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Prevalence of pain in hospitalized patients in the Neurosurgery Service of a Tertiary University Hospital in Madrid, Spain

Prevalencia del dolor en pacientes hospitalizados en el Servicio de Neurocirugía de un Hospital Universitario Terciario en Madrid, España

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Abstract

Objectives: to measure the prevalence and intensity of acute pain in hospitalized patients in the Neurosurgery Service of a Tertiary Hospital, using a numerical verbal scale, the Visual Analogue Scale (VAS) for its evaluation. Material and methods: observational, cross-sectional study to evaluate acute pain. All patients admitted to the ward during November 2019 are included and those with limitations to understand or evaluate pain according to VAS are excluded. Results: of the total of 120 patients admitted to the ward during the study period, 40 were excluded because they did not meet the inclusion criteria. Eighty patients with a high prevalence of pain (76.61%) were analyzed, with a mean score of 3.47 0.78. Of those who report pain, 20% is mild, 40% moderate and 40% intense. For pathologies, the highest values correspond to post-intervention. Hospital analgesic protocols were applied in all cases and no patient went to the emergency room due to pain after hospital discharge. The main limitation of the study was that the VAS score was not adequately collected in all patients. Conclusions: the prevalence of pain in a neurosurgery ward is high (76.61%), with average scores (3-4, moderate pain) that require improving our analgesic strategies and its measurement. Malignant diseases, predominantly intracranial, were associated with greater pain.

Keyword: pain, neurosurgery, hospitalization, visual analog scale, clinical protocols.

Resumen

Objetivos: medir la prevalencia e intensidad del dolor agudo en pacientes hospitalizados en el Servicio de Neurocirugía de un Hospital Terciario, utilizando una escala verbal numérica, la Escala Visual Analógica (EVA) para su evaluación. Material y métodos: estudio observacional, transversal, para evaluar el dolor agudo. Se incluyen todos los pacientes ingresados en planta durante noviembre del 2019 y se excluyen aquellos con limitaciones para entender o evaluar el dolor según EVA. Resultados: del total de 120 pacientes ingresados en planta durante el periodo de estudio, son excluidos 40 por no cumplir los criterios de inclusión. Se analizan 80 pacientes que presentan elevada prevalencia de dolor (76,61%), con una puntuación media de 3,47 ± 0.78. De los que refieren dolor, en un 20% es leve, 40% moderado y 40% intenso. Por patologías los valores más elevados corresponden a post-intervención. Los protocolos analgésicos del Hospital se aplicaron en todos los casos y ningún paciente acudió a urgencias por dolor tras el alta hospitalaria. La principal limitación del estudio fue que no en todos los pacientes se recogió adecuadamente la puntuación EVA. Conclusiones: la prevalencia de dolor en una planta de neurocirugía es elevada (76,61%), con unas puntuaciones medias (3-4, dolor moderado) que requieren mejorar nuestras estrategias analgésicas y la medición del mismo. Las enfermedades malignas, de predominio intracraneal, se asociaron con mayor dolor.

Palabras clave: dolor, neurocirugía, hospitalización, escala visual analógica, protocolos clínicos.

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Introduction

In-hospital pain is one of the main reasons for patient-referred discomfort and is associated with delayed recovery and increased hospital stay (1). In addition, the intensity of acute postoperative pain increases the risk of developing persistent pain (2) and contributes to postoperative morbidity and mortality (3). It has been shown that proper pain control helps to prevent or reduce complications such as respiratory or cardiovascular problems (4). On the other hand, between 5 and 50% of adults who are admitted to a neurosurgical department develop persistent pain, which has a great negative impact on the patient's quality of life (5).

In this context, poor control of acute post-surgical pain 2 hours after surgery correlates with the pain suffered by the patient at home (6). Moreover, the persistence of postoperative pain after discharge is responsible for up to 9% of hospital readmissions after surgery and significantly increases the number of emergency room visits (7).

In this regard, our Hospital has implemented a multidisciplinary pain management protocol that follows the guidelines of the Joint Commission Accreditation of Healthcare Organizations (JCAHO) (8). The objectives of a "pain-free hospital" are associated with the achievement of the following plans: 1) Plan for systematized patient information; 2) Plan for systematized evaluation and recording of pain intensity; 3) Plan for analgesic protocolization; 4) Plan for dissemination of the "pain-free hospital" program; and 5) Plan for evaluation of results.

The study of pain can help to identify risk factors and protective factors in order to prevent the social and

economic problems associated with the appearance of chronic pain. In this sense, the determination of the influence of compliance with pain protocols in our Hospital on in-hospital pain could provide data that could help to improve its efficiency in the future (9). The prevalence and predictive factors of acute postoperative pain in adult patients have been studied previously.

Given the negative impact it has both on the patient's quality of life and on the course of recovery, as well as the economic impact of poorly controlled pain on health systems, it is essential to know the prevalence of pain in our hospital environment and to analyze certain factors involved in its treatment, such as the use of analgesics or the application of protocols for its management, specifically in our Department (10). The main objective of this study is to measure the prevalence of acute pain in patients hospitalized in the Neurosurgery Department, using the Visual Analog Pain Scale (VAS). In addition, to determine the effectiveness of compliance with protocols for in-hospital pain management and to describe the influence of the different variables studied on pain control in neurosurgical patients.

Material and methods

This is an observational, cross-sectional, prospective study. The study population is all patients admitted to the Neurosurgery Service of our Hospital during the month of November 2019.

All patients over 18 years of age admitted for 24 hours or more in the Neurosurgery Service were included.

All patients with cognitive impairment or other condition preventing proper use of the VAS (sedation or need for postoperative intubation during the periods of variable collection) or severe psychiatric pathology were excluded.

At the time of admission, demographic data, type of neurosurgical pathology and baseline pain values evaluated according to VAS from 0 to 10 were collected, considering 0 as no pain, 1-2 (mild pain), 3-5 (moderate pain), 6-8 (severe pain) and 9-10 (unbearable pain). The evaluation was performed daily in the morning and before any potentially painful procedure, such as postural changes, surgical wound dressings, standing or others.

In the peri-operative period, various surgical variables were studied, and the research group actively intervened so that VAS was measured by the nursing team in all the patients included. During admission to the ward, protocols are applied according to the expected pain, according to the patient's patrology and characteristics, and the analgesic guidelines are modified according to the VAS pain scores. In our Hospital there are pain treatment protocols according to VAS less than 4 (which associate Paracetamol 1 g every 6 hours and Metamizole 575 mg every 8 hours if necessary, for pain increased by mobilization or surgical cures, in addition to Omeprazole 20 mg every 24 hours and Metoclopramide 10 mg every 8 hours), and VAS greater than 4 (which adds Tramadol 100 mg every 8 hours on a scheduled basis).

Likewise, after hospital discharge, an analysis was made of the incidence of ED visits (number of visits and causes) and readmissions (cause of readmission) 30 days after discharge.

For the statistical analysis we used the most frequent descriptive parameters (means, modes, medians, standard deviations and others), and the Chi-square test, establishing statistical significance with a $p<0.05$. The study was approved by the Research Ethics Committee and the Feasibility Committee of the Getafe University Hospital (A11/19, dated October 31, 2019).

Results

From a total of 120 patients admitted, 40 were excluded for not meeting inclusion criteria. Data from 80 patients were analyzed, with a mean age of 55.29 2.67 years, a discrete predominance of women of 1.2/1 and a mean pain score according to VAS of 3.47 0.78 (Table 1). The prevalence of pain was high, 75.61%, being mild in 20% of cases, moderate in 40% and severe in the remaining 40%. Only one patient (1.25% of the total), with subdural empyema, after glioblastoma surgery, with a medical history of depression, reported an episode of unbearable pain (bifrontal headache).

There are higher pain scores, with statistical significance ($p<0.05$) in patients with 1-4 associated chronic pain conditions such as abdominal pain, arthritis, low back pain, fibromyalgia, gout, jaw pain, joint pain or stiffness, knee problems, lupus, bone or muscle pain, neck pain, peripheral circulation problems, recurrent headache, rheumatoid arthritis, sprain or tendonitis, migraine and other causes of chronic pain, lupus, bone or muscle pain, neck pain, peripheral circulation problems, recurrent headache, rheumatoid arthritis, sprain or tendonitis, migraine and other causes of chronic pain, and in those with malignant pathology and in previous treatment with minor opioids ($p<0.05$). The variables that have been related to a pain score greater than 4 with statistical significance are anxious/depressive syndrome ($p<0.01$), history of treatment with major opioids ($p<0.01$) and the existence of 5 or more associated painful conditions ($p<0.01$).

Similarly, variables related to surgery were collected (Table 2).

With the different pain management protocols established in our Hospital, both oral and

intravenous, and applied according to the VAS score, it was found that pain decreased from admission to hospital discharge (Figure 1), with occasional elevations in intracranial pathology, thus achieving correct analgesic control in hospitalized patients. Furthermore, the protocols defined at the Getafe University Hospital were applied in 100% of the patients studied (Table 3).

Table 1. Demographic data and variables at admission

Characteristic	n	%
Age (Mean + SD)	55,29+/-3,6	
Body Mass Index	23+/-4,8	
ASA Anesthetic Scale		
I	15	18,75%
II	40	50%
III	20	20%
IV	5	6,25%
Origin		
European	55	68,75%
Latin	15	18,75%
Arabic	5	6,25%
Chinese	5	6,25%
Number of associated painful conditions (2012 NHIS Adult Core): Grouping them into three groups:		
a) No associated condition.	20	25%
b) 1-4 conditions.	40	50%
c) 5 or more conditions.	20	25%
Chronic consumption of:		
a) Paracetamol or NSAIDs (non-opioid analgesics)	25	31,25%
b) Weak/minor opioids (Tramadol, Zaldiar, etc.)	40	50%
c) Major opioids and complex treatments (combination opioids, potent opioids, trans-cutaneous release patches)	15	18.75%
Depression/diagnosed anxiety syndrome	35	43,75%
Type of disease for surgical intervention:		
a) Benign disease	35	43,75%
b) Malignant Disease	15	18,75%
c) Spine Pathology	30	37,5%
VAS daily	3,47+/-0,8	

Table 2. Surgical and peri-operative variables

Characteristic.	n	%
Surgery:	75	93,75%
a) Urgent.	20	25%
b) Programmed.	55	68,75%
First Intervention.	70	93,33%
Re-intervention.	5	6,66%
Location:		
a) Head.	45	60%
b) Cervical spine.	10	13,33%
c) Lumbar spine.	20	26,55%
Drains (The urinary catheter should not be classified as "drainage"):		
a) Yes.	47	%
b) No.	28	%

Table 3. Variables during hospital stay

Characteristic	n	%
Pain intensity recording (VAS).	80	*100%*
Determination of the investigators' daily VAS.	80	100%
Determination of the daily nursing VAS.	65	81,25%
Compliance with pain management protocols.	80	100%
Special techniques during admission (P.C.A. pump, epidural catheter, etc.):		
a) Yes.	20	25%
b) No.	60	75%
Days of stay.	5.35+/-4,12	

SCompliance with protocols" has been considered "protocol compliance" if the following are met:

(a) Measurement of the VAS scale on the hospital ward at least once a day during all days of admission.

b) Pharmacological treatment using the protocols for acute postoperative pain available in the hospital.

The VAS is collected in 100% of the cases by the study investigators, but only in 80% of the cases was the VAS assessment performed by nurses trained in pain assessment scales, and subsequently recorded in the medical record. In the remaining 10% this information was deficient because the personnel were not trained but their values were recorded, and in another 10% pain was not assessed.

The pain management protocols established in our Hospital were applied in all patients according to the VAS score. The mean VAS values of all patients are shown in Figure 1 and these decreased from admission to discharge, with occasional elevations in intracranial pathology.

Furthermore, the above is also verified if we classify the patients into the different pathologies studied, with greater pain in patients with intracranial malignant pathology, $p<0.05$ (Figure 2). Considering the classification of patients by pathology, higher pain scores were observed in patients with intracranial malignant pathology, $p<0.05$.

The average length of hospital stay was 5.35 days, there was no readmission for pain or visits to the emergency room after discharge, and there was good satisfaction after discharge, according to the Patient Care Service surveys (Table 4).

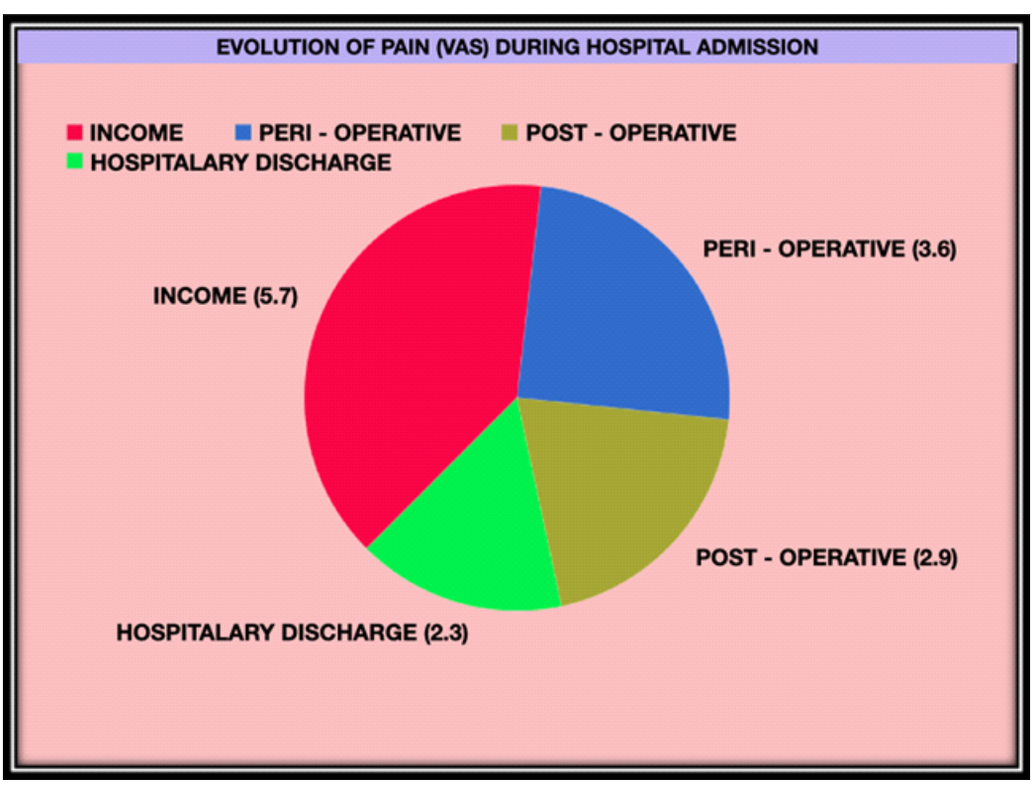

Figure 1. VAS score during hospital admission

In our research, a high percentage, close to 35%, of the hospitalized patients reported a significant limitation in the usual activities of daily living, such as walking, toileting, communicating with others, reading or others, as a consequence of their pain during admission.

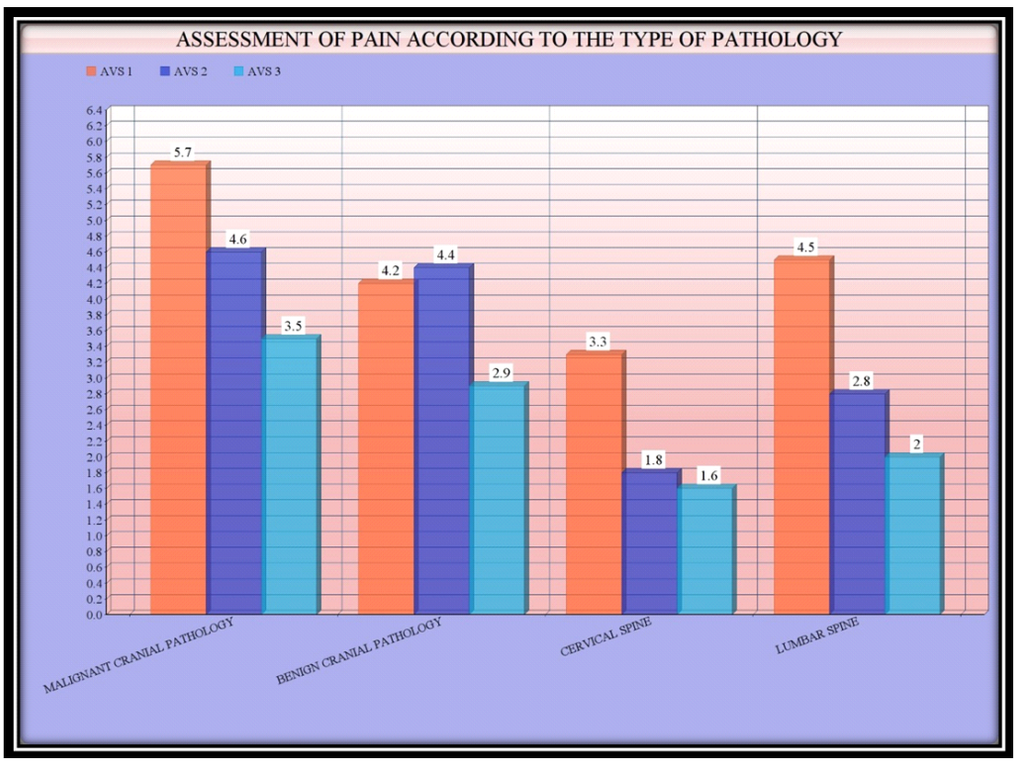

Figure 2. Evolution of pain during admission and according to associated pathologies

Table 4. Variables determined during the 30-day postoperative period

Characteristic	n	%
Emergency room assistance after hospital discharge:		
He goes to the emergency room after discharge from the hospital.	5	6,66%
He doesn`t go to the emergency room after discharge from the hospital.	65	92,85%
1 visit to the emergency room. Was the cause pain?		
Yes	0	0%
No	5	100%
More than 1 visit to the emergency room. Was the cause of at least 1 visit pain?		
Yes	0	0%
No	5	100%
Re-entries:		
Yes	0	0%
No	70	100%

Discussion

The International Association for the Study of Pain (IASP) defines pain as "an unpleasant sensory and emotional experience associated with present or potential tissue injury, or described in terms of such injury" (11). As a consequence of this definition, pain is really a subjective experience that can only be assessed by the statement of the patient who suffers it, using instruments that have been validated and that are considered appropriate specifically to each patient's situation (12).

Inadequate pain control in patients hospitalized in neurosurgical services may be due to multiple causes, among which are a deficient assessment of pain intensity by health care personnel, as well as barriers in pain information related to the patient, the professionals and the system itself (13) and limited

effectiveness of treatments.

Our results differ from the survey carried out at European level in 746 hospitals, so that the intensity of pain in hospitalized patients is not quantified in 34% of patients compared to only 10% in our study, in 56% it is not documented compared to 10% in our case, and 75% of the centers lack protocols to manage pain from the clinical point of view (14).

Despite our clinical experience, our special awareness of pain management and the existence of protocols, it does not prevent pain control from being inadequate in a considerable percentage of patients, and the tool used for its measurement from working properly. One possible explanation is the origin of our patients, most of whom are oncological and have degenerative spinal pathology, patients who present pain when they are admitted for study.

Acute pain is a biological alarm mechanism of first line of action; it is considered as the immediate sensory consequence of the activation of the nociceptive system, which really represents an alarm signal triggered by the protective systems of the organism (15,16). Generally, the origin is due to tissue damage, either somatic or visceral, and it develops with a time course that closely follows the process of repair and healing of the original lesion. If there are no subsequent complications, the pain of acute characteristics disappears with the injury that originated it. Its inadequate treatment, however, can give rise in certain cases to the prolonged persistence in time of such a situation, and the appearance of pain with chronic characteristics (17,18).

Postoperative pain is considered to be the maximum representative of acute pain. It develops as a consequence of a stimulation of nociceptive origin, which is actually the result of a direct or indirect aggression produced by a surgical intervention. Indirect aggression is understood as that which is not directly due to the application of the surgical technique or anesthetic procedure, but which, as a consequence of the same (muscle spasms, bladder or intestinal distension, lesions of nerve structures secondary to undue traction, etc.), or to the patient's baseline pathology, develops during the postoperative period. Classically, it has been considered that age, sex or social or cultural and ethnic factors could influence pain perception (19). On the contrary, and based on different studies, it is currently known that the elderly present greater and more prolonged pain relief than the rest of the population in the face of the same analgesic treatment (18-20).

The high prevalence of pain in our study, which really constitutes a very important health care problem, despite the availability of specific treatments and very diverse analgesic protocols, can be explained, based on the statements of Marks and Sachar in 1973(20), by an under-dosage of the prescribed opioids and by the low compliance with their administration. In fact, we believe that these factors could play an important role in the high prevalence of severe pain that we observed in the patients studied in our research (21).

Despite the fact that there are currently very important advances that have perfected the knowledge of the most intimate mechanisms that direct nociception and the progress made in the clinical control and treatment of pain, with the appearance and development of new pharmacological therapies and analgesic techniques that are increasingly more effective, there are still numerous publications that point to the failure of pain treatment (22-24). Even today, pain is still too often treated late, inadequately and insufficiently (25).

Regardless of the fact that the ineffective treatment of pain is a cause of suffering, probably unnecessary for mankind, and of the very diverse ethical considerations that this phenomenon could imply, the incorrect treatment of pain represents an increase in morbidity and mortality, a very high social and economic cost, and generates, given its high incidence, an increase in general health care costs. Therefore, there is no other option but to accept that the problem that originates postoperative pain is unresolved, with the consequent suffering that this entails for the patients who undergo surgery in our hospitals in their daily routine (26).

There are important factors to consider, such as the type of procedures, their aggressiveness, and the percentage of patients who present pain, acute or chronic, prior to hospital admission. We know that the type of surgery is the most important conditioning factor of postoperative pain intensity and pain (26,27). The direct influence of the surgical act on postoperative pain is determined by: the location of the intervention, the nature and duration of the intervention, the type and extent of the lesion, the underlying surgical trauma and the complications related to the intervention.

The results of this research show a high percentage of pain measured on the ward by nurses (90%) and a high prevalence (76.61%). The mean scores correspond to moderate pain (3-4) but up to 40% of patients have pain scores higher than 5.

All these factors influence hospitalized patients, and according to very different studies the prevalence of pain has been estimated at 61.4%, with no differences by sex. Most of the patients presented mild pain. From the hospital point of view, post-surgical patients had a higher prevalence of pain than non-surgical patients, although the intensity remained at moderate pain levels (28). The prevalence of pain in our series is 76.61%, higher than that reported in the literature, although mostly mild or moderate, in 60% of the total. However, we are concerned about the percentage of patients with

severe pain (40%), although it is lower than that published in some studies in the literature, with figures between 60% and 65% in the surgical area. Currently, this should be a reason for improvement in order to increase patient satisfaction and to reduce average length of stay. A recent publication on the prevalence of pain in patients admitted to surgical units in hospitals, determined the percentage of patients with moderate or severe pain to be 56.5% (29).

The various personal medical consequences of poorly treated pain are now well known, as are the healthcare consequences, with delays in hospital discharges, leading to an increase in overall healthcare costs. The causes or reasons for inadequate treatment are diverse and multiple, ranging from hospital organizational problems, lack of time and lack of staff motivation, to the complexity in the medical management of pain, the difficulty in measuring it, or the lack of knowledge of the mechanisms of action of the different analgesic treatments and, in general, of the overall treatment of pain on the part of health care personnel (7,30). Usually in surgical services pain continues to be treated in an inadequate and ineffective manner, with a deficient use of the various opioid analgesics, due to lack of knowledge of the staff about their pharmacological characteristics, fear of the various side effects they cause, such as respiratory depression, poor use of the routes of administration or inadequate treatment guidelines.

Adequate pain control is a parameter of true quality of care. In our study, a high percentage of hospitalized patients reported a significant limitation, as a consequence of their pain, in their personal activities of daily living during admission. The measurement of pain, introduced as the fifth constant, is mandatory in nursing charts to avoid or decrease this incidence, as recommended by the Joint Commission on Accreditation of Healthcare Organization (11). Not only should pain be measured, but the staff should be trained in the techniques of such measurement, because healthcare professionals have a legal obligation and ethical responsibility to ensure that the most effective means are used, all with the aim of achieving physical well-being and pain relief in hospitalized patients (12).

We are in favor of pain being considered a healthcare priority, and that its relief represents an important criterion of quality of care. In this sense, our Hospital makes many efforts for the implementation of evidence-based recommendations, which help us in an important way to prevent, mitigate and treat pain in our patients, making pain relief a hospital priority ("Hospital without pain").

Our research really has important limitations, because it is not a clinical trial, and it has important biases due to the characteristics of our patients. Furthermore, the time period of the study is limited, and the VAS measurement instrument is not used in all hospitalized patients.

Despite these limitations, we can conclude that, in our department, despite the existence of an analgesic protocol, the prevalence of pain remains high (75.61%). The levels of severe pain (40%) should be improved by updating the existing analgesic protocols. Malignant diseases, predominantly intracranial, are associated with a higher incidence of pain. We have an important area for improvement in the training and application of pain measurement scales by nursing staff in all patients.

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Contribution of the authors

All authors participated in the entire research process.

Interest conflict

We declare no conflict of interest.

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