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Prevalence of pain in patients hospitalized in Metabolic Intensive Care Units with orotracheal intubation and under sedation, measured with the COMFORT scale

P. E. García Ramírez, L. C. Valenzuela Molina, E. Zazueta Araujo, C. M. López Morales, R. Cabello Molina y P. Martínez Hernández Magro

Medicina del Dolor y Cuidados Paliativos. UCIM. Centro Médico del Noroeste. IMSS Ciudad Obregón. Sonora, México

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ABSTRACT

Introduction: Pain is common in hospitalized patients in intensive care conditions; however, it is underdiagnosed in patients who are unable to express it. A number of scales have been validated worldwide to determine these patients' pain level; nevertheless, there is a lack of trained personnel to apply them, and deficient medical information regarding the prevalence of pain in ICUs.

Objectives: To determine prevalence of pain in hospitalized patients in Metabolic Intensive Care Units, with oral intubation and under sedation.

Methods: Cohort study, descriptive, observational and prospective. Including all patients hospitalized in MICUs with oral intubation plus sedation, who meet inclusion criteria.

Results: A total of 36 patients were included. 77.7 % were male. Age ranged between 18 and 71 years old with 51 on average and a standard deviation of 14.05. 86 % of patients were admitted for surgical pathology and 75 % were treated with analgesic combination therapy. Prevalence of pain measured with the COMFORT scale was 69.4 %.

Conclusion: Prevalence of pain in intubated patients under intravenous sedation is the same as reported in the literature, with level of sedation as a main factor associated with an increase in the presence of pain.

Key words: Pain, intensive therapy, intubation, sedation.

RESUMEN

Introducción: El dolor es un padecimiento frecuente en pacientes hospitalizados en unidades de cuidados intensivos, sin embargo es subdiagnosticado en aquellos pacientes que no tienen la capacidad para expresarlo. Diversas escalas se han validado a nivel mundial para determinar el nivel de dolor en dichos pacientes, pero existe poco personal entrenado para aplicarlas y escasos estudios sobre prevalencia de dolor en UCI.

Objetivos: Se determina la prevalencia de dolor en pacientes hospitalizados en la Unidad de Cuidados Intensivos Metabólicos (UCIM) orointubados y bajo sedación.

Material y métodos: Estudio de cohorte, descriptivo, observacional y prospectivo. Fueron incluidos todos los pacientes hospitalizados en UCIM que cumplen con los criterios de inclusión (pacientes orointubados bajo sedación).

Resultados: Se incluyeron 36 pacientes, siendo el 77,7 % del sexo masculino. La edad osciló entre 18 y 71 años con media de 51 y desviación estándar de 14,05. El 86 % de los pacientes ingresó por patología quirúrgica y el 75 % se encontraba con politerapia analgésica. La prevalencia de dolor medido con escala COMFORT fue del 69,4 %.

Conclusión: La prevalencia de dolor en pacientes intubados y bajo sedación endovenosa en la UCIM es similar a la reportada en la literatura, siendo el nivel de sedación el factor que más se correlaciona de manera significativa con una mayor intensidad de dolor.

Palabras clave: Dolor, terapia intensiva, intubación, sedación.

INTRODUCTION

Any patient subjected to treatment, whether medical or surgical, will in some way or another undergo pain. Nevertheless, in patients whose clinical condition

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Correspondence: Patricia Emiliana García Ramírez
patriga71@yahoo.com.mx

does not permit communication, as they are under sedation or orotracheal intubation, it is essential to have tools to evaluate the presence of pain, thus preventing the complications that it may cause. The COMFORT scale has been adapted to evaluate pain in non-communicative adults under sedation. It evaluates five parameters: alertness, agitation, physical movement, vital and physiological signs (skin and attached parts). It is a pilot test that has proved promising in order to offer a more appropriate measurement in these patients.

GOALS

Pain in intensive therapy is a frequent issue but which is generally undervalued, and therefore underdiagnosed. The presence of pain in a critical patient may hinder a favorable clinical evolution, as it presents a greater risk of hemodynamic instability, plus psychiatric alterations and depressive dysfunction, apart from favoring a prolonged stay that exposes the patient to a greater incidence of complications. The fact that a patient has orotracheal intubation and is under sedation and is unable to verbally communicate their complaints, does not mean that they are unable to feel pain, and so this type of patient requires integral evaluation. Our goal is to determine the prevalence of pain in patients hospitalized in MICU with orotracheal intubation and sedation, measured using the COMFORT scale (Table I).

MATERIAL AND METHODS

This investigation study was carried out in the Metabolic Intensive Care Unit (MICU) of the IMSS Hospital located in Obregón City, Sonora, Mexico. Study population: patients of any age and gender who were hospitalized in the MICU, under sedation and with orotracheal intubation during the period comprised between June and August 2015. Investigation design and type: cohort, observational, prospective, descriptive and longitudinal.

a) Inclusion criteria:
- Men and women.
- Aged 18 and <80 years old.
- Under orotracheal intubation.
- Patients under intravenous sedation.
- Patients with analgesic management whether with NSAID or combinations of NSAID plus opioids.

b) Exclusion criteria:
- Patients whose relatives did not agree to the protocol.
- Patients under 18 years old.
- Patients not intubed.
- Patients hemodynamically unstable.
- Patient without intravenous sedation.
- Heart surgery patients.
- Patients with an absence of stem reflexes.

Once all the data was collected, each of the variables was analyzed with the STATA version 14 statistical package. For numeric variables, the measurement used was central tendency (mean, mode) and dispersion (standard deviation with a confidence interval of 90%). For qualitative variables, frequencies and percentages were used. Differential analysis evaluated the quantitative variables with Student's t method for independent samples, and for qualitative variables, the Chi-square test was used. A p value lower than 0.05 was considered statistically significant.

The following variables were analyzed: age, gender, diagnosis on admittance to the MICU, level of sedation (according to the RAMSAY scale) (Table II), type of analgesic management and application of the COMFORT scale evaluating the level of sedation-analgesia. Measurements were always taken at 7 o'clock a.m., once the prescribed analgesic therapy had been applied and vital signs had been checked (blood pressure, heart rate, etc.).

RESULTS

Thirty-six patients complied with the inclusion criteria. Univariate and bivariate analysis were carried out on the sample obtained, giving the following results: 28 patients were male representing 77.7%, and 8 females representing 22.2%. Presentation age ranged between 18 and 71 years old, with a mean age of 51.84 and a standard deviation of 14.05.

Thirty-one patients were admitted for surgical pathologies (86.11%) and only 5 patients (13.8%) were admitted for clinical pathologies. As regards analgesic therapy administered, 27 of the patients (75%) were treated with polytherapy using benzodiazepines, NSAIDs and opioids, and 9 patients (25%) only with benzodiazepines and NSAIDs. And according to the RAMSAY scale, 7 patients (19.44%) were level 4-5 (deep sedation) and 29 (80.56%) were lightly sedated, level 1-3 (Table III).

The benzodiazepines used for patients were: 1 patient Dexmetomidine, 2 Dexmetomidine plus Midazolam, 13 Midazolam and Propofol, and in 20 patients only Midazolam. No significant differences were observed in pain evaluation with the COMFORT scale according to patient gender.

As regards analgesic management with mono or poly-therapy and the presence of pain, it was observed that 20

TABLE I
COMFORT SCALE FOR PAIN ASSESSMENT

Alertness		*Calmness*	
Deeply asleep (eyes closed, no response)	1	Calm	1
Lightly asleep (head movement, eyes closed)	2	Slightly anxious	2
Drowsy (eyes closed frequently)	3	Anxious	3
Fully awake and alert (calm, cooperative)	4	Very anxious (hard to calm)	4
Hyper alert (restless, agitated)	5	Panicky	5
Respiratory distress		*Physical movement*	
No spontaneous respiration	1	No movement	1
Spontaneous respiration	2	Occasional (< 3)	2
Resistance to ventilation	3	Frequent (> 3 slight movements)	3
Resistance to ventilation (regular coughing)	4	Vigorous limited to limbs	4
Fights ventilator	5	Vigorous including head and torso	5
Muscle tone		*Facial tension*	
Muscles relaxed	1	Totally relaxed	1
Reduced muscle tone	2	Facial muscle tone normal	2
Normal muscle tone	3	Tension evident (in some facial muscles)	3
Increase in muscle tone (hand and foot flexion)	4	Tension evident (throughout facial muscles)	4
Highly increased (rigidity, hand and foot flexion)	5	Facial muscles contorted (grimacing)	5
Blood pressure		*Heart rate*	
BP under baseline	1	HR under baseline	1
BP consistently at baseline	2	HR consistently under baseline	2
Infrequent elevations of BP (> 15 % above baseline)	3	Infrequent elevations of HR (> 15 % above baseline)	
Frequent elevations of BP (> 15 % above baseline)	4	Frequent elevations of HR (> 15 % above baseline)	4
Sustained elevations of BP (> 15 % above baseline)	5	Sustained elevations of HR (> 15 % above baseline)	5

TABLE II
RAMSAY SEDATION SCALE

1	Anxious, agitated and restless
2	Cooperative, oriented, tranquil
3	Drowsy, responds only to commands
4	Brisk response to loud noise or glabellar tap
5	Sluggish response to loud noise or glabellar tap
6	No response to loud noise or glabellar tap

of the patient with poly-therapy reported moderate to intense pain, although it was not statistically significant, p = 0.261 (Figure 1). As regards reason for admission, patients admitted post-surgery reported moderate to intense pain in 74% cases (23 patients), standing at 63%, p = 0.154 (Figure 2).

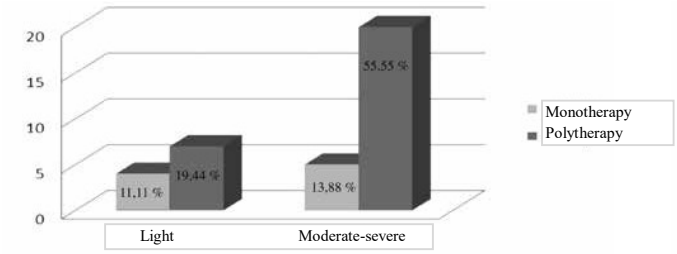
Patients who had analgesic treatment with poly-therapy showed a light level of sedation averaging 2.8 on the RAMSAY scale, 0.921, CI 95% 2.45-3.17.

Based on sedation level, the analysis showed that average patient sedation reporting pain is 2.52 whose standard deviation is 0.822 (CI 95% 2,18-2.85) and p = 0.000, which is statistically significant (Figure 3).

TABLÈ III
GENERAL FEATURES OF THE TOTAL PATIENT STUDY GROUP IN THE WHOLE MICU SERVICE OF IMSS CD. OBREGÓN SONORA

Factors		*No. of cases*	*%**	*IC (95 %)*	*p*
Age			50.22 (14.62)	43-61	0.12
Gender	Femle	8	22.23		
	Male	28	77.77		
Level of sedation	Light*	29	80.55 (14.29)	45-73	0.43
	Deep**	7	19.44 (16.47)	31-61	
Pain	Yes	26	72.22		0.32
	No	10	27.78		
Pathology for admission	Surgical	31	86.11		
	Clinical	5	13.88		
Pain management	Monotherapy NSAID+	9	25	2.38-4.06	
	Politherapy NSAID/Opioids++	27	75	2.45-3.17	

*: average and standard deviation was calculated. %: percentage. A bivariate analysis was carried out with Student's t. CI: confidence intervals 95%. p: statistically significant less than 0.05. *RAMSAY 1-3 **RAMSAY 4-5. +NSAID. ++NSAID and opioids.
Source: study protocol patient of the period comprised between 1 June 2015 and 15 August 2015.

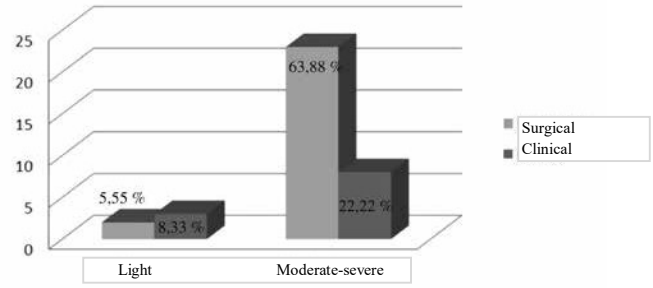


* The univariate percentage analysis was carried out based on the Chi-square method. p = 0,261.

Poly-therapy: use of NSAIDs and opioids. Mono-therapy: NSAIDs.

Source: protocol study patients of the period comprised between 1 June 2015 and 15 August 2015.

Fig. 1. Presence of pain in relation to analgesic management, patients hospitalized in MICU in the IMSS, Cd Obregón, Sonora.



* Univariate percentage analysis was carried out based on the Chi-square method. p = 0.154.

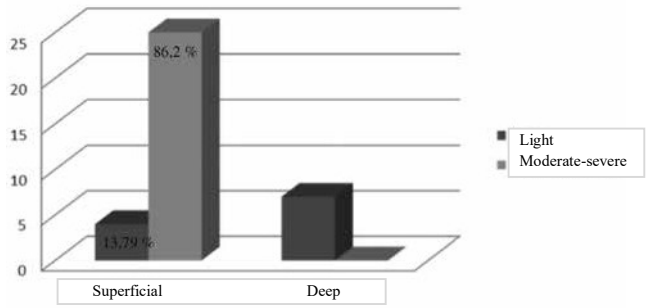
Source: protocol study patients of the period comprised between 1 June 2015 and 15 August 2015.

Fig. 2. P presence of pain in relation to the pathology of admission to the MICU in IMSS, Cd Obregon, Sonora.

DISCUSSION

Although pain is a common health problem among hospitalized patients in intensive care units, there is little bibliography analyzing its incidence. Chong et al. report that different multi-centre studies have reported an incidence of 49%-64% of severe pain, and only 14.9% described its inadequate management (1).

Unlike other countries, Mexico does not routinely carry out a registration of pain among patients in intensive therapy, so there is no data regarding incidence. Whizar-Lugo et al., from the General Hospital of Tijuana, ISESALUD, carried out a review where they report that 63% of ICU patients reported moderate-intense pain (2). International studies, such as the one carried out in the University of Baltimore in the United



* The analysis included: mean, SD and bivariate percentage analysis based on Student's t method. SD: 1.09. CI 95% 2.38-4.06. p = 0.001.

Source: protocol study patients of the period comprised between 1 June 2015 and 15 August 2015.

Fig. 3. Presence of pain in relation to the sedation level of patients hospitalized in the MICU, Cd. Obregón, Sonora.

States, report that 77% of ICU patients present pain, of which 32% is considered intense and 60% moderate-intense (3).

Generally, patients in the area of intensive therapy not only present pain due to their basic pathology but also from therapeutic procedures (samples, intubation, blood gas tests, suctions, etc.), handling by nursing staff and even the environment of the ICU itself (2,3). All this produces an increase of circulating catecholamine, which generates peripheral vasoconstriction, as well as hypoperfusion and hypoxia, leading to metabolic acidosis, which in turn increases catabolism, leading to hyperglucemia, lipolysis and consumption of muscle mass that terminates in a state of severe acute malnutrition (2,3).

In turn, catabolic stimulation and hypoxemia increase the risk of acquiring nosocomial infections, due to nutritional deficit, in addition to these patients' reduced immune response, thus increasing the risk of complications (4).

All metabolic and cellular changes as a consequence of pain modify the pharmacokinetics of certain drugs, especially analgesics, which significantly impacts their half life, and as a result their analgesic and toxic effect; it is therefore important to administer the appropriate dosage of the drugs used in an individual way in patients hospitalized in intensive therapy (4).

In these areas, it is common to see that pain management and the prescription of drugs is inadequate, due to concerns regarding hemodynamic complications, respiratory deterioration, addiction and drug interactions they could cause (4).

Another point of view that is frequently held by staff working in the intensive care area is that the patients under sedation and orotracheal intubation do not feel pain, whose consequence is the prescription of deficient pain management (4).

There exist different tools to determine pain level whether a patient is awake or sedated. The numeric pain rating scale (NPRS) ranges from 0-10, where 0 = no pain; 1-4 = light pain; 5-6 = moderate pain and from 7 -10 = intense pain (5).

Additionally, the behavioral pain scale is a useful example to evaluate patients under sedation with orotracheal intubation, as it evaluates facial characteristics, limb movements and ventilation tolerance (5,6).

Scales have been developed such as COMFORT, which is used to evaluate pain and sedation in pediatric patients, and at present modifications have been made to evaluate adult patients who are unable to communicate. This evaluates patients' behavior and physiologic values, with 8 points to consider: state of alertness, agitation, respiratory response, physical movements, muscle tone, facial tension, heart beat and blood pressure (7).

A tool has recently been developed to evaluate pain among adults admitted to ICU called CCPOT (critical care pain observation tool), which is based on evaluating the behavior, facial expression, restlessness, limb rigidity and asynchrony between ventilator and patient, observed during a painful process (8).

In 2005, the American Pain Society published a quality guide highlighting the evaluation of pain in daily clinical practice, because it is an underdiagnosed and poorly managed problem, and whose goal is that healthcare staff provide safety and effectiveness, as well as offering pain management in due time (9). Adequate pain management is a human right (10).

However, multiple factors complicate appropriate pain management, starting with the lack of available evidence as a guide for the therapy used (10). Furthermore, there are other factors that complicate pharmacological pain management such as: algological treatment is commonly extrapolated from a healthy patient to a critically ill patient, the difficulty of distinguishing adverse effects of analgesic drugs, patients' idiosyncrasy and the fact that in this type of patient invasive techniques are hard to use to control pain (11).

For a patient admitted to an ICU, the route of pharmacological administration is a major factor to bear in mind in its algological management; oral is generally preferred as the ideal route of administration, although in patients under sedation with orotracheal intubation, the intravenous route is more common (12).

Because opioids provide better pain control and are drugs that can be used over extended periods, they are the drugs most used to manage pain among critical patients (13-15).

However, and although opioids are the cornerstone, supplementary therapy can be provided with the aid of neuromodulators, relaxation therapy and antipsychotics (15). At present, the trend in managing pain control is prevention, whose purpose is that patients present a lesser metabolic response to painful procedures, and reducing the adverse effects that analgesic therapy can normally provide in intensive care units (15,16).

CONCLUSIONS

This study concludes that in the Metabolic Intensive Care Unit of the IMSS Hospital in Obregón City, 69.4% (5.55% light and 63.88% moderate - intense) of our patients presented pain during their stay in this unit, which is in accordance with what is reported in the literature. This leads us to carry out new research lines to determine whether pain peaks depend on certain specific procedures or on when the half-life of analgesics administered have expired. It furthermore allowed us to generally identify that sedation level is the predisposing factor for the presence of pain, which underscores the importance of making continuous evaluations of our patients who do not have the verbal or physical ability to express the presence of pain.

CONFLICTS OF INTEREST

The authors state that they have no conflicts of interest.

REFERENCES

1. Chong C, Burchett K. Pain management in critical care. British Journal of Anesthesia 2003;3(6):183-6.
2. Barr J, Fraser G, Puntillo K, Gelinas C, Dasta J, Davidson J, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. Crit Care Med 2013;41(1):263-306. DOI: 10.1097/CCM.0b013e3182783b72.
3. Erdek M, Pronovost P. Improving assessment and treatment of pain in the critically ill. Int J Qual Health Care 2004;16(1):59-64.
4. Whizar-Lugo V, Flores-Carrillo J, Marin-Salazar G, Benavides-Vazquez A. Diagnóstico y tratamiento del dolor agudo en el paciente crítico. Anestesia en México 2008;20(2):85-90.
5. Ahlers S, Van der Veen A, Van Dijk M, Tibboel D, Knibbe C. The use of the behavioral pain scale to assess pain in conscious sedated patients. Critical Care and Trauma 2010; 110(1):127-33. DOI: 10.1213/ANE.0b013e3181c3119e.
6. Puntillo K, Pasero C, Li D, Mularski R, Grap M, Erstad B, et al. Evaluation of Pain in ICU Patients. Chest Journal 2009;135(4):1069-74. DOI: 10.1378/chest.08-2369.
7. Sessler C, Jo Grap M, Ramsay M. Evaluating and Monitoring Analgesia and Sedation in the intensive Care Unit. Critical Care 2008;12(Suppl 3):S2. DOI: 10.1186/cc6148.
8. Sessler C, Varney k. Pacient Focused sedation in analgesia in ICU. Chest Journal 2008;133(2):552-65. DOI: 10.13778/chest.07-2026.
9. Pasero C, Puntillo K, Li D, Mularsky R, Grap M, Erstad E, et al. Structured approaches to Management in the ICU. Crit Care Med 2009;135(6):1665-72.
10. Nelson JE, Bassett R, Boss RD, Brasel KJ, Campbell ML, Cortez TB, et al. Models for structuring a clinical initiative to enhance palliative care in the intensive care unit: a report from the IPAL-ICU Project (Improving Palliative Care in the ICU). Crit Care Med 2010;38(9):1765-72. DOI: 10.1097/CCM.0b013e3181e8ad23.
11. Estard B, Putillo K, Gilbert H, Grap M, Li D, Medina J, et al. Pain Management Principle in the Critically Ill. Crit Care Med 2009;135(4):1075-86.
12. Mularsky R, Puntillo K, Varkey B, Erstad B, Grap M, Gilbert H, et al. Pain Management whitin the palliative and End of life care experience in the ICU. Crit Care Med 2009;135(5):1363-9. DOI: 10.1378/chest.08-2328.
13. Ramos I, Samso E. Analgesia y sedación en el paciente crítico en ventilación mecánica. Revista Española de Anestesiologia 2007;54:302-12.
14. Ashler JS, Van Gulik L, Van der Yeen HP, Knibbe Tibboet. Comparison of different pain scoring in critically ill patient in general ICU. Crit Care 2008;12(1):R15. DOI: 10.1186/cc6789.
15. Barr J, Pandharipande P. The pain, agitation, and delirium care Bundle: Synergistic Benefits of Implementing the 2013 pain, agitation and delirium guidelines in an integrated and interdisciplinary fashion. Crit Care Med 2013;45(9):s99-s115. DOI: 10.1097/CCM.0b013e3182a16ff0.
16. Chanques G, Jaber S, Barbotte E, Violet S, Sebbane M, Francois P, et al. Impact of Sistematic evaluation of pain and agitation in intensive care unit. Crit Care Med 2006;34(6):1691-9.