# WHAT IS EXCESSIVE SEDATION

**KEY POINT:**
**What is excessive sedation and how common is it?**
There is no universally agreed definition of excessive sedation.

A useful description is "the presence of coma (lack of consciousness and absence of response to painful, physical, and vocal stimuli) in a sedated patient when there is no clinical indication for deep sedation".

## Assessing Sedative State

Assessing excessive sedation requires a clinical assessment of sedation state. The simplest way to assess this is to use one of the clinical sedation scales described in module two. Patients who do not respond to any form of stimulation or only respond to a painful or physical stimulus may be excessively sedated.

The simplest way to assess how patients are being excessively sedated is to measure the frequency of clinical sedation states that indicate no or minimal response to physical stimulation.

Most studies that have measured excessive sedation in ICUs suggest it remains common, especially during the first few days of treatment.

# WHY DOES EXCESSIVE SEDATION OCCUR IN ICU?

**Which of the following are reasons that excessive sedation can occur in intensive care patients?**

**Sedative drugs can accumulate**

- (•) True
- ( ) False

Correct. Most sedative drugs are excreted from the body by the kidneys and liver. Other drugs being administered can “compete” with the sedative drugs slowing down their metabolism. If liver or renal function is impaired, the clearance of the metabolised drugs can also be decreased.

**The dose of sedative drugs administered by bedside staff is unnecessarily high.**

- (•) True
- ( ) False

Correct. Bedside staff may increase sedation to decrease movement, coughing, poor synchronisation with the ventilator, or because they think the patient is anxious or in pain. The best way to assess conscious level is to use a validated sedation assessment tool. Patients who do not respond to voice or physical stimulation are unlikely to be conscious or aware of discomfort. We

know that patients who are kept lightly sedated and mobilise early suffer less delirium and wean from ventilation quicker. They may also have less long term disability during post-ICU recovery.

**Sedative drugs have active metabolites that accumulate in the body.**

- (•) True
- ( ) False

Correct. Some sedative agents, such as morphine and diazepam, are metabolised in the body but the metabolites continue to have sedative and/or analgesic effects. In healthy individuals these metabolites are rapidly removed from the body but in patients with liver and renal failure they can accumulate, typically over several days.

**Poor synchronisation with the ventilator.**

- (•) True
- ( ) False

Correct. Patients who synchronise poorly with ventilation may cough and strain, resulting in worsening hypoxaemia or carbon dioxide removal. This can lead to progressive increases in sedation despite the patient being deeply unconscious. In this situation it is important to consider adjusting the ventilator settings or using higher doses of agents that specifically decrease coughing, such as opiates. Some patients may benefit from neuromuscular paralysis rather than more sedation when coma is present.

**Due to efforts to promote sleep.**

- (•) True
- ( ) False

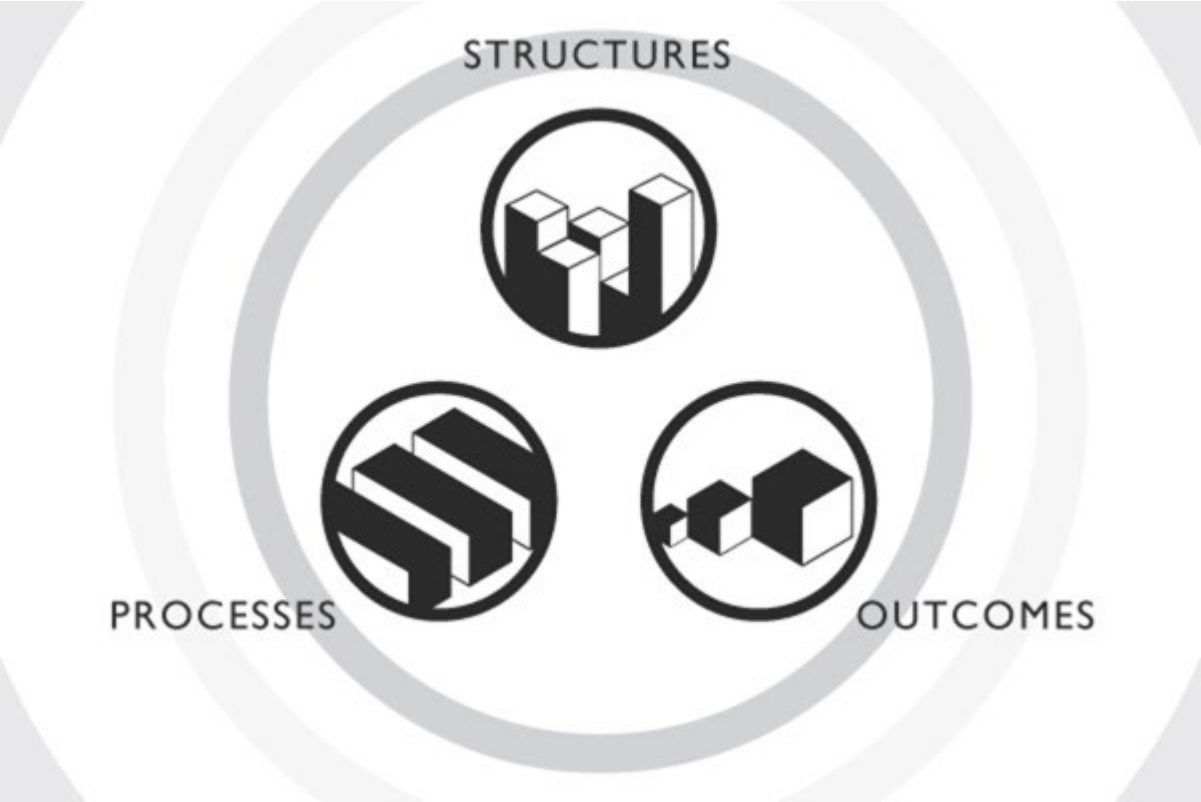
Correct. Sedative drugs can produce the outward appearance that a patient is asleep. However, sedative drugs do not produce natural sleep and there is no evidence that using them to produce the outward appearance of sleep improves patient outcomes (this is covered in module 9). Excessive sedation may delay the return of normal sleep patterns, and increase the risk and duration of delirium.

**Key point:** There are many potential reasons that excessive sedation can occur in ICU patients, but many are avoidable if patients are carefully assessed and alternative approaches considered. The association between excessive sedation and poorer patient outcomes mean this could impact directly on individual patients.

# IMPROVING SEDATION QUALITY

**How to improve sedation quality in the ICU**

Initiatives to improving quality are often divided into **structures**, **processes**, and **outcomes**.




## STRUCTURES

### Use a validated sedation scoring system to assess all ICU patients

All ICUs should use a clinical sedation assessment tool (this is covered in module 2). Ideally these should be tools that have been shown to be valid (good at discriminating different sedation states) and reliable (give similar results whoever performs them). The scales that have been shown to have highest validity and reliability are the Richmond Agitation and Sedation Scale (RASS scale) and the Sedation Agitation Scale (SAS).

### Have agreed protocols that link sedation assessments to clinical decisions to adjust sedation

Locally agreed protocols should support nurse-led adjustment of sedation for appropriate patients. Unless there is a medical indication for deeper sedation, the protocol should target achieving the sedation score that represents a patient purposively following commands without agitation.

### Have agreed protocols to determine which agents should be used to manage pain, agitation, and delirium

Clear local guidance should be in place to determine the "first-line" analgesic drug, hypnotic drug, and treatment for agitated delirium. Clear guidance should be in place regarding when alternative "second-line" agents should be used, for example clonidine or dexmedetomidine.

**Have clear guidance when to consider a daily sedation break linked to a weaning trial, and how to undertake this.**

The idea of using a daily sedation break arose from a trial published in 2000 that compared a daily interruption of sedation with the existing practice of largely non-protocolized sedation. This trial demonstrated a marked reduction in the duration of mechanical ventilation without increasing adverse events.

## PROCESSES

**Record clinical sedation and pain assessment scores at an agreed interval as part of routine practice**

There should be a locally agreed frequency of performing and recording sedation and pain scores. Ideally this should be at least 2-3 hourly.

**Record whether a sedation break or hold was considered each day, and whether one was carried out**

It may not be appropriate to perform a sedation hold in all patients every day. For example, some may have medical conditions that require deep sedation, and in other cases patients may already be lightly sedated and at risk of agitation. However, systems that ensure a sedation hold is considered every day will ensure that patients with unnecessary deep sedation will have a sedation hold. This has been shown to reduce the duration of ventilation and a range of complications.

## OUTCOMES

**Monitor or audit the use of sedation scoring systems and feed these back to staff**

Undertaking audit and feedback of the use of clinical sedation, pain, and delirium scores against locally agreed standards, and distributing and discussing results will drive changes and improvements in practice.

**Monitor and feedback the proportion of time that patients are not optimally sedated**

Feedback of audits of the proportion of time patients are over- or under-sedated or comply with local sedation protocols may drive quality improvement.

## SEDATION HOLDS AND SEDATION BREAKS

Short history of research on sedation holds.

The concept of a sedation hold as part of a strategy to avoid excessive sedation is more than 10 years old. Our understanding of the possible role and importance of this is strongly influenced by several important research trials. Knowing what these trials showed is useful to understanding current practice and recommendations.

**2000: The idea of using a daily sedation arose from a trial published in 2000 that compared a daily interruption of sedation with the existing practice of largely non-protocolized sedation. This trial demonstrated a marked reduction in the duration of mechanical ventilation without increasing adverse events.**

Daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation. Kress JP. Pohlman AS. O'Connor MF. Hall JB. New England Journal of Medicine. 200; 342(20): 1471-7

This was a randomised controlled trial of 128 adult patients who were receiving mechanical ventilation and continuous infusions of sedative drugs in a medical intensive care unit in the USA. In the intervention group, the sedative infusions were interrupted until the patients were awake, on a daily basis; in the control group, the infusions were interrupted only at the discretion of the clinicians in the intensive care unit. The investigators found that the median duration of mechanical ventilation was decreased from 7.3 to 4.9 days by the daily sedation interruption, and the median length of stay in the intensive care unit was 6.4 days as compared with 9.9 days. Fewer patients in the daily sedation interruption group required investigations for persisting coma. The incidence of sedation related complications, for example removal of the endotracheal tube by the patient, was similar.

**2008: A further trial published in 2008 compared the use of a weaning protocol alone with a paired sedation interruption and weaning protocol. The paired sedation interruption and weaning protocol reduced duration of mechanical ventilation and reduced mortality.**

Efficacy and safety of a paired sedation and ventilator weaning protocol for mechanically ventilated patients in intensive care (Awakening and Breathing Controlled trial) Girard TD. Kress JP. Fuchs BD. et al. Lancet. 2008; 371(9607): 126-34

This randomised trial compared a protocol that paired spontaneous awakening trials (SATs)-ie, daily interruption of sedatives-with spontaneous breathing trials (SBTs). In four tertiary-care hospitals in the USA, 336 mechanically ventilated patients were randomised to receive either management with a daily SAT followed by an SBT (intervention group; n=168) or sedation as per usual care plus a daily SBT (control group; n=168). The primary endpoint was time breathing without assistance. The patients in the intervention group spent more days breathing without assistance during the 28-day study period than did those in the control group (14.7 days vs 11.6 days; mean difference 3.1 days) and were discharged from intensive care (median time in intensive care 9.1 days vs 12.9 days) and the hospital earlier (median time in the hospital 14.9 days vs 19.2 days). More patients in the intervention group self-extubated than in the control group (16 patients vs 6 patients), but the number of patients who required reintubation after self-extubation was similar, as were the total reintubation rates (13.8%vs 12.5%). Patients in the intervention group had lower mortality during the year following enrolment than the patients in the control group.

**2012: These and several other small studies evaluating the use of daily sedation interruption were carried out in medical ICU patients rather than surgical populations.**

**However, a study published in 2012 found no benefit from a daily sedation interruption when compared with the use of a sedation protocol that did not include daily interruption. An important difference between this and earlier studies was that *both* groups received carefully protocolised sedation management that involved regular assessment using a sedation assessment scale and adjustments to achieve a light sedation level. Adding the daily sedation interruption to this approach did not improve patient outcomes and actually increased sedation use, and the bedside nurses' perceived that their workload was higher.**

Daily sedation interruption in mechanically ventilated critically ill patients cared for with a sedation protocol: a randomized controlled trial.

Mehta S. Burry L. Cook D. et al. SLEAP Investigators. Canadian Critical Care Trials Group. JAMA. 2012; 308(19): 1985-92

This randomised trial compared the use of protocolised sedation management (without daily sedation interruption) with protocolized sedation plus daily sedation interruption in 430 critically ill,

mechanically ventilated adults in 16 medical and surgical ICUs in Canada and the United States. The patients were sedated with continuous opioid and/or benzodiazepine infusions. Using validated sedation assessment scales (typically every hour), nurses titrated infusions to achieve light sedation. For patients receiving daily interruption, nurses resumed infusions, if indicated, at half of previous doses. The median time to successful extubation was 7 days in both the interruption and control groups and there was difference in ICU or hospital stay. Daily sedation interruption was associated with higher mean daily doses of midazolam and fentanyl, and more daily boluses of benzodiazepines and opiates. There were no differences in rates of delirium or unintentional endotracheal tube removal. Nurses perceived their workload was greater in the daily sedation interruption group.

Many patient safety and quality improvement programmes have included *"consideration of performing daily sedation interruption"* in a bundle of care for all patients receiving mechanical ventilation. This bundle of care is often called the "ventilator bundle".

## WHAT IS A SEDATION INTERRUPTION/BREAK/HOLD?

The correct sequence of events in a sedation interruption is as follows:

**STEP ONE**

**Check there is no contraindication to perform a sedation hold, for example muscle paralysis, cerebral oedema, brain injury, status epilepticus, or hypoxaemia despite optimisation of ventilation.**

**STEP TWO**

**Perform a baseline assessment of clinical sedation state using a clinical sedation score. Patients who are comatose or unresponsive are more likely be excessively sedated and benefit from assessment following a sedation interruption**

**STEP THREE**

**Stop all hypnotic drugs (propofol, midazolam, other benzodiazepines, dexmedetomidine). Adjust analgesic drugs (opiate infusions or intermittent doses) according to the anticipated pain associated with the patient's underlying condition (for example traumatic injuries, surgery, or wounds). It is not necessary to stop all analgesic drugs to perform a sedation interruption, especially if the patient is likely to be in significant pain.**

## SEDATION HOLD

**STEP FOUR**

**Observe patient carefully throughout period of sedation interruption. Hypertension and tachycardia may indicate emergence from coma, but should be interpreted alongside assessment of consciousness. Repeat clinical sedation assessment regularly until the patients regains consciousness.**

**STEP FIVE**

**Reassess patient when conscious.**

**AGITATED patients: explore reasons for agitation (see module 7) and treat accordingly**

**CALM patients: consider weaning ventilation without re-starting sedation**

**STEP SIX**

**If re-starting sedation consider reason for agitation, for example delirium, pain, drug withdrawal, poor ventilator synchronisation. Treat these appropriately. Consider re-starting hypnotic drug infusion at reduced rate, for example 50% of previous rate, and titrate to the patient's requirements.**

## SUMMARY

Excessive sedation is common. Unnecessary deep sedation is associated with poorer patient outcomes. Ways to avoid unnecessary deep sedation include:

- Systems embedded in the ICU that encourage regular assessment of sedation state
- The regular use of clinical sedation scales to document sedation state
- Avoiding unnecessary deep sedation by:
  - Using protocols that encourage lighter sedation
  - Understanding the reasons that excessive sedation occurs and taking steps to avoid this
  - Using sedation interruptions to reassess patients status
- Measuring how often unnecessary deep sedation occurs and using this to improve practice