Lesson S39: PreAnesthetic Assessment of a Young Man for Endoscopy

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REVIEW DATE: July, 2014

Read this article, reflect on the information presented, then go online and complete the lesson post-test and course evaluation before the termination date below. (CME credit is not valid past this date.) You must achieve a score of 80% or better to earn CME credit.

TIME TO COMPLETE ACTIVITY: 2 hours
RELEASE DATE: November 1, 2014
TERMINATION DATE: October 31, 2015

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Professional Gaps

Anesthesiologists usually perceive the administration of anesthesia in an endoscopy suite as a fairly simple procedure. However, they may lack familiarity with the many statements and guidelines presented by the American Society of Anesthesiologists to ensure patient safety, especially when sedation is given by non-anesthesiologists who may have less expertise regarding the pharmacology of sedative agents.

Learning Objectives

At the completion of the activity, the reader will be able to:

1. Discuss the continuum of the depth of sedation
2. Identify high risk patients scheduled for moderate sedation (MS)
3. Articulate ASA Guidelines for monitoring by non-anesthetic personnel in off-site areas
4. Recognize patients at risk for obstructive sleep apnea (OSA)
5. Describe patients for procedures that require preanesthetic assessment and management
6. Formulate a plan for the management of these high-risk patients
7. Design a learning program for non-anesthesiologists in an endoscopy suite
8. List indications for the use of the Sedaysis® system
9. Note the caveats placed by the FDA on use of computerized delivery systems
10. Indicate when preoperative testing is useful for patients treated in the endoscopy suite.

Case

A 37 year old man was scheduled for upper and lower colonoscopy for investigation of anemia (Hb 7 gm). He was evaluated by the nurse for moderate sedation to be supervised by the proceduralist and
monitored by a dedicated nurse. He was paraplegic following a gunshot wound at T9 some years previously. While it was difficult to assess his height, the patient said he used to be about 5’10”. Weight was approximated at 325lbs. (BMI = 47). He admitted to snoring and to abusing heroin, cocaine and tobacco although he claimed that he had been “clean” for about 24 hours. The anemia was thought to be the result of several recent episodes of bloody diarrhea. The vital signs were recorded at BP 160/90, heart rate 70 bpm, temperature 39 degrees C, SpO2 94% on room air. On review of the patient’s history, the endoscopist asked for an anesthetic consult.

Introduction

Non-anesthesiologist practitioners that administer sedation – e.g., emergency physicians, gastroenterologists, pulmonologists, dentists – must use hypnosedative drugs with full attention to the hazards associated with these medications. While sedation and monitored anesthetic care (MAC) are not identical, studies have shown that the risk of MAC may equal that of general anesthesia. This may be due to the fact that the cases are considered simple and generally short, and patients are frequently young and relatively healthy. As such, a less experienced anesthesia provider may be assigned to administer the sedation. Agents used today have a much improved safety profile with rapid onset and offset. Furthermore, because many practitioners feel that they are familiar with the medications administered and they have used them many times without complications, they may be less cautious than they would be in other circumstances.

Standards, Statements and Guidelines

The American Society of Anesthesiologists (ASA) has produced many position statements on monitoring and care of patients who receive sedation and anesthesia. It should be noted that “standards” reflect the standard of care and, as such, are requirements. Position papers are a consensus derived from opinions and reviews of evidence based studies. Application of the conclusions reached should improve patient safety and care. The following are significant documents issued by the ASA (and available online at https://www.asahq.org/For-Members/Standards-Guidelines-and-Statements.aspx):

- Standards for Basic Anesthetic Monitoring
- Basic Standards for Preanesthesia Care
- Position on Monitored Anesthesia Care (MAC)
- Distinguishing MAC from Moderate Sedation/Analgesia (Conscious Sedation)
- Continuum of Depth of Sedation: Definition of General Anesthesia and Levels of Sedation/Analgesia
- Statement on Respiratory Monitoring During Endoscopic Procedures
- Statement on the Safe Use of Propofol
- Statement on Granting Privileges for Administration of Moderate Sedation to Practitioners Who are not Anesthesia Providers
The Continuum of the Depth of Sedation

The continuum of the depth of sedation progresses from minimal sedation/anxiolysis where cardiorespiratory function is not affected to moderate sedation (MS) (Table 1). Airway intervention is still not required and cardiac function remains unaffected, either. The difference between these two levels is that the patient becomes less responsive, perhaps requiring tactile stimulation to elicit a response. However, since MS may transition without warning into deep sedation/analgesia (DS) and finally general anesthesia, practitioners who administer MS must be capable of managing an airway that becomes compromised. If more drugs are given, general anesthesia may result with the associated risks of cardiovascular compromise and airway difficulties.

Table 1: CONTINUUM OF DEPTH OF SEDATION: DEFINITION OF GENERAL ANESTHESIA AND LEVELS OF SEDATION / ANALGESIA (Approved by the American Society of Anesthesiologist House of Delegates, 2009)

<table>
<thead>
<tr>
<th></th>
<th>Minimal Sedation (Anxiolysis)</th>
<th>Moderate Sedation / Analgesia</th>
<th>Deep Sedation / Analgesia</th>
<th>General Anesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Responsiveness and Consciousness</strong></td>
<td>Normal response to verbal stimulation.</td>
<td>Purposeful* response to verbal or tactile stimulation.</td>
<td>Purposeful* response following repeated or painful stimulation.</td>
<td>Unarousable, even with painful stimulus.</td>
</tr>
<tr>
<td></td>
<td>Impaired cognition and coordination.</td>
<td>Depression of consciousness.</td>
<td>Depression of consciousness.</td>
<td></td>
</tr>
<tr>
<td><strong>Airway</strong></td>
<td>No intervention required</td>
<td>No intervention required</td>
<td>Intervention may be required</td>
<td>Intervention often required</td>
</tr>
<tr>
<td><strong>Spontaneous Ventilation</strong></td>
<td>Adequate</td>
<td>Adequate</td>
<td>May be inadequate</td>
<td>Frequently inadequate</td>
</tr>
<tr>
<td><strong>Cardiovascular Function</strong></td>
<td>Maintained</td>
<td>Usually maintained</td>
<td>Usually maintained</td>
<td>May be impaired</td>
</tr>
</tbody>
</table>

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

Gastroenterology Suites and Provision of Anesthesiology

There has been widespread interest in alternative models of administration of sedation to patients receiving both upper and lower endoscopies and esophagastroduodenoscopies in gastroenterology suites. This interest is driven, in large part, by the enormous increase in cost associated with anesthesia administration for these procedures. An increasing number of patients are getting sedation for colonoscopies. In 2003, only 14% had a trained anesthetic care provider; by 2009 that number had risen to 30%, mostly healthy patients. While the choice of the amount of sedation for endoscopy is often left up to the patient, the person who administers the drugs may depend on where the patient’s geographic location. Those who live in the northeast of the United States are more likely to get anesthesia services (59% of the time vs 13% in Western states). If anesthesia services were used for all endoscopies and colonoscopies performed annually, it would cost an extra 8 billion dollars.
Most insurers claim that the majority of patients do well with sedation given by the endoscopists and Aetna went so far as to threaten to deny all claims for provision by an anesthesiologist in 2008, a decision that was later rescinded. Thus geographic variation shows that much of what is considered conventional in one region may be considered to be inadequate treatment (no anesthesiologist) or excessive treatment (an anesthesiologist). As of 2013, Medicare allowed about $169.00, Medicare $119.00 and private insurers about $700.00 on average for anesthetic services. Provision of sedation by anyone other than a trained anesthetic care provider does not increase the facility fee.

Arguments for provision of anesthetic services include better patient satisfaction, and improved conditions for the endoscopist allowing more cases to be accommodated daily and relieving him/her of potential liability for unanticipated adverse reactions. There is also the fear that patients might refrain from screening procedures for fear of discomfort or pain.\(^{15}\)

**Position of Gastroenterology Groups**

GI Societies have addressed the issue of sedation in endoscopy. In a world-wide meeting with representatives from gastroenterology, anesthesiology and medical jurisprudence, a document known as the Athens Statements\(^{16}\) made recommendations concerning the use of sedatives, monitors to be employed, and identification of those who should administer hypnosedatives. Some of the conclusions/recommendations of this group include:

- Sedation increases the cost of these procedures.
- Sedation is responsible for nearly 50% of endoscopic complications.\(^{17,18}\)
- Sedation and analgesia are the standard of care for GI endoscopy.
- Sedation is associated with a higher rate of completed GI exams.
- Capnography is a more precise measure of ventilation than observing the chest rise and should be added to standard ASA monitors.
- Someone other than the endoscopist must be assigned to monitor the patient.
- Worldwide evidence (2010) in over 650,000 cases suggests that endoscopist-directed propofol (EDP) administration has a mortality rate of 1:158,000.
- All physicians and nurses administering sedation must possess the skills needed to rescue the patient from cardiorespiratory distress.

This worldwide consensus statement follows the position statement released in 2009 by 4 different groups as follows:\(^{19}\)

1. The American Association for the Study of Liver Diseases
2. The American College of Gastroenterology
3. The American Gastroenterological Association
4. The American Society for Gastrointestinal Enteroscopy

These societies issued a joint statement with following recommendations:

- Both Nurse-Administered Propofol Sedation (NAPS) and Balanced Propofol Sedation (BPS) require skills and abilities distinct and different from standard sedation.
- Individuals administering propofol should be proficient in the management of upper and lower airway complication.
- Capnography reduces the occurrence of apnea and hypoxemia during EGD.
The above four groups, in conjunction with the Society for Gastroenterology Nurses and Associates (SGNA) have gone further and developed a, “Multisociety Sedation Curriculum for Gastrointestinal Endoscopy” (MSCGE).\textsuperscript{20}

As can be seen, all groups – GI, anesthesia and SGNA – are in agreement that capnography is recommended in GI sedation cases and particularly in examinations of the upper GI tract. Guidelines for the involvement of anesthesia personnel during GI endoscopy are shown in Table 2.

<table>
<thead>
<tr>
<th>Table 2: Pre-existing conditions that strongly support the involvement of anesthesia trained providers in GI procedures \textsuperscript{21}</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Prolonged or therapeutic procedures requiring deep or general anesthesia</td>
</tr>
<tr>
<td>▪ High arched palate</td>
</tr>
<tr>
<td>▪ Anticipated intolerance, allergy to standard techniques</td>
</tr>
<tr>
<td>▪ Tonsillar hypertrophy</td>
</tr>
<tr>
<td>▪ Severe co-morbidities (ASA &gt;3)</td>
</tr>
<tr>
<td>▪ Risk of airway obstruction</td>
</tr>
<tr>
<td>▪ Mallampati 4</td>
</tr>
<tr>
<td>▪ Stridor, obstructive sleep apnea</td>
</tr>
<tr>
<td>▪ Neck abnormalities/short thick/ limited extension</td>
</tr>
<tr>
<td>▪ Dysmorphic facial features</td>
</tr>
<tr>
<td>▪ Thyromental distance &lt; 3cm in adults</td>
</tr>
<tr>
<td>▪ Trisomy 21</td>
</tr>
<tr>
<td>▪ C-spine rheumatoid arthritis/ trauma</td>
</tr>
<tr>
<td>▪ Pierre-Robin syndrome. Oral anomalies</td>
</tr>
<tr>
<td>▪ Tracheal deviation</td>
</tr>
<tr>
<td>▪ &lt; 3 cm oral opening in adults / jaw abnormalities/trismus</td>
</tr>
<tr>
<td>▪ Retrognathia/micrognathia</td>
</tr>
<tr>
<td>▪ Protruding incisors</td>
</tr>
<tr>
<td>▪ Trismus</td>
</tr>
<tr>
<td>▪ Macroglossia</td>
</tr>
<tr>
<td>▪ Morbid obesity</td>
</tr>
</tbody>
</table>
Computer-Assisted Personalized Sedation

Considerable discussion and concern among several groups have arisen recently with the introduction of plans for Computer-Assisted Personalized Sedation (CAPS).\textsuperscript{22} Various devices are in design and the one most likely to have market penetration in the near future is Sedasys\textsuperscript{®} by Johnson and Johnson (J&J). This system received pre-market approval in May, 2013. The concept is to provide propofol for moderate sedation to patients who would otherwise not be able to receive propofol because no qualified provider is available. (It is important to note that as per FDA labeling, propofol can only been administered by an anesthesia provider or to a patient in an ICU setting.) The company notes that Sedasys\textsuperscript{®} is not intended to replace an anesthesia provider but rather to allow the administration of mild-to-moderate sedation. The FDA product statement for Sedasys\textsuperscript{®} includes many exclusion criteria and the company specifically notes that Sedasys\textsuperscript{®} will be only sold to facilities where “anesthesia provider is immediately available.”

The system is approved for the following uses:

1. Initiation and maintenance of minimal to moderate sedation
2. Administration to ASA physical status 1 and 2 patients > 17 years
3. Colonoscopy or EGD

Sedaysis\textsuperscript{®} is not indicated in several patient populations:

1. Patients younger than 18 years
2. ASA physical status 4 and 5
3. Patients with a fentanyl patch
4. Patients with abnormal airways or diagnosed OSA
5. Patients with gastroparesis
6. BMI > 35
7. Patients undergoing both colonoscopy and EGD
8. Emergency situations

Use is contraindicated in:

1. Patients with a known hypersensitivity to propofol, eggs, or soybean products
2. Hypersensitivity to fentanyl
3. Delivery of any other drug
4. Pregnancy or lactation
5. Patients with a full stomach

Of note, is that Sedaysis\textsuperscript{®} is neither approved nor disapproved for ASA 3 patients. Nor is it able to prevent or manage loss of consciousness. To counter this last deficiency, the manufacturer has developed a clinical training program that consists of online knowledge-based training (about 4 hours) and simulation training (about 6 hours). Whether this is a successful solution remains to be seen. In the meantime, the cost savings could be substantial, estimated at some 430 million dollars annually.\textsuperscript{22}
**Anesthetic Assessment**

In the case presented, the endoscopist was correct in requesting the involvement of an anesthesiologist. While it is common that no preoperative tests are indicated for patients undergoing screening endoscopy procedures, the finding of the pre-procedure patient history and physical exam may require that tests be ordered if the result is anticipated to alter management. For the case patient, several factors had to be examined and treated or excluded. The physical exam needs to assess for a difficult airway as the patient is morbidly obese and presumably suffers from sleep apnea. Chung et al. developed the STOP-BANG tool as a screening tool for OSA in 2008. This screening tool has been validated to indicate a high likelihood of OSA in patients who screen positive.

**Table 3: STOP-BANG questionnaire.**

*Answering “yes” to > 3 indicates a high probability of OSA*

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Snoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2. Tired</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you often feel tired, fatigued, or sleepy during daytime?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3. Observed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has anyone observed you stop breathing during your sleep?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4. Blood Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have or are you being treated for high blood pressure?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5. BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI more than 35 kg/m2?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>6. Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age over 50 yr. old?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>7. Neck circumference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck circumference greater than 40 cm?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(Neck circumference is measured by staff)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender male?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

It is imperative that departments of gastroenterology and anesthesiology develop appropriate processes to identify patients at high risk for sedation when no anesthesia provider is available. Table 4 reviews the recent ASA guidelines for management of patients with OSA. GI societies acknowledge that in cases of OSA and sleep apnea, the involvement of an anesthesia provider is indicated. Medico legal implications suggest that endoscopists who administer propofol must have the airway skill set to manage patients who transition from a stage of MS to DS.
Practice guidelines for the perioperative management of patients with obstructive sleep apnea: A report by the American Society of Anesthesiologists Task Force on Perioperative Management of patients with obstructive sleep apnea. Anesthesiology.2014: 120(2); 268-86

- Anesthesiologists and other health care providers should work together to develop a protocol so that patients suspected of OSA can be properly evaluated prior to the procedural day and an appropriate plan put in place.

- Preoperative evaluation should include a comprehensive review of previous medical records with a focus on an evaluation of the airway, any prior difficulties and co morbidities, and the results of any sleep studies. Focused questions are encouraged including application of the ASA scoring system and/or the STOP-BANG questionnaire. Physical examination is directed especially at the head and neck. If the evaluation suggests OSA, the anesthesiologist and surgeon should decide whether to manage the patient based on clinical criteria or obtain sleep studies and initiate OSA treatment. Clinical criteria should have a high degree of specificity. For some patients, more aggressive treatment might be indicated. The patient, family and proceduralist should be aware of the potential perioperative implications of OSA.

- A determination should be made regarding the advisability of inpatient versus outpatient surgery depending on sleep apnea status, anatomical and physiologic abnormalities, co-morbid diseases, nature of the procedure, need for postoperative opioids, age, and adequacy of post discharge observations and the capabilities of the outpatient facility. In addition, the availability of emergency difficult airway and other respiratory equipment, radiology services and transport agreements should be taken into consideration.

- Preoperative preparation should encompass initiation or continuation of CPAP or non-invasive positive pressure ventilation. If feasible, mandibular advancement devices or oral appliances or weight loss programs should be incorporated. Patients who have undergone UP3 may still be at risk unless a normal sleep study has been documented. Patients with difficult airways must be managed according to the Updated Report on the Practice Guidelines for Management of the Difficult Airway.

In the case presented, obesity carries many risks for the patient, including altered drug metabolism, aspiration, hypertension, pulmonary dysfunction and positioning difficulties. He has a history of drug addiction although he denies recent use. The anesthesiologist ordered a 12 lead EKG which was read as within normal limits. Anemia of 7 gm is at the lowest limit of transfusion need according to ASA guidelines. However, these guidelines do not take into account the rate of loss or if continuing loss is anticipated. The anesthesiologist requested that 2 units of blood be prepared and began the transfusion of one. The temperature is elevated. A white blood count was also within normal limits and no areas of infection could be found. The patient is paraplegic but the level of paralysis is below that likely to trigger autonomic hyperreflexia. Also, on further questioning, the patient remembered that he had undergone several bladder procedures in the past without sedation or abnormal consequences. As a smoker, some degree of pulmonary dysfunction is to be expected. Chest auscultation was clear after e few coughs. Administration of oxygen 2L by nasal cannula increased the sp02 to 98%. It was concluded that a chest X-ray would not provide further information.

Discussion was then held with the endoscopist to determine his needs. Although he preferred to conduct the upper endoscopy first, he agreed that colonoscopy could take precedence. The patient was included in the discussion and he also approved the decision to start with the colonoscopy without any sedation but close monitoring by the anesthesiologist. Aspiration prophylaxis was given and the patient positioned on the table. Standard ASA monitors and O2 were applied. Almost immediately the
endoscopist was able to identify, biopsy and cauterize a bleeding ulcer. He felt that upper endoscopy was not warranted; rather the patient was observed for several hours. Hemoglobin counts indicated no further loss and there were no episodes of bloody diarrhea. The patient was discharged to home later than evening accompanied by several family friends.

**Conclusion**

Not all cases in the GI suite require anesthesiologist involvement. This would be cost prohibitive. Strict assessment of GI patients must be conducted and criteria should be established to clearly identify cases that require the expertise of an anesthesiologist. Those cases not suitable for outpatient management should be identified before the day of the procedure.

In addition, anyone administering sedation – particularly propofol – must be cognizant of the monitoring that is required to ensure the safety of sedated patients. For non-anesthesiologists administering hypnosedatives, airway management skills are essential to rescue patients who progress to a deeper level of sedation.

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*Dr. Elizabeth A.M. Frost, who is the editor of this continuing medical education series, is clinical professor of anesthesiology at The Mount Sinai School of Medicine in New York City. She is the author of Clinical Anesthesia in Neurosurgery (Butterworth-Heinemann, Boston) and numerous articles. Dr. Frost is past president of the Anesthesia History Association and former editor of the journal of the New York State Society of Anesthesiologists, Sphere. She is also editor of the book series based on this CME program, Preanesthetic Assessment, Volumes 1 through 3 (Birkhäuser, Boston) and 4 through 6 (McMahon Publishing, New York City).*
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22. Boggs SD. Computer-assisted personalized sedation (CAPS); Will it change the way moderate sedation is administered. *The Commuqine* 2014; 19(40; 8-11


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**Post-test**

1. Propofol is approved by the FDA for moderate to deep sedation administration by:
   a. Endoscopists
   b. Nurse practitioners who work in endoscopy suites
   c. Anesthesiologists
   d. All of the above

2. An indication for the use of a Sedaysis® system is:
   a. A healthy 15 year old
   b. ASA class 2 in a 65 year old
   c. A woman who gave birth 1 week ago and is nursing
   d. Colonoscopy and EGD together

3. The STOP-BANG questionnaire:
   a. Has not been validated
   b. Requires a score of 10 before OSA can reliably be determined
   c. Requires a score of >3 to indicate a high possibility of OSA
   d. Considers room air saturation

4. For patients undergoing screening endoscopy, preoperative tests such as an EKG and chest X-ray are:
   a. Routinely performed on all patients
   b. Required for all adults over age 50
   c. Required for patients with a history of anemia
   d. Not commonly indicated

5. Advantages for providing anesthetic services for colonoscopies include:
   a. Less cost for the insurance companies
   b. Increased fees for the facility
   c. Faster turn over time
   d. There really are no true advantages
6. **The Athens Statements concluded:**
   
   a. Sedation increases costs  
   b. Mortality rate of endoscopist-directed propofol is 1:158,000  
   c. All providers giving sedation must be skilled in rescue maneuvers  
   d. All of the above

7. **A true statement regarding anesthesia services for colonoscopy:**
   
   a. Not all cases of colonoscopy require anesthesia services  
   b. The use of sedation for EGD is decreasing because of the associated risks  
   c. Patients on the West coast are more likely to get sedation than those in the northeast  
   d. Medicaid does not pay for the services of an anesthesiologist

8. **A pre-existing condition least likely to support involvement of a trained anesthetic provider in the endoscopy suite is:**
   
   a. Age > 70  
   b. Morbid obesity  
   c. High arched palate  
   d. OSA

9. **In the continuum of depth of sedation:**
   
   a. Minimal sedation includes anxiolysis  
   b. During moderate sedation there are no purposeful movements  
   c. Deep sedation rarely requires intervention  
   d. Spontaneous ventilation usually continues during general anesthesia

10. **A false statement regarding monitoring a sedated patient during GI procedures is:**
    
    a. Capnography reduces the occurrence of hypoxemia.  
    b. Capnography should be added to standard ASA monitors.  
    c. A dedicated individual must be assigned to monitor the patient.  
    d. A dedicated monitoring is not essential and only adds to the cost.