This examination is intended for dentists who have completed training in the safe and effective use of enteral, inhalation and intravenous sedation. The examination consists of 100 multiple choice questions that address the following topics and objectives. A bibliography of suggested learning resources is also provided.

Direct any inquiries to central office:

American Dental Society of Anesthesiology

211 East Chicago Ave. Suite 780 Chicago, Illinois 60611

Website: www.adsahome.org

Telephone: 877/255-3742
Topics and Objectives

**General concepts of sedation and general anesthesia**

1. Distinguish the classic ether stages of general anesthesia introduced by Guedel from the more contemporary definitions based on the concept of three general anesthesia components.
2. Distinguish the clinical signs and the respiratory and cardiovascular changes that accompany minimal, moderate and deep sedation, and those that accompany general anesthesia.
3. Describe essential aspects of preoperative medical assessment and evaluation including the ASA risk categories and the Mallampati airway classifications.
4. Identify anatomical and physiological characteristics unique to pediatric and geriatric patients that must be considered when planning enteral or parenteral minimal or moderate sedation.

**Pharmacological considerations**

5. Explain basic principles of pharmacodynamics including mechanisms of action, effects, drug potency versus efficacy, and potential additive effects when combining more than one sedative agent.
6. Define and explain basic pharmacokinetic processes distinguishing those following PO, IM and IV administration.
7. Explain the mechanism of action, adverse effects and the principal pharmacokinetic features for medications commonly used for enteral and parenteral moderate sedation:
   - Benzodiazepines: diazepam, midazolam, lorazepam, triazolam
   - Antihistamines: diphenhydramine, hydroxyzine, promethazine
   - Opioids: fentanyl, meperidine, nalbuphine
8. Explain essential pharmacological features of nitrous oxide, including principles of gas uptake, distribution and minimum alveolar concentration (MAC).
9. Describe the function of each component of a nitrous oxide inhalation machine.
10. Discuss the abuse potential, occupational hazards, contraindications and any respiratory or cardiovascular influences for nitrous oxide and other sedative agents.
11. Explain the actions, effects and patterns of clearance for local anesthetics, epinephrine and levonordefrin including cardiovascular influences and proper dosage calculations.

**Patient monitoring and records**

12. Describe fundamental physiological principles of respiration and circulation.
14. Describe appropriate patient education, discharge criteria and appropriate sedation records for patients receiving moderate sedation.

**Managing complications**

15. Describe the recognition and management of possible complications associated with inhalation, minimal and moderate sedation, including anatomical and foreign body obstruction, laryngospasm, respiratory depression, delirium, nausea, vomiting and aspiration.
16. Describe the recognition and management of possible medical emergencies such as bradycardia/hypotension, acute hypertensive episodes, allergic reaction, acute coronary syndromes, and stroke.
Intravenous technique and complications

17. Describe the components of an intravenous infusion including principal features that distinguish various intravenous solutions.
18. Explain advantages of intravenous catheters over rigid-needle devices for intravenous access.
19. Describe the proper selection of appropriate sites for an intravenous infusion including locations to avoid.
20. Describe the recognition and management of local complications associated with intravenous drug administration including extravasation, phlebitis, and inadvertent intraarterial injection.

Learning Resource List

All sedation providers should be familiar with the characteristics and influences of various sedation levels and general anesthesia.†

<table>
<thead>
<tr>
<th></th>
<th>Minimal Sedation (Anxiolysis)</th>
<th>Moderate Sedation/Analgesia (Conscious Sedation)</th>
<th>Deep Sedation/Analgesia</th>
<th>General Anesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsiveness</td>
<td>Normal response to verbal stimulation</td>
<td>Purposeful* response to verbal or tactile stimulation</td>
<td>Purposeful* response after repeated or painful stimulation</td>
<td>Unarousable, even with painful stimulus</td>
</tr>
<tr>
<td>Airway</td>
<td>Unaffected</td>
<td>No intervention required</td>
<td>Intervention may be required</td>
<td>Intervention often required</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>Unaffected</td>
<td>Adequate</td>
<td>May be inadequate</td>
<td>Frequently inadequate</td>
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<tr>
<td>Ventilation</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Cardiovascular</td>
<td>Unaffected</td>
<td>Usually maintained</td>
<td>Usually maintained</td>
<td>May be impaired</td>
</tr>
<tr>
<td>Function</td>
<td></td>
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</table>

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

**Minimal Sedation (Anxiolysis)** a drug-induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

**Moderate Sedation/Analgesia (Conscious Sedation)** a drug-induced depression of consciousness during which patients respond purposefully* to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

**Deep Sedation/Analgesia** a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully* following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

**General Anesthesia** a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

Because sedation is a continuum, it is not always possible to predict how an individual patient will respond. Hence, practitioners intending to produce a given level of sedation should be able to rescue patients whose level of sedation becomes deeper than initially intended. Individuals administering Moderate Sedation/Analgesia (Conscious Sedation) should be able to rescue patients who enter a state of Deep Sedation/Analgesia, while those administering Deep Sedation/Analgesia should be able to rescue patients who enter a state of general anesthesia.

† American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. Anesthesiology 2002;96:1004-17
Textbook


The following articles are available for download from ADSA website.)


