to experience pain ranging in intensity from moderate to severe in 25-64% of the cases during hospital admission. Nevertheless, this symptom remains underdiagnosed and undertreated in the pediatric population.

Objective: To characterize the presence of pain within the first 24 hours of hospital admissions in patients aged 3 to 17 undergoing cancer treatment, hospitalized at the Colombian National Cancer Institute (INC) in the city of Bogota.

Methods: Descriptive, observational and retrospective study. The frequency of pain in patients under 18 years of age undergoing oncologic treatment was obtained by reviewing medical records to assess the presence of pain during the first 24 hours of hospital admission.

Results: A total of 193 pediatric patients were included. The prevalence of pain in the pediatric population during the first 24 hours of hospitalization was 40.4% (95% CI: 33.4% to 47.7%). The most common pain scale used was the numeric pain rating scale in 67.9% of the children with a median age of 13 years (IQR=5). Most of the children showed mild pain (63.6%). Among the causes of pain reported in the patients the most common were

causes related to the underlying disease (58 patients, 74.36%), followed by surgical procedures (21.7%).

Conclusion: Pain in children with cancer is more prevalent. Therefore, it is crucial to make an early and in-depth assessment of pain while under medical care, as this symptom has been underdiagnosed for years, and therefore undertreated.

Keywords: pain, pediatrics, prevalence.

Introduction

Pain is an unpleasant sensory and emotional experience related to actual or potential tissue damage; it is a highly prevalent symptom in hospital wards and an important cause of emergency department visits, both in children and adults. Pain relief has been recently considered a human right, for it causes intense physical, emotional, social and psychological suffering, not only in the afflicted but also in their family (1).

Pain is a highly frequent symptom, known to account for 78% of the emergency department visits; (2) hospitalized children continue to experience pain ranging from moderate to severe intensity in 25-64% of the cases during hospital admission (3). Although it has been considered the “fifth vital sign,” some studies suggest that it is not

being routinely measured (4). Friedrichsdorf et al. describe that up to 58% of hospitalized patients in the United States experience pain, but it is not reported in medical records (3). Furthermore, during the early stages of development there are limitations to express pain and there is a lack of knowledge about how to assess it, which leads to it not being routinely measured and therefore remaining underdiagnosed and undertreated. This could indicate a desensitization of the healthcare personnel, something more pronounced with toddlers or preschoolers, due to the cognitive characteristics of this population (5).

For the proper assessment and management of pain in the pediatric population, the correct application and interpretation of pain rating scales must be considered; as, depending on the age, psychomotor development and communication skills of children, there are several reliable, clinically sensitive and supported tools to identify pain (6,7). For neonates, one of the scales used is the PIPP (premature infant pain profile), which measures 3 behavioral items (gestures: frowning, eye squeezing and nasolabial fold), 2 physiological items (heart rate, oxygen saturation) and 2 contextual items (gestational age and behavioral status). In infants and toddlers, the most commonly used scale is FLACC (abbreviation for Face, Legs, Activity, Cry and Consolability), which evaluates 5 behaviors, each of which is given a score from 0 to 2, with a maximum score of 10 (maximum pain) (8). For children aged 4 to 12 years, several tools can be used to assess

pain. If developmental skills make it difficult to use numerical scales, image-based pain scales are used, such as the Faces Pain Scale - Revised (FPS-R), where the child is asked to pick 1 out of 6 neutral faces to accurately reflect their pain with a score ranging from 0 to 10(6). In children older than 8 years who can understand abstract concepts, the visual analogue scale can be used, which uses a vertical or horizontal line (100 mm), where the 2 extremes represent those of pain ranging from "no pain" to "worst pain". Numbers can also be included below the line, where the child can mark on the line their pain level, then the distance from the left end of the scale to the mark made by the patient is measured, which yields the pain score. The Numeric Pain Rating Scale (NPRS) going from 0 to 10 can also be used in this age range, with zero indicating the absence of pain and 10 the worst pain, as long as the child is able to count. (9)

Sadly, for decades it has been thought that children are less able to perceive pain, a thought held by false beliefs such as children having a low neurological development and a poor capacity to remember painful events. In addition, there's the thought that treatment in children may be subtherapeutic due to the risk of adverse events or complications. (10) Pain should be treated early in everyone, especially children, since it has a negative impact on psychological, motor and neurological development as well as on pain perception during adulthood (11).

To date, there are few studies about pain prevalence in the pediatric population in Colombia, and none have been carried out in the oncologic pediatric population which is more vulnerable to suffer from this symptom. Therefore, it is difficult to measure the severity of this problem. This suggests that the negative impact on the quality of life of these children could be underestimated. Therefore, it is important to have clear statistics on the prevalence of pain and its related factors, for this allows us to make proposals for assessment and management, as well as to encourage new research to positively impact the quality of life of pediatric patients and their caregivers. Since the Colombian National Cancer Institute is the main national reference center for the management of oncologic pathologies in children, the pain characterization in this institution could provide an estimate of the current state of pain in the pediatric population at regional and national level.

Objective: To characterize the presence of pain within the first 24 hours of hospital admissions in patients aged 3 to 17 undergoing cancer treatment, hospitalized at the Colombian National Cancer Institute (INC) in the city of Bogota.

Specific aims:

- To describe demographic and clinical characteristics of the study sample.

- To estimate the frequency of pain in patients under the age of 18 undergoing oncologic treatment.

- To describe the pharmacological and non-pharmacological interventions for pain management received by patients under the age of 18 undergoing cancer treatment.

Methods

A retrospective descriptive observational study that aims to characterize the presence of pain in pediatric patients aged 3 to 17, undergoing cancer treatment while hospitalized in a quaternary care referral center (Colombian National Cancer Institute) in the city of Bogota, determining the demographic and clinical characteristics of the study sample. The frequency of pain in patients under 18 years of age undergoing oncological treatment was obtained by evaluating the presence of pain within the first 24 hours of hospital admission. Finally, the pharmacological and non-pharmacological interventions carried out for the management of pain received by patients aged under 18 undergoing cancer treatment were described.

The study included patients aged 3 to 17 hospitalized in pediatric wards, and who were assessed for pain within the first 24 hours of admission. Children diagnosed with a

cognitive or sensorimotor dysfunction which prevented an adequate process of the instruments used in the study, such as organic mental disorders, schizophrenia, schizotypal disorders, delusional disorders, mental retardation, cerebral palsy and other paralytic syndromes, and patients in the intensive or intermediate care unit as well as emergency rooms were excluded.

A medical record review was performed, with the first patients who completed the eligibility criteria entering the study in the June 2022 to June 2023 period. Considering a sample size of at least 175 patients, with a confidence interval of 95%, Confidence interval width: 15%, Estimated proportion of 0.4(10) However, to preserve the precision of the estimators and in view of the possible loss of data, the previous sample size was overestimated by 10%, leaving 193 patients as the definitive sample.

The statistical analysis was performed in R-Project v4.2.3 software. Descriptive statistics were used to characterize the population under study. In the case of qualitative variables, they were described by absolute and relative frequencies. Means or medians together with their respective measure of variability (standard deviation or interquartile range) were used depending on the distributional form of the quantitative variables. The prevalence of pain was estimated through a proportion, using as numerator the accumulated number of detected cases of pain during the study period, and as denominator the accumulated

number of hospitalized patients during said period. The prevalence was reported with its respective 95% confidence interval.

This study will be conducted in accordance with resolution number 8430 of 1993 and law 2378 of 2008 that regulates clinical research in Colombia and the declaration of Helsinki, the international agreement on human research ethics. As this is a retrospective study, the resolution considers it an ethically safe investigation.

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Results

A total of 193 pediatric patients (aged 3 to 17 years) were included, the median age was 12 years (IQR 8), 55% of the patients were male and most patients were from urban areas (64%). The most frequent caregiver was the mother (78%) followed by the father (13%). 48.2% of the children had solid tumors, followed by leukemias with 34.2% of the cases. Some children had a past medical history with non-oncologic diagnoses (n = 30, 15.5 %), from which 20.0 % (n = 6) were associated to mental disorders, such as anxiety disorder and depression, and 80 % with other diseases such as heart disease, asthma, pulmonary embolism, thrombosis, epilepsy, herpes, among others (see Table 1).

The prevalence of pain in the pediatric population within the first 24 hours of admission was 40.4% (CI95%: 33.4% to 47.7%), this was higher in girls than in boys (41.4 % vs 36.8 %). The highest prevalence was found in those aged older than 12 years 52.7 % (IC95% 41.5 - 63.7). In detail, the highest prevalence was found in patients with solid tumors 48.4 % (95%CI38.5 - 58.4) and the lowest in patients diagnosed with central nervous system tumors 27.8 % (95%CI12.5 - 50.9). In 93% (n=179) of children, pain was assessed immediately at the first contact with the physician.

The most used pain rating scale in this cohort was the numerical rating scale in 68% of children with a median age of 13 years. Only in one 4-year-old patient the pain was assessed using the facial scale, and the only patient who used the FLACC was 11 years old, since he was unable to use any other instrument. The chief complaint was related to pain in only 28 children (15%), the rest of the patients visited the service due to causes different to pain such as infection, chemotherapy, lab tests, among others.

Most of the children presented with mild pain (63.6%), followed by moderate pain (22%) while a minority of patients presented severe pain (14.2%). (See chart 1) Only 2 patients within the severe pain category presented with the maximum pain score of 10/10. And finally, in one patient pain was documented but the severity was not assessed. Among the causes of pain reported in the patients the most common were causes related to the

underlying disease (58 patients, 74.36%), followed by surgical procedures (21.7%), and pain caused by acute infections in third place (8.97%). In one patient the pain was reported as caused by neuropathy due to chemotherapy and in another patient due to mucositis. There were no reports in the medical records about pain caused by lumbar puncture, venipuncture nor wound dressing.

In regard to pain management strategies, in the group of patients who presented pain within the first 24 hours of admission N=78, non-pharmacological therapy was performed and reported in 31 patients (40%), with physical therapy and psychotherapy being the most frequent, both with 21%, followed by occupational therapy 6%. None of the patients who expressed pain underwent distraction with the goal of having analgesic control. On the other hand, pharmacological strategies for pain relief were reported in 73 out of the 78 patients who presented pain (94%).

Among the most commonly used pharmacological strategies in patients who presented pain during the first 24 hours of hospitalization, the most used therapy was paracetamol (76%), followed by the use of neuromodulators (47%), dipyrone (46%) and opioids (45%). To a lesser extent, other strategies such as nonsteroidal anti-inflammatory drugs, anticholinergics, lidocaine infusion therapy and interventional management were used. In no patient was Ketamine infusion used. Patient-controlled analgesia (PCA) with opioids

was used in 4 patients (Table 2). It is important to highlight that a patient may report more than one pharmacological therapy (Charts 2 and 3).

The use of different pharmacological groups was also evaluated in the total population, as the absence of pain within the first 24 hours of hospitalization did not necessarily mean that patients could not use analgesics on an outpatient basis, whether through medication reconciliation or needed at another time during hospitalization; therefore, 53% of the total population received paracetamol, followed by 25% who received dipyrone and only 5% who received some other type of non-steroidal anti-inflammatory medication. Twenty-six percent received at least one neuromodulator at some time during hospitalization and 23% received at least one opioid, either weak or strong. Within this group no child was on methadone, buprenorphine nor fentanyl.

Referral to pain and palliative care was present in 67 patients (35%), regardless of whether the patient was in pain or not.

Discussion

This study carried out in the pediatric cancer population which aimed to assess the prevalence of pain found that the main companion in this group of patients are first degree

relatives, mainly the mother, which fits with the majority of studies that evaluated this type of demographic characteristics. In addition, in our study a large part of the patients came from urban areas as has been seen in other reports, which may be due to the fact that the rural population is normally underrepresented, possibly due to less access to healthcare services(12). The sex distribution in the total general population was higher in males than in females, yet, the prevalence of pain was slightly higher for the female gender. A systematic review was conducted in 2024 on the prevalence of chronic pain in the pediatric population where girls were found to have a higher prevalence of chronic pain 18.3% compared to boys 12.7%(13). Almost half of the children who were part of this study had solid tumors, followed by leukemia, and to a lesser extent central nervous system tumors and lymphomas; contrary to what was found in other studies where the frequency of leukemia, neuroblastomas and central nervous system neoplasms are higher (14).

The prevalence of pain within the first 24 hours of admission in the pediatric cancer population was found to be 40%, higher than those reported in other studies where children in general hospitals were assessed, both in hospitalization and in the emergency department. For instance, in two studies carried out in Uruguay the prevalence of pain was 15% and 34% (10,15). In another study carried out in Colombia the prevalence of pain was only 12%, much lower than ours. However, this can be explained, since only the

crying scale was used there to assess the prevalence, also they were infants and toddlers in whom it could be more difficult to identify pain and it was done on a non cancer population, where the prevalence and severity of pain is lower (12).

It is important to emphasize that we measured the prevalence of pain at a specific point of admission (only the first 24 hours), yet, when comparing with studies where the assessment was done during the entire hospitalization, the prevalence was higher in those studies. Possibly because the measurement time was much longer. Hence, in the study conducted by Zunino et al in 2018, the prevalence of general pain was greater than 50%. However, in this same report they also assessed the pain prevalence at the intervention time only, and in this case it was only 15%(16).

On the other hand, when compared with studies that assessed the prevalence of pain in the pediatric cancer population, ours is lower. In an Italian study where the prevalence of pain was evaluated in a tertiary care center in the areas of surgery and hematoncology, prevalence was 55%. It should be noted that as previously mentioned, the evaluation of pain in this study was also performed at any point of hospitalization. In addition, surgical patients were also included which are those with the highest reported pain prevalence (17). In a study conducted in Canada in 2017, the prevalence of pain in pediatric patients with a cancer diagnosis, both active and in remission was higher than ours (50% versus

40%); yet, in this study, the prevalence of pain was assessed surveying parents and during a longer period (pain one month prior to conducting the survey) ((14).

It should be noted that few studies have evaluated prevalence within the first 24 hours of admission in pediatric patients and none in a cancer-only population in our context. It is also important to note that the lower prevalence compared to other studies in this population may be due to factors such as time of evaluation of the symptom, but also to underdiagnosis and poor sensitivity of physicians while detecting pain which leads to less instances of pain registered in medical records, which is why this study invites further prospective research on pain assessment in this population as well as training of healthcare personnel who work with this group of patients.

Pain intensity reported in our study was described as mild in more than 50% of the patients, this coincides with the findings in other cohorts in which mild pain has been described as the most common in the pediatric population, followed by moderate and lastly by severe pain (15,16,18). However, it is important to mention that the results of pain intensity have been quite heterogeneous, since this can be influenced by the age of the child, the type of acute or chronic pathology, the activity that the patient is performing at the time of assessment and comorbidities, thus in the same study it was found that

36% of patients experienced severe pain during rest, yet, this rose to 58% when moving (19).

It is a crucial to emphasize that, although in our study most children showed mild pain, this symptom should not be disregarded, as some studies describe much higher prevalences of severe pain, even higher than mild and moderate pain ((20). On the other hand, pain in children is a problem, since it is underdiagnosed and, as observed in our study, there continues to be a lack of knowledge of the instruments for pain assessment, so training should be provided to all healthcare personnel working with this population routinely assessing it.

It is clear that the approach to pain and its diagnosis in the pediatric population continues to be a challenge, mainly because underreporting persists, and it does more when it is not assessed by experts, as it represents a great challenge, both for the professionals who work directly with the patients as it does for the general team. This is clearly reflected in our study, where procedures such as venipuncture, wound dressing and lumbar punctures were not evaluated by the professionals as causes of pain and, therefore, the minors did not receive any management there. The causes of pain reported in our study were in most patients related to the underlying disease (58 patients, 74.36%), followed by surgical procedures (21.7%), and pain secondary to acute infection in third place

(8.97%). In one patient the pain was reported as caused by neuropathy due to chemotherapy and in another patient due to mucositis. However, the literature reports that the most frequent causes of pain during hospitalization are surgical causes, in addition to minor procedures such as venipuncture (12,15).

With regard to treatment, it is essential to consider both pharmacological and non-pharmacological treatment. Studies have shown that non-pharmacological treatment for pain in children is arising greater interest in patients and relatives, as they are effective and have fewer adverse effects; some of the most commonly used include distraction games, music therapy, virtual reality, hospital clowns and hypnosis (21,22). In our work, non-pharmacological therapy aiming to control pain was registered in 40%, with physical therapy and psychotherapy being the most frequently used, both with 21%, followed by occupational therapy 6%. None of the patients who expressed pain underwent distraction with the goal of having analgesic control. Our data shows a much higher use of non-pharmacological therapy than that reported in other studies, where the use of non-pharmacological therapy was documented in 6.3% of children and young people (23) (24).

The most used pharmacological treatment in our study was paracetamol, which coincides with a large number of studies, both in cancer and non-cancer pediatric populations (14).

A striking finding in our study is that the second most used pharmacological group was neuromodulators, which contrasts with other studies where dipyrone is the second and even sometimes the most used drug (16). It should be noted that regarding treatment, some studies show some very worrisome data, where only 48.8% of the cases had an adequate analgesia prescription in terms of dosage and only 43.1% of the patients in terms of frequency (15).

As has been mentioned, pain in pediatrics goes underdiagnosed and therefore undertreated. However, this is not the only symptom that is overlooked in the pediatric population, which has resulted in less referrals to palliative care services. Also, parents and patients are afraid of being referred to these services, but even physicians who, either due to lack of knowledge or fear, do not refer those who would have an indication due to the disease they suffer, life expectancy or poor symptoms control. Even political and logistic barriers have been identified for referral to these services (24). This is the case of our study where only 35% of patients had access to palliative care during their hospitalization despite the service being present in the institution.

Finally, it should be noted that as previously discussed in our study as well as other studies previously conducted in both the cancer and non-cancer pediatric population, there are deficits detecting and managing pain. This is an invitation for healthcare

personnel working with the pediatric population to be trained to detect and treat pain, thus impacting the quality of life of patients and families.

Conclusions

1. When compared with studies in other pediatric populations, pain in children with cancer is more prevalent. Therefore, it is crucial to make an early and in-depth assessment of pain while under medical care, as this symptom has been underdiagnosed for years, and therefore undertreated.
2. According to the results of our study, most patients showed pain secondary to the underlying cancer diagnosis. However, in landmark studies, the main cause of pain is associated with venipuncture, which suggests that frequent stimuli that could be painful for children may go overlooked and that an active search for pain in the pediatric oncology population should be conducted.
3. Palliative care in the pediatric population continues to be an underutilized resource; in our cohort less than half of the patients were referred to this service during hospitalization.

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Table 1: Population Characteristics

Pediatric cancer population		N=193
Age (median)		12 years old (IQR 8)
Male (%)		106 (54,9%)
Urban origin (%)		123 (63,7%)
Caregiver	Mother	151 (78,2%)
	Father	26 (13,5%)
	Other relatives	11 (5,7%)
	Other, non-caregiver	2 (1,0%)
	No caregiver	3 (1,6%)
Cancer diagnosis	Solid	93 (48,2%)
	Leukemia	66 (34,2%)
	CNS	18 (9,3%)

	Lymphoma	14 (7,3%)
	Other	2 (1,0%)
Pain related chief complaint (%)		28 (14,5%)
Referral to Pain and palliative care		67 (34,7%)

Table 2: Characteristics of pain presenting patients

Patients with pain			N=78
Pharmacological approach			73 (94%)
	Paracetamol		59 (76%)
	Neuromodulators		37 (47%)
	Dipyrone		36 (46%)
	Opioid		35 (45%)
	Non-steroidal anti-inflammatory drugs		9 (12%)
	Anticholinergic: hyoscine		6 (8%)
	Other	Lidocaine infusion	5 (6%)
		Lidocaine patch	4 (5%)
		Dexamethasone	3 (4%)

		Interventionist management	2 (3%)
		Analgesic radiation therapy	2 (3%)
Non-pharmacological approach			46 (59%)
	Physical therapy		16 (21%)
	Psychotherapy		16 (21%)
	Occupational therapy		6 (8%)

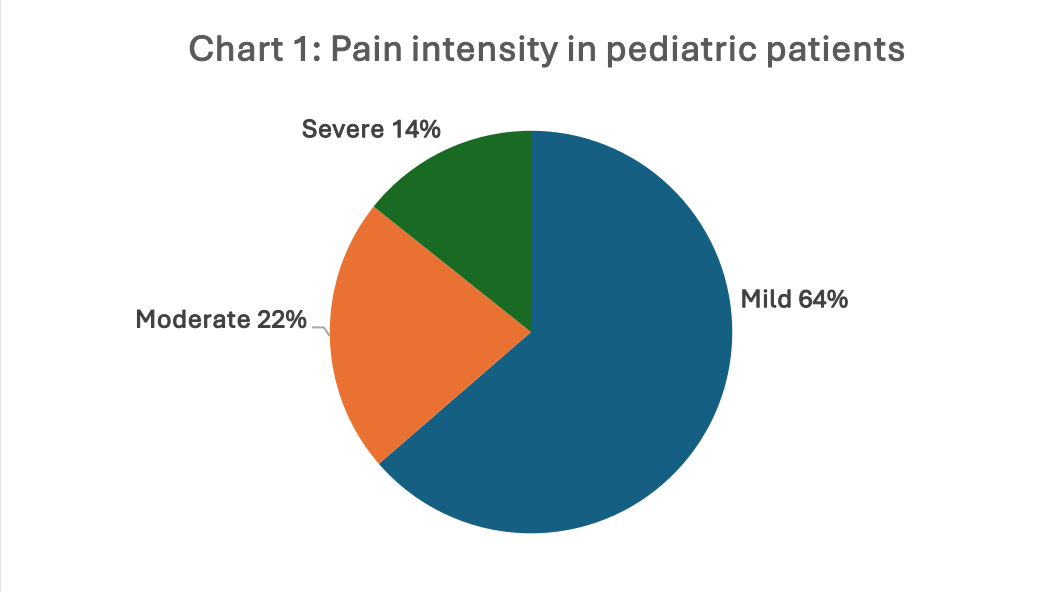

Chart 1: Pain intensity in pediatric patients

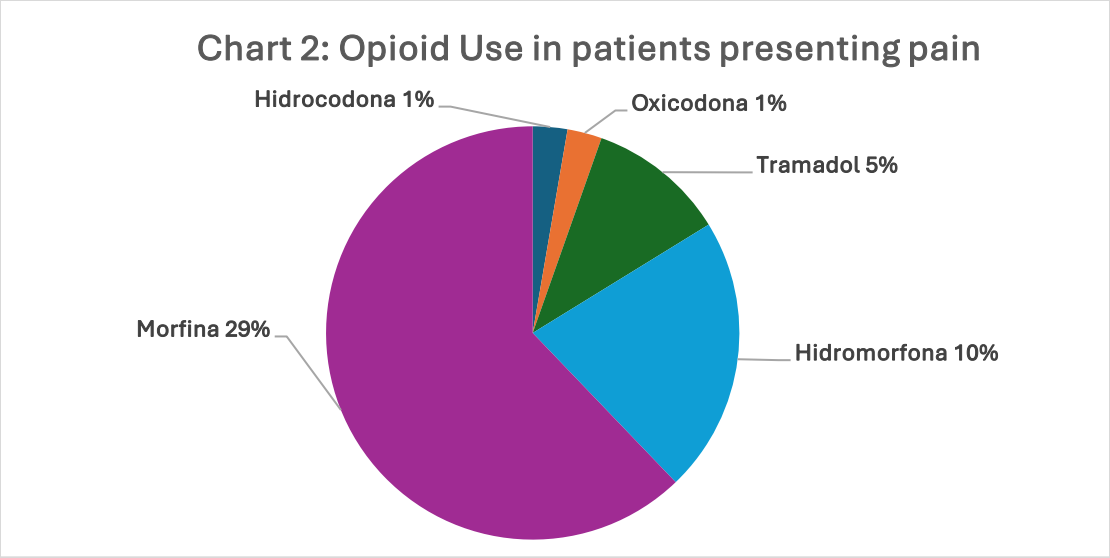

Chart 2: Opioid use in patients presenting pain

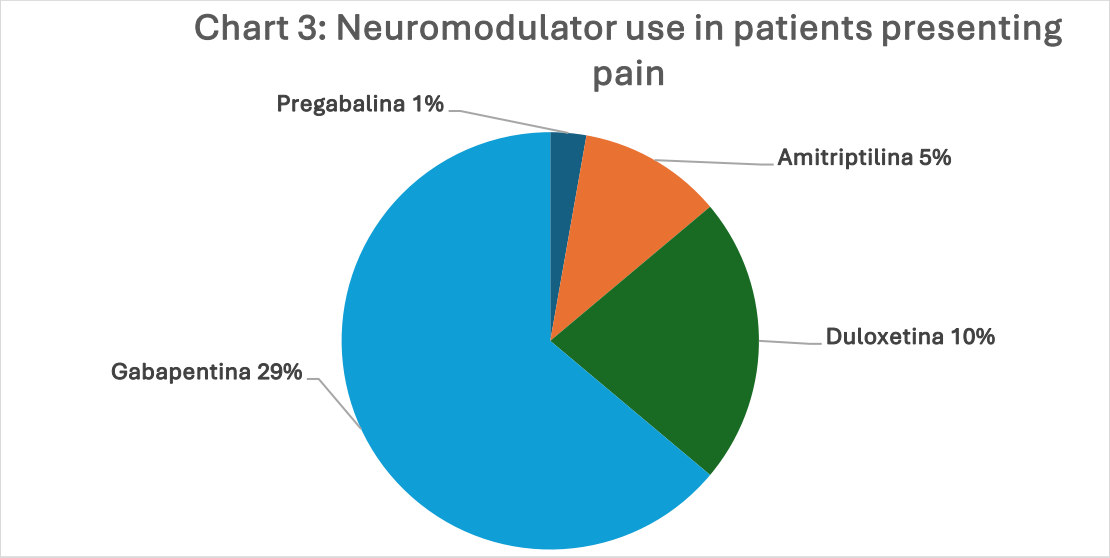

Chart 3: Neuromodulator use in patients presenting pain