VA NATIONAL CENTER FOR PATIENT SAFETY

Moderate Sedation Toolkit for Non-Anesthesiologists

Table Top Simulation
Cases 1 Through 4

Content Produced by
The Durham VAMC Patient Safety Center of Inquiry (PSCI)

Table Top Simulation Case Discussion: GI Sedation Case 1

Mr. E is 47-year-old veteran with a history of dysphagia following a Nissen fundoplication, who is scheduled for esophagogastroduodenoscopy (EGD) and esophageal dilatation. He has been in good health other than obesity and lower back pain. He has never smoked.

Past Medical History

Allergies: NKDA

Medications: omeprazole 20 mg QD, prazosin 2 mg @ hs (for nightmares), ranitidine 150 mg QD, Vicodin PRN, ibuprofen 800 mg BID

History Relevant to Procedure: dysphagia, s/p Nissen fundoplication

Significant comorbidities (include severity and recent changes in condition): GE reflux, hypertension, hyperlipidemia, low back pain, obesity, hiatal hernia shoulder arthralgia, gastritis and esophagitis

Use of tobacco, ETOH, other drugs: denies both

Past anesthetic or sedation history: none

Vital Signs

Height: 76 in Weight: 106 kg BMI: _____

BP: 128/87 HR: 58 RR: 18 SpO2: 95%

Physical Exam

Heart: rrr w/o murmur Lungs: bilateral, equal

Level of Consciousness: WNL

Airway: MP Class: II Teeth: none loose Neck Extension: normal

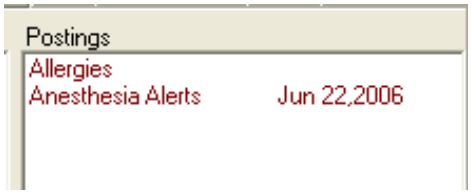
Neck Size: normal TM Distance: 6 cm

Mouth Opening: normal

Other: _____

Laboratory Testing/Consultation

EKG: NSR



The Anesthesia Alert note reads as follows:

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LOCAL TITLE: ANESTHESIA ALERTS
STANDARD TITLE: CLINICAL WARNING
     SUBJECT: Difficult Intubation

Epiglottis only with MAC 3,4 and straight blade.  Epiglottis floppy,
obscured bougie placement or view of cords.  Easy mask ventilation
with two people.

ETT placed using fiberoptic scope without difficulty (using direct
laryngoscopy to open airway and assist placement of scope).
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He has signed his informed consent and expressed his understanding of the intended procedure.

THE PREVIOUS INFORMATION MAY BE PROVIDED TO THE SESSION PARTICIPANTS. THE FOLLOWING IS A SAMPLE GUIDED DISCUSSION BASED ON THIS CASE. IT SHOULD BE ADAPTED TO THE CLINICAL SETTING OR FACILITY AS APPROPRIATE.

Question 1. What are the salient issues in this patient as they relate to the administration of moderate sedation?

Question 2. Is the Anesthesia Alert relevant to the intended procedure today? Please explain.

State 1. The patient is attached to an ECG, pulse oximeter, and non-invasive blood pressure cuff. Initial VS show BP 128/87, HR 55, RR 16, SpO_2 96%. He is awake and alert, and lying on his side. A 20g IV is in place in his left hand. Pre-procedural time out has been performed with the patient, MD endoscopist, and sedation nurse.

Question 3. What medications will you administer to begin patient sedation and how will you determine whether the patient is adequately sedated?

State 2. The patient receives midazolam and fentanyl IV. VS show BP 110/75, HR 50, RR 8, SpO_2 92%. His eyes are closed and he has stopped talking.

Question 4. Is the patient adequately sedated? Do the vital signs help you in making this determination? Are other findings needed? Why or why not?

State 3. The endoscopist attempts to insert the scope, but the patient gags and protests. VS show BP 140/90, HR 80, RR 24, SpO_2 98%. Additional midazolam and fentanyl in divided doses over a few minutes are administered. The scope is introduced successfully.

Question 5. How do you determine the doses of midazolam and fentanyl needed in a given patient?

- How frequently should supplemental doses be administered? Why?
- Once the procedure is underway, should additional doses be administered? Why or why not, and if "yes," how do you decide when and which drug to use?

State 4. Ten minutes following the last dose of midazolam and fentanyl and eight minutes into the procedure, the patient opens his eyes and again protests, tries to vocalize, and raises his arms. VS show BP 160/80, HR 100, RR 27, SpO_2 98%.

Question 6. What should be done now?

Question 7. Why was the patient seemingly sedated adequately minutes earlier but not now?

State 5. The patient receives additional midazolam IV, and the procedure is completed. VS show BP 120/80, HR 60, RR 16, SpO_2 95%.

Question 7. How should the patient be monitored at this time?

- Describe plans for post-procedural recovery
- How long should the patient be observed in the recovery area?

Table Top Simulation Case Discussion: GI Sedation Case 2

Mr. G is 69-year-old veteran with a history of adenomatous polyps who is scheduled for follow-up colonoscopy. He arrives in the clinic with his daughter, who will drive him home following the procedure. A pre-procedural assessment is performed and entered into CPRS.

Past Medical History

Allergies: morphine (N,V)

Medications: omeprazole 20 mg QD, lisiliopril 20 mg QD, HCTZ 25 mg QD, simvastatin 20 mg QD, citalopram 40 mg QD, Vardenafil 20 mg, ASA 81 mg QD

History Relevant to Procedure: h/o peptic ulcer disease, routine follow-up

Significant comorbidities (include severity and recent changes in condition):
GE reflux disease, obesity, hypertension, hyperlipidemia, sleep apnea, prostate cancer, PTSD, erectile dysfunction, osteoarthritis

Use of tobacco, ETOH, other drugs: denies both

Past anesthetic or sedation history: no adverse reactions

Vital Signs

Height: 70 in Weight: 119 kg BMI: _____

BP: 124/76 HR: 89 RR: 16 SpO2: 98%

Physical Exam

Heart: RRR w/o murmur Lungs: bilateral, equal

Level of Consciousness: WNL

Airway: MP Class: III Teeth: none loose Neck Extension: normal

Neck Size: mod. large TM Distance: 6 cm

Mouth Opening: normal

Other: _____

Laboratory Testing/Consultation

EKG: NSR

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Question 1. What are the salient issues in this patient as they relate to the administration of moderate sedation?

- Obesity
- OSA
- Hypertension (controlled on HCTZ/lisinopril)
- PTSD (on citalopram)

Question 2. Do you need any additional information prior to beginning moderate sedation? If so, what information and how will it influence your conduct of his sedation?

- Does he use CPAP for OSA?
- What is the nature of his PTSD symptoms?

Question 3. Is his morphine allergy relevant? Explain.

Question 4. You meet the patient in the endoscopy procedure room. How will you greet him and explain what will happen during the procedure?

- Are there any specific risks to discuss with this patient?
- What are his expectations for depth of sedation and likelihood of awareness?

Question 5. Which monitors will you use and why? Does capnography ($ETCO_2$) have any advantages in this patient? Why?

- Does nasal vs. mouth breathing have any implications for capnographic monitoring?

Question 6. Will you administer supplemental oxygen? Why or why not?

State 1. The patient is attached to an ECG, pulse oximeter, non-invasive blood pressure cuff, and capnogram. He is receiving O_2 at 2L/min by nasal cannula. Initial VS show BP 124/76, HR 89, RR 16, SpO_2 95%, $ETCO_2$ 32. He is awake and alert and lying on his right side. A 20g IV is in place in his left hand. Pre-procedural time out has been performed with the patient, MD endoscopist, and sedation nurse.

Question 7. What medications will you administer to begin patient sedation and how will you determine whether the patient is adequately sedated?

State 2. The patient receives midazolam and fentanyl. VS show BP 110/65, HR 85, RR 8, SpO_2 93%. His Ramsey Sedation Scale is 4.

Question 8. Is the patient adequately sedated? Do the vital signs and Ramsey score help you in making that determination? Are other findings needed? Why or why not?

State 3. The sedation nurse and endoscopist assess the patient and determine that he is ready for the procedure. The endoscopist inserts the colonoscope, and almost immediately, the patient moves and complains of discomfort. VS show BP 130/60, HR 95, RR 24, SpO_2 96%.

Question 9. What actions should be taken now?

Question 10. Why did the patient appear adequately sedated before the insertion of the scope but then appeared inadequately sedated as soon as it was placed?

State 4. The patient receives additional midazolam and fentanyl IV, both in divided doses. VS show BP 170/80, HR 105, RR 20, SpO_2 92%, $ETCO_2$ 39. He is audibly snoring. The endoscopist continues the colonoscopy, the patient murmurs something unintelligible and moves slightly.

Question 11. Is the patient adequately sedated now? Why or why not?

Question 12. Do the vital signs indicate inadequate sedation? Why or why not?

- Hypertension as a chronic medical problem vs. a sign of inadequate sedation
- Role of hypercarbia as a sympathomimetic stimulus

The endoscopist hears the patient quietly vocalize “oh, oh,” notes the blood pressure increase, and asks for additional sedation to be administered.

Question 13. As the sedation nurse, what would you do now? Why?

State 5. The sedation nurse administers midazolam and fentanyl IV. The colonoscopy continues. A few minutes later, VS show BP 180/100, HR 120, SpO_2 82%. The upper abdomen is moving regularly, but the monitor shows RR 0 and $ETCO_2$ 0.

Question 14. What would you do now? Why does the patient appear to be breathing, yet the monitor shows RR 0 and $ETCO_2$ 0? What other tools might be helpful at this point?

- How would a stethoscope be useful now?

Question 15. How would you describe the management of upper airway obstruction?

- Mask oxygen
- Jaw lift
- Nasal airway
- Oral airway
- Ambu bag
- Call for help?

Question 16. The endoscopist states that he can complete the procedure in only a few minutes. Do you think it is safe to continue at this point? Why or why not? What are alternative plans of action at this point?

State 6/7. The patient responds to a jaw lift and supplemental mask oxygen. VS show BP 130/75, HR 90, RR 20, SpO_2 93%. The patient responds appropriately to the command “open your eyes.” The colonoscopy is completed.

Question 17. Should naloxone and/or flumazenil be given now? Why or why not?

Question 18. Are there any special precautions to be taken at this point in terms of the patient's recovery from sedation? If so, what are these special measures?

- Recovery time
- Monitoring (during recovery and transport)
- Does the patient have a driver?
- Discharge instructions

Table Top Simulation Case Discussion: GI Sedation Case 3

Mr. H is a 60-year-old veteran scheduled for routine screening colonoscopy. He appears anxious and smells of tobacco. He plans to take the VA van home afterwards. A pre-procedural assessment is performed and entered into CPRS.

Past Medical History

Allergies: PCN and IV contrast

Medications: Vicodin PRN, omeprazole 20 mg QD, HCTZ 25 mg QD

History Relevant to Procedure: routine screening colonoscopy

Significant comorbidities (include severity and recent changes in condition):

hypertension, alcohol abuse, chronic low back pain, GE reflux, h/o laryngeal neoplasm, depression, chronic productive cough

Use of tobacco, ETOH, other drugs: heavy use of both

Past anesthetic or sedation history: no adverse reactions to anes. or sedation

Vital Signs

Height: 67 in Weight: 58 kg BMI:

BP: 158/92 HR: 84 RR: 16 SpO2: 95%

Physical Exam

Heart: RRR w/o murmur Lungs: bilat exp wheezes and ronchi

Level of Consciousness: WNL

Airway: MP Class: I Teeth: none loose Neck Extension: normal

Neck Size: mod. large TM Distance: 6 cm

Mouth Opening: normal

Other: smells of tobacco on exam and is anxious, PAIN SCORE 9/10

Laboratory Testing/Consultation

none available

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Question 1. What are the salient issues in this patient as they pertain to moderate sedation?

- Smoking
- Drug tolerance (alcohol, sedatives [diazepam], analgesics/opiates [acetaminophen, oxycodone, Vicodin, naproxen, capsaicin])
- Malignant neoplasm larynx (airway)
- Liver disease (incompletely characterized)

Question 2. Are plans for him to ride home on the VA van following the procedure acceptable? Why or why not? Under what circumstances might this be acceptable? What alternatives are available?

Question 3. Do you need any additional information prior to beginning moderate sedation? If so, what information and how will it influence your conduct of his sedation?

- How was laryngeal neoplasm treated?
- Pain score 9, why?
- Alcohol use quantified
- Level of anxiety, depression
- Are there stigmata of liver disease?

Question 4. You meet the patient in the endoscopy procedure room. How will you greet him and explain what will happen during the procedure?

- Any specific risks for this patient?
- Unusual expectations of awareness or level of sedation?

Question 5. Which monitors will you use and why?

Question 6. Will you administer supplemental oxygen? Why or why not?

State 1. The patient is attached to an ECG, pulse oximeter, non-invasive blood pressure cuff, and capnogram. He is receiving O_2 at 2L/min by nasal cannula. Initial VS show BP 158/92, HR 84, RR 16, SpO_2 95%. He is awake and alert and lying on his right side. An 18g IV is in place in his left hand. Pre-procedural time out has been performed with the patient, MD endoscopist, and sedation nurse.

Question 7. What medications will you administer to begin patient sedation and how will you determine whether the patient is adequately sedated?

- Does the history of airway cancer change this assessment?

The patient receives midazolam and fentanyl. VS are minimally changed, patient's eyes are wide open, and he nervously asks questions about the sedation, is moving about anxiously on the stretcher, and is not remaining on his side.

Question 8. Should you give more sedation now? Why or why not?

Question 9. The endoscopist asks whether it is appropriate to proceed. How would you respond?

State 2. The patient receives additional midazolam and fentanyl over five minutes. VS show BP 130/60, HR 75, RR 12, SpO_2 92%. The patient's eyes are closed, his speech is slurred, and then he becomes quiet.

Question 10. Can the colonoscopy begin now? How will you determine whether the patient is adequately sedated?

- Technique of pharmacologic titration
- RASS vs. Ramsay sedation scale?
- Assessment of depth of sedation

Question 11. Under what circumstances would you give additional midazolam? Additional fentanyl? How do you determine which of these to administer?

State 3. The endoscopist inserts the colonoscope. The patient groans softly but remains still. VS show BP 120/60, HR 70, RR 12, SpO_2 95%. One minute later, the patient suddenly awakens, moves, and complains loudly of severe pain.

Question 12. What actions should be taken now?

State 4. The patient becomes increasingly confused and verbally abusive of the staff, and tries to roll onto his back. VS show BP 167/88, HR 95, RR 22, SpO_2 94%. The endoscopist states that the procedure will be completed in five minutes if the patient can remain still.

Question 13. How do you respond to this request?

- Can this patient be safely sedated given his drug requirement?

State 5. The patient receives additional midazolam . He is quiet now, moans occasionally with manipulation of the colonoscope. VS show BP 179/96, HR 98, RR 25, SpO_2 94%. He remains quiet, then suddenly tries to sit up, pulls at his IV catheter, and shouts out. The endoscopist quickly removes the colonoscope.

Question 14. Why does the patient appears to suddenly change from a sedated to an agitated state?

State 6. The patient is now quiet with the scope removed. He is lying supine. VS show BP 140/70, HR 80. Over the next few minutes, his respirations and oxygen saturation decrease, RR 4, SpO_2 78%.

Question 15. Why is this happening now? What actions should be taken?

Question 16. Should "reversal" drugs be given? Flumazenil, naloxone, or both? Why or why not?

State 7. The patient is given oxygen by mask, a nasal airway is inserted, and after five minutes of airway support, begins to respond to verbal commands. VS show BP 130/75, HR 75, RR 16, SpO_2 95%.

Question 17. Are there any special precautions to be taken at this time in terms of the patient's recovery from sedation? If so, what are these special measures?

- Possible prolonged recovery owing to delayed hepatic clearance
- Monitoring recommendations during transport and recovery

Table Top Simulation Case Discussion: GI Sedation Case 4

Mr. S is an 82-year-old man with a history of adenomatous disease and cancer of the colon. He has a complicated past medical history of severe emphysema/chronic obstructive lung disease, congestive heart failure (left ventricular ejection fraction 35 percent), paroxysmal ventricular tachycardia (treated with an implantable cardioverter-defibrillator), renal insufficiency, gastro-esophageal reflux, and alcohol abuse (with a history of seizures).

Past Medical History

Allergies: PCN

Medications: Albuterol, ASA, digoxin, formoterol, simvastatin, valsartan, metoprolol, mometasone, quinine, ranitidine, warfarin, diltiazem, furosemide

History Relevant to Procedure: screening following colon cancer

Significant comorbidities (include severity and recent changes in condition): chronic obstructive lung ds., GE reflux, h/o alcoholism, paroxysmal atrial fibrillation, end-stage renal failure, paroxysmal ventricular tach. with AICD placement (3/01), congestive heart failure, hypertension, hyperlipidemia, colon cancer, depression

Use of tobacco, ETOH, other drugs: heavy ETOH (denies current), denies tobacco

Past anesthetic or sedation history: no adverse reactions to anes. or sedation

Vital Signs

Height: 70 in Weight: 69 kg BMI:

BP: 134/75 HR: 74 RR: 18 SpO2: 97%

Physical Exam

Heart: RRR w/o murmur Lungs: end- inspir. bibasil. crackles

Level of Consciousness: WNL

Airway: MP Class: III Teeth: + dentures Neck Extension: normal

Neck Size: nl TM Distance: 6 cm

Mouth Opening: normal

Other: appears thin and older than stated age

Laboratory Testing/Consultation

Hct 41%, Cr 4.2 mg/dl, K 4.1 mEq/dl

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Question 1. What are the salient issues in this patient as they relate to the administration of moderate sedation?

- Complicated medical history including severe multi-system disease
- Elderly patient, sensitive to medications
- Current alcohol use and complications (tolerance vs. sensitivity to sedation)
- Special precautions for AICD, including use of cautery

Question 2. Do you need any additional information prior to beginning moderate sedation? If so, what information and how will it influence your conduct of his sedation?

- Are the medical conditions stable? Are there signs of uncompensated CHF or bronchospasm that need treatment before proceeding?
- What would you do if you hear “crackles” on chest auscultation?
- Implications of recent laboratory test results (Cr/BUN, electrolytes, others)?
- Were regular medications taken this morning?
- Alcohol use quantified and implications?
- Are there stigmata of liver disease?

Question 3. You meet the patient in the endoscopy procedure room. How will you greet him and explain what will happen during the procedure?

- Any specific risks for this patient?
- Unusual expectations of awareness or level of sedation?

Question 4. Which monitors will you use and why?

- Why is ECG particularly important in this patient?
- Role for capnography ($ETCO_2$) in this patient?

Question 5. Will you administer supplemental oxygen? Why or why not?

State 1. The patient is attached to an ECG, pulse oximeter, non-invasive blood pressure cuff, and capnogram. Initial VS show BP 134/74, HR 74, RR 18, SpO_2 97% on room air. He is awake and alert and lying on his right side. Chest auscultation reveals mild bilateral wheezes and faint crackles. An 18g IV is in place in his left hand. Pre-procedural time out has been performed with the patient, MD endoscopist, and sedation nurse.

Question 6. What medications will you administer to begin patient sedation and how will you determine whether the patient is adequately sedated?

- How will you determine that the patient is ready for the procedure to start?

- Are these endpoints different in this patient compared to a younger, healthier patient? Why?

State 2. The patient receives midazolam and fentanyl. VS show BP 110/50, HR 60, RR 6, SpO_2 91%, $ETCO_2$ 50. He is awake and alert and lying on his right side. His eyes are closed. When he is shaken slightly, his speech is slurred.

Question 7. Is the patient ready for the procedure to begin?

- Are you concerned about the SpO_2 91%? Why?
- If the patient is receiving room air, what would you do now?
- What does the $ETCO_2$ 50 indicate?

State 3. The colonoscope is inserted, the patient moves his arms, moans loudly, and begins to curse. VS show BP 150/90, HR 110, RR 12, SpO_2 92%, $ETCO_2$ 40.

Question 8. What should be done now? Should the endoscopist remove the scope? Should more sedation be administered? Why or why not?

State 4. The colonoscope is removed, and two additional doses of midazolam and fentanyl are given over the next minute. VS show BP 86/40, HR 90, RR 8, SpO_2 91%, $ETCO_2$ 30. The patient becomes quiet.

Question 9. What should be done now?

- Is a fluid bolus appropriate?
- Should any medications be administered at this time?
- Would it be better to insert the colonoscope to see what will happen?

State 5. The patient's IV is dripping freely, and he has received 200 ml of saline over 10 minutes. VS show BP 72/35, HR 43, RR 8, SpO_2 89%, $ETCO_2$ 30. The patient is quiet but moves when the colonoscope is manipulated.

Question 10. What should be done now?

- Is a fluid bolus sufficient?
- Should any medications be administered at this time? If so, which ones (atropine, naloxone, flumazenil, vasopressor [phenylephrine, ephedrine, "low dose" epinephrine]) and what doses?
- How do you further assess the patient at this time (feel for pulses, determine level of consciousness/responsiveness, survey for ABCs)
- Should you "call for help" now?
- How is that done in your setting (i.e. call attending endoscopist, rapid response team, code team, etc.)?

State 6A. The patient is now unresponsive. VS show BP 50/28, HR 30, RR 4, SpO_2 70%, $ETCO_2$ 15.

Question 11. How will you initiate resuscitation, including BLS and ACLS protocols?

Question 12. The patient is successfully resuscitated and the vital signs are similar to baseline values. He is responding to physical stimuli, but not to verbal commands. What should be done now?

- Protocols and procedures for monitoring
- Hospital admission for observation

State 6B. Assuming CPR/chest compression was not required, the patient responds to your resuscitative interventions. VS show BP 95/50, HR 60, RR 12, SpO_2 92%. He is arousable but very drowsy. The colonoscopy is incomplete.

Question 13. What should be done now?

- Debriefing of recent events
- Discussion of alternative plan for sedation and endoscopy, including anesthesiology support
- Plans for post-procedural monitoring, patient disposition (home vs. observation in hospital)
- Need for other medical consultation