

Goals of goal-directed sedation

Objetivos da sedação guiada por metas

“Be stubborn about your goals and flexible about your methods”

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Although goal setting is traditional in motivational and behavioral sciences,⁽¹⁾ goal-directed (GD) approach is a relatively recent phenomenon that has dominated the intensive care world over the last 2 decades.⁽²⁾ GD management, however, is not new to medicine.⁽³⁾ The goals of blood pressure and blood sugar levels and anticoagulation are examples of specific clinical and biological management targets designed to achieve short-term control in hypertension, diabetes and atrial fibrillation, for example, for better remote and long-term outcomes.

A GD approach to management in intensive care has been adopted to simplify complex processes. Goal-directed sedation (GDS) in mechanically ventilated critically ill patients is a classic example. The sedation in the context of critical illness, however, is a complex and multifaceted intervention. Sedation practice is therefore the outcome of a multidimensional matrix of different but simultaneous intermediations, which includes the following:

1. The choice and total dosage of sedative agent/s given.
2. The intensity of prescribed and achieved sedation depth.
3. Patient factors, such as the severity of illness, concomitant therapy and premorbid state.
4. The timing and duration of the above interventions.

Achieving GDS therefore must include the manipulation of some or all aspects of sedation practice. Specific hurdles, however, continue to hamper GDS as a concept. These include the following:

1. Variable knowledge and competence of bedside nursing and medical care.
2. Variable intensity of bedside care, nurse:patient ratio and continuity of medical coverage.
3. Lack of routine use of sedation monitoring clinical scales or electrophysiological surrogates.
4. Lack of a universal specific sedation target as there is no target that fits all patients all the time.
5. Tangible benefits seem remote and long-term and are thus unrealized at the bedside.

For the above reasons and despite recent international guidelines, sedation is still a low priority in the setting of critical illness and GDS is only an afterthought. This can have significant negative impact on important patients

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outcomes.⁽⁴⁾ Clinicians usually focus on restoring apparent vital organ function as a matter of priority.⁽⁵⁾ This approach is the default as attention is given to measured parameters, such as cardiovascular (blood pressure, heart rate and cardiac output), pulmonary (oxygen saturation and carbon dioxide) and renal indices (urine output and creatinine), and on managing detrimental pathophysiology, such as intracranial pressure in patients with acute brain injury.

The outcome of patients with critical illness is largely determined by the severity of the illness. However, the impact of different sedation practices on important clinical outcomes in this context is often covert and unrecognized. The above point can be illustrated by the trial of high-frequency oscillation (HFO) in early adult respiratory distress syndrome.⁽⁶⁾ This trial was terminated early due to the higher mortality in the HFO group despite significantly lower refractory hypoxemia than that in the control group. What is noticeable is the significantly higher midazolam and fentanyl equivalents given to HFO treated patients, with subsequent prolonged deep sedation, iatrogenic coma and longer vasoactive support in the HFO treated patients.

The feasibility and efficacy of GDS as a process of care can be determined by the delivery of a custom-made sedation strategy that is patient centered to achieve known short-, medium- and long-term benefits to most patients (Figure 1). Although the 2013 Clinical Practice Guidelines on the management of pain, agitation and delirium⁽⁷⁾ recommends light sedation whenever clinically possible, sedation depth is a continuum and patients swing between deep and light sedation many times within any 24 hour period. As such, an evidence-based descriptive process is needed.

The incorporation of GDS in the care plans for critically ill patients is a clinical imperative. Although many clinicians believe that GDS is primarily a process for achieving light sedation, we need a shift in our mindset, as GDS aims to achieve the optimal sedation level for a particular clinical situation. Needless to say, the immediate ultimate aim of GDS is to provide clinically appropriate moderate or deep sedation for the shortest possible time and to ensure light sedation otherwise. This mandates the implementation of GDS as soon as a patient is mechanically ventilated and/or sedated.

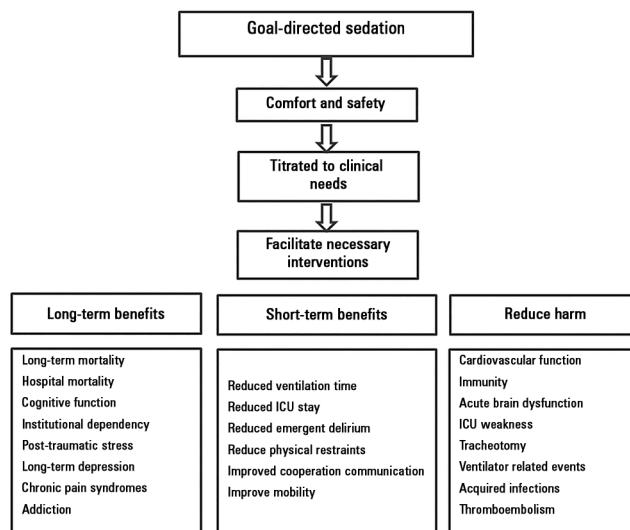


Figure 1 - Goal directed sedation; goals and potential benefits. ICU - intensive care unit.

To address the challenges described above, the Sedation Practice in Intensive Care Evaluation (SPICE) program⁽⁸⁾ has been initiated to achieve the following goals:

1. Establish a current sedation practice and patterns of sedative prescription.
2. Evaluate early sedation practice (first 48 - 72 hours) after the onset of critical illness.
3. Assess the impact of sedation intensity and particularly the impact of early practice on patient-centered outcomes, such as mortality.
4. Identify modifiable risk factors associated with sedation intensity, including early practice.
5. Test the hypothesis that such risks can be mitigated using a plausible sedation strategy.
6. Conduct a definitive, randomized controlled trial to investigate the clinical effectiveness of such a sedation strategy on long-term and patient-centered outcomes.

The SPICE program has uncovered, for the first time, that the prevalence of deep sedation during the first 48 - 72 hours of critical illness, with > 60% of patients being deeply sedated during this period. More importantly, early deep sedation independently predicted both prolonged time to extubation and 6-month mortality.^(8,9) This confers the necessity of implementing GDS as early as possible.

An intervention strategy, named early goal-directed sedation (EGDS), was then designed to reverse the

pattern of early deep sedation and provide flexibility in delivering GDS matching different clinical needs. EGDS is based on the following principles:

1. Early commencement of sedative intervention.
2. Early effective analgesia.
3. Utilizing dexmedetomidine as a primary sedative agent, with propofol being used to fine-tune sedation intensity. This combination has been shown to:
 - a. Achieve rousable sedation and reduce overall sedation depth.
 - b. Facilitate wakefulness and ventilation weaning.
 - c. Reduce overall sedative and opioid loads.
4. Targeted light sedation (Richmond Agitation-Sedation Scale score -2 to +1).
5. Avoiding and minimizing benzodiazepines.

EGDS is a sedation strategy that combines the choice of sedative agents and sedation intensity with a goal-targeted sedation level that is consistent with clinical needs. In a pilot study conducted in Australian and New Zealand intensive care units (ICUs), EGDS with dexmedetomidine as the primary sedative agent reversed the pattern of early deep sedation and reduced rescue and additional sedatives and the use of physical restraints.⁽¹⁰⁾ The question remained, however, whether EGDS could be achieved with conventional sedatives and in ICUs with a lower nurse:patient ratio. To address this issue, we conducted a second pilot study in 10 Malaysian

ICUs, in which the EGDS strategy was applied in both the conventional and dexmedetomidine arms.⁽¹¹⁾ This trial showed that EGDS with a dexmedetomidine-based algorithm achieved early light sedation more readily, reduced use of restraints and increased the number of delirium-free days compared with standard sedatives.

The interaction between sedation strategies and the length of time required to access early mobilization and physical and occupational therapy are important questions that need to be resolved. Reports of benefits with early mobility and rehabilitation⁽¹²⁾ suggest that adopting a sedation strategy that facilitates early rehabilitation is imperative. Nevertheless, the impact of such an interaction on long-term outcomes remains unknown.

In 2015, goal-directed sedation should incorporate strategies that meet the following criteria:

1. Be coordinated with the overall care plan of critically ill patients.
2. Be delivered early and as soon as a patient is ventilated, either invasively or non-invasively.
3. Mandates light sedation as the default sedative intensity.
4. Mandates monitored deep sedation for the shortest time necessary.
5. Facilitates mobilization and early access to rehabilitation.
6. Systematically monitors pain, agitation and delirium.

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