PART 1

Nursing considerations for procedural sedation and analgesia

This first in a two-part series reviews patient assessment, red flags, and pharmacologic agents.

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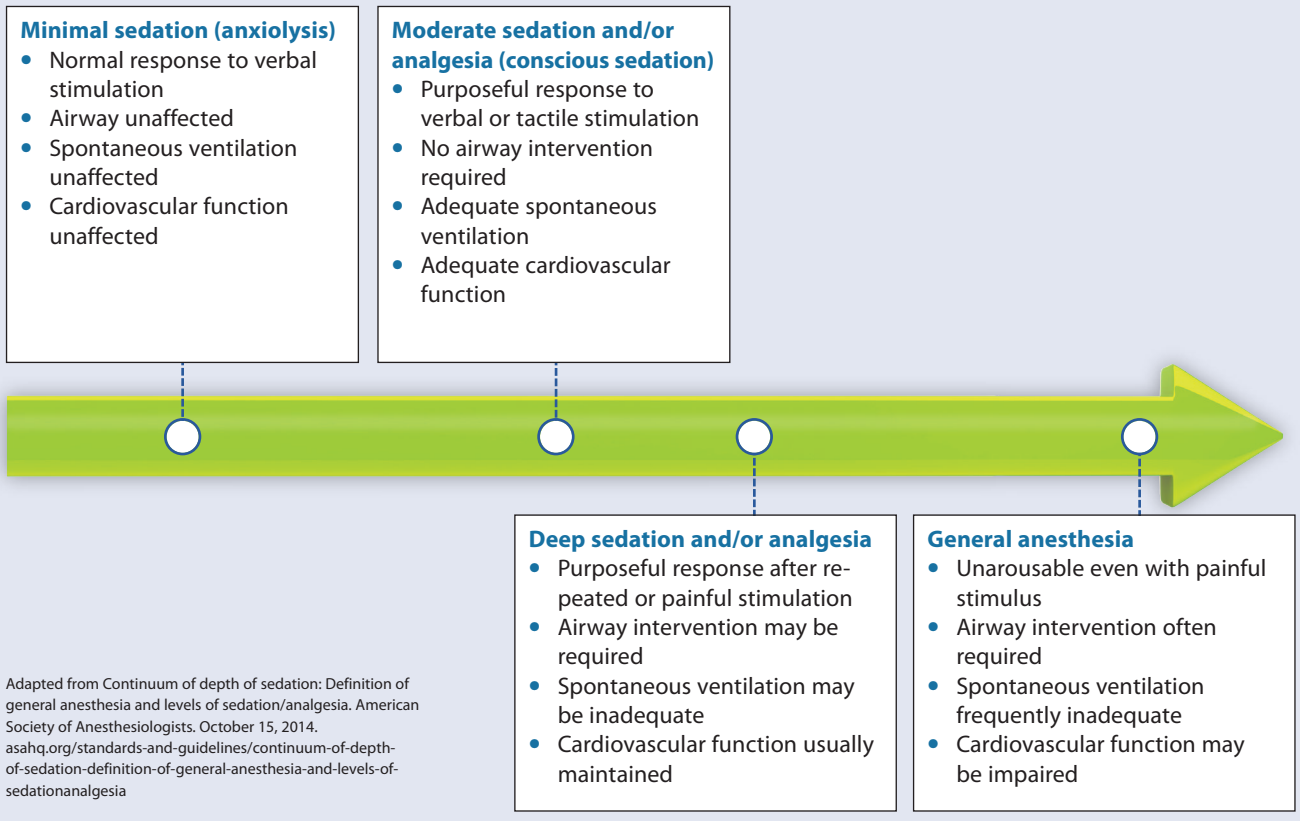
IN 1978, Bennett first described the clinical effects associated with I.V. conscious sedation and its impact on dental practice. Revised clinical practice guidelines have replaced the word *conscious* with *moderate* to address differences that occur within the continuum of sedation. The terms *moderate* sedation and *procedural* sedation are now used interchangeably.

Over the last several decades, procedural sedation and analgesia for surgical, therapeutic, and diagnostic procedures has gained widespread popularity. The rationale for its proliferation includes medical technology that allows providers to treat patients with minimally invasive procedures and techniques that no longer confine them to traditional perioperative environments.

With healthcare's focus on cost and efficiency, procedural sedation

Continuum of sedation

Sedation exists along a continuum from minimal sedation to general anesthesia.



Adapted from Continuum of depth of sedation: Definition of general anesthesia and levels of sedation/analgesia. American Society of Anesthesiologists. October 15, 2014. asahq.org/standards-and-guidelines/continuum-of-depth-of-sedation-definition-of-general-anesthesia-and-levels-of-sedationanalgesia

Presedation assessment checklist

Using a checklist can ensure consistent presedation assessment.

General information
- Patient age, height, weight
- Proposed procedure
- Attending physician or service

Medical history

Cardiovascular assessment
- Hypertension
- Coronary artery disease
- Angina
- Myocardial infarction
- Cardiac arrhythmia
- Presence of pacemaker/automatic implantable cardioverter-defibrillator
- Valvular heart disease

Pulmonary assessment
- Dyspnea
- Exercise tolerance
- Asthma
- Bronchitis
- Obstructive sleep apnea
- Tobacco use

Hepatic assessment
- Enzyme induction
- Hepatitis
- Cirrhosis
- Ascites

Renal assessment
- Renal insufficiency
- Renal failure
- Dialysis

Neurologic assessment
- Cerebrovascular insufficiency
- Carotid artery and vertebral basilar disease
- Stroke
- Convulsive disorders
- Headaches
- Syncope
- Peripheral nervous system assessment

Endocrine assessment
- Diabetes
- Hyper/hypothyroidism
- Adrenal disease

Gastrointestinal assessment
- Nausea
- Vomiting
- Recent weight loss
- Hiatal hernia

Hematologic assessment
- Anemia
- Aspirin, nonsteroidal anti-inflammatory drug use
- Excessive bleeding

Musculoskeletal assessment
- Arthritis
- Back pain
- Joint pain

Surgical history
- Anesthesia complications (nausea, vomiting, delayed emergence)
- Diagnostic procedures
- Family anesthesia history
- Operations

Medications
- Name
- Dosage
- Patient adherence

Allergies
- Anaphylactic
- Anaphylactoid
- Side effects

Laboratory data
- Additional laboratory profiles
- Chest X-ray
- Electrocardiogram
- Electrolytes

Dentition
- Capped teeth
- Loose/chipped teeth
- Dentition/dentures

Social history
- Tobacco use
- Alcohol use
- Illicit drug use
- Herbal use
- Possibility of pregnancy

Oral intake status
- Instructions
- Liquids
- Solids

Informed consent
- Patient questions answered
- Written consent obtained
- Patient instructions given

American Society of Anesthesiologists (ASA) physical status classification
- ASA Risk 1 to 3

Presedation evaluator name and date _____

and analgesia administered by nonanesthesia personnel provides an alternative for many procedures. As a result, the demand for competent sedation nursing care has increased, and many registered nurses have assumed sedation subspecialty roles in gastroenterology settings, emergency departments, cardiac catheterization labs, operating rooms, fertility clinics, and interventional radiology settings.

Part 1 of this two-part series reviews the sedation continuum, the goals of procedural sedation and analgesia, presedation patient assessment, and the relevant pharmacologic agents.

The sedation continuum

Sedation exists along a continuum that progresses from a state of minimal sedation to general anesthesia. (See *Continuum of sedation*.) Procedural sedation and analgesia is a drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. (Note that reflex withdrawal from a painful stimulus is not considered a purposeful response.) No interventions are required to maintain a patent airway, spontaneous ventilation is adequate, and cardiovascular function is supported.

Goals and objectives

The goals of procedural sedation and analgesia vary based on procedural requirements, provider preferences, and the sedation technique. Regardless of these variables, goals include administering the lowest dose of medication to:
- maintain patient safety and welfare
- minimize physical pain and discomfort
- control anxiety, minimize psychological trauma, and maximize amnesia
- control behavior and movement to allow safe performance of the procedure.

Presedation patient assessment

The clinician who will administer the sedation should conduct the presedation patient assessment in an unhurried atmosphere so he or she can gather patient data, order laboratory tests, and implement a sedation plan of care. During the assessment, the clinician seeks to identify patient risk factors that may lead to complications and ensure that the patient is in the best physical condition for the planned procedure.

To ensure consistent, thorough presedation assessment, many clini-

ASA physical status classification system

The American Association of Anesthesiologists (ASA) physical status (PS) classification system is the most commonly used system for classifying patients for anesthesia. Traditionally, administering procedural sedation and analgesia by nonanesthesia providers has been restricted to PS I, PS II, and medically well-managed PS III patients. In the event that sedation is required for patients with higher acuity, a consult with the anesthesia department is strongly advised.

Physical status	Definition	Example
PS I	A normal healthy patient	Healthy, nonsmoking patient
PS II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. For example, current smoker, well-controlled diabetes, mild lung disease.
PS III	A patient with severe systemic disease	Substantive functional limitations, one or more moderate to severe diseases. For example, chronic obstructive pulmonary disease, poorly controlled diabetes or hypertension.
PS IV	A patient with severe systemic disease that is a constant threat to life	For example, recent myocardial infarction (< 3 months ago), cerebrovascular accident, ongoing cardiac ischemia
PS V	A moribund patient who is not expected to survive without surgery	For example, ruptured abdominal or thoracic aortic aneurysm, intracerebral bleed
PS VI	A patient declared brain-dead whose organs are being removed for donor purposes	

Source: ASA physical status classification system. October 15, 2014. asahq.org/standards-and-guidelines/asa-physical-status-classification-system

STOP-Bang questionnaire

Use this mnemonic device to assess patient risk for obstructive sleep apnea (OSA). Answering yes to two or fewer questions indicates that the patient is at low risk for OSA; three to four yes answers places the patient in the intermediate-risk category; five to eight yes answers places the patient in the high-risk category.

- ☐ **S**noring: Do you snore loud enough to be heard through closed doors?
- ☐ **T**ired: Do you often feel tired or fatigued, or do you sleep during the day?
- ☐ **O**bserved: Has anyone observed you stop breathing during sleep?
- ☐ **P**ressure: Do you have high blood pressure?
- ☐ **B**MI: Is your body mass index > 35?
- ☐ **A**ge: Are you older than 50?
- ☐ **N**eck circumference: Is your neck circumference > 40 cm?
- ☐ **G**ender: Are you male?

Source: Chung F, Subramanyam R, Liao P, Sasaki E, Shapiro C, Sun Y. High STOP-Bang score indicates a high probability of obstructive sleep apnoea. *Br J Anaesth*. 2012;108(5):768-75.

cians follow a prescribed assessment format. (See *Presedation assessment checklist*.) Joint Commission standards and elements of performance require that patients be reevaluated immediately (moments) before sedation administration.

After the presedation assessment, the clinician assigns the patient a physical status classification. The most commonly accepted classification system, first developed in 1940 by a committee of the American Society of Anesthetists (now the American Society of Anesthesiologists [ASA]), assigns a category based on the assessment findings. (See *ASA physical status classification system*.)

OSA: A red flag

Obstructive sleep apnea (OSA) is a pulmonary disorder of significant concern for sedation providers. It affects up to 17% of middle-aged women and 22% of middle-aged men, but less than 15% of those have been diagnosed. OSA is a disorder of the upper airway at the level of the pharynx. It leads to fragmented sleep, arterial hypoxemia, hypercarbia, polycythemia, systemic and pulmonary hypertension, and right ventricular failure.

The most common OSA signs and symptoms include morning headache, hypertension, stroke, ischemic heart disease, cognitive dysfunction, and overwhelming somnolence during normal working hours. The STOP-Bang questionnaire is a validated screening tool used to identify a patient's risk for OSA. (See *STOP-Bang questionnaire*.)

Scheduling patients with OSA early in the morning for procedures requiring sedation and analgesia allows for a lengthier recovery and assessment period to identify postprocedure respiratory complications (apnea, hypopnea). Clinical management includes careful assessment of the patient's airway before beginning the procedure and placement of the patient's continuous positive airway pressure, bilevel positive

airway pressure, or adaptive servo ventilation device immediately after the procedure. Oxygen may be beneficial during and after the procedure. To avoid deep sedative states or general anesthesia, titrate sedative drugs to clinical effect. Patients with OSA are highly sensitive to all central nervous system depressants. Even minimal doses increase the potential for increased airway obstruction or apnea. Practitioner interventions to effectively manage airway obstruction include chin-lift/jaw-thrust, airway insertion, and use of a bag-valve-mask device.

Preprocedure oral intake

The clinician should provide the patient with preprocedure fasting guidelines. Historically, patients have been instructed to have nothing to eat or drink after midnight the night before the procedure to decrease the risk of gastric acid aspiration. However, these guidelines don't address the:

- time of the procedure
- time the patient went to bed the night before the procedure
- variability associated with gastric emptying for solids and liquids.

Failure to address these variables can lead to dehydration, hypoglycemia, hypovolemia, increased irritability, enhanced preoperative anxiety, thirst, hunger, and headaches.

The ASA recently updated its practice guidelines for preoperative fasting based on studies that showed a reduced fasting interval did not increase the risk of pulmonary aspiration in normal, healthy individuals. (See *ASA fasting guidelines*.)

Pharmacologic agents

Combinations of carefully titrated sedative, analgesic, and hypnotic medications alter a patient's level of consciousness and enhance cooperation. However, sedative and analgesic medications also may produce profound synergistic effects, which may lead to deep sedation or general anesthesia. Successfully producing a sedate, analgesic state and minimizing complications (respiratory distress, cardiovascular depression, and hypoxemia) requires an understanding of these medications as well as the reversal agents that may be needed if the level of sedation becomes deeper than intended. (See *Pharmacologic agents: An overview*.)

Note that benzodiazepines and narcotics are pharmacologically reversible, but propofol is not and may produce rapid, unpredictable effects, including respiratory arrest.

Propofol

Several professional organizations—including the American College of Gastroenterology, the American Society for Gastrointestinal Endoscopy, and the Society for Gastroenterology Nurses and Associates—have endorsed nonanesthesiologist or nurse-administered propofol administration. However, the Food and Drug Administration (FDA) notes that propofol should be administered only by "persons trained in administering general anesthesia and not involved in the conduct of the surgical/diagnostic procedure."

Here's some background on the status of propofol administration by nonanesthesia providers:

- Reports of adverse patient events have been connected to nonanesthesia provider propofol administration. Over a decade ago, the Pennsylvania Patient Safety Reporting System received more than 100 reports in which propofol administration in untrained hands resulted in adverse patient events. Sixteen percent of those reports were classified as serious events, including four patient deaths.
- In 2009, Rex and colleagues reported that propofol is known to cause hypoventilation, hypotension, and bradycardia relatively

ASA fasting guidelines

The American Society of Anesthesiologists (ASA) updated its fasting guidelines in response to studies showing that reducing fasting intervals doesn't increase the risk of pulmonary aspiration in healthy adults.

Oral intake	Minimum fasting period
Clear liquids	2 hours
Breast milk	4 hours
Infant formula	6 hours
Nonhuman milk	6 hours
Light meal (toast, clear liquids)	6 hours
Fried, fatty foods or meal	8 hours or more

Source: Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: Application to healthy patients undergoing elective procedures: An updated report by the American Society of Anesthesiologists Task Force on Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration. *Anesthesiology*. 2017;126(3):376-93.

Pharmacologic agents: An overview

Here is an overview of procedural sedation and analgesia medications and reversal agents.

	Dose	Onset (minutes)	Peak (minutes)	Clinical effects (minutes)	Sedation	Anxiolysis	Analgesia	Nursing considerations
Benzodiazepines								
Midazolam	0.5-1 mg over 2 minutes; wait 2-3 minutes to evaluate sedative effect after each 0.5-1 mg additional dose adjustment; total dose 5 mg (I.V.)	1-5	1-5	30-45	Yes	Yes	No	✓ May produce apnea with rapid administration; effects are pronounced with concomitant opioid administration. ✓ Mean arterial pressure, cardiac output, stroke volume, and systemic vascular resistance may be slightly decreased. ✓ Reversal: Flumazenil
Diazepam	2-5 mg over 60-120 seconds; evaluate sedative effect after each 1-2 mg additional dose adjustment; total dose 10 mg (I.V.)	1-5	3-5	15-60	Yes	Yes	No	✓ Use caution in acute narrow angle glaucoma and untreated open angle glaucoma. ✓ Administer via a large vein to prevent venous irritation and possible thrombophlebitis. ✓ I.V. diazepam may cause respiratory depression and apnea. Respiratory depression is generally minimal unless large doses are given with concomitant opioid administration. ✓ Reversal: Flumazenil
Opioids								
Fentanyl	25-50 mcg administered over several minutes; additional 25 mcg titrated to clinical effect (I.V.)	1-2	3-5	30-60	No	No	Yes	✓ Duration of respiratory depression may last longer than analgesic effects. ✓ Be prepared to treat vagally mediated bradycardia. ✓ Potent synergism occurs when administered with sedatives, hypnotics, and central nervous system depressants. ✓ Reversal: Naloxone

frequently, but they posit that severe adverse events are rare.

- In 2005, the American College of Gastroenterology petitioned the FDA to remove warnings about who can administer propofol from its package labeling. In a 2010 letter, the FDA denied the petition and noted that the warning "should help ensure that propofol is used safely."

Nonanesthesia providers who administer or monitor patients receiving propofol must recognize that the Institute of Patient Safety recognizes it as a high-risk medication. Propofol is not reversible and may produce rapid, unpredictable effects, including respiratory arrest. The prescribing clinician and nonanesthesia provider administering the sedation and monitoring the patient should possess advanced airway-management skills, demonstrate proficiency in managing cardiovascular complications, and recognize that propofol can induce deep sedative states and

	Dose	Onset (minutes)	Peak (minutes)	Clinical effects (minutes)	Sedation	Anxiolysis	Analgesia	Nursing considerations
Anesthetics								
Propofol	10-mg intermittent boluses to desired clinical effect; sedation state may rapidly result in deep sedation or general anesthesia (I.V.)	< 1	2-3	5-8	Yes	Yes	No	✓ Dose-dependent respiratory depression, apnea, hiccoughs, laryngospasm, bronchospasm, wheezing, and coughing may occur. ✓ Hypotension is associated with a decrease in cardiac output, cardiac contractility, and preload. Arrhythmias and tachycardia may occur. ✓ Patient may experience pain on injection. ✓ Potent synergism may occur when administered with other central nervous system depressants. ✓ *Not* pharmacologically reversible
Reversal agents								
Flumazenil	0.2 mg administered I.V. over 15 seconds; a second dose of 0.2 mg can be injected and repeated at 60-second intervals as necessary to a maximum total dose of 1 mg	1-2	6-10	45-90	No	No	No	✓ Patients on long-term benzodiazepine therapy and tricyclic antidepressants may experience seizures. ✓ Risk of resedation is high when reversing long-acting benzodiazepines or large dose of a short-acting benzodiazepine. ✓ Resedation may be treated with a repeat dose at no less than 20-minute intervals.
Naloxone	0.5-1 mcg/kg titrated in 0.1-mg increments to obtain a respiratory rate of 12 or more breaths per minute	1-2	5-15	30-45	No	No	No	✓ Patients may experience hypertension, tachycardia, pulmonary edema, excitement, tremors, or seizures. ✓ Duration of action of some opioids may exceed that of naloxone. Patients must be carefully monitored postsedation for signs of respiratory depression/arrest.

Source: Kost M. *Moderate Procedural Sedation and Analgesia: A Question and Answer Approach*. St. Louis, MO: Elsevier, Inc; 2020.

general anesthesia. Before administering this sedative, nurses should check their state board of nursing to ensure this care is within their scope of practice.

Be prepared

Preparing the patient and care team for procedural sedation and analgesia requires a thorough patient assessment, awareness of potential red flags, and a firm grasp of pharmacologic and reversal agents. Learn about airway management, procedural monitoring, and postsedation care in part 2 of this two-part series. ★

Visit americannursetoday.com/?p=56273 for a list of selected references.

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