**Recommendations for Alternative Analgesic and Sedative Agents in the Setting of Drug Shortages**

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Additional resources related to drug shortages in the intensive care unit are available at LearnICU.org.

*Judith Jacobi, PharmD, BCPS, FCCM, discusses drug shortages in the intensive care unit and how such shortages affect critical care patients and those requiring anesthesia. She discusses reasons for various drug shortages, the Society of Critical Care Medicine’s recent participation in an information summit on the matter, and the U.S. Food and Drug Administration’s limited ability to help resolve the situation. In a robust and insightful conversation, Jacobi addresses the potential unintended consequences of shortages and the future of drug availability. Jacobi is a clinical pharmacy specialist at Methodist Hospital/Clarian Health in Indianapolis, Indiana.

*Authors John J. Lewin III, PharmD, MBA, BCPS, and Judith Jacobi, PharmD, BCPS, FCCM, detail the reasons and possible solutions for alleviating drug shortages affecting critical care in the April 2011 issue of Critical Connections.

Drug shortages are an increasingly common occurrence that threatens the quality and safety of care provided by the multispecialty care team in the intensive care unit (ICU). The U.S. Food and Drug Administration (FDA) has reported an ever-increasing number of drug shortages over the past decade with more than 200 shortages reported in 2011, including several sedatives and opioids commonly used in the ICU. As members of the Society of Critical Care Medicine’s (SCCM) Anesthesiology and Clinical Pharmacy and Pharmacology Sections, we have compiled a reference for those coping with shortages in analgesic and sedation drugs. This guide outlines first-, second- and third-tier drug recommendations for those faced with shortages during their everyday practice.

Additionally, the Society has been participating in various outreach and educational activities in an attempt to address the issue on a broader scale. A position paper published at www.sccm.org/advocacy outlines concerns
for patient safety and endorses the Preserving Access to Life-Saving Medication Act, which would give the FDA improved capacity to prevent shortages. Recently, SCCM participated in a drug shortages summit, which facilitated discussion among several healthcare associations, pharmaceutical manufacturers, supply chain entities, and the FDA.

Despite these efforts, critical care professionals can expect to face shortages well into the foreseeable future, as the underlying factors are multifaceted and numerous. The inconsistent supply source for raw materials, inventory practices that offer little or no cushion in supply, and regulatory and legislative factors – including the lack of requirements for reporting impending shortages to the FDA – are among the most pressing issues contributing to the current situation. Solutions will be complex and far-reaching. Until then, preparation is key and an outline of available alternatives and supplements is vital for those administering and prescribing drugs in the ICU.

The tables below outline suggestions for alternative analgesics and sedatives for use in adult, mechanically ventilated ICU patients.

| Table 1.
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<tr>
<td><strong>ANALGESICS</strong></td>
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<tr>
<td><strong>Drug</strong></td>
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<td>Fentanyl</td>
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<td>Hydromorphone</td>
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<td>Morphine</td>
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<td>Remifentanil</td>
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<td>Sevoflurane</td>
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<td>Propofol</td>
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<td>Ketamine</td>
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*Dosage based on prior to start of continuous infusion for rapid rapid-response effect.

**Abbreviations:** IV, intravenous; N/A, not applicable; po, by mouth; qID, every other day; ST IV, 5% dextrose in water; ICU, intensive care unit; BW, ideal body weight.
Although analgesics and sedatives are often used in other settings (e.g., procedural sedation, surgery), these recommendations were not intended for those scenarios. Clinicians must be cautioned that high-level evidence for these alternative agents in the ICU setting is sparse and, in many cases, drug doses and titration recommendations were derived from a combination of limited published data, tertiary drug information resources, alternative indications, pharmacokinetic properties and expert opinion. Determination of well-established dosing recommendations for alternative agents is limited by a relative lack of information regarding the impact of critical illness (e.g., changes in volume of distribution and elimination) on drug disposition. As such, the recommendations provided represent conservative, initial starting doses that can be adjusted as clinically indicated. This approach (i.e., start low and go slow), as well as efforts to optimize therapy while minimizing waste, are strongly advised. Dosing weight considerations are provided for select agents that may be less familiar to ICU clinicians. Finally, appropriate monitoring for common adverse drug events, like respiratory depression and coma, is essential, particularly with agents of limited familiarity and comfort.

When a shortage arises in a preferred analgesic or sedative, clinicians should consider an alternative from the same tier listed in the appropriate table (e.g., hydromorphone if fentanyl and morphine are not available). If this is not feasible, then an agent from the next tier should be selected. Global principles for the use of analgesics and sedatives must be adhered to and standard evidence-based practices followed. For example,
nonopioid agents can be considered to reduce opioid requirements where appropriate. Validated scales should be used to guide sedation therapy, and daily wake-up assessments should be performed as clinically indicated. Clinicians can also consider an analgesic-first sedation strategy when primary sedatives are unavailable. When use of less-familiar agents is necessary, specialized calculators from validated drug information resources can assist with conversions and infusion rate calculations.

References:


**Disclosures:**

* Author has no disclosures to report

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*** Author has no disclosures to report

**** Author has no disclosures to report