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Pain Assessment, Sedation, and Analgesic Administration in the Intensive Care Unit

ANALGESIC protocols, efficacy, and outcomes for acute postoperative pain management have been studied extensively and are widely adopted.[1] In this issue of ANESTHESIOLOGY, Payen *et al.*[2] report analyses of data from the DOLOREA study, a prospective, multicenter, observational survey evaluating the analgesia and sedation practices of mechanically ventilated patients during the first week of intensive care unit (ICU) stay. This is the second report from these data acquired from 44 ICUs in France. The first analyses showed that a large proportion of mechanically ventilated patients were treated with sedatives and analgesics but were not concomitantly evaluated for sedation and analgesia.[3] From this first study, it is clear that protocols for the use of analgesic drugs in the ICU were not widely established or used.

The current article analyzing data from the DOLOREA database[2] evaluates the interdependence of pain treatment and sedation protocols in ICU patients requiring mechanical ventilation. This analysis indicates that mechanically ventilated patients who were assessed for both their level of pain and their degree of sedation received reduced hypnotic drug dosing compared with those who were not assessed for pain and sedation. Evaluation for sedation and analgesia was associated with a reduction in time of ventilator support and duration of ICU stay when compared against patients with similar severity of illness and no assessment of analgesia.

Early studies that addressed pain control in the ICU implicated pain management as a modifiable factor in the long-term outcomes of critically ill patients.[4,5] Recent reports in selected patients can, on occasion, demonstrate positive findings in favor of an analgesic regimen in intensive care patients.[6] Other variables that are interdependent with pain management can also influence outcome, *e.g.*, myocardial ischemia, pulmonary complications, and delirium. Therefore, analgesia as a sole factor influencing outcome in the ICU is uncommon in recent studies. However, the inability of a ventilated, sedated ICU patient to report pain should not preclude pain management and does not rule out the possibility that these patients are experiencing pain.[7] For these patients, sedation can limit opioid dosing, and of course, treatment with opioids will also produce sedation. The complex relation between sedation and analgesia management in critically ill patients receiving ventilatory support may be further compounded by multiple comorbidities, drug interactions, and acute organ dysfunction.

The past decade has seen an increase in the number of scales and assessment tools for the evaluation of sedation and analgesia in ICU patients. Several sedation scales, including the Richmond Agitation Sedation Scale, Adaptation to the Intensive Care Environment tool, and Minnesota sedation assessment tool, and tools for assessment of analgesia in the ICU, such as the visual analog scale, behavioral pain scale, and critical care pain observation scale, have been developed. The fact that several scales and checklists for pain and sedation exist emphasizes the complex nature of the problem. Furthermore, the actual percentage of ICUs implementing formal sedation and analgesia protocols is approximately 50% in the United States.

Prospective trials have demonstrated that strategies such as daily interruption of sedation and spontaneous breathing trial protocols have decreased the duration of mechanical ventilation and ICU stay (fig. 1). In the Awakening and Breathing Controlled Trial, the hypothesis to combine the spontaneous breathing trial and daily interruption of sedatives was tested and showed a significant reduction in dosages of benzodiazepines and opioids and a decrease in the time of mechanical ventilation.[8] Uniform implementation of such protocols in all types of ICUs is challenging and may not necessarily be easily implemented. Crucial to the safe implementation of such protocols is the careful screening of patients and the education of the ICU staff. Risks such as increased patient distress, potential self-extubation and removal of critical monitoring devices, worsening intracranial pressures, and drug withdrawal syndromes are considerations.

In addition to problems associated with sedation and inadequate pain control, patients undergoing mechanical ventilation in the ICU are at risk for developing delirium. Delirium in mechanically ventilated patients is associated with a threefold increase in risk of death at 6 months after discharge.[9] Hence, the early recognition and management of delirium is crucial in the ICU. Benzodiazepine use has been implicated as an independent risk factor in patients' transition to delirium in the ICU, indicating that both sedative drug and dosage may influence long-term outcome.[10] North American studies have reported delirium rates in excess of 50% in the sedated, mechanically ventilated ICU population.[11] In the current report from the DOLOREA database, there is no information on delirium in these mechanically ventilated ICU

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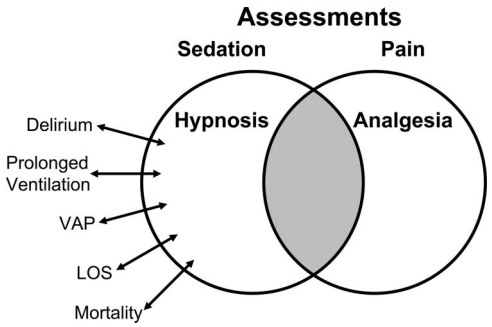

Fig. 1. Assessments for pain and sedation and their treatments are complementary and interdependent in mechanically ventilated intensive care unit patients. Sedation and hypnotic drugs must be administered using doses that allow for pain assessment. Pain and analgesic drug administration produce sedation which may affect sedation measurement and hypnotic drug requirements. Hypnotic drugs and drug dosing have been linked to increased delirium, prolonged mechanical ventilation, ventilator-associated pneumonia (VAP), increased length of stay (LOS), and greater mortality in intensive care unit patients.

patients. This is an important issue because the most widely used sedation agent in the DOLOREA study was a benzodiazepine, already implicated as a risk factor for developing delirium in the ICU. Furthermore, reducing benzodiazepine use was linked to reduced ventilator days and ICU stay in the DOLOREA study.

The results of this second analysis from the DOLOREA study suggest that optimal care of mechanically ventilated patients includes use and integration of pain and sedation assessment tools to optimize dosing of analgesic and sedative drugs. This optimal care should result in decreased time of ventilator support and reduced duration of ICU stay. The strength of this study is the large number of ICUs from which the data were generated. More than 1,000 mechanically ventilated patients were studied; data from more than 500 patients who were assessed for pain and more than 600 patients who were not assessed were analyzed.

Although the DOLOREA study is a prospective, multicenter, observational study, associations can be made, but cause and effect cannot be demonstrated. Unknown or unmeasurable differences between these two groups of patients, those assessed for pain and those who were not, may influence the outcome. Propensity-adjusted score analysis was used to eliminate imbalances between groups[12]; however, it is always possible that unknown factors may contribute to group differences that may not be accounted for by the propensity scoring. This particular study does not address the issue of benzodiazepine use, delirium, and ICU stay. Other details about types of surgery are not available, *e.g.*, did patients undergoing thoracic surgery have greater susceptibility to prolonged mechanical ventilation compared with orthopedic procedures? Were regional anesthetic techniques such as epidural analgesia used in any selected patients?

In conclusion, based on current study, pain assessment seems to reduce sedative drug dosing, allowing for objective pain evaluation and analgesic drug dosing based on patient report. Dosages based on assessments likely reduced ventilator days and duration of ICU stay. Perhaps reductions in delirium, ventilator-associated pneumonia, or post–traumatic stress disorder will also occur. From this, reduction in hospital costs and long-term morbidity may follow. Future studies may demonstrate causal relations between sedation and pain assessments and improved long-term outcomes.

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