# Order Set Reference Document

### Nurse Driven Sedation Protocol in the Pediatric Intensive Care Patient

**Purpose:**

To provide evidenced based guidelines and best practice for the use of a provider-initiated order set to manage sedation and analgesia led by a nurse driven sedation protocol.

**Inclusion Criteria**: All patients admitted to the Pediatric Intensive Care Unit (PICU) at UNC Children's Hospital whose plan of care includes mechanical ventilation greater than 24 hours.

**Exclusion Criteria**: Patients planning to be extubated within 24 hours

**Definitions:**

**Sedation**- a drug induced state to reduce agitation and/or alertness, ranging from light/moderate sedation (conscious state) to deep (responsive to painful stimulus) and finally to general anesthesia (unarousable).

**Analgesia-** the inability to feel pain

**Opioids-** class of medications that acts on opioid receptors to block pain signals to the brain, can also be used for sedation. Most commonly used are fentanyl, morphine, hydromorphone and oxycodone.
Potential adverse effects: hypotension with large dosages, constipation, respiratory depression
Drug specific concerns Fentanyl: rigged chest if pushed fast Morphine: pruritis

**Dexmedetomidine:** Alpha 2 adrenergic receptor used for sedation and pain control, does not cause respiratory depression.
Potential adverse effects: hypotension, bradycardia (particularly with bolus dosages)

**Benzodiazepine-** class of psychoactive drugs used to treat a range of conditions, including seizures, anxiety, insomnia and muscle spasms. Most commonly used are lorazepam, midazolam, and diazepam.
Potential adverse effects: hypotension with large dosages, respiratory depression, delirium

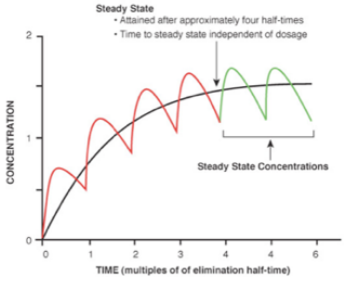
**Delirium:** an acute mental disturbance causing and altered level of attention and awareness
Can be hyperactive (agitated, hallucinations), hypoactive (somnolent, mute), or mixed
Risk factors: prolonged ICU stay(1), poor sleep, benzodiazepines(2), diphenhydramine(3)
*Pediatric delirium has been linked to mortality, prolonged hospitalization, and long-term disability (4)*

**Richmond Agitation-Sedation Scale (RASS)**: a medical scale used to measure a patient's agitation or sedation level. The RASS can be used in all critically ill patients
scale of -5 (unarousable) → +4 (combative)

**Face, Legs, Activity, Cry, Consolability Scale (FLACC)**: measurement used to quantify pain in pediatric patients (scale of 0-10)
**0**=Relaxed, comfortable **1-3** =Mild discomfort **4-6**= Moderate pain **7-10** = Severe discomfort/pain

**Bolus-** a discrete amount of a medication administered over a short amount of time

**Steady State-** State when the amount of drug being administered is the same amount that is being eliminated providing a constant therapeutic range. This is usually achieved after 5-6 half-lives of a drug and can be hastened by given boluses. **This is why we give 3 bolus dosages prior to increasing an infusion rates**

**Background:**

Critically ill children often require sedation and analgesia to:

-promote comfort -ensure their safety

-increase tolerance for necessary interventions (mechanical ventilation, indwelling lines)

Sedation decreases physiological stress by inducing amnesia, alleviating agitation, reducing metabolic demand.

Prolonged use of sedation can lead to detrimental side effects such as:

-respiratory depression -delirium -ICU acquired weakness

-physical dependence leading to iatrogenic withdrawal

How to opitimize sedation for our patients:

-should be goal-directed and customized for each patient

-use consistent and reliable assessment methods (FLACC, RASS)

-use the lowest effective dose with the widest therapeutic index

The goal of the care team should be to ensure the patient is not

under sedated (at risk for injury or pain) OR over sedated (could prolong ventilation, increase risk for delirium and withdrawal)

**This protocol allows for variability in optimal dosing per patient, it must be realized that these standard medication choices in the protocol may not be the ideal medications due to the patient's underlying physiology or interactions with other medications.**

For example: Status Asthmaticus, ketamine is a better choice to allow spontaneous breaths, promote bronchodilation

**Reference to algorithm:**

1. If patient is planned to be intubated for <24 hours, may use sedation algorithm or PRN sedation medications at MD discretion.
2. Boluses are used to achieve steady state, not "extra" medication until a higher dose drip is ordered (see definition for steady state on page 1).
3. Benzodiazepines have been linked to lower likelihood of ICU discharge/longer ICU stay, development of delirium, increased mortality, and long-term disabilities(1, 4).
4. Dexmedetomidine (Precedex) side effects include bradycardia and hypotension. There is a higher risk of these with dexmedetomidine boluses.
5. Causes of agitation to consider include:
   a) Delirium: screen for delirium (with MD assistance), normalize day-night regimen, consider adding melatonin
   b) Constipation: we recommend starting an underlying bowel regimen on any patient on initiation of the sedation pathway and adjusting as needed
   c) Itching: naloxone infusion can be beneficial, may also consider intermittent hydroxyzine
   d) Muscle spasms if post-operative (especially post craniotomy or spinal fusion):
      - diazepam may be helpful
   e) Hunger: consider initiating enteral feeds if there is a safe way to administer

**References:**


1.Traube C, Silver G, Reeder RW, Doyle H, et al: Delirium in Critically Ill Children: An International Point Prevalence Study. *Crit Care Med* 2017; 45(4):584-590

2.Smith HAB, Gangopadhyay M, Goben CM, Jacobowski NL, et al: Delirium and Benzodiazepines Associated With Prolonged ICU Stay in Critically Ill Infants and Young Children. *Crit Care Med* 2017; 45(9):1427-1435

3.Madden K, Hussain K, Tasker RC: Anticholinergic Medication Burden in Pediatric Prolonged Critical Illness: A Potentially Modifiable Risk Factor for Delirium. *Pediatr Crit Care Med* 2018; 19(10):917-924

4.Traube C, Silver G, Gerber LM, Kaur S, et al: Delirium and Mortality in Critically Ill Children: Epidemiology and Outcomes of Pediatric Delirium. *Crit Care Med* 2017; 45(5):891-898

# PICU Sedation Algorithm for intubated patients (planned intubation >24 hours)[1]

**Patient weight ≥40kg**

Define RASS goal (standard goal is 0 to -1)

Initiate fentanyl infusion at 25mcg/hr

RASS > goal?

No → Continue infusion at current rate

Yes → Bolus fentanyl q15min PRN to achieve desired RASS[2]

Sedation bolus should always match hourly continuous infusion rate

Have you bolused 3x within the last 60 minutes?

No → Increase fentanyl by 25mcg/hr (range of 0-250mcg/hr)
*if increase opioid more than 2x per shift discuss with MD

Yes

RASS still >goal

No → Continue infusion at current rate

Yes

Fentanyl infusion at <100mcg/hr?

Yes → Increase fentanyl by 25mcg/hr (range of 0-250mcg/hr)
*if increase opioid more than 2x per shift discuss with MD

No

Pain present? (FLACC >4)

Yes → Increase fentanyl by 25mcg/hr (range of 0-250mcg/hr)
*if increase opioid more than 2x per shift discuss with MD

No → Start dexmedetomidine[4] infusion at 0.3mcg/kg/hr

Can consider Lorazepam[3] 2mg x1 and/or discussing physician bolus of dexmedetomidine

RASS still >goal

Yes → Increase dexmedetomidine infusion by 0.2mcg/kg/hr q 30 min (range of 0-2mcg/kg/hr)

No → Continue infusion at current rate

If infusions are increased more than 2 times per shift consider[5]:
- screening for delirium
- treating side effects such as itching
- presence of muscle spasms (use valium)
- hunger

Last updated May 2020
Review Due May 2022
Process Owners: Stephanie Schwartz and Tracie Walker

# PICU Sedation Algorithm for intubated patients (planned intubation >24 hours)[1]

**Patient weight <40kg**

Define RASS goal (standard goal is 0 to -1)

Initiate fentanyl infusion at 0.5mcg/kg/hr

RASS > goal?

No → Continue infusion at current rate

Yes → Bolus fentanyl q15min PRN to achieve desired RASS[2]

Sedation bolus should always match hourly continuous infusion rate

Have you bolused 3x within the last 60 minutes?

No → Increase fentanyl by 0.5mcg/kg/hr (range of 0-5mcg/kg/hr)
*if increase opioid more than 2x per shift discuss with MD

Yes

RASS still >goal

No → Continue infusion at current rate

Yes

Fentanyl infusion at < 2mcg/kg/hr?

Yes → Increase fentanyl by 0.5mcg/kg/hr (range of 0-5mcg/kg/hr)
*if increase opioid more than 2x per shift discuss with MD

No

Pain present? (FLACC >4)

Yes → Increase fentanyl by 0.5mcg/kg/hr (range of 0-5mcg/kg/hr)
*if increase opioid more than 2x per shift discuss with MD

No → Start dexmedetomidine[4] infusion at 0.3mcg/kg/hr

Can consider Lorazepam[3] 0.1mg/kg x1 and/or discussing physician bolus of dexmedetomidine

RASS still >goal

Yes → Increase dexmedetomidine infusion by 0.2mcg/kg/hr q 30 min (range of 0-2mcg/kg/hr)

No → Continue infusion at current rate

**If infusions are increased more than 2 times per shift consider[5]:**
- screening for delirium
- treating side effects such as itching
- presence of muscle spasms (use valium)
- hunger

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