Editorial

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Sedation in Intensive Care Unit patients: Assessment and awareness

There has been an increase in the number of patients who are placed on mechanical ventilators as more numbers of hospitals in India have started maintaining intensive care units (ICU) equipped with ventilators.

These patients in the ICU on mechanical ventilators require sedation and analgesia in order to tolerate the endotracheal tube, to lie down in the same position for a long time, to prevent dysynchrony with the ventilator, to tolerate many of the procedures, for optimization of oxygenation and for patient safety.[1]

Nevertheless, providing patients with an optimal level of sedation is a challenging act. Patients who are inadequately sedated are more likely to remain anxious, experience ventilator dysynchrony, remove invasive devices and experience post-traumatic stress disorder.[1] Other problems arising from undersedation are increased stress symptoms such as hypermetabolism, sodium and water retention, substrate mobilization from energy stress and lipolysis, cardiovascular symptoms including tachycardia, increased blood pressure, increased oxygen consumption, altered respiratory rates, altered gastrointestinal motility, changes in coagulability such as clotting time, platelet aggregation and delayed wound healing.[2]

Conversely, patients who become oversedated are more difficult to liberate from mechanical ventilation and thus are at greater risk for developing complications such as ventilator-associated pneumonia and each extra day on ventilator costs substantial amount to the patient.[1] Excessive sedation can also contribute to hypotension, venous thrombosis, prolonged ventilation, an increased risk for pneumonia and a prolonged stay in the ICU, with an increasing burden on staff, bed availability and associated costs.[3] Quimet *et al.* have identified a higher incidence of delirium and death in patients who develop drug-induced coma during their ICU stay.[4]

It is very important to optimize sedation and analgesia for these patients on mechanical ventilators. The role of the nursing staff is very crucial in this aspect to assess the level of sedation.

Many methods have been used to assess the sedation level of patients in ICUs. Both objective methods like electroencephalogram (EEG), auditory evoked potential and signal-processed EEG - bispectral index (BIS) monitors[5] and subjective methods in the form of sedation scores like Riker sedation-agitation scale (SAS), motor activity assessment scale (MAAS), richmond agitation-sedation scale (RASS), Adaptation to the intensive care environment scale (ATICE), Ramsay Sedation Scale and, more recently, Marak A Mirsky *et al.* have introduced the nursing instrument for the communications of sedation (NICS) and level of arousal (LOA).[6]

Although many scoring systems are available, few if any health professional can recall any scale in its entirety or score a patient without direct review of a scale's ordinal parameters.[6] The NICS scale [Table 1] appears to be a simple scale and can be easily followed by the nursing staff. Marek A Mirsky *et al.*[6] compared the utility of the NICS against other established scales – SAS, Ramsay and MAAS. The authors concluded that NICS ranked highest in nursing preference and ease of communication and may thus permit more effective and interactive management of sedation.

Because a majority of the sedation scales are subjective, many of the intensivists feel strongly that an objective monitor of sedation is crucial for adequately assessing the status of a patient.

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Table 1: Nursing instrument for the communication of sedation score response[6]

–3	Dangerously agitated: Physical risk to patient and others. Attempting to pull, or pulling on invasive devices. Actively fighting restraints
–2	Agitated. Frequent or constant motor activity; requiring restraints. Not controlled with verbal reminders
–1	Anxious. Fidgety. Calms with reassurances and instruction
0	Awake, cooperative, calm
1	Lethargic but arouses easily to voice or gentle tactile stimulation. Attentive, purposeful motor examination. Eyes closed when not stimulated
2	Deeply sedated. Requires loud voice or deep stimulation to arouse. Will follow commands briefly only when stimulated. Rapidly returns to deep sedated level. Purposeful movements during stimulation
3	Unresponsive to deep stimulation. No command following or purposeful motor

The bispectral index monitor (BIS) was developed in the 1990s to monitor the effects of anaesthetics and other drugs on the brain during surgery,[7] BIS monitoring has been used as an objective measure of sedation in ICU patients . Numerous studies have been conducted in the past decade to determine the role of BIS monitoring of sedation in adult patients in the ICU.[8-12] Many studies have concluded that BIS monitoring was not helpful in assessing the level of sedation in ICU patients.[2,9] Deogaonkar *et al.*,[10] Consales *et al.*[11] and Arbour[12] have recently concluded that BIS is useful in the ICU setting. The main problem of using BIS for sedation in the ICU is that significant electromyographic (EMG) activity may be present in sedated, spontaneously breathing patients, which interferes with EEG signal and BIS calculation. The EMG activity may be interpreted as high-frequency, low-amplitude waves falsely elevating BIS. Similarly, falsely elevated BIS values can also occur with high electrode impedances produced by inadequate electrode attachment and misplacement.[13] Because of this, patients may be given unnecessary extra sedation. The newer version of BIS XP was designed to minimize EMG influence by detecting and filtering the interference. Deogaonkar *et al.*[10] found that BIS XP was useful in monitoring sedation in brain-injured patients, whereas Tonner *et al.*[14] found that the newer version was not useful for monitoring sedation in post-operative ICU patients.

Gelinas *et al.*[15] conducted a pilot study to explore the validity of BIS, the critical care pain observation tool (CPOT) score and vital signs (mean arterial pressure, heart rate) during rest and painful procedures in sedated and mechanically ventilated patients, and found that both BIS and CPOT scores are increased, but the vital signs remained quite stable during painful procedures. They concluded that CPOT score can be used in non-verbal patients to detect pain. However, when the patient is on muscle relaxants, BIS seems to be an interesting tool.

BIS monitoring may be of special benefit when oversedation has to be avoided because clinical scales do not allow a discrimination of deep sedation. A deeper degree of sedation cannot be differentiated by clinical scales alone, whereas BIS can discriminate the level of sedation even down to a burst-suppression EEG.[2]

DAILY INTERRUPTION OF SEDATIVES

Kress *et al.*[16] tested to determine whether daily interruption of sedative infusions in critically ill patients receiving mechanical ventilation would decrease the duration of mechanical ventilation (MV) and the intensive care unit length of stay (ICU LOS) and in the hospital stay. They found that daily interruption of sedative infusions reduced the duration of MV and ICU LOS. There was a concern that stopping sedation may expose patients to long-term psychological harm in the form of post-traumatic stress disorder (PTSD).[17] But, later studies have found that there is no increase in PTSD with daily spontaneous awakening trials (SATs).[18,19] Jackson *et al.*[18] found that, compared with usual care sedation and ventilation weaning practices, a wake up and breathe protocol that pairs daily SATs (i.e., interruption of sedatives) with spontaneous breathing trials resulted in similar cognitive, psychological, functional and quality-of-life outcomes among patients tested 3 and 12 months after their ICU stay.

Contrary to traditional thinking, sedative medications may contribute to adverse psychological outcomes rather than prevent them. Jones and colleagues[20] demonstrated that patients who experience sedative-induced delusions while in the ICU, for example, are more likely to develop PTSD than patients who have factual memories of their ICU stay. Higher doses of benzodiazepines have been associated with PTSD symptoms months after discharge.[21] Recently, Strom *et al.* have shown that withholding sedation in critically ill patients on mechanical ventilation is associated with an increase in days without ventilation.[22] This move has been made possible by the improvement in ventilator algorithms, which are increasingly flexible in dealing with variable patient efforts.[23] Now, we have progressed from deep sedation for days on end to those that involve keeping patients in the ICU much more awake and interactive.

Another method of improving the neurologic and functional outcome of mechanically ventilated patients is the use of the "ABCDE" bundle, i.e Awake and Breathing co-ordination, Choice of sedatives and analgesics, Delirium monitoring, Early mobility and exercise where spontaneous awakening and breathing trials have been combined is found to be very promising.[24]

AWARENESS AMONG THE YOUNG DOCTORS AND NURSING STAFF

Many of the young doctors, including recently qualified anaesthesiolgists, may not be aware of many of the sedation scoring systems used and many of the ICUs may not have a protocol for sedation. Hence, sedation protocols should be standardized in every critical care unit, and every health care person working in the ICU should be made aware of the protocol used. A simple scoring system like NICS can be used, which can be easily followed by the nursing staff and duty doctors in the ICU. At this juncture, a national survey regarding the sedation practice in the majority of the ICUs in India is required.

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