Contents

This document outlines analgesia, sedation, and neuromuscular blockade recommendations for COVID + patients during times of major intravenous opioid, sedative, and neuromuscular blocking agent shortages, which are determined by individual pharmacy departments at the various institutions.
When there are no major drug shortages, the usual guidelines below should be utilized for sedation in COVID-19 pts

Adult Continuous Infusion: Standard Concentrations and Nursing Titration Guidelines: LINK
Pain, Agitation, Delirium Guideline for Mechanically Ventilated Patients: LINK
ICU Sedation with Propofol for Mechanically Ventilated Patients: LINK
Neuromuscular Blockade Therapy Guidelines: LINK

Goal: Due to the COVID-19 pandemic, medications commonly used for analgesia, sedation, and neuromuscular blockade are intermittently difficult to obtain. The goal of these guidelines is to promote early use of enteral therapies and minimize intravenous agents when possible when major drug shortages are in effect.

Aspects of Care	Considerations
Global	Patients with ARDS resulting in ventilator asynchrony despite ventilator adjustments may require lower RASS goals of -2 to -3. If ventilator asynchrony persists despite RASS goal of -2 to -3, a RASS goal of -4 to -5 should be attempted. If ventilator asynchrony persists, consider neuromuscular blockage with a RASS goal of -4 to -5. Daily evaluation of analgesia and sedation, as well as the need for neuromuscular blockade is imperative. Minimization of medications should be considered where possible to conserve supply. In general, patients on vasopressors who are not considered resuscitated should not receive oral therapies. When implementing the therapies below, consider patient specific factors such as history of substance abuse, age, or body weight. Selection of agent may be impacted by availability at each institution.

Aspects of Care	Considerations
Analgesia	Analgesic therapy should not be used with a goal of achieving a determined RASS goal. **If a patient has a BPS<6, but higher than desired RASS, a sedative medication should be initiated.** 1. Intermittent IV analgesia: Use of intermittent IV analgesia to achieve goal BPS or RASS is recommended as first line. **2.** If goal RASS is not achieved or BPS remains >6 with the above measures, refer to the UPHS PAD guidelines for initiation of IV continuous infusion therapy. In mechanically ventilated patients that require continuous infusion analgesia that do **NOT** require frequent neurologic assessment, the following algorithm should be applied: 3. Continuous infusion analgesia: a. Fentanyl is the preferred analgesic for continuous infusion. Hydromorphone is an alternative analgesic for continuous infusion. b. Morphine is an alternative analgesic for continuous infusion, but not preferred in ICU patients. Patients with renal dysfunction may require lower doses due to accumulation. Monitor for hypotension upon initiation. 4. Oral analgesic therapy (Mechanical ventilation expected >24hrs): Following initiation of continuous infusion therapy, oral analgesic therapy could be considered to reduce intravenous requirements: ▪ Oxycodone 10-20 mg q6h standing (May titrate) ▪ Hydromorphone 4-6 mg Q4-6h standing (May titrate)
Sedation	**Sedation should be initiated in patients unable to achieve goal RASS despite achievement of BPS <6.** In mechanically ventilated patients that require continuous sedation for agitation or ventilator synchrony, not requiring frequent neurologic assessment, the following algorithm should be applied. **If a patient has a RASS of -4/-5, but continues to demonstrate ventilator asynchrony, despite appropriate ventilator manipulation, therapy with a paralytic agent should be initiated. Additional use of sedation with a low RASS WILL NOT aid in increased ventilator synchrony and will lead to inappropriate overdosing of patients and waste of medication.** 1. Continuous infusion sedation a. Propofol continuous infusion is the sedative of choice i. Patients should be evaluated for baseline triglyceride (TG) monitoring and Q48h ii. Discontinue agent if TG exceed 500 mg/dL. b. Benzodiazepines i. Midazolam or lorazepam are the preferred continuous infusion benzodiazepines (institutional preference or availability) c. Dexmedetomidine i. Achieves light sedation (RASS -1/-2). This agent should be used consistent with current UPHS guidelines and should not be used in patients requiring moderate to deep sedation (RASS -3 to -5) and/or neuromuscular blockade LINK. ii. Caution should be used in patients displaying signs of reduced ventricular function, bradycardia or heart block.

Aspects of Care	Considerations
	2. Intermittent sedation a. Consider the below therapies if propofol or continuous benzodiazepines are unavailable and dexmedetomidine is contraindicated or anticipated to be unsuccessful in achieving goal sedation. i. Benzodiazepines ii. Phenobarbital (IV to PO) 1. Loading dose: 130 mg IV x 1 dose 2. Maintenance therapy: 64.8 – 97.2 mg via gastric tube q8h (or 65 – 130 mg IV q8h if unable to tolerate orals) a. Titrate to sedation goal while not exceeding a level of 50 mg/L 3. Oral sedation therapy a. Following initiation of continuous infusion therapy, oral therapies could be considered to reduce intravenous requirements: i. Clonazepam 1-2 mg Q8h (May titrate) ii. Lorazepam 1-2 mg Q6h (May titrate) iii. Oxazepam 10 - 30 mg Q8h (May titrate) b. Other adjunctive medications (consult with clinical pharmacy) i. Quetiapine or alternative antipsychotic. Exercise caution in patients on other QTc prolonging medications. ii. Gabapentin iii. Valproic acid
Neuromuscular blockade	Neuromuscular blockade is only required in the presence of ventilator dyssynchrony and deep sedation (RASS -4 to -5) ▪ Ensure adequate sedation and analgesia are achieved prior to neuromuscular blockade as evidenced by RASS -4 to -5 and BPS <6. If BIS is available, titrate to 40-60. **Do not reduce analgesia or sedation once neuromuscular blockade has been established. Analgesics and sedatives SHOULD NOT be titrated to reduce hypotension. Consider initiation of a vasopressor if hypotension persists.** ▪ Paralytic requirement should be evaluated daily to limit use 1. Intermittent dosing: ▪ Vecuronium is the preferred agent for intermittent dosing (Alternative: Rocuronium) o Dosing: 0.1 – 0.2 mg/kg every 4-6 hours o Dose and frequency will vary based on organ dysfunction; Patients with significant organ dysfunction may require smaller and less frequent dosing ▪ If initial dosing of intermittent vecuronium or rocuronium does not achieve desired ventilator synchrony and/or TOF 1-2/4, increase dose or frequency as appropriate ▪ If patient goals are not achieved or requires more than Q4h dosing, begin continuous infusion neuromuscular blocking agent 2. Continuous infusion: ▪ Vecuronium is the preferred NMBA for patients without renal/liver dysfunction ▪ Cisatracurium is permitted for patients with significant organ dysfunction

Appendix 1: Opioid Conversion

Equianalgesic Dosing of Intravenous Opioids

Patients transitioning between agents should be bolused with an equianalgesic dose of the new medication and started on an appropriate dose of continuous infusion. Prior intravenous therapy should then be discontinued.

Agent	**Equianalgesic IV Dose**
Fentanyl	200 mcg
Hydromorphone	3 mg
Morphine	20 mg