Goals of any sedation:
- Patient safety
- Patient comfort

Conscious Sedation
- Minimal Sedation
- Moderate Sedation
- Deep Sedation
- Anesthesia

Educational goals of this webcast
- Pre-procedure assessment
- Airway assessment
- Consent
- Monitoring
- Post-procedure management
- Transport and discharge
- Pharmacology of sedation drugs
- Reversal agents
- Oxygen delivery
- Airway management
- Sedation policy
- Credentialing
- Deep sedation
Minimal Sedation (anxiolysis)
- Patients respond normally to verbal commands
- Cognitive & function and coordination may be impaired
- Ventilatory and cardiovascular functions are unaffected

Moderate sedation/analgesia
- Depressed consciousness
- Patients respond purposefully to verbal commands
- No interventions are required to maintain airway
- Spontaneous ventilation is adequate
- Cardiovascular function is usually maintained

Deep sedation/analgesia
- Depressed consciousness
- Patients cannot be easily aroused but respond purposefully following repeated or painful stimulation
- Ventilatory function may be impaired
- May require assistance in maintaining a patent airway
- Spontaneous ventilation may be inadequate
- Cardiovascular function is usually maintained

Anesthesia
- Patients are not arousable, even by painful stimulation
- Ventilatory function is often impaired
- Often require assistance in maintaining a patent airway
- Positive pressure ventilation may be required
- Cardiovascular function may be impaired
Sedation is a continuum

Mild sedation  Moderate sedation  Deep sedation  Anesthesia

The sedation plan should be clearly articulated to all members of the procedure team prior to the procedure

Pre-procedure Assessment

- Patient’s condition
- Operative indication
- Procedure planned
- Potential complications

An up-to-date history and physical examination must be available in the room at the time of the procedure

Inpatients: on the inpatient chart
Outpatients:
1. Ambulatory H & P within the past 30 days on the chart or available electronically
   OR
2. H & P completed at the time of the procedure
Key Elements of the History

- Cardiac conditions
- Pulmonary conditions
- Renal disease
- Hepatic disease
- Endocrine disorders
- Head Trauma

- Prior surgical or airway issues
- Prior intubation
- Strider
- Snoring
- Sleep apnea
- Previous reactions to sedatives or anesthetic agents

Key Elements of the Past Medical History

- Current medications
- Allergies
- Pregnancy status
- Last oral intake
- Need for isolation

- Alcohol use
- Tobacco use
- Substance abuse

Key Elements of the Physical Examination

- Cardiac exam
- Pulmonary exam
- Ability to lay in proper procedure position
- Additional exam relevant to the procedure
- Airway assessment

Other Key Elements of the Pre-Procedure Assessment

- Review of appropriate laboratory, radiographic, diagnostic data
- Need for and availability of blood products
- Interpretation of cardiac rhythm (if not sinus)
- Verification of NPO status
- Availability of responsible adult at discharge
ASA Physical Status

P1  A normal healthy patient
P2  Mild systemic disease
P3  Severe systemic disease
P4  Severe systemic disease that is a constant threat to life
P5  Moribund & unlikely to survive
P6  Brain dead organ donor

When to consider anesthesia consult?

• Significant co-morbid conditions or significant sleep apnea
• History of airway problems during prior sedation
• History of adverse reaction to sedative
• Fail airway screening
• Chronic opioid or other sedative users

And now, let me introduce my colleague, Dr. John Rogoski, from the Department of Anesthesiology to discuss airway assessment

(Rogoski slides)
AIRWAY MANAGEMENT & ASSESSMENT OF THE DIFFICULT AIRWAY

John S Rogoski DO
The Ohio State University
Department of Anesthesiology

Four Types of Difficulty

• Difficult to bag/mask ventilate/oxygenate
• Difficult laryngoscopy
• Difficult intubation
• Difficult to perform cricothyrotomy

How Does the ASA Define the Difficult Airway?

• Difficult mask ventilation
  ✓ Impossible for an unassisted anesthesiologist to prevent or reverse signs of inadequate ventilation during positive pressure mask ventilation

How Does the ASA Define the Difficult Airway?

• Difficult rigid laryngoscopy
  ✓ It is not possible to visualize any portion of the vocal cords with conventional laryngoscopy
• Difficult intubation
  ✓ Proper insertion of an endotracheal tube requires more than 3 attempts or greater than 10 minutes
Causes of Difficulty

**Congenital:**
- Pierre Robin Syndrome
- Cystic hygroma
- Treacher-Collin Syndrome
- Gargoylism
- Achondroplasia
- Marfan’s Syndrome

**Anatomical:**
- Obesity
- Short neck
- Protruding teeth, long high arched palate
- Receding mandible
- Decreased distance between occiput and spinous process
- Increase in alveolar-mental distance

**Acquired:**
- Acute neck swelling: trauma or postoperative bleeding.
- Restricted jaw opening: Trismus, fibrosis, Rheumatoid arthritis, mandibular fracture
- Restricted neck movements: osteoarthritis, scarring, C-spine tumor, ankylosing spondylitis

Predicting Difficult Bag and Mask Ventilation

- B earded
- O bese/Obstetric
- N o teeth
- E lderly
- S nores/sleep apnea
Predicting Difficult Intubation

Mallampati Classification

- Class 1: view of entire posterior oropharynx to bases of tonsillar pillars
- Class 4: no view of posterior oropharynx or uvula

Predicting Difficult Intubation

Thyromental Distance

- Thyromental distance:
  - Less than 6 cm associated with difficulty
  - Distance tip of mentum to thyroid base three fingers
  - Distance hyoid bone to thyroid notch two fingers

Predicting Difficult Intubation

3 – 3 – 2 Rule
Predicting Difficult Intubation

• 3 finger mouth opening
• 3 finger mentum to hyoid
• 2 finger hyoid to thyroid

Predicting Difficult Intubation

• Review medical record and history
• Open mouth entail tongue
• Measure submental space (>6 cm)
• Prognath – protrude mandible
• Assess teeth – especially protruding incisors
• Assess patent nares
• Assess neck – short, thick
• Review systemic or congenital disease
• Body habitus
• Assess neck mobility, sniffing position

Consent

• Written, signed consent for both:
  A. The procedure
  B. The sedation
• Consent should include the possible complications of sedation
• If two procedures are planned, consent for both should be obtained before sedatives are given

Sedation Monitoring

• An additional individual to perform monitoring should be:
  ✓ ACLS (or PALS/NRP) certified
  ✓ Trained in airway assessment and basic airway management
  ✓ Trained in sedation pharmacology and monitoring
All patient require monitoring of:
1. Level of consciousness
2. Blood pressure
3. Oxygen saturation
4. Respiratory rate
5. Cardiac rhythm (in patients with known heart disease)

Monitoring begins before administration of sedation

All parameters must be measured and recorded every **FIVE** minutes

The monitoring personnel will remain in attendance with the patient during the procedure and during the recovery period
**Required In The Room**
- Supplemental oxygen (with back up)
- Bag valve mask
- Nasal cannula & non-rebreather mask
- Suction equipment
- Emergency light source
- Phone

**In Addition:**
- Reversal agents immediately accessible
- Code cart with defibrillator in close vicinity

**Post Procedure Monitoring:**
- Vital signs, level of consciousness, pain, oxygen saturation every 5-10 minutes
- Body temperature should be measured

**Monitoring Can Be Discontinued When The Patient Is:**
- Awake, alert, oriented
- Recovered protective reflexes
- Vital signs returned to baseline
- Oxygen saturation > 95% or at baseline
- Reversal agents = minimum 90 minutes in recovery area
Post-Procedure Transport
• Accompanying personnel trained in sedation monitoring/recovery
• Pulse oximeter
• Supplemental oxygen
• Appropriate ventilation equipment
• Oral airways
• Emergency drug supplies
• Cardiac monitor (if rhythm not sinus)

Discharge Requires:
• Post-procedure instruction sheet
  ✓ Alcohol, sedatives, & analgesics should be avoided
• A responsible adult to transport (taxis don’t count)

And now let’s here about the pharmacology of sedatives from Mary Beth Shirk, a Pharm.D. in the Department of Pharmacy. Mary Beth?

(Shirk slides)
### Agents for Procedural Sedation
- **Opioids**
- **Benzodiazepines**
- **Etomidate**
- **Ketamine**
- **Methohexital**
- **Propofol**

### Opioids
(Fentanyl, Hydromorphone, Meperidine, Morphine)
- **Class II Controlled Substances**
- **Mu receptor agonists**
- **Hepatic metabolism with varying $t\frac{1}{2}$**
- **Estimated Relative Potency:**
  - Fentanyl 100 micrograms
  - Hydromorphone 1.5 mg
  - Meperidine 75mg
  - Morphine 10mg
- **Respiratory depression, hypotension, miosis, decreased GI motility, and urinary retention**

### Fentanyl
- **Phenylpiperidine opioid agonist**
- **Preferred opioid for procedural sedation**
- **Precautions**
  - Skeletal muscle and chest wall rigidity
  - Dose and administration rate related
  - Discontinue administration & give naloxone
  - Bradycardia responds to ephedrine or anticholinergics

### Fentanyl
- **Fentanyl TD Black Box with CYP3A4 Agents**
  - Inhibitors: itra/ketoconazole, ritonavir, nelfinavir, nefazodone, erythrol/clarithromycin, etc
  - Inducers: rifampin, phenytoin, carbamazepine, etc
Meperidine

- No longer first line agent
  - Preferred kinetic profile of fentanyl
  - Undesirable side effects
    - Seizures (also related to normeperidine)
    - Vagolytic properties may increase ventricular response rate

- Contraindicated with MAO Inhibitors
  - Any use of MAOI in last 14 days
    - Eldepryl®/selegiline; Nardil®/phenelzine; Marplan®/isocarboxazid; Parnate®/tranylcypromine

Benzodiazepines

- Diazepam, Lorazepam, Midazolam
  - Class IV Controlled Substance
  - GABA and BZD agonist
  - Hepatic metabolism with varying t ½
  - Estimated relative potency
    - Diazepam 5 mg
    - Lorazepam 1 mg
    - Midazolam 2 mg
  - Decreased respiratory rate, hypotension, paradoxical reactions, tenderness at injection site, hiccoughs, nausea, vomiting

- Midazolam
  - Preferred benzodiazepine for procedural sedation
  - Elimination half life approximately doubled
    - CHF
    - Renal function impairment
    - Hepatic function impairment
    - Obesity
    - Elderly
<table>
<thead>
<tr>
<th><strong>Benzodiazepines</strong></th>
<th><strong>Etomidate</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Midazolam</strong></td>
<td></td>
</tr>
<tr>
<td>• CYP3A4 Substrate</td>
<td>• Not controlled substance</td>
</tr>
<tr>
<td>• 3A4 inhibitors prolong duration</td>
<td>• Nonbarbiturate benzylimidazole hypnotic</td>
</tr>
<tr>
<td>✓ Erythromycin, diltiazem, itraconazole, verapamil, cimetidine</td>
<td>• 0.1 – 0.3mg/kg IVP over 30-60 seconds</td>
</tr>
<tr>
<td></td>
<td>• Inhibits 11-ß hydroxylase and blocks cortisol production</td>
</tr>
<tr>
<td></td>
<td>• Myoclonus (up to 33%)</td>
</tr>
<tr>
<td></td>
<td>• Injection site pain (30-80%)</td>
</tr>
<tr>
<td></td>
<td>• Minimal effect on hemodynamics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ketamine</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Class III Controlled Substance</td>
</tr>
<tr>
<td>• NMDA Receptor antagonist and PCP derivative</td>
</tr>
<tr>
<td>• IM or IV administration</td>
</tr>
<tr>
<td>• Doses 0.5-2mg/kg over at least 60 seconds IVP</td>
</tr>
<tr>
<td>• Analgesic properties appealing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ketamine</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Respiratory drive maintained</td>
</tr>
<tr>
<td>• Three concentrations available (caution!)</td>
</tr>
<tr>
<td>✓ 10mg/mL</td>
</tr>
<tr>
<td>✓ 50mg/mL</td>
</tr>
<tr>
<td>✓ 100mg/mL (dilute prior to administration)</td>
</tr>
</tbody>
</table>
Ketamine

- Emergence reaction (12%)
  - Severity varies
  - Least common in <15yrs and >65 yrs
  - Less frequent with IM administration
  - Minimize verbal, tactile, visual stimulation during recovery (pretreat?)

Ketamine

- Hypersalivation (pretreat?)
- Nystagmus, anaphylaxis, increased skeletal muscle tone, increases ICP/IOP, little change or increase in HR/BP

Methohexital

- Class IV Controlled Substance
- Ultrashort acting IV barbiturate anesthetic
- Doses 0.25 – 1mg/kg IVP at <10mg/5 seconds
- 500mg vials!
- Avoid extravasation (pH of 1% sol’n 10-11)
- Contraindicated in porphyria
- Hypotension and respiratory depression

Propofol

- Not controlled substance
- Contraindicated if egg allergy/soy intolerance
- Patient can transition in unpredictable fashion to deeper level of sedation
- MUST be able to manage an airway
Propofol

- At OSUMC physician must be credentialed for deep sedation
- Cardiovascular depressant - Hypotension!
- 0.75-1mg/kg IV over 2-3 minutes once then 0.5mg every 3 min if needed

<table>
<thead>
<tr>
<th></th>
<th>Onset (Min)</th>
<th>Peak (Min)</th>
<th>Duration (Min)</th>
<th>Elimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fentanyl*</td>
<td>Immed</td>
<td>Immed</td>
<td>30-60</td>
<td>Hepatic</td>
</tr>
<tr>
<td>Midazolam*</td>
<td>1-2</td>
<td>2-2.5</td>
<td>30</td>
<td>Hepatic</td>
</tr>
<tr>
<td>Etomidate</td>
<td>&lt;1</td>
<td>1</td>
<td>3-5</td>
<td>Hepatic</td>
</tr>
<tr>
<td>Ketamine</td>
<td>1</td>
<td>1</td>
<td>15-20</td>
<td>Hepatic Active metabolite</td>
</tr>
<tr>
<td>Methohexital</td>
<td>Immed</td>
<td>Immed</td>
<td>10-20</td>
<td>Hepatic</td>
</tr>
<tr>
<td>Propofol</td>
<td>½</td>
<td>1</td>
<td>3-10</td>
<td>Hepatic</td>
</tr>
</tbody>
</table>

*Recommended Agents

Recommended Agents at OSUMC

- Midazolam +/- Fentanyl agents of choice
- Propofol limited to physicians credentialed in deep sedation
- Meperidine no longer recommended for routine use
- Alternative agents used by physician experienced in their use

<table>
<thead>
<tr>
<th></th>
<th>Amnestic</th>
<th>Analgesic</th>
<th>Anxiolytic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzodiazepines</td>
<td>+</td>
<td>_</td>
<td>+</td>
</tr>
<tr>
<td>Opioids</td>
<td>_</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Etomidate</td>
<td>+</td>
<td>_</td>
<td>+</td>
</tr>
<tr>
<td>Ketamine</td>
<td>+</td>
<td>+</td>
<td>Dissociative properties</td>
</tr>
<tr>
<td>Methohexital</td>
<td>_</td>
<td>_</td>
<td>+</td>
</tr>
<tr>
<td>Propofol</td>
<td>+/-</td>
<td>_</td>
<td>+</td>
</tr>
</tbody>
</table>
Dosing

• Universally safe & effective dose DOESN'T exist
• Variable dose requirements
  ✓ Patient Age
  ✓ Patient Weight
  ✓ Medical Condition
  ✓ Patient Medication History
  ✓ Previous requirements during procedures
  ✓ Goal depth of sedation

• Combination agents have added risks and benefits
  ✓ TITRATE
    ✓ Small incremental doses
    ✓ Sufficient time must elapse between doses to evaluate effect of previous dose
    ✓ Time between doses longer for nonintravenous routes

Fentanyl: Typical Initial Regimen*

• 25-100 micrograms SLOW IVP
• IVP over at least 2 minutes
• Dilute to permit slower administration
• Additional doses administered in 2 minutes
• Administer prior to midazolam if using combination regimen

* Dose is highly variable, per previous slide

Midazolam: Typical Initial Regimen*

• 0.5-2.5 mg IVP
• Additional doses administered in 3 minutes if needed
• IVP over at least 2 minutes
• Dilute to permit slower administration
• Administer after opioid if using combination regimen

* Dose is highly variable, per previous slide
JCAHO & Medication Administration During Procedures

- Sterile technique!
- Proper labeling of the product
  - Label includes drug name, strength, and amount of drug
  - Single individual process and immediate administration = no label
  - Two individual process = product verification with vial and label
  - Not administered immediately = label

JCAH & Medication Administration During Procedures

- Complete Documentation
  - Proper wasting of controlled substances is CRITICAL
  - Proper charting (including drug/dose/route/time)
- Which healthcare professional administers procedure medications

Topical Anesthesia

- Integral part of the procedural plan
  - Identifiable benefits
  - Separate risks
    - Lidocaine/benzocaine toxicity
    - Methemoglobinemia

Reversing Agents

- Used to treat overdose or to reverse sedatives
- Half lives can be shorter than the sedative
- Can precipitate withdrawal symptoms
- May not completely reverse all complications of sedatives (eg, hypotension)
| **Flumazenil**  
*Romazicon* |
<table>
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<tbody>
<tr>
<td>• Onset of action 15-60 seconds</td>
</tr>
<tr>
<td>• Half life in blood 7-15 minutes but in brain 20-30 minutes</td>
</tr>
<tr>
<td>• Hepatic clearance</td>
</tr>
<tr>
<td>• Clearance delayed if patients have eaten recently</td>
</tr>
</tbody>
</table>

| **Flumazenil**  
*Adverse Effects* |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>• Seizures</td>
</tr>
<tr>
<td>• Panic attacks &amp; emotional lability</td>
</tr>
<tr>
<td>• Benzodiazepine withdrawal symptoms</td>
</tr>
<tr>
<td>• Dizziness, diaphoresis, headache, blurred vision</td>
</tr>
<tr>
<td>• Pain at injection site if extravasation occurs</td>
</tr>
</tbody>
</table>

| **Flumazenil**  
*Dosing* |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>• 0.2 - 0.3 mg IV</td>
</tr>
<tr>
<td>• Repeat every 45 seconds to total of 1.0 mg</td>
</tr>
<tr>
<td>• Can re-dose every 20 minutes as needed up to a total of 3 mg/hr</td>
</tr>
<tr>
<td>• Use of flumazenil requires 90 minute recovery time</td>
</tr>
</tbody>
</table>

| **Naloxone**  
*Narcan* |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Opiate receptor antagonist</td>
</tr>
<tr>
<td>• Onset of action 1-2 minutes</td>
</tr>
<tr>
<td>• Half life 60-90 minutes</td>
</tr>
<tr>
<td>• Hepatic clearance</td>
</tr>
</tbody>
</table>
Naloxone
Adverse Effects
- Opiate withdrawal
- Acute hypertension
- Supraventricular tachycardia
- Seizures

Naloxone
Dosing
- 0.1 - 0.2 mg IV every 1-2 minutes
- Doses of up to 2 mg may be required
- May need to re-dose if naloxone wears off before the opiate originally used for sedation
- Use of naloxone requires 90 minute recovery time

Oxygen Delivery

Nasal Cannula Oxygen
- Desaturation is not predictable by the patient’s baseline pulmonary function
- Give supplemental oxygen if the SaO2 falls below 90%
- Nasal cannula oxygen is sufficient in most patients
Correct positioning of nasal cannula oxygen

Face Mask Oxygen
- If you need > 6 liters per nasal cannula, you need a face mask
- Venturi masks: 28-40% FiO2
- Non-rebreather: 80-90% FiO2

Correct positioning of a non-rebreather face mask

Next, we’re going to review the basics of airway management. Here’s Dr. Colin Kaide from the Department of Emergency Medicine.
Evaluating the Situation

- Prior to any procedure that may produce airway or breathing compromise, you must evaluate your ability to perform:
  - Bag-Valve Mask Ventilation
  - Endotracheal Intubation

Difficult BVM Ventilation

“BONES”

- B Beard/Mustache
- O Obese BMI > 26 kg/m²
- N No Teeth
- E Elderly: Age > 55
- S Snoring

The presence of any 2 of these was 72% sensitive and 73% specific for difficult mask ventilation.

BVM Failure

“You haven’t failed with the BVM until your patient looks like a missile silo...2 nasal airways and an oropharyngeal airway in place!”

-Ron Walls, MD, FACEP

Author: Emergency Airway Management
Using the Bag-Valve Mask

- Success is dependent on 2 factors
  - A patent airway
  - A good mask seal

BVM Technique

- Technique is extremely important!
  - 2 Hands are better than 1
  - A good seal must be maintained

When Problems Arise!

Nasal Airway Insertion

- Always have 2 nasal airways immediately available along with lubricating gel!
- Place the nasal airway into the nostril with the beveled edge toward the septum
- Place 2 nasal airways if possible for maximum effectiveness

Oral Airway Insertion

- Always have an oral airway available
- Placement of an oral airway lifts the tongue out of the way and helps to open the airway
- Size is measured from the corner of the mouth to the angle of the mandible

“The best laid schemes of mice and men, Oft go awry” - Robert Burns
Oral Airway Insertion

- Insert the airway with the tip pointing AWAY from the tongue.
- Rotate the airway downward so it slips past the tongue and into the posterior pharynx.

Difficult Intubation: LEMON Law

- L Look Externally
- E Evaluate Internally 3-3-2
- M Mallampati
- O Obstruction
- N Neck Mobility

Look Externally

- Receding mandible
- High-arched palate
- Buck teeth
- Full dentition
- Small Jaw
- External trauma

Obvious Potential Problems!

- Neck Hematoma
Evaluate Internally 3-3-2

3 fingers of opening

3 fingers chin to hyoid

2 fingers hyoid to thyroid

Mallampati and Cormack & Lehane

Grade 1   Grade 2   Grade 3   Grade 4

Class 1    Class 2    Class 3    Class 4

Mallampati Class I & II

Prepare Mallampati Class III & IV

Abandon All Hope, Ye Who Enter Here
Class IV Airway!

Prepare Obstruction

- Obstruction can be pre-glottic or below the cords
- Includes
  - Tumors
  - Abscesses
  - Edema
  - Hematomas
  - Foreign bodies

Prepare Neck Mobility

- Decreased mobility interferes with alignment of airway
- Includes
  - Cervical collars
  - Arthritis
  - Previous cervical fusions

Supplemental Oxygen

- Option 1: Place your patients on a non-rebreather mask for 5 minutes prior to the procedure and leave it on during the entire procedure
  - Removes nitrogen from the residual volume of the lung and allows for a prolonged apnea time if a complication arises
- Option 2: Use a nasal cannula at 6 liters during the procedure
**PreOxygenate**

**Apnea Time**
- Time to Desaturation
- 2 points
  - 100% to 90%
  - 90% to 0%
- Varies by age and size
- State of health

**Watch your patient!!!**
- Hypercapnea may occur but *complications* arise from hypoxia!
- Watch O$_2$ saturations and keep them above 90-92%
- Watch for chest rise and breathing effort
- Be AFRAID of new bradycardia or sudden hypotension - may suggest hypoxia

**Sedation Policy**

**Credentialing for Moderate Sedation**
- ACLS (or PALS/NRP)
- View this webcast and pass the associated test
- Complete an approved airway assessment and management course
- Reappointment: 10 documented uncomplicated moderate sedation episodes every 2 years
Credentialing for Deep Sedation

• Meet all criteria for moderate sedation privileges
• Fellowship training in advanced airway management (Emergency Medicine, Critical Care, Pulmonary)
  
  OR
• Other approved training in intubation and advanced airway management
• Reappointment: 10 deep sedations/2 years

Deep Sedation

• Defined by the degree of sedation
• Not defined by a particular drug
• Some drugs inherently more likely to result in deeper sedation (propofol)
• Requires separate credentialing

• The major complications are respiratory and airway related
• The physician/dentist must have greater airway management skills
  ✔ Emergency medicine
  ✔ Pulmonary medicine
  ✔ Critical Care
  ✔ Oral maxillary facial surgery
  ✔ OR demonstrated advanced airway skills

For the final part of our webcast, we’re going to go over a few cases that exemplify common problems in sedation. Here’s Dr. Harrison Weed, the Chairman of the OSU Pharmacy and Therapeutics Committee. Hank?
Case 1
• A 52 yr old male smoker is referred for bronchoscopy. He has a severe cough and a lung mass.

Case 2
• A 60 yr old woman with an exacerbation of COPD has progressive respiratory failure and requires endotracheal intubation and mechanical ventilation.

Case 3
• A 45 yr old man with atrial fibrillation is undergoing electrical cardioversion.

Case 4
• A patient is undergoing wisdom tooth extraction. Midazolam (Versed) is used for sedation and supplemental oxygen (6 liters per nasal cannula) is given. During the procedure, the heart rate falls to 45 but the oxygen saturation remains above 90%.
Case 5
• A 20 yr old man presents to the emergency room with a spontaneous pneumothorax which requires placement of a chest tube.

Case 6
• A patient undergoes a transesophageal cardiac echo. 30 minutes later, he develops severe cyanosis, headache, lethargy, and an SaO2 = 85% by pulse oximeter.

Case 7
• A 50 year-old man presents for routine screening colonoscopy. He has been dreading the procedure because he has a low pain tolerance.

Sedation Key Points:
1. Sedation is defined by the degree of impaired consciousness, not a specific drug
2. Midazolam & fentanyl are usually preferred
3. Meperidine should no long be used.
4. A history and physical exam must be on the chart (or computer) before administering sedation
Sedation Key Points:

5. Separate sedation consent is needed
6. Beware of methemoglobinemia
7. Bradycardia during sedation = hypercarbia until proven otherwise
8. IV and topical anesthetics require physician orders