CLINICAL ISSUES

Administration of propofol; infectious waste disposal; Aspergillus; portable humidifiers in the OR

QUESTION: Intravenous conscious sedation is being used more frequently at our facility. The nurses monitoring these patients are being asked by physicians to administer propofol on an increasing basis. Is this something we should be doing?

ANSWER: Propofol is considered an anesthetic medication; therefore, it should be administered only by those who have the appropriate anesthesia credentials. According to the Physicians Desk Reference:

For general anesthesia or monitored anesthesia care (MAC) sedation, [propofol] should be administered only by persons trained in the administration of general anesthesia, and not involved in the conduct of the surgical/diagnostic procedure. Patients should be continuously monitored, and facilities for maintenance of a patent airway, artificial ventilation, and oxygen enrichment and circulatory resuscitation must be immediately available.¹

Propofol produces significant cardiac depression in the usual induction doses. The effects are more pronounced than those seen with equivalent doses of thiopental, midazolam, or etomidate. Respiratory depression, even more prominent than that seen with thiopental, has been reported with induction doses of propofol. Residual medication is eliminated via the liver, and hepatic elimination can be prolonged in patients with liver disease.

Propofol’s pharmacological activity can be influenced by age. Older patients require lower doses, whereas children require higher doses because of their increased distribution volume based on body weight (ie, children can have a higher rate of clearance).

The effects of propofol administration are unpredictable. Propofol can accumulate with prolonged infusion.² Standard protocols are difficult to develop because propofol is a short-acting medication. Some patients respond to minimal dosages, and others require massive amounts of the medication to achieve procedural sedation. Airway management can be extremely demanding, and rapid intubation may be required. Propofol has no known reversal medications.³ Artificial ventilation, resuscitation, or both may be required if a patient experiences respiratory compromise or arrest.

Only six state boards of nursing in the United States have issued either a declaratory statement or an advisory opinion that administration to and/or monitoring of patients receiving propofol for procedural sedation is within a nurse’s scope of practice. Twelve states have issued either a declaratory statement or an advisory opinion that administration to and/or monitoring of patients with propofol or other anesthetic agents is beyond the scope of practice for RNs other than certified RN anesthetists. No rulings have been issued in the remaining 32 states.⁴

Propofol is a highly effective, rapid-acting anesthetic medication that can have serious adverse effects. Sedation occurs on a continuum from minimal sedation through moderate sedation to deep sedation to anesthesia. Patients may slip unavoidably into a deeper level of sedation/analgesia than desired (Table 1).⁵ Individuals administering to and/or monitoring patients undergoing moderate or deep sedation or anesthesia should have the appropriate credentials to manage patients at whatever level of sedation or anesthesia is achieved either intentionally or

For answers to your questions contact the Center for Nursing Practice at (800) 755-2676 x 334 or e-mail consult@aorn.org. AORN’s Standards, Recommended Practices, and Guidelines are now available.
### Table 1
Continuum of Depth of Sedation

<table>
<thead>
<tr>
<th></th>
<th>Minimal sedation</th>
<th>Moderate sedation/analgesia</th>
<th>Deep sedation/analgesia</th>
<th>General anesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsiveness</td>
<td>Normal response</td>
<td>Purposeful response</td>
<td>Purposeful response</td>
<td>Unarousable even</td>
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<tr>
<td></td>
<td>to verbal</td>
<td>to verbal or tactile</td>
<td>following repeated</td>
<td>with painful</td>
</tr>
<tr>
<td></td>
<td>stimulation</td>
<td>stimulation*</td>
<td>painful stimulation*</td>
<td>stimulus</td>
</tr>
<tr>
<td>Airway</td>
<td>Unaffected</td>
<td>No intervention required</td>
<td>Intervention may be</td>
<td>Intervention</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>required</td>
<td>often required</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>Unaffected</td>
<td>Adequate</td>
<td>Intervention may</td>
<td>Frequently</td>
</tr>
<tr>
<td>ventilation</td>
<td></td>
<td></td>
<td>inadequate</td>
<td>inadequate</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Unaffected</td>
<td>Usually maintained</td>
<td>Usually maintained</td>
<td>May be impaired</td>
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<tr>
<td>function</td>
<td></td>
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</tbody>
</table>

* Reflex withdrawal from a painful stimulus is not considered a purposeful response.

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unintentionally. Additionally, anyone permitted to administer moderate sedation should be qualified to revive patients from deep sedation, manage a compromised airway, and provide adequate oxygenation and ventilation. As with all medications, the product literature for propofol should be consulted and directions for use followed carefully. Individual state regulatory agencies should be consulted for scope of practice questions.

**Question:** We have been instructed to put all regulated waste into red bags for special handling and disposal and have been doing this for some time. We recently hired two new staff members with experience at other facilities, and they are questioning some of the items we put into bags. Exactly what goes into regulated waste, and how should it be handled after it is placed into the red bag? Should we be concerned about how it is disposed?

**Answer:** All regulated waste should be placed in red bags, including liquid or semi-liquid blood or other potentially infectious materials, such as:
- contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed,
- items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling,
- pathological and microbiological wastes containing blood or other potentially infectious materials.

All red bags should be transported to a secured area in the facility designated for hazardous waste. The bags are placed in this area for storage until it is time for transportation to the waste management processing plant or facility. Hazardous waste must be packaged according to guidelines published by the US Department of Transportation so that it may be transported safely. Transportation guidelines require that packages or containers must:
- be break-resistant,
- be impervious to moisture,
- be leak resistant,
- be puncture resistant for sharps,
- be rigid,
- be sealed to prevent leakage during transport,
- be tightly lidded or stoppered for fluids in quantities greater than 20 mL,
- have sufficient strength to prevent tearing or bursting under normal conditions of use and handling, and
- weigh
  - 400 kg (882 lbs), or less for nonbulk maximum net mass, or
  - 450 L (119 gal), or less for nonbulk maximum capacity.

Each state has regulations for decontamination of hazardous waste. Incineration,
Planning for construction requires early consultation with infection control professionals, epidemiologists, architects, and engineers to incorporate infection control practices.

sterilizing by autoclave, or chemical means may be used according to the Occupational Safety and Health Administration. Whatever decontamination process is used must be monitored regularly.9

QUESTION: We are planning to renovate our OR and have heard people mention the dangers of Aspergillus. What is Aspergillus and why should we be concerned about it? How can we find out if it exists in our area? Finally, who should we contact to ensure that we are adhering to appropriate environmental safety guidelines during our renovation project?

ANSWER: Aspergillus is an ubiquitous fungus found in soil, water, and decaying vegetation. Aspergillus also can be found in potted plants, dried flower arrangements, fresh fruits, and other unprocessed food. In health care facilities, it can be found in ventilation ducts and ceiling spaces and behind wall boards. Water leaks can release Aspergillus from any of these areas, and it also can be dislodged during renovation when ducts, false ceilings, or some insulating materials are manipulated.10 Environmental sources of Aspergillus outbreaks have been associated with
- open windows,
- contamination of particle board frames surrounding air filters,
- backflow of contaminated air from exhaust ducts with contaminated filters,
- gaps in filters, and
- support frames permitting entry of unfiltered outside air.11

Aspergillosis is an infection caused by inhalation of species of Aspergillus that can produce inflammatory granulomatous lesions on or in any organ.12 The risk factors for development of invasive Aspergillosis include patients on steroids, prolonged neutropenia, and patients with AIDS.13 The prognosis for immunosuppressed patients with Aspergillosis is poor.12

Multiple Aspergillus outbreaks have been reported in conjunction with construction occurring in a hospital or surrounding area.11 Planning for new construction or remodeling requires early consultation with infection control professionals, epidemiologists, architects, and engineers to ensure that the design and process will include the desired infection control practices. The planning process involves an infection control assessment, followed by interventions, monitoring, and continuous assessment and improvement.14 Depending on what is learned during the assessment phase, interventions might include creating partitions or enclosures, modifying traffic flow, controlling entry and egress from the construction zone, or modifying air handling to control dust and airborne particles. If partitions are required, they should be solid in nature, securely attached, and sealed at the floor and ceiling above. A separate ventilation and exhaust system may be required to maintain a negative air pressure gradient in the construction area.14 Perioperative involvement should occur in the planning phase with ongoing input as the project progresses.

Air sampling can be used to determine if Aspergillus is present in the construction area. Air should be sampled before the construction project is started to develop a base line, after demolition is performed, and at the end of the project. The sampling equipment should be designed to obtain spores capable of entering the lungs (i.e., less than 5.0 μm in diameter).15 Air sampling can be contracted to a reputable company if the hospital does not own sampling equipment. The area should be decontaminated if Aspergillus is found on the air-sampling culture plates. The area first must be cleaned of all dust and debris, and decontaminated with chlorine-based mist or diluted bleach. Then the surfaces must be painted or sprayed with copper 8-quinolinolate.16 Another air sampling is performed after this to ensure that Aspergillus no longer is present in the area. The area may not be used until a negative result is received. Additionally,
Reservoir-type water-spray or evaporative-pan humidifiers (ie, portable humidifiers) should not be used in the OR because of cleaning difficulties and potential for contamination buildup.

patients who are at risk should be relocated.

QUESTION: Our permanent OR humidifier is not working. Can we use a portable humidifier?

ANSWER: Reservoir-type water-spray or evaporative-pan humidifiers (ie, portable humidifiers) should not be used in the OR. The American Institute of Architects (AIA) Academy of Architecture for Health has developed Guidelines for Design and Construction of Hospital and Health Care Facilities, 2001 with assistance from the US Department of Health and Human Services. The AIA standard states “because of cleaning difficulty and potential for buildup of contamination, recirculating room units should not be used”\textsuperscript{16} in surgical suites.

The humidifier system should be designed so that duct work used with duct-mounted humidifiers has a way to remove of water. An adjustable, high-limit humidistat should be located downstream from the humidifier to reduce the potential for condensation inside the duct. All duct take-offs should be sufficiently downstream of the humidifier to ensure complete moisture absorption. Steam humidifiers should be used.

Humidifying systems need to be part of the heating, ventilation, and air conditioning system. Provisions need to be made for periodic cleaning of this system as well. According to AIA guidelines, the relative humidity should be between 30% and 60%.\textsuperscript{14}

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NOTES

15. C G Mayhall, ed, Hospital Epidemiology and Infection Control, second ed (Philadelphia: Lippincott Williams & Williams, 1999) 1219-1220.
16. C Peterson “Fire safety; instrument counts; plants in OR areas; portable humidity and air conditioning units; artificial nails,” (Clinical Issues) AORN Journal 75 (June 2002) 1175-1178.