Association between intensities of pain and sedation in intensive care patients

Associação entre intensidades de dor e sedação em pacientes de terapia intensiva

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Abstract

Objective: To identify the clinical profile, intensities of pain and sedation in patients in the intensive care unit, and associate the data.
Methods: Quantitative and cross-sectional study performed in an intensive care unit of a teaching hospital. Sample of 240 patients. Clinical data were obtained from the electronic medical record. The following scales filled out by nurses were used: *Richmond Agitation-Sedation* Scale (RASS), visual numeric pain scale and *Behavioral Pain Scale* (BPS).
Results: Prevalence of non-elderly, male, neurological and surgical patients in deep sedation. There was higher mortality in patients in deep sedation, and longer hospitalization time in patients in moderate sedation. Sedation was not effective in suppressing pain, but it served to control its intensity.
Conclusion: The identification of intensity of pain and sedation performed by nurses helps decision making and provides adequate management of sedoanalgesia in patients of intensive care.

Resumo

Objetivos: Identificar o perfil clínico, intensidades de dor e sedação em pacientes na unidade de terapia intensiva e associar os dados.
Métodos: Estudo quantitativo e transversal, realizado em unidade de terapia intensiva de um hospital de ensino. Amostra de 240 pacientes. Os dados clínicos foram obtidos do prontuário eletrônico. Foram utilizadas escalas de sedação e agitação de *Richmond*, dor visual numérica e *Behavioral pain scale*, preenchidas por enfermeiros.
Resultados: Prevaleceram pacientes não idosos, masculinos, neurológicos, cirúrgicos, com sedação profunda. Houve maior mortalidade em pacientes com sedação profunda e maior tempo de internação naqueles com sedação moderada. A sedação não se mostrou efetiva para suprimir a dor, mas serviu para controlar sua intensidade.
Conclusão: A identificação da intensidade de dor e sedação realizada por enfermeiros auxilia na tomada de decisão e propicia adequado manejo da sedoanalgesia de pacientes em terapia intensiva.

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Introduction

International multi-center studies indicate the majority of patients in intensive care units (ICU) presents pain, and its systematic evaluation is fundamental to provide adequate analgesia.[1] The self-report is considered 'gold standard' in pain assessment. For awake patients with adequate cognitive and auditory abilities, assessment scores can be used. One of them is the visual numeric scale (VNS), in which patients are asked to rate their pain between zero and ten, that is, 'no pain' and 'worst possible pain', respectively.[2] However, as many patients in ICUs are in critical state, intubated, in mechanical ventilation and/or sedated, and with suppressed level of consciousness, their adequate expression of duration of pain can be impossible.

Scales are used to assess patients' behavioral pain in the context of intensive care, and are an important tool for nurses' clinical practice. The Behavioral Pain Scale (BPS) was translated and adapted to Portuguese in 2014, and assesses three aspects, namely: facial expression, body movements and adaptation to mechanical ventilation.[3] Once identified, pain needs adequate management through analgesic and/or sedative drugs with the aim to control stressors, patient's adaptation to mechanical ventilation in severe respiratory diseases, control of intracranial pressure, epileptic disease and to facilitate the care provided by health professionals, offering comfort during the performance of invasive procedures at the bedside.[4]

In patients' sedation process, their level of consciousness is depressed mainly with use of benzodiazepines drugs, which exert profound effects on the central nervous system. These drugs also act on other organs and systems, which can often be underestimated, highlighting the influence on the immune system. This system is involved with pathologies that prolong the length of stay in ICUs, such as nosocomial infections.[5-7]

The excessive use of sedatives makes it difficult and delays the withdrawal of mechanical ventilation. Depending on the chosen drugs, in some cases it may exacerbate the effects of sepsis, increase hospitalization time, incidence of delirium, and morbidity and mortality in ICU.[8] Studies have demonstrated lower hospitalization time with consequent reduction in mortality in patients using lower level of sedation.[9]

Some sedation guidelines recommend its start to provide adequate analgesia. However, a study of patients on mechanical ventilation has shown that administering analgesia to the patient with morphine first, instead of sedating, may lead to a shorter length of stay in ICUs and the hospital because it provides early weaning from mechanical ventilation.[10]

Scales have been developed when researching the need for adequate titration and control of use of sedation. The Richmond Agitation-Sedation Scale (RASS), for example, is used to classify sedation intensities in light, moderate, or deep. It is important to control the use of sedation through protocols based on the use of analgesics prior to administration of sedation. This helps to reduce the use of hypnotics and improve the practice of sedation in patients in need of mechanical ventilation. Opioids offer lighter sedation, thus facilitate assessment of patients, and provide faster awakening with consequent reduction in length of hospital stay and institutional expenditures.[11]

National and international studies emphasize the importance of using scales to assess the levels of sedation in ICUs in order to establish protocols guiding the sedation practice by goals, and patients benefit from shorter hospitalization time, lower incidence of nosocomial pneumonias and mortality.[12] However, in the literature and clinical practice, there is little involvement of nurses in relation to established guidelines for the use of sedation and analgesics.[13]

With the use of pain and sedation assessment scales by intensive care unit nurses, the following questions emerge: What is the importance of these sedation and analgesia protocols for the management of patients' pain? How does the nurse use these data for decision making on pain and sedoanalgesia? Therefore, the objective of this study was to

identify the clinical profile, intensities of pain and sedation in patients in the intensive care unit, and associate the data.

Methods

A cross-sectional study was conducted at an ICU (clinical, surgical and neurological) divided into 27 beds (17 for clinical and surgical patients, and 10 for neurological patients) of a teaching hospital that is part of the Sentinel Network of the National Sanitary Surveillance Agency of the northwestern region of São Paulo. Data collection was performed through the Richmond Agitation-Sedation Scale (RASS) for assessment of the level of sedation; the Visual Numeric Pain Scale (VNS) was used for self-reported pain; and the Behavioral Pain Scale (BPS) for behavioral pain. Clinical data were obtained from electronic medical records (gender, age, diagnosis, discharge or death in the hospital and ICU, and length of stay in the ICU).

The sample included 240 patients, considering the inherent rotation of the sector. All hospitalized patients during the data collection period were included, and those hospitalized for less than 24 hours were excluded. The scales were filled out by nurses from the unit, from Monday to Friday, in alternating periods (morning, afternoon and night), once every 24 hours, next to the patient by the bedside.

From the total sample of 240 patients, 161 could be evaluated for behavioral pain and 140 for self-reported pain. With patients' clinical evolution throughout the data collection period, 61 patients could be evaluated for behavioral pain at a certain time, and in relation to self-reported pain at another time, or vice versa. As during hospitalization patients presented changes in levels of consciousness resulting from withdrawal, employment or changes in sedation doses, it was possible to assess the same patient with different scales at different times.

The RASS scores range between -5 and 4; the lower the score the deeper the sedation, and the higher the score the more agitated the patient.[14] In this study, was considered the mean RASS score of each patient that was established through the applications of the scale. The score classification for the levels of sedation was considered as follows: light sedation (-2 to 4), moderate sedation (-2.1 to -3.9), and deep sedation (-4 to -5).

The BPS version translated and validated for the Brazilian reality and used in patients under mechanical ventilation and/or sedated was used for assessment of behavioral pain. Its scores range between 3 and 12; 3 means the patient is without pain and 12 means maximum pain, and the following items are evaluated: facial expression, limbs and compliance with mechanical ventilation.[15] For this study, was considered the mean pain score of each patient that was established from all applications. Afterwards, the pain intensity was classified into: no pain (3.00 to 3.09), mild pain (3.10 to 4.09), moderate (4.10 to 6.09), severe (6.10 to 11.99), and maximum (12.00). The VNS was used for identification of self-reported pain, when patients with appropriate level of consciousness could report the intensity of their pain, ranging from 0 (no pain) to 10 (worst possible pain).[16] For this study, the intensity of pain was classified according to the mean scores of each patient obtained from all applications, being 0 to 0.9 (no pain); 1.0 to 3.0 (mild pain); 3.1 to 6.0 (moderate); and 6.1 to 10.0 (severe).

The study complied with resolution 244/12 that involves human beings, and opinion number 984.505. Data were grouped into a database in Excel® 2010 (Microsoft Inc.), submitted to descriptive analysis of the variables of sample characterization, application of analysis of variance (ANOVA) with multiple comparison test of Tukey averages or chi-square test. All statistical analyzes were applied with a significance level of 5% or ($P<0.05$). The Minitab® 17 software (Minitab Inc.) was used.

Results

Overall, 240 patients were evaluated regarding age, length of stay in the ICU, presence of behavioral

pain and/or self-reported pain and RASS score. The 161 assessments of behavioral pain and the 140 of pain by self report were evaluated separately, as shown in table 1.

Table 1. Quantitative variables of the general profile by behavioral pain and by self-report in intensive care unit patients

Quantitative variables	Mean	Standard deviation	Median	Minimum	Maximum
Total patients (240)					
Age	55.9	20.7	58.0	15.0	97.0
Length of hospital stay	10.7	9.0	7.5	1.0	47.0
Behavioral pain	3.2	0.5	3.0	2.0	5.8
Self-reported pain	0.7	1.4	0.0	0.0	8.0
RASS	-2.9	2.0	-2.6	-5.0	-1.2
Behavioral pain (161)					
Age	57.4	20.5	61.0	16.0	97.0
Length of hospital stay	13.2	9.6	10.0	1.0	47.0
RASS	-3.5	1.4	-3.8	-5.0	1.0
Self-reported pain (140)					
Age	52.1	21.7	53.0	15.0	97.0
Length of hospital stay	9.3	8.9	6.0	1.0	46.0
RASS	-1.1	1.6	-0.3	-5.0	1.2

RASS - Richmond Agitation-Sedation Scale

In relation to the total sample (58.7%), patients older than 60 years of age had death as a prevalent clinical outcome, and 65% of those younger than 60 years were discharged. The male gender prevailed in 64.5% of discharges, 64.1% of deaths in the ICU, and 70.4% of deaths in the hospital.

Regarding the intensity of behavioral pain, of the 161 patients evaluated, 93 (57.8%) presented no pain, 59 (36.6%) had mild pain, and nine (5.6%) had moderate pain. No patient had severe behavioral pain. Male patients presented a mean score of 3.23, and female patients' mean score was 3.20 hence, both had mild pain.

Regarding self-reported pain, of the 140 patients assessed, 106 (75.7%) presented no pain, 28 (20%) had mild pain, four (2.9%) had moderate pain, and two (1.4%) had severe pain. Male patients had a mean score of 0.63 and the female mean score was 0.85, which means both were considered as having no pain. The percentiles for qualitative variables are shown in table 2.

The results related to the use of sedation during hospitalization were grouped according to their intensities (light, moderate, deep) and non-sedated patients. For each of these levels, was made an association with quantitative and qualitative variables (Table 3).

Table 2. Qualitative variables of patients in relation to the total sample regarding the assessment of behavioral pain and self-reported pain in the intensive care unit

Qualitative variables	Total n(%)	Behavioral pain n(%)	Self-reported pain n(%)
Gender			
Male	155(64.6)	108(67.0)	91(65.0)
Female	85(35.4)	53(33.0)	49(35.0)
Type of hospitalization			
Clinical	67(27.9)	45(28.0)	41(29.3)
Surgical	173(72.1)	116(72.0)	99(70.7)
Clinical outcome			
Discharge	121(50.4)	52(32.3)	101(72.1)
Death in ICU	92(38.3)	93(57.8)	28(20.0)
Death in the hospital	27(11.3)	16(9.0)	11(7.9)
Specialties			
Neurology	112(46.7)	75(46.6)	61(43.6)
Others	128(53.3)	86(53.4)	79(56.4)
Level of sedation			
Light	66(27.5)	26(16.1)	62(44.3)
Moderate	54(22.5)	54(33.5)	25(17.9)
Deep	78(32.5)	78(48.4)	11(7.9)
Not sedated	42(17.5)	03(1.9)	42(30.0)

ICU - Intensive Care Unit

Table 3. Quantitative variables of patients in relation to sedation levels in intensive care unit

Qualitative variables	Light n(%)	Moderate n(%)	Deep n(%)	Not sedated n(%)	p-value
Gender					
Male	42(63.6)	34(63.0)	52(66.7)	27(64.3)	0.864
Female	24(36.4)	20(37.0)	26(33.3)	15(35.7)	
Classification of hospitalization					
Clinical	14(21.2)	15(27.8)	25(32.0)	13(31.0)	0.428
Surgical	52(78.8)	39(72.2)	53(68.0)	29(69.0)	
Clinical outcome					
Discharge	53(80.3)	22(40.7)	08(10.3)	38(90.5)	<0.001
Death in ICU	08(12.1)	23(42.6)	59(84.3)	02(4.8)	
Death in the hospital	05(7.6)	09(16.7)	11(15.7)	02(4.8)	
Specialty					
Neurology	34(51.5)	23(42.6)	41(52.6)	14(33.3)	0.203
Others	32(48.5)	31(57.4)	37(47.4)	28(66.7)	
Quantitative variables					
Age					
Mean±SD	48.9±21.7	56.1±20.5	62.9±16.6	53.8±22.6	0.001
Median	51.5	57.5	66.5	53.0	
Minimum	15	18	20	17	
Maximum	90	96	97	91	
Length of hospital stay					
Mean±SD	12.2±7.1	16.2±9.6	8.4±9.2	4.5±4.8	<0.001
Median	6.0	16	9.5	3.0	
Minimum	2	1	1	1	
Maximum	46	42	47	27	
Behavioral pain					
Mean±SD	3.5±0.8	3.3±0.5	3.1±0.3	2.0	-
Median	3.3	3.2	3.0	2.0	
Minimum	2.2	2.0	2.2	2.0	
Maximum	5.9	5.0	5.0	2.0	
Self-reported pain					
Mean±SD	0.9±1.6	0.9±1.6	0.5±1.1	0.4±0.7	0.195
Median	0.1	0.0	0.0	0.0	
Minimum	0.0	0.0	0.0	0.0	
Maximum	8.0	7.5	3.0	2.7	

Qualitative variables: p-value for the chi-square test; Quantitative variables: p-value for the ANOVA test - Analysis of variance and Tukey test; ICU - Intensive Care Unit

Discussion

The male gender, age under 60 years old, and mean time of 10.7 days of hospitalization of patients in this study corroborate with recent studies.[12,17,18] The prevalent specialty (neurology) can be justified according to the profile of the studied hospital that is a reference in the care of polytrauma patients, and traumatic brain injury (TBI) is the predominant diagnosis in these hospitalizations, which also justifies the higher incidence of surgical hospitalizations (72.1%).

Regarding the clinical outcome, there was prevalence of discharges compared to deaths in the ICU, differing from the literature findings that show death as the predominant outcome.[12] However, comparing deaths in the ICU and the hospital, the difference was relatively small. Male patients presented higher mortality both in the ICU and after discharge in other hospital admission units.

A study indicates prevalence of deaths in the elderly, with increased mortality throughout hospitalization time, and a higher number of discharges for patients younger than 60 years.[17] These data corroborate with the present study findings, in which most deaths occurred in individuals aged over 60 years and those younger than 60 years old were discharged from the ICU.

In relation to behavioral pain, the majority presented mild pain, and self-reported pain was absence of pain. An international study found 40% of the assessed patients had pain with prevalence of mild to moderate intensity.[12] In another study, mild pain was observed in 65% of patients.[3]

Deep sedation was predominant, but the mean RASS score was equivalent to moderate sedation. For patients assessed for behavioral pain, the RASS score was equivalent to moderate sedation and the length of hospital stay was 2.5 days longer compared to the total sample. In patients assessed by self-report, the RASS score was light sedation, as expected. As the effective application of the visual numeric pain scale requires that patients are conscious and oriented to report the intensity of pain, the levels of sedation must be superficial. The hospitalization time for this group was reduced by 1.4 days, compared to the total sample. It was also observed that the higher the intensity of pain the higher the incidence of death.

Regardless of the intensity of sedation (light, moderate and deep), patients presented behavioral pain varying from mild to moderate intensity. Patients in light and moderate sedation showed self-reported pain ranging from mild to severe intensity. Therefore, the use of sedation was effective in pain control, but not sufficient to suppress patients' pain.

Elderly patients presented lower pain intensity when compared to younger patients. Probably given the weakness of advanced age, lower doses of analgesic-sedative drugs are sufficient for pain relief and their adaptation to invasive conditions inherent to hospitalization itself and their clinical status. However, in this study there was no significant association between pain and age, which is equivalent to the recent study in which elderly patients also demonstrated greater tolerance to discomforts resulting from hospitalization, including pain.[18] There was no statistical relevance between intensity of behavioral pain and gender, type of hospitalization (clinical/surgical) and clinical outcome ($p>0.05$).

Pain is the most found stressor in intensive care units. When untreated, it can lead individuals to present other stressors such as anxiety and agitation.[18] One of the challenges for the treatment of pain is the deficiency of its perception by analyzing body and facial expressions, and identifying its intensity and nature of origin. Even with the initiative to make pain the fifth vital sign, professionals are often passive in relation to this theme, and less than 50% of health professionals perform pain assessment.[3]

In relation to use of sedation, the present study showed a significant association between the levels of sedation used and the length of hospital stay ($p<0.001$). Patients in moderate sedation had longer length of hospital stay, followed by those in deep sedation. On the other hand, patients who were not sedated or in light sedation presented shorter length of hospital stay.

There was a statistical relationship between the intensity of sedation and ICU mortality; the deep-

er the sedation the greater the number of deaths, and the more superficial (or absent) the sedation the higher the number of discharges (p <0.001). A research on this subject found that patients submitted to deep sedation tend to present agitation after the weaning of sedation and psychological changes, even after hospital discharge.[12]

The use of more superficial levels of sedation was observed mainly in younger patients and deeper levels are used with older patients. Younger patients tend to remain with more superficial sedation and older patients with deeper sedation. Moderate sedation and absence of sedation are commonly observed in patients of intermediate ages (less than 60 years). There was no significant association between levels of sedation and gender, type of hospitalization (clinical/surgical), specialty and intensity of pain by self-report (p> 0.05).

Analgesic-sedative drugs are used in intensive care units to reduce stress response and provide comfort and safety to patients. However, sedoanalgesia must be kept at safe levels, preferably at more superficial levels, so patients are monitored for pain control appropriately without completely suppressing their level of consciousness in a way that they can interact and express their physical and emotional needs

Conclusion

Regarding the clinical profile, most patients were older than 60 years old, male, neurology specialty, surgical, deep sedation level, and the clinical outcome showed higher number of ICU discharges than deaths. Patients in moderate sedation had longer length of stay in the ICU, while young adults (younger than 60 years old) in light sedation had more discharges from ICU and later from other hospitalization units of the hospital. There was pain of mild intensity in sedated patients, therefore, sedation was not effective in suppressing pain, but it provided control of its intensity. In conclusion, nurses' identification of the intensity of pain and sedation performed with use of scales helps decision making and provides adequate management of sedoanalgesia in the ICU.

Collaborations

Silva DC, Barbosa TP, Bastos AS and Beccaria LM declare they have contributed to project design, analysis and interpretation of data, article writing, critical review of intellectual content and final approval of the version to be published.

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