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COMMENTS ON RESEARCH ARTICLES

The impact of a pain management algorithm on ventilation, length of stay, and pain assessment in intensive care patients☆

Efecto de un algoritmo de manejo del dolor sobre la ventilación, la estancia y la valoración del dolor en pacientes de cuidados intensivos

Olsen BF, Rustøen T, Sandvik L, Jacobsen M, Valeberg BT. Results of implementing a pain management algorithm in intensive care unit patients: The impact on pain assessment, length of stay, and duration of ventilation. J Crit Care. 2016;36:207–11.

Abstract

Purpose This study aimed to measure the impact of implementing a pain management algorithm in adult intensive care unit (ICU) patients able to express pain. No controlled study has previously evaluated the impact of a pain management algorithm both at rest and during procedures, including both patients able to self-report and express pain behavior, intubated and nonintubated patients, throughout their ICU stay.

Materials and methods The algorithm instructed nurses to assess pain, guided them in pain treatment, and was implemented in 3 units. A time period after implementing the algorithm (intervention group) was compared with a time period the previous year (control group) on the outcome variables: pain assessments, duration of ventilation, length of ICU stay, length of hospital stay, use of analgesic and sedative medications, and the incidence of agitation events.

Results Totally, 650 patients were included. The number of pain assessments was higher in the intervention group compared with the control group. In addition, duration of ventilation and length of ICU stay decreased significantly in the intervention group compared with the control group. This difference remained significant after adjusting for patient characteristics.

Conclusion Several outcome variables were significantly improved after implementation of the algorithm compared with the control group.

Comments

Pain is a common symptom in patients who are admitted to an ICU and can originate both at baseline or during the conduct of painful procedures applied frequently during daily care.[1–5]

Pain not treated adequately constitutes an important source of stress for patients, which, in turn, triggers an inflammatory response that can affect the patients' clinical evolution and result in chronic pain.[6]

To provide optimal pain management, routine pain assessments should be carried out using validated scales. The patients' own communication with regard to their level of pain is considered as a gold standard for pain assessment. When direct communication with patients is not possible, the pain assessment must be performed using scales based on behavioral indicators. These recommendations are included in different evidence-based Clinical Practice Guidelines (CPG)[7,8] which recommend a coordinated approach to treat pain, agitation and delirium.

Analgesia and sedation strategies applied to critically ill patients have changed over the past few years, adapting to the evidence reported in different scientific publications. The most recent CPGs published recommend the use of sedation strategies based on analgesia and the administration of minimal sedative doses to achieve the desired effects, encouraging the application of levels of superficial sedation whenever possible. In this regard, new concepts such as the eCASH,[9] which recommends achieving a mild sedation, giving priority to the administration of analgesia, and relegating the use of deep sedation to those patients for which it is strictly necessary, have been developed. In order to achieve this goal, the conduct of systematic pain

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assessments is required both at baseline or whenever the pain is related to a pathology, such as pain secondary to the procedures are care administered to a patient.

The study was carried out in 3 intensive care units of 2 Norwegian hospitals, and it aims to address the impact of a pain management algorithm in critically ill patients, without combining it with the systematic evaluation of other tools assessing agitation and delirium. This facilitates the measurement of the impact of pain assessment, which is hampered by the introduction of several tools aimed at different variables. The design of the algorithm was based on the evidence-based recommendations of the CPGs, which recommend the conduct of at least one pain assessment per shift, both at baseline and during mobilization. The tools chosen to measure patients' levels of pain are validated and are supported by the available literature for different patient contexts (medical, surgical and trauma patients).

It is important to consider that the implementation of assessment tools for their systematic use and the potential change in the management of patients in clinical practice, is faced with knowledge and resistance deficits, as well as with barriers towards changing usual clinical practice.[10] In this sense, the author of this study,[11] as a strategy for its implementation and adherence, dedicated a previous training plan and introduced reference nursing figures to provide feedback to the rest of the nursing team (74.6% adherence).

As for the sample size, it must be directly related to the standard deviation of the scores of the characteristics of the variables under study. In this study, only the data reported by the available literature on the average hours of mechanical ventilation (MV) was used to calculate the sample size, without considering the patients' length of stay at the ICU or the number of agitation events, among others. Furthermore, not all patients assessed had received MV. This issue was solved by recruiting at least the number of subjects who received MV in each group ($n = 117$). Following the exclusion criteria of the study population, the dose of deep sedation (RASS-4/-5) must be considered as a relative exclusion criteria in order to apply behavior-based scales, as it greatly reduces the expression of behavioral indicators.[12]

With regard to the study design, two measurements (pre and post-intervention) were taken from two patient samples and during one intervention. It was assumed that the greater the equivalence between both groups the more it matched the conditions of the experimental research, although most characteristics were similar, there were differences in the severity level and the workload in both groups. On the other hand, factors that could have an impact on the patients' level of pain, such as a history of psychotic substance use, a psychiatric disease, chronic pain and/or the prior consumption of analgesics, among others, should have also been considered. Regarding pain assessments, the levels of pain in the control group were only assessed with the EVN tool, as no other tools were available for patients who were unable to communicate prior to the implementation of the algorithm, whereas these assessment tools (patients who received/did not receive MV) were used in the experimental group; hence, this condition increases the number of assessments carried out in the intervention group compared to the control group.

On the other hand, no diagnoses of delirium were reached in the patients of either group (control and intervention), which could have an impact on both the number of episodes of agitation (hyperactive and mixed delirium) and the bias of behavioral pain indicators in certain circumstances (hypoactive, hyperactive and mixed delirium).

In spite of these methodological limitations, the results of the use of a pain management algorithm showed a statistically and significant impact, with a lower number of hours of mechanical ventilation, agitation events and length of stay at the ICU, with the latter having little clinical relevance (control group: length of stay 3 days (1.7–6.9)); intervention group: length of stay 2.6 days (1.7–5.4; $p = 0.04$).

In our results, we found it striking that the same therapeutic regimen of analgesics and sedatives was used in both groups, as the use of analgesics in the intervention group did not increase due to the greater monitoring of the patients' levels of pain. This is justified in the discussion section by the fact that the administration of analgesics was already more frequent before (control group) and that the drugs administered in the intervention group were better suited to the patients' specific moments of needs. A greater use of epidural analgesia and lower doses of midazolam were observed in the intervention group, consequently resulting in lower degrees of sedation, although no statistically significant differences were observed in the degree of sedation of both groups.

It should be noted that, one of the strengths of the algorithms used in this study is that it constitutes a brief and simple design which serves to systematize pain management between different health professionals. Moreover, all patients admitted to the ICU can benefit from its use, as it includes different tools based on the patients' ability to communicate, and whether or not they need mechanical ventilation. This study proves its validity for its application in different types of critically ill patients, such as medical, surgical and trauma patients.

This study demonstrates that the implementation of a pain management algorithm, normalizing the number of assessments, has an impact on patients.

This type of studies highlight the need to implement evidence-based practices in our healthcare environment, aimed at achieving a systematic pain management and, therefore, ensuring patient comfort during their stay at the ICU and reducing adverse events related to an inadequate pain management.

References

1. Chanques G, Jaber S, Barbotte E, Violet S, Sebbane M, Perrigault PF, et al. Impact of systematic evaluation of pain and agitation in an intensive care unit. Crit Care Med. 2006;34:1691–9.
2. Chanques G, Sebbane M, Barbotte E, Viel E, Eledjam JJ, Jaber S. A prospective study of pain at rest: incidence and characteristics of an unrecognized symptom in surgical and trauma versus medical intensive care unit patients. Anesthesiology. 2007;107:858–60.
3. Payen JF, Chanques G, Mantz J, Hercule C, Auriant I, Leguillou JL, et al. Current practices in sedation and analgesia for mechanically ventilated critically ill patients: a prospective multicenter patient-based study. Anesthesiology. 2007;106:687–95, quiz 891–2.
4. Puntillo KA, White C, Morris AB, Perdue ST, Stanik-Hutt J, Thompson CL, et al. Patients' perceptions and responses to

procedural pain: results from Thunder Project II. Am J Crit Care. 2001;10:238–51.
5. Puntillo KA, Max A, Timsit JF, Vignoud L, Chanques G, Robleda G, et al. Determinants of procedural pain intensity in the intensive care unit. The Europain(R) study. Am J Respir Crit Care Med. 2014;189:39–47.
6. Lewis KS, Whipple JK, Michael KA, Quebbeman EJ. Effect of analgesic treatment on the physiological consequences of acute pain. Am J Hosp Pharm. 1994;51:1539–54.
7. DAS-Taskforce 2015Baron R, Binder A, Biniek R, Braune S, Buerkle H, et al. Evidence and consensus based guideline for the management of delirium, analgesia, and sedation in intensive care medicine. Revision 2015 (DAS-Guideline 2015) – short version. Ger Med Sci. 2015:13.
8. Barr J, Fraser GL, Puntillo K, Ely EW, Gelinas C, Dasta JF, 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;41:263–306.
9. Vincent JL, Shehabi Y, Walsh TS, Pandharipande PP, Ball JA, Spronk P, et al. Comfort and patient-centred care without excessive sedation: the eCASH concept. Intensive Care Med. 2016;42:962–71.
10. Horbury C, Henderson A, Bromley B. Influences of patient behavior on clinical nurses' pain assessment: implications for continuing education. J Contin Educ Nurs. 2005;36:18–24, quiz 46–7.
11. Olsen BF, Rustoen T, Sandvik L, Miaskowski C, Jacobsen M, Valeberg BT. Implementation of a pain management algorithm in intensive care units and evaluation of nurses' level of adherence with the algorithm. Heart Lung. 2015;44:528–33.
12. Latorre-Marco I, Acevedo-Nuevo M, Solis-Munoz M, Hernandez-Sanchez L, Lopez-Lopez C, Sanchez-Sanchez MM, et al. Psychometric validation of the behavioral indicators of pain scale for the assessment of pain in mechanically ventilated and unable to self-report critical care patients. Med Intensiva. 2016;40:463–73.

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