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Analgesia and Sedation in Intensive Care Unit

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Summary: Sakata RK – Analgesia and Sedation in Intensive Care Unit.

Background and objectives: Many Intensive Care Unit (ICU) patients present pain. The administration of analgesics and sedatives is crucial for patient comfort and to reduce stress, as well as to prevent delay in recovery and ventilator weaning. The objective of the present study was to conduct a review on analgesia and sedation in the ICU.

Content: The present study reviewed the causes of pain, the methods used to evaluate the intensity of pain and sedation and the conducts employed in pain treatment and sedation. Drug selection is important in order to prevent excessive sedation, by performing analgesia before the sedation.

Conclusions: The most commonly employed drugs are morphine, fentanyl, midazolam and propofol. Other medications are less frequently used.

Keywords: ANALGESIA; SEDATION; INTENSIVE THERAPY.

INTRODUCTION

Most patients at the Intensive Care Unit (ICU) experience pain, fear and anxiety [1,2]. The administration of analgesics and sedatives is crucial for patient comfort and to reduce stress, as well as to prevent delay in recovery and ventilator weaning[1].

One study showed that less than 50% of the patients have adequate pain control at the ICU [3]. The barriers were: the physician's conduct, use of protocols without evidence, the professionals' resistance in changing the conduct, inadequate method of assessment and insufficient training of the professionals regarding pain assessment and treatment.

Pain relief is essential for the patient's adequate recovery [1,2,4,5]. The benefit is more evident in the patient that presents alterations in several organs when the pain causes more severe alterations.

Recovery is significantly influenced by the choice of analgesic and sedative agents, deficient or excessive sedation and the insufficient control of pain [2].

In spite of published guidelines and studies, the use of strategies that have been approved at the routine can occur slowly [2]. Analgesia and sedation at the ICU are complex due to several comorbidities, drug interactions and organ dysfunctions [6].

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Critically-ill patients

Critically-ill patients present important alterations in the pharmacology of analgesics. Very often it is not possible to administer drugs orally. The absorption of medication administered orally is unpredictable in a patient with gastrointestinal function alterations and decreased splanchnic blood flow.

There is a decrease in the hepatic blood flow and drug clearance in arterial hypotension, in trauma, in sepsis, in hipoxemia and when some drugs are being administered.

Organ dysfunction causes alteration in the clearance of drugs and metabolites [7-10]. In kidney failure there is accumulation of analgesics, sedatives and active metabolites normally eliminated by the kidneys. In shock, drug clearance is slower [9,10].

In the patient with hypoproteinemia, more free drugs are associated with a higher possibility of toxicity. Acidemia also causes increase in the active drug levels. Alterations in the hematoencephalic barrier also facilitate the passage of some drugs.

What causes pain?

Many ICU patients experience pain. The causes are [7,11,12]:

- Tracheal aspiration
- Change of decubitus
- Dressing wounds
- Tracheal tube
- Trauma
- Surgical lesion
- Burns
- Nasogastric tube
- Central catheter
- Arterial Catheter
- Drains
- Pressure ulcers
- Venous or arterial puncture
- Bandages for limb restraining

Pain and sedation assessment

Less than 50% of the professionals evaluate the pain [7]. Pain and sedation assessment is particularly complex in an ICU, as the patients are very often incapable or unable to verbally communicate with the professionals [4,11,13-15]. The patient cannot establish communication with the professionals due to several reasons: tracheal intubation, alteration of consciousness, sedation, and effect of medications [11].

The patient undergoing mechanical ventilation must be assessed regarding pain and sedation to have the drug dose optimized. That reduces the need for ventilation and ICU stay duration [6].

Scales help to detect pain [7]. A patient that can communicate verbally can be evaluated through the numerical verbal scale (0 to 10)[1], which requires a higher degree of comprehension than the 4-point verbal rating scale (VRS-4), in which the pain can be absent = 1, mild = 2, moderate = 3 or severe = 4 [18]. The correspondence of the descriptive scale with the numerical one would be: absent pain = 0; mild = 1-3; moderate = 4-6 and severe = 7-10[14]. Scores > 3 in the numerical scale or 2 at the verbal scale are unacceptable [14].

Pain causes sympathetic stimulation accompanied by tachycardia and increased blood pressure, symptoms that can help to detect pain. However, these alterations have little specificity at the ICU and can be caused by vasopressors, beta-adrenergic blockers, anti-arrhythmic drugs, sedatives and pathological conditions (sepsis, shock, hypoxemia and fear) [11].

When the patient is unable to communicate, other methods must be used [7-14]. The Behavioral Pain Scale **(**BPS) can be used, with scores from 3 to 12, through the observation of the facial expression, body movements, muscle tension and synchrony with the ventilator [1-2].

The BPS, which is easy to interpret, is used to assess the pain in sedated patients or those submitted to mechanical ventilation (Chart I). If the score is > 6, it is considered unacceptable [14].

The facial expression is the item that contributes the most to pain assessment, followed by limb movement and acceptance of ventilation [11]. The following are pain behaviors: grimacing, frowning, rigidity, tightly closed eyelids, wrinkling the nose, elevated upper lip, verbalization, and closed fists [11]. The acceptance of the mechanical ventilation can be affected by hypoxemia, bronchospasm and secretion [11].

Chart I – The Behavioral Pain Scale Analyzes:

Facial expression
Relaxed: 1
Partially tense: 2
Totally tense: 3
Grimace: 4
Movements of upper limbs
Relaxed: 1
Partially flexed: 2
Totally flexed: 3
Totally contracted: 4
Mechanical ventilation
Tolerating movements: 1
Coughing, but tolerating during most of the time: 2
Fighting the ventilator: 3
Impossible to control the ventilator: 4

The scale of sedation was described by Ramsay (Chart II) [11,14]. When the scale is used there is a lower incidence of excessive sedation[1]. Approximately 70% of the professionals use scales for sedation [16].

Chart II – Ramsay Score

1 – anxious, agitated
2 – cooperative, oriented and serene
3 – sleeping, drowsy and responding easily to commands
4 – sleeping and responding to stimuli on glabella
5 – sleeping and responding slowly to pressure on glabella
6 – sleeping without response to pressure on glabella

The desirable characteristics of a scale are:

- Easy to apply
- Easy to interpret
- Possibility to evaluate small alterations
- Evaluation of sedation for drug titration
- Evaluation of agitation

Treatment of pain and sedation

The methods of analgesia can act on different points of the pain pathways, reducing the activation of nociceptors or the passage of the stimulus, activating the inhibitory pathways and altering pain perception.

To alleviate pain and anxiety, analgesic and sedative agents are administered [12]. A study disclosed the different protocols adopted for analgesia and sedation in the ICU [1]. There is a discrepancy between the need for sedation and the way it is carried out [16]. Opioids, benzodiazepines and propofol are the basic medications used to give the patient comfort and facilitate mechanical ventilation. Most professionals use opioids associated with GABA agonists [1].

No medication has all the characteristics of the ideal analgesic or sedative. To optimize pain treatment, the physician must know the pharmacokinetic and pharmacodynamic differences that can affect the safety and effectiveness of analgesics and sedatives [17].Modifications in the pharmacokinetics and pharmacodynamics with long-term administration, alterations in the protein binding and volemia and organ dysfunction cause variable results [1]. Pain treatment requires knowledge of the action mechanisms, pharmacokinetics, latency and the duration of the analgesia and the side effects. The correct analgesic agents must be administered at the adequate dose to a certain patient at the right moment [1]. It is important to know what clinical alterations the patient presents and the medications he or she uses, as it is possible that there will be an interaction with the analgesics.

The sedation procedures for ICU patients have evolved and depend on the patient and the available drug [7]. The ideal level