University Hospitals of Derby and Burton
NHS Foundation Trust

Sedation - ICU Clinical Guideline – Burton Sites Only

Reference no.: CG-ICU/2023/3535

Introduction

Most patients will require sedation at some point during their stay in critical care. Some degree of sedation (analgesia & hypnosis) is often required to allow patient cooperation with organ support (eg intubation and ventilation) and associated nursing care. Correct management of sedation is often difficult as patients cannot easily communicate how they feel and no single sedation regimen is without significant unwanted side effects.

While it is clear that under sedation, leaving patients in pain or distress is unacceptable, the same may be said of over sedation with all sedative agents sharing a variety of unwanted side effects:

- accumulation with prolonged infusion, delaying weaning from supportive care increasing complications and consequently morbidity and mortality.
- detrimental effects on the circulation leading to increased inotrope requirements.
- detrimental effects on the pulmonary vasculature. increasing VQ mismatch leading to increased ventilatory support with the consequent increase in complications.
- tolerance during sedation and withdrawal when it is stopped.
- no sedative provides rapid eye movement (REM) sleep - i.e. useful sleep. REM sleep deprivation is thought to be one of the most important causes of ICU psychosis.
- reduced intestinal motility impairing establishment of enteral feeding.

Sedation should be tailored to individual patient needs using a suitable sedation scoring tool.

Principles

1. **All patients must be comfortable and pain free.** Analgesia is thus the first aim.
2. **Anxiety should be minimised.** This is difficult as anxiety is an appropriate emotion. The most important way of achieving this is to provide compassionate and considerate care; communication is an essential part of this.
3. Most sedative regimens will include an **opiate** analgesic ***plus* a hypnotic**.
4. P**atients should be calm, co-operative and able to sleep when undisturbed.** This does not mean that they must be asleep at all times.
5. **Patients must be able to tolerate appropriate organ system support**. Patients may need in some specific circumstances neuromuscular blockade. These patients should have BIS/Entropy monitoring to avoid awareness as well as avoid oversedation.
6. **Patients must not be paralysed and awake.**

   Remember - before increasing sedation or adding neuromuscular blockade:
   i. Any avoidable source of physical discomfort should be excluded.
   ii. The need for any uncomfortable or disturbing therapies should be reviewed.
   iii. A perceived need to increase sedatives may be an index of clinical deterioration.
   iv. When sedation has been stopped night sleep is often fitful because of rebound REM sleep. Continued night sedation may prolong this rather than treating it.
   v. Non-farmacological measures should be considered.

Drugs

Sedative regimes are given by intravenous infusion and so will take up to 4 half-lives to achieve steady state at any one infusion rate. Consequently when starting sedation this should be commenced with a bolus of analgesic/hypnotic titrated to effect followed by and infusion. Similarly, increases in sedation level should be achieved by bolus followed by change in infusion rate.

All drugs given by infusion must be delivered by either syringe driver (Braun 'Perfusor') or volumetric pump (Baxter 'Colleague')

Sedative Drugs

Propofol

A short acting general anaesthetic agent. Duration of action by bolus injection 2-4 minutes. Used as infusion for sedation on critical care. Has no analgesic effect. 1% solution only stocked in critical care. Presented in lipid emulsion. Available in 20ml ampule, 50 ml vial 100ml vial. No licence for use by infusion in children (<16 years)

Side effects
Hypotension bradycardia
Respiratory depression apnoea
Fat overload (1ml 1% propofol contains 0.1 g fat)

Bolus dose 0.5 – 2 mg/kg 0.05 – 0.2 ml/kg of 1% solution

Infusion rate 0.3 – 4 mg/kg/hr 0.03 – 0.4 ml/kg/hr of 1% solution

Midazolam

Relatively short acting benzodiazepine. Water soluble. Prolonged sedation occurs after infusion due to accumulation. Significantly prolonged effect in renal and hepatic impairment. Intermittent boluses rather than continuous may be considered in these patients. Stocked as 1mg/ml solution in premade 50ml bottles on ITU. Held in controlled drug cupboard.

Side effects
Respiratory depression
Prolonged residual sedation
Hypotension
Hallucinations, disinhibition more commonly associated with ITU delirium

Bolus dose 30 - 300µg/kg in steps 1 – 2.5 mg every 2 minutes

Infusion rate 30 - 200 µg/kg/hr

Opiate Analgesic Drugs

Fentanyl

Short acting potent synthetic opiate. 100 times more potent than morphine. Pure µ agonist. Accumulates after prolonged infusion, in hepatic and renal impairment. Stocked as 50µ g/ml pre made 50 ml bottles on ITU. Held in controlled drug cupboard.

Side effects
Respiratory depression
Bradycardia
Nausea vomiting
Depressed GI function
Chest wall rigidity

Bolus dose 0.5 – 2.0 µg/kg (0.01 – 0.04 ml/kg of 50 µg/ml solution)

Infusion rate 1.0 – 5.0 µg/kg/hr (0.02 – 0.1 ml/kg/hr of 50 µg/ml solution)

Morphine

Naturally occurring opiate. Longer acting than fentanyl. Peak effect 15 minutes post iv dose. Duration 2-3 hours. Effect prolonged in hepatic and renal failure Stocked as 10 mg/1ml and 30 mg/1ml ampule. Prepared as 1mg/1ml infusion . Held in controlled drug cupboard.

Side Effects

As above for fentanyl *plus*
Histamine release
Itching
Hypotension tachycardia
Tolerance

Bolus dose 0.05 – 0.2 mg/kg (0.05 – 0.2 ml/kg of 1 mg/ml solution)

Infusion rate 0.05 – 0.2 mg/kg/hr (0.05 – 0.2 ml/kg/hr of 1 mg/ml solution)
May require considerably larger doses in young and with opiate tolerance

Remifentanil
Ultrashort acting syntetic opiate , pure μ agonist. Eliminatin half-life 3-10 minutes, does not accumulate in hepatic/renal failure even after prolonged infusion. Presented as 1, 2, 5 mg vial powder . Administered as continuous infusion . Diluted with Sodium Chloride 0.9% or 5% dextrose as 100 mcg/ml.
MUST NOT BE GIVEN AS A BOLUS

Side Effect :
Bradycardia, hypotension

Infusion rate : 0-12 mcg/kg/hour of 100 mcg/ml solution

CONSULTANT INDICATION ONLY

Other

Clonidine

Clonidine is a centrally acting alpha 2 agonist. It suppresses catecholamine release and depressed CNS function. It is licensed for use in hypertension. It is used off license as an adjunct to sedation and in the management of the sympathetic syndrome occasionally encountered after prolonged opiate infusion (withdrawal syndrome).
Side effects : Bradycardia, hypotension, constipation

Infusion rate **0-2 micrograms/kg/h**

Dexmedetomidine

Short acting Alpha 2 agonist , more potent than Clonidine, higher affinity to alpha2 receptors. Sympatholytic and anxiolytic properties.
Delivered as continuous infusion, loading dose not recommended. Steady state achieved after approximately one hour.

Infusion rate 0-1.4 micrograms/kg/hr

Side effects similar to clonidine .
DO NOT BOLUS
Can be used in carefully selected group of patients. **Consultant indication only!**

Sedation scoring

All patients receiving sedative drugs should have their level of sedation assessed and recorded using the Richmond agitation sedation Score (RASS)

Scores and meaning:

+4 Combative/unmanageable
+3 Very agitated
+2 Agitated
+1 Restless

0 Alert and calm

-1 Drowsy
-2 Light sedation
-3 Moderate sedation
-4 Deep sedation
-5 Unrousable

Level of sedation needed will vary depending on patients condition but **RASS 0 should be aimed for in all sedated patients as a general rule** (unless contraindicated)

Mechanically ventilated that are deeply sedated (RASS of -3 or less) have been shown to remain intubated and mechanically ventilated for longer periods of time. This in turn leads to longer ICU stays and **higher mortality**.

Similarly, mechanically ventilated patients that are too agitated are at risk of self-extubation and of ventilator dyssynchrony.

All patients receiving sedation **MUST** have a daily 'sedation hold' (*cf ventilator care bundle)* to reduce accumulation unless contraindicated (eg head injury, critical oxygenation etc.)

Paralysis

Need for paralysis must be reviewed on the daily basis.
Patients must be adequately sedated (analgesia and hypnosis – RASS -3 or 4) before being paralysed.
Patients should have BIS/ENTROPY monitoring when paralysed.
Paralysis should be monitored using neuromuscular monitoring (TO4) regularly.

Scoring:

https://www.mdcalc.com/richmond-agitation-sedation-scale-rass#why-use

https://www.mdcalc.com/confusion-assessment-method-icu-cam-icu#use-cases

Reviewed April 2023
Review: April 2025