

Considerations for Prioritizing Medications for Mechanically Ventilated Patients in Intensive Care Units

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Medications are critical for patients requiring mechanical ventilation. Not only do they provide sedation and comfort, medications reduce energy expenditure, which aids in minimizing carbon dioxide production and oxygen consumption on the ventilator. During the COVID-19 pandemic, demand for these medications has increased significantly, resulting in limited supply and requiring care teams to consider 2nd, and 3rd line options to provide care for their patients. The purpose of the table below is to outline considerations for prioritizing medications for mechanically ventilated patients during medication shortages. The information was compiled from critical care experts and from ASHP membership.

Current prescribing information with details on dosing, medication safety information, and monitoring parameters can be found using free access the [AHFS Clinical Drug Information](#) resource (username “ahfs@ashp.org” and password “[covid-19](#)”).

| Critical Care Drugs | 1 st Line | 2 nd Line | 3 rd Line |
|---|---|---|---|
| Analgesics | Fentanyl Hydromorphone | Hydrocodone Acetaminophen Oxycodone | Morphine Ketamine Remifentanyl Sufentanyl Lidocaine NSAIDs |
| Sedatives | Propofol Ketamine Dexmedetomidine Midazolam | Lorazepam Phenobarbital | Diazepam Pentobarbital Chlordiazepoxide |
| Delirium/agitation Use with extreme caution for patients at risk for QT interval prolongation, especially those receiving other QTc prolonging agents. | Olanzapine | Haloperidol Quetiapine | Droperidol |
| Rapid Sequence Intubation | Etomidate Propofol Midazolam Ketamine Succinylcholine Rocuronium | Atracurium Vecuronium | Pancuronium |
| Continuous Neuromuscular Blockade | Cisatracurium Rocuronium | Vecuronium | Atracurium Pancuronium |

Pharmacists, providers, nurses and other health care professionals are urged to assess individual patients' needs to determine an optimal treatment plan for each patient at a given point in time. Adjustments in doses and use of agents are likely to be required over time, based upon patient response, clinical course, and

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medication availability. Application of information found in this table in a particular situation remains the shared professional responsibility of the patient care team.

In addition, pharmacists, providers, nurses and other health care professionals are urged to employ conservation measures for all agents, while maintaining safety and efficacy. Such measures may involve the use of analgesics and sedatives that can be safely and effectively administered via tubes in the abdominal spaces (including immediate-acting and select long-acting agents), buccally, or transdermally. Further, analgesics, sedatives, and some neuromuscular blocking agents may also be safely and effectively administered by IV-push routes instead of continuous infusion (in consideration of nursing administration, assessment and routine care practices). Conservation or sparing measures may also involve the use of other agents for weaning from continuous infusions or to make transitions to enteral/transdermal agents.

ADDITIONAL RESOURCES

1. ASHP Drug Shortages: <https://www.ashp.org/drug-shortages/current-shortages>
2. FDA Drug Shortages: <https://www.fda.gov/drugs/drug-safety-and-availability/drug-shortages>
3. Society of Critical Care Medicine Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU: <https://www.sccm.org/ICULiberation/Guidelines>
4. Brigham and Women's Hospital COVID-19 Clinical Guidelines and Protocols: Respiratory and pulmonology: <https://covidprotocols.org/protocols/03-respiratory-and-pulmonology/> Note: Brigham and Women's expressly indicates that the resource may be linked to without permission, but asks that users avoid printing and copying content into a new format as it will rapidly become outdated. In addition, the terms of use allow sharing the content with "anyone fighting COVID-19," however users may not use the content for any for-profit or promotional endeavor.

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