

# Sedation & Analgesia

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# Moderate Sedation/Analgesia

## ■ **DEFINITION:**

- Reduction of the level of consciousness induced by medications (like narcotic +/- benzodiazepine)
- in order to facilitate the acceptance of a procedure,
- with **preservation of purposeful response to verbal commands, either alone or with the addition of light tactile stimulation.**

## ■ **There is preservation of:**

- Protective reflexes,
- Airway patency,
- Spontaneous ventilation, and
- Cardiovascular function.

# Moderate Sedation/Analgesia

## Points to Consider

- Not all procedures need sedation & analgesia:
  - preference and comfort
- 50% of complications in endoscopy are cardio-pulmonary;
  - sedation increases their risk.
- Complications from sedation/analgesia are more likely with:
  - **a) Co-morbidities**
    - cardiac, pulmonary, renal, hepatic, neurologic, ..., and other disorders,
    - malnutrition, & morbid obesity
  - **b) Complexity and length of procedure,**
  - **c) Urgency,**
  - **d) Larger caliber of instrument in esophagus,**
  - **e) Old age**

# Monitoring

- **DEFINITION**: Assessment of patient before, during and after an event.
- **PORPOUSE**: Detects early signs of distress before compromise of vital functions.
- **OPERATOR**: endoscopist and endoscopy assistant.
- **PARAMETERS**:
  - Pulse,
  - Respiratory rate or ventilation, Capnography
  - Blood pressure,
  - Neurological status/consciousness,
  - Pain distress,
  - Skin changes.



# MONITORING

PARAMETER	TECHNIQUES
Consciousness / Neurologic Status	<ul style="list-style-type: none"><li>-Response to voice</li><li>-Response to touch</li><li>-Quantified by:<ul style="list-style-type: none"><li>-MOAA/S or Ramsay scale, or</li><li>-Bi-Spectral Index Monitoring (BIS).</li></ul></li></ul>
Ventilation	<ul style="list-style-type: none"><li>-Pulse oximetry + Respiration rate, or</li><li>-Capnography</li></ul>
Perfusion / Cardiac Rhythm	<ul style="list-style-type: none"><li>-Blood pressure + Pulse + Skin warmth</li><li>-Selective EKG (Hx arrhythmia or MI)</li></ul>
Pain	<ul style="list-style-type: none"><li>-Skin warmth and perspiration</li><li>-Face expression</li><li>-Voice</li></ul>

# Modified Observer's Assessment of Alertness/Sedation (MOAA/S) or Ramsay Scale

- Usual Goal

- Colonoscopy = 3

- EGD = 2

Responsiveness	Score
Agitated	6
Alert, responds to name, in normal tone call	5
Lethargic, responds to name, in normal tone call	4
Responds after name called loudly or repeatedly	3
Responds after mild prodding or shaking	2
Does not respond to mild prodding or shaking; (purposeful response to painful trapezius squeeze)	1
Does not respond to deep stimulus (trapezius squeeze)	0

# Automated Monitoring Equipment

## **Bi-spectral Index of Sedation (BIS)**

- Evaluates EEG parameters of the frontal cortex corresponding to different levels of sedation, giving a numeric score.
  - Lower score indicates deeper sedation.
  - BIS of 70 to 90 is consistent with “Moderate Sedation”.
- Correlates well with “Modified Observer’s assessment of alertness/sedation”
- BIS of 70 – 85 gives best patient satisfaction, but respiratory depression occurs in 20%.
- Confounding Factors:
  - Patient movement,
  - Respiration,
  - Skeletal muscle contraction.

# Automated Monitoring Equipment for Perfusion, Ventilation, and Cardiac Rhythm

# Automated Monitoring Equipment

## **Pulse Oximeter**

- Transcutaneous measurement of ratio of venous to arterial blood,
  - Done by % absorption of light wavelength of 660 & 940 nm.
- “O<sub>2</sub> Sat” calculated by mathematical algorithm.
- Assumes absence of methemoglobin and carboxyhemoglobin.

# Automated Monitoring Equipment

## Pulse Oximeter

- False reading in:
  - Low body-core temperature,
  - Vasoconstriction,
  - Hypotension,
  - Deep skin pigmentation,
  - Hb S disease,
  - Sick cell crisis,
  - Methemoglobinemia,
  - Carboxy-hemoglobinemia,
  - Blue nailpolish.

# Automated Monitoring Equipment

## **Automated Sphygmomanometer**

- Oscillometric measurement of peak oscillation magnitude of arterial flow, which reflects **"mean arterial pressure"** and pulse.
- Appropriate cuff size is critical.
- Mathematical algorithm calculates systolic and diastolic pressure.
  - Underestimates high blood pressure, and
  - Overestimates low blood pressure.
- **When in doubt, use manual sphygmomanometer.**



# Automated Monitoring Equipment

## **ECG Monitor**

- Continuous display of single-lead ECG.
  - Ideally with printout capability.
- Reading affected by improper placement of electrodes, poor skin contact, and deep breathing.
- Area of skin contact for each electrode should be at least 3 cm<sup>2</sup> (2 cm diameter), to minimize risk of electro-cautery burn.
- Distortion of S-T segment is common.

# Automated Monitoring Equipment

## Capnography

- Measured by infrared spectroscopy:
  - Waveform tracks “absorption peak of CO<sub>2</sub>” at 4200 nm wave length.
  - Real time graphic assessment gives visual demonstration of ventilatory status.
- Can be “end tidal” or transcutaneous.
  - End tidal with waveform is used in Monitoring
- Limitation:
  - In non-closed system (not intubated), using a modified nasal cannula, measurement may be inaccurate due to mix of expired air and dead-space air.

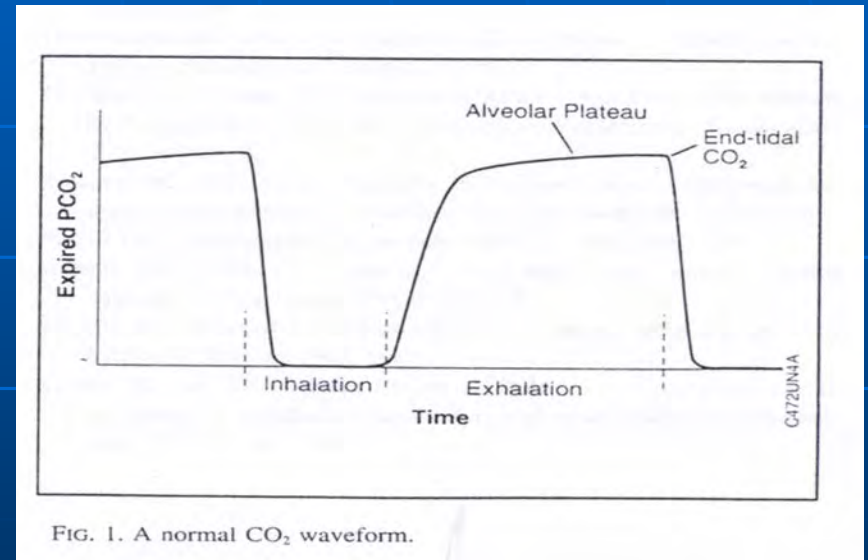
# Automated Monitoring Equipment

## Capnography

- **Specially useful:**
  - Deep sedation (Propofol)
  - Difficult to sedate patients
  - Prolonged diagnostic/therapeutic procedures
  - When adequate visual assessment can not be done
  - When O<sub>2</sub> supplementation is given ?
  - ASA Status III or IV ?
- **The ASA requires use of Quantitative Waveform Capnography for Moderate Sedation since July 2011.**
- **AGA + ACG + ASGE (02/2012):** There are insufficient data to demonstrate that improved clinical outcomes or care quality derive from the use of capnography in adults undergoing targeted moderate sedation for upper endoscopy and colonoscopy. The adoption of the revised ASA Standard will unnecessarily add cost, inefficiency and waste to a healthcare system already overrun with excess costs and waste.

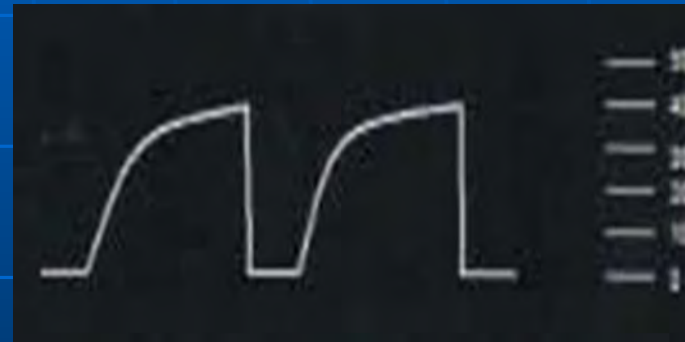
# ETCO<sub>2</sub> Waveform

- Normal ETCO<sub>2</sub> in the adult patient should be 35-45 mmHg.
  - Hypoventilation > 45 mm Hg
  - Hyperventilation < 35 mm Hg
- It is a direct measurement of ventilation in the lungs,
- Indirectly measures metabolism and circulation.
  - A decrease in perfusion (low cardiac output) will lower the delivery of carbon dioxide to the lungs and will cause a decrease in the ETCO<sub>2</sub> (end-tidal CO<sub>2</sub>),
  - This will be observable on the waveform as well as with the numerical measurement.



# Obstructive Airway Waveforme

- Shark fin waveform
  - With or without prolonged expiratory phase
  - Can be seen before actual obstruction attack
- Indicative of Bronchospasm (asthma, COPD, allergic reaction)
  - **Mild Dz:** Low  $\text{ETCO}_2$  indicating hyperventilation & tachypnea
  - **Severe Dz:** High  $\text{ETCO}_2$  due to  $\text{CO}_2$  retention
- Useful for Differential Dx:
  - Wheezing with Square normal wave = CHF/Pulmonary edema
  - Wheezing with "shark fin" = bronchospasm.
- Management: Bronchodilators (albuterol, atrovent, or Epinephrine)



# Use of ETCO<sub>2</sub> in CPR

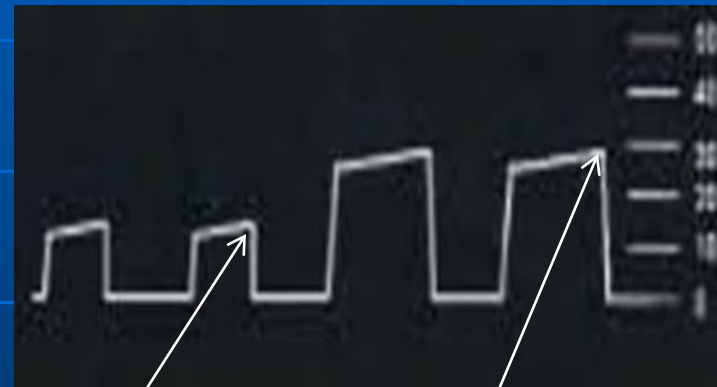
## ■ Evaluates the effectiveness of chest compressions:

- High quality chest compressions: ETCO<sub>2</sub> of at least 10-20 mmHg.
- Low ETCO<sub>2</sub> value (< 10 mmHg) during CPR in an intubated patient: quality of chest compressions needs improvement.

## ■ Identification of ROSC:

- After cardiac arrest, "Return of Spontaneous Circulation" increases ETCO<sub>2</sub> to 35-45 mm Hg.

Return of Spontaneous Circulation: ETCO<sub>2</sub> increases to 35 mm Hg



15 mm Hg  
on good CPR

35 mm Hg  
and climbing

# Pre-Procedure Evaluation



# Pre-Procedure Evaluation

- Indication
  - procedure & sedation.
- Brief Hx
  - diseases, allergies, medications, anesthesia
- Risks:
  - bleeding, airway compromise.
- Fasting status
  - clear liquids=2h,
  - light meal=6h
- Pregnancy status
- Ride
- IV access
- Baseline vital signs
- Informed consent:
  - procedure, sedation, blood products.
- Teaching to decrease anxiety.
- Time Out:
  - patient name, SSN or MRN, and procedure.

**GUIDELINE:** The findings of the Pre-Procedure assessment should be documented before initiating sedation.

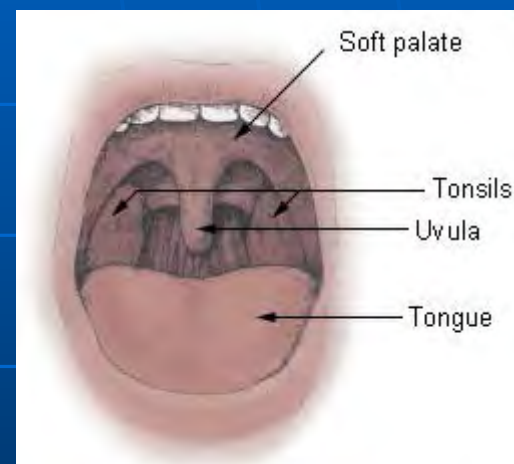
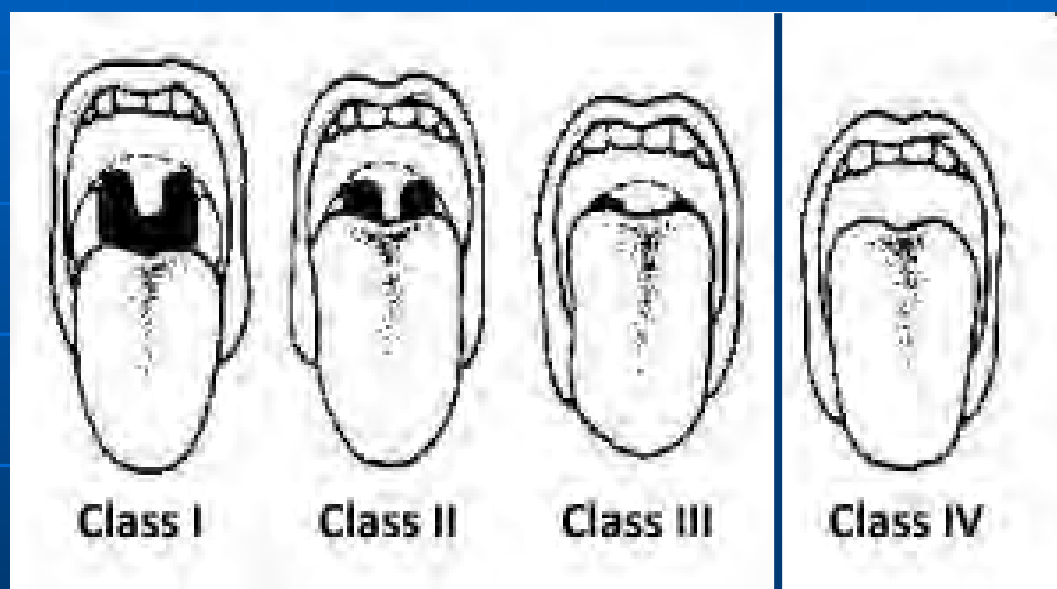
# Minimal Information Needed Before Sedation & Endoscopy

- **Airway**: stridor, snoring, sleep apnea, advanced RA of neck, obesity, neck mass, cervical spine disorder, tracheal deviation, large tongue, large tonsils, small jaw, laryngospasm.
  - mouth < 3 cm,
  - non-visible uvula (Mallampati class IV),
  - hyoid-mental distance < 3 cm,
  - large neck size,
  - loose teeth, dental prosthesis,
  - inability to extend cervical spine.

# Mallampati Airway Classification System

This system is a method for quantifying the degree of difficulty of endotracheal intubation based on amount of posterior pharynx that can be visualized.

The exam is performed with the patient sitting with the head in a neutral position and the mouth open as wide as possible



**Class I:** soft palate, fauces, uvula, pillars visible. No difficulty.

**Class II:** soft palate, fauces, portion of the uvula visible. No difficulty.

**Class III:** soft palate, base of uvula visible. Moderate difficulty.

**Class IV:** hard palate only. Severe difficulty; **Needs anesthesia support.**

# Airway Assessment



LEMON airway assessment method ;

- 1 = Inter-incisor distance in finger breadths ( $\geq 3$ ),
- 2 = Hyoid mental distance in finger breadths ( $\geq 3$ ),
- 3 = Thyroid to floor of mouth in finger breadths ( $\geq 2$ )

- The score with a maximum of 10 points is calculated by assigning 1 point for each of the following LEMON criteria:
- **L** = Look externally
  - facial trauma,
  - large incisors,
  - beard or moustache,
  - large tongue
- **E** = Evaluate the 3-3-2 rule
  - incisor distance  $< 3$  finger breadths,
  - hyoid-mental distance  $< 3$  finger breadths,
  - thyroid-to-mouth floor distance  $< 2$  finger breadths
- **M** = Mallampati (Mallampati score  $\geq 3$ ).
- **O** = Obstruction
  - presence of any condition like epiglottitis, peritonsillar abscess, trauma.
- **N** = Neck mobility (limited neck mobility)
- Patients in the difficult intubation group have higher LEMON scores.

# Laryngospasm

## ■ Dealing with Laryngospasm

- This is uncontrolled spasm (glottic closure) of the vocal cords.
- May be provoked by mucus, blood, saliva, locally instilled medications, acrid smell, manipulation of airway, pain, or visceral distention.
- May be incomplete (some air movement is present, inspiratory stridor, accessory respiratory muscles use) or complete (complete airway obstruction, no respiratory sounds; chest & diaphragm movement may be present, but not effective — "paradoxical breathing")

## ■ Treatment (procedures and sequence):

- Stop the procedure to avoid any additional stimulation
- Suction oropharynx if the local irritants are suspected to be the cause of laryngospasm.
- **Call Anesthesiologist or in-house airway management resource stat while attempting a jaw thrust and mask ventilation with 100% O<sub>2</sub>**
- Consider Lidocaine IV bolus 0.5–0.8 mg/kg

# Minimal Information Needed Before Sedation & Endoscopy

## ■ Respiratory:

- COPD,
- Home O<sub>2</sub>,
- Tobacco abuse,
- Asthma,
- Active pulmonary TB.

## ■ Previous anesthesia:

- Adverse reaction,
- Difficult intubation,
- Paradoxical response to sedation.

# Minimal Information Needed Before Sedation & Endoscopy

## ■ Cardiac:

- CHF,
- Arrhythmia,
- Recent MI,
- Unstable angina,
- Pacemaker,
- AICD.

- History of endocarditis\*,
- Prosthetic valve\*,
- Vascular graft < 1 year\*,
- Surgical pulmo-systemic shunt\*,
- Cyanotic heart disease\*

\* Endocarditis prophylaxis currently not recommended



# Minimal Information Needed Before Sedation & Endoscopy

## ■ Neuro-Psych:

- Seizures,
- Neuro-muscular disease,
- Oro-pharyngeal dysphagia,
- Panic disorder,
- Chronic benzodiazepine,
- Chronic narcotic,
- Alcohol abuse,
- Drug abuse.
- Use of MAO inhibitor [phenelzine (**Nardil**), tranylcypromine (**Parnate**)] or SSRI

# Minimal Information Needed Before Sedation & Endoscopy

## ■ Others:

- Cirrhosis,
- Renal insufficiency,
- Diabetes,
- Cachexia,
- Blood-borne pathogens
  - Hepatitis B,
  - Hepatitis C,
  - HIV,
- Bleeding disorder,
- Thrombocytopenia,
- Warfarin,
- Heparin,
- LMWH
  - Enoxaparin, Dalteparin.
- Fondaparinux (Arixtra)
- Antiplatelet:
  - Dipyridamole, ASA
- Thienopyridines:
  - Clopidogrel, Prasugrel, Ticlopidine, Ticagrelor.
- GP IIb/IIIa inhibitors
  - Tirofiban, Abciximab, Eptifibatide
- Xa Inhibitors:
  - Rivaroxaban, Apixaban, Edoxaban.
- PAR-1 inhibitor
  - Vorapaxar
- Direct Thrombin Inhibitors:
  - Dabigatran, Argatroban, Bivalirudin

# Risk: ASA Classification

Class I	Normal & healthy
Class II	Mild systemic disease that does not limit activities
Class III	Moderate to severe systemic disease which limits activities
Class IV	Severe systemic disease that is a constant potential threat to life
Class V	Moribund and at substantial risk of death within 24 hours
Suffix E	Added to any class; -Denotes EMERGENCY procedure; -Increases risk of complications.

Classes IV & V likely need anesthesia support or are done in ICU

# ASA and Mortality

Class	Definition	Approximate Mortality Rate
I	A normal healthy patient	0.06–0.08%
II	A patient with mild systemic disease and no functional limitations	0.27–0.4%
III	A patient with moderate to severe systemic disease that results in some function limitation	1.8–4.3%
IV	<b><i>A patient with severe systemic disease that is a constant threat to life and functional incapacity</i></b>	<b>7.8–23%</b>
V	<b><i>A moribund patient who is not expected to survive 24 hours with or without surgery</i></b>	<b>9.4–51%</b>
VI	A brain-dead patient whose organs are being harvested	
E	The procedure is an emergency (for example, "2E") Emergency increases the risk of complications	

**Classes IV & V likely need anesthesia support or are done in ICU**

# Guidelines for Anesthesiology Assistance

- Prolonged or therapeutic endoscopic procedures requiring deep sedation or general anesthesia
- Anticipated intolerance, paradoxical reaction or allergy to standard sedation regimens
- Severe comorbidity (ASA class 4 and higher)
- Increased risk of airway obstruction
  - History of stridor
  - History of severe sleep apnea
  - Dysmorphic facial features
  - Trisomy 21
  - Pierre-Robin syndrome
- Jaw abnormalities
  - Retrognathia
  - Micrognathia
  - Trismus
  - Severe malocclusion

# Guidelines for Anesthesiology Assistance

## ■ Oral abnormalities

- Oral opening < 3 cm in adults
- Protruding incisors
- Macroglossia
- High arched palate
- Tonsillar hypertrophy
- Mallampati score of 4

## ■ Neck abnormalities

- Decreased hyoid-mental distance ( < 3 cm in adults)
- Short thick neck
- Limited neck extension
- Cervical spine disease (eg, advanced rheumatoid arthritis) or trauma
- Severe tracheal deviation

## **JH Criteria for LVAD to have Endoscopy under Moderate Sedation in Endoscopy Suite**

- Patient can be sedated with Moderate-Sedation.
- LVAD Implanted more than 30 days earlier.
- Pulse Pressure > 15 mm Hg (BPs – BPd).
- Reliable Blood Pressure, with BP-Cuff or Doppler.
- No Obstructive Sleep Apnea.
- No COPD on Home Oxygen.
- Perfusionist Available for the Endoscopy (Ext. 8384).



# Risk Factors for Cardio-Pulmonary Complications of Moderate Sedation

- Ischemic heart disease.
- Moderate to severe pulmonary disease.
- Hospitalized status.
- Baseline  $\text{SaO}_2 < 95\%$ .
- Age  $> 70$  years.
- ASA III & IV.
- Procedure Specific:
  - Urgent or Emergent.
  - Use of Supplemental oxygen (helps in EGD).

# Emergency Resuscitative Equipment (1)

- Assorted syringes, tourniquets, adhesive tape
- Intravenous access equipment including fluids
- Basic airway management equipment
  - Oxygen supply
  - Suction machine and catheter
  - Nasal cannulae and face masks\*
  - Bag-mask ventilation device\*
  - Oral and nasal airways (all sizes)\*
- Advanced airway management equipment
  - Laryngoscope handles and blades\*
  - Endotracheal tubes and stylets\*
  - Laryngeal mask airway (LMA)\*
- *\*All appropriate sizes should be available.*

# Emergency Resuscitative Equipment (2)

## ■ Cardiac Equipment

- Pulse oximeter
- Cardiac defibrillator
- Emergency medications
- Atropine
- Diphenhydramine
- Epinephrine
- Ephedrine
- Flumazenil
- Glucose, 50%
- Hydrocortisone
- Lidocaine
- Naloxone
- Sodium bicarbonate

# Agents for Sedation/Analgesia

# Considerations

- Use of O<sub>2</sub> supplementation:
  - At “Room air”: O<sub>2</sub> saturation falls before hypoventilation, but
  - With supplemental O<sub>2</sub>: hypoventilation and arrhythmia/arrest may occur without O<sub>2</sub> desaturation;
  - **Recommend: start O<sub>2</sub> after 1<sup>st</sup> desaturation, and be extra careful with further sedative use.**
- Combined narcotic + benzodiazepine are synergistic in:
  - sedative effect and
  - respiratory depression

# Considerations

- Best sequence to give the drugs:
  - 1) Diphenhydramine/ Promethazine/Droperidol (if used),
  - 2) Narcotic,
  - 3) Benzodiazepine
- Idiosyncratic responses:
  - excitation or panic;
  - most frequently due to benzodiazepine:
    - try Flumazenil +/- cancel

# Considerations

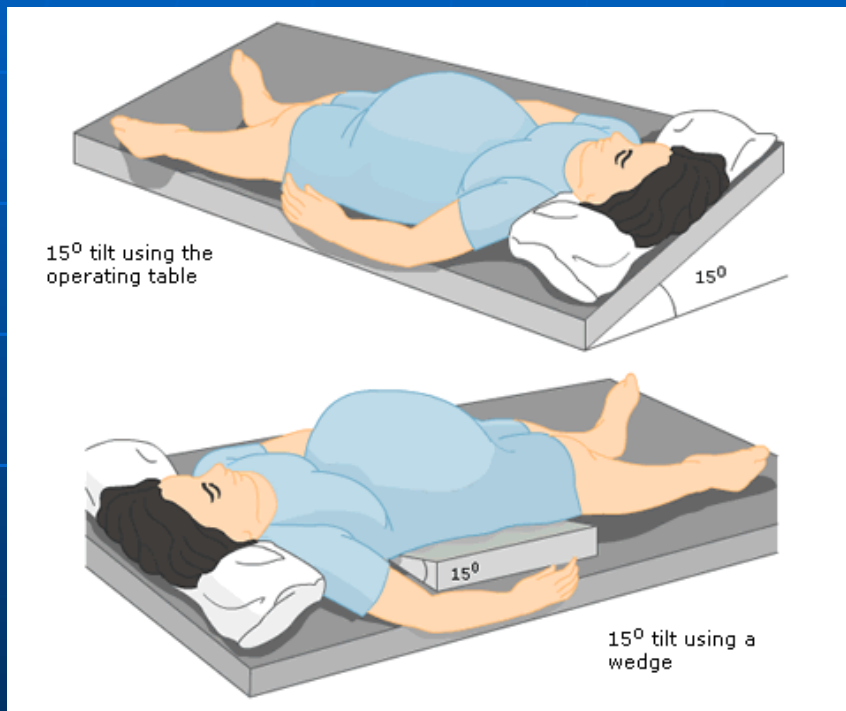
## ■ In pregnancy:

- **Only procedures with strong indication.**
- **Timing:**
  - If possible, wait until second trimester.
  - Minimize duration of procedure.
  - Obtain obstetric support for complications
- **Asses fetus:**
  - Confirm presence of fetal heart sounds before sedation and after the procedure, then document them in the note.
- **Position:**
  - Patient in Left lateral position or with a Left pelvic tilt (to avoid IVC & aortic compression)
- **Medication:**
  - lowest possible dose,
  - Category A or B if possible: Propofol, ketamine, benadryl; less often meperidine (category C) (preferred over fentanyl)



# Position for Endoscopy Pregnancy

## Left pelvic tilt



## Left Lateral Decubitus



# Indications for Endoscopy During Pregnancy

- Significant or continued GI bleeding
- Severe or refractory nausea and vomiting or abdominal pain
- Dysphagia or odynophagia
- Strong suspicion of a colonic mass
- Severe diarrhea with a negative evaluation
- Biliary pancreatitis, choledocholithiasis, or cholangitis
- Biliary or pancreatic ductal injury

# Agents for Sedation/Analgesia

- **Fentanyl**
- **Meperidine**
- **Midazolam**
- **Remimazolam**
- **Diazepam**
- **Ketamine**
- **Diphenhydramine**
- **Promethazine**
- **Droperidol**
- **Propofol**
- **Fospropofol**
- **Dexmedetomidine**
- **Nitrous Oxide**

Drug	Onset of action (min)	Peak effect (min)	Effect Duration (min)	Initial dose (Kg IBW)	Maximal dose (Kg IBW)	Pregnancy category	Antagonist	Adverse events
Dexmedetomidine (mcg)	5	15	Unknown	1/kg	200	C	None	Hypotension, bradycardia
Diazepam (mg)	2–3	3–5	360	5–10	20	D	Flumazenil	Respiratory depression, chemical phlebitis
Diphenhydramine (mg)	2–3	60–90	240	25–50	400	C/B 3rd trimester	None	Dizziness, prolonged sedation
Droperidol (mg)	3–10	30	120–240	1.25–2.5	10	C	None	QT prolongation, ventricular arrhythmia, Extrapyramidal effects
Fentanyl (mcg)	1–2	3–5	30–60	50–100	200	C	Naloxone	Respiratory depression, vomiting
Flumazenil (mg)	1–2	3	60	0.1–0.3	5	C		Agitation, withdrawal symptoms
Ketamine (mg)	1	1	10–15	0.5/kg	Titrate to effect	B	None	Emergence reaction, apnea, laryngospasm
Meperidine (mg)	3–6	5–7	60–180	25–50	150	C	Naloxone	Respiratory depression, pruritus, vomiting, interaction with MAOI
Midazolam (mg)	1–2	3–4	15–80	1–2	6	D	Flumazenil	Respiratory depression, disinhibition
Naloxone (mg)	1–2	5	30–45	0.2–0.4	2	B		Narcotic withdrawal
Nitrous oxide	2–3	Dose-dependent	15–30	Titrate to effect	Titrate to effect	?	None	Respiratory depression, headache
Promethazine (mg)	2–5	Unknown	120	12.5–25	100	C	None	Hypotension, respiratory depression, Extrapyramidal effects
Propofol (mg)	1	1–2	4–8	10–40	400	B	None	Respiratory depression, cardiovascular instability

# Common Moderate Sedation Drugs

Medication	Initial Dose	Titration	Onset	Peak	Duration	Antagonist	Other
Midazolam (Versed)	0.5–2 mg IV	Small increments every 3–5 min	1–2.5 min	3–5 min	20–40 min	Flumazenil	No active metabolites
Fentanyl (Sublimaze)	25–50 mcg IV	Small increments every 3–5 min	1–5 min	3–5 min	30–60 min	Naloxone	May cause the "stiff-chest" syndrome
Meperidine (Demerol)	12.5–50 mg IV	Small increments every 10–15 min	1–5 min	5–7 min	60–120 min	Naloxone	Causes less spasm of smooth muscles. Avoid in renal impairment, in patients on MAO inhibitors, in patients with severe CAD (risk of tachycardia)
Morphine	1–3 mg IV	Small increments every 5–15 min	1–5 min	20–30 min	20–180 min	Naloxone	Lower the dose for renal impairment

# Antagonists

Medication	Bolus Dose	Administration	Onset	Duration	Other
<b>Flumazenil (Romazicon)</b>	0.2 mg IV	Administer the dose over 15 sec; may repeat every 1 min up to max dose of 1 mg. No more than 3 mg is recommended in any 1-hour period	0.5–1 min	60 min	May precipitate seizures in patients chronically treated with Benzodiazepine. May cause cutaneous vasodilatation, sweating, flushing, arrhythmias, HTN.
<b>Naloxone (Narcan)</b>	0.02–0.04 mg IV	Administer 0.02–0.04 mg IV every minute till the desired degree of reversal is achieved. The large bolus (0.2–0.4 mg IV) should be reserved for emergency reversal of profound respiratory depression.	1 min	15–30 min	Caution must be utilized when administering to patients with preexisting cardiac disease or patients with known or suspected physical dependence to opioids.

# Allergic Reactions to Narcotics

## **Immune Related**

- Allergic Dermatitis
- Anaphylaxis
  - IgE mediated or not
  - Nasal congestion
  - Flushing
  - Angioedema
  - Pruritus
  - Bronchospasm
  - Nausea; Diarrhea
  - Urinary urgency
  - Hypotension
  - Death

## **Immune Mimic**

- Mild itching
- Urticaria
- Red eyes
- Wheals
- Flushing (histamine release)
- Bronchospasm
- Dose related hypotension



# Opioids Families

Cross to different family for drug allergies

## ■ PHENANTHRENES

- Morphine
- Codeine
- Hydrocodone
- Oxycodone
- Hydromorphone
- Oxymorphone
- Levorphanol
- Buprenorphine
- Butorphanol
- Naloxone
- Heroin

## ■ DIPHENYLHEPTANES

- Methadone
- Propoxyphene

## ■ PHENYLPIPERIDINES

- Meperidine
- Fentanyl
- Sufentanyl
- Alfentanyl
- Remifentanyl

## ■ BENZOMORPHANS

- Pentazocine
- Loperamide
- Diphenoxylate

# Fentanyl (1)

- **Effect:** Potent synthetic Mu-receptor agonist analgesic.
- **Equivalency:** Fentanyl 100 mcg = morphine 10 mg = meperidine 75 mg
- **Onset:** 1 circulation or 1.5- 2 min.;
- **Peak** at 5 min.;  
redistributes from fat after 13 min.
- **Half-life:** 2 hours (up to 10 hours)
- **Dose:** 1-2 mcg/kg IBW.  
Initial: 50-100 (75) mcg,  
Subsequent 25-50 mcg q 2-3 min

# Fentanyl (2)

## ■ **Risks:**

- Potent respiratory depressor; reduces brain-stem response to high CO<sub>2</sub> and low O<sub>2</sub>
- With high initial dose “wooden chest”: muscle rigidity and clonic movements
- Small fall in SVR; rare vagally-mediated bradycardia
- Cough suppression, itching, pupillary const.

## ■ **Cautions:** Reduce dose in elderly, cachexia, renal insuffic

## ■ **Pregnancy (Cat C):** probably safe in low dose (Meperidine is preferred)

## ■ **Breast Feeding:** OK to breast feed any time.

## ■ **Reversed:** by Naloxone

# Meperidine (1)

- **Effect:** Synthetic Mu-receptor agonist analgesic.
- **Equivalency:** Meperidine 75 mg = morphine 10 mg = fentanyl 100 mcg
- **Onset** at 2 min.;
- **Peak** at 10 min.
- **Half life:** 4 hours
- **Dose:** Initial: 25-75 (50) mg IV;  
Subsequent 12.5-25 mg q 5 min.
- **Cautions:**
  - Elderly have high levels b/o low protein binding and elimination; decrease dose by 25-50%.
  - Slow clearance in cirrhotics; reduce dose
- **Pregnancy (Cat C):** preferred agent
- **Breast feeding:** hold for 24 hours.

# Meperidine (2)

## ■ **Risks:**

- Causes respiratory depression and hypotension;
- Disorientation, hallucinations, nausea, tachycardia, headache.
- Convulsions from active metabolites.
- ***Serotonin Syndrome:***
  - Hypertensive crisis and death with:
    - MAO inhibitors (phenelzine-Nardil, tranylcypromine-Parnate), and
    - Less often with Selective Serotonin Reuptake Inhibitors (SSRI's).

## ■ **Reversed:** by Naloxone (Narcan)

# Midazolam (1)

## ■ **Effect:**

- Binds to benzodiazepine receptors in spinal cord, brain-stem, cerebellum, limbic system and cerebral cortex.
- Potentiates GABA inhibitor effects.
- Anxiolytic, sedative, hypnotic that causes anterograde amnesia.

## ■ **Peak** effect in 3-5 min

## ■ **Half life:**

- 2-3 hours (10 h in elderly);
- longer in dose > 10 mg,
- has inactive metabolites.

# Midazolam (2)

## ■ Dose:

- **Single-agent:** 0.07 – 0.1 mg/kg IBW (5-7 mg).  
MAX: 0.3 mg/kg IBW
- **Combination:** initial 1-2 mg IV followed by 0.5-1 mg q 2 min.

## ■ Risks:

- respiratory and cardiovascular depression,
- ventricular irritability,
- blunted heart rate response to hypotension (in deep sedation)
- Agitation, involuntary movements, blurred vision, nausea and vomiting (< 2%).



# Midazolam (3)

## ■ **Cautions:**

- Is 3-4 fold stronger than diazepam
- Older than 65 year-old are more sensitive.
- Often responsible for idiosyncratic reactions.

## ■ **Pregnancy (Cat D):** use only if

- meperidine alone is not enough, and
- only after first trimester.

## ■ **Breast feeding:** hold for 4 h.

## ■ **Reversed:** by Flumazenil.

# Diazepam (1)

## ■ **Effect:**

- Binds to benzodiazepine receptors (like midazolam) and potentiates GABA inhibitory effect.
- Anxiolytic, sedative, hypnotic that causes anterograde amnesia.

## ■ **Peak** effect at 3-5 min.

- Must be given at  $< 5$  mg/min. b/o phlebitis.

## ■ **Half-life:**

- 30 hours.
- Has active metabolites with half-life of 30-200 hours.

# Diazepam (2)

## ■ **Dose:**

- **Initial:** 5-10 mg IV (5mg/min),
- **Subsequent:** 2.5-5 mg q 5 min.

## ■ **Risks:**

- respiratory & cardiovascular depression at high dose.
- Phlebitis, dizziness, nausea, diplopia, headache, tachycardia.

## ■ **Cautions:** Elderly are very prone to CNS depression; reduce dose.

## ■ **Pregnancy (Cat D):** do not use.

## ■ **Reversed:** by Flumazenil.

# Patient Difficult-to-Sedate

# Ketamine

- Phencyclidine derivate.
- Analgesic and sedative effect.
- Mechanism:
  - functional dissociation between limbic and cortical system;
  - depresses cortex & thalamus, while stimulates parts of limbic system
- Effect: causes trance-like cataleptic state;
  - impairs sensory recognition,
  - blocks painful stimuli, and
  - retards memory,
  - does not depress airway nor cardiovascular reflexes.

# Ketamine

## ■ Risks:

- Can produce dose-dependent increase in heart rate, blood pressure, and cardiac output, through stimulation of sympathetic nervous system;
  - Avoid it in ischemic heart disease, significant cerebrovascular disease, and severe hypertension.
- Can produce “Emergence Reaction” with floating sensation, vivid dreams, hallucinations, and delirium.
  - Midazolam or Diazepam minimize this risk.

# Ketamine

- Onset: < 1 min.
- Duration: 10-15 min.
- Initial dose: 0.5 mg/kg
- Adult experience: Varadarajulu (Alim. Pharmacol. Ther 2007;25:987-997)
  - **Population:** patients having EUS or ERCP who were difficult to sedate with Meperidine 50 mg + Midazolam 5 mg.
  - **Intervention:** Ketamine 20 mg IV q 5 min.
  - **Result:** better sedation, comfort, recovery time, and less sedation-related technical difficulty.
  - **Pregnancy:** Category B



# Diphenhydramine

- **Histamine-H1 receptor antagonist:** anticholinergic & sedative effect.
- **Risk:** hypotension, dizziness, blurred vision, dry mouth, epigastric discomfort, urinary retention & wheezing.
- **Advantage:** Modest stimulation of ventilation.
- **Dose:** 25-50 mg IV
- **Onset of action:** 2-3 min; peak 60-90 min
- **Duration of action:** 240 min
- **Pregnancy:** category C; B in 3<sup>rd</sup> trimester.

# Promethazine

- **Phenothiazine:** anti-histaminic, sedative, anti-emetic, anticholinergic effect.
- **Mechanism:**
  - Increase effect of sedatives.
  - Blocks postsynaptic dopaminergic receptors in brain, and has alpha-adrenergic inhibitory effect.
  - Competitive inhibition of H1 receptors.
- **Risks:** hypotension, respiratory depression, neuroleptic malignant syndrome, extrapyramidal effect, oculogyric crisis.
- **Dose:** 12.5-25 mg IV slowly, < 25 mg/min.
- **Onset:** 2-5 min; peak unknown
- **Duration:** 120-180 min.
- **Pregnancy:** category C

# Droperidol (Inapsine) (1)

- Butyrophenone similar to haloperidol
- Effect:
  - Subcortical sedative; causes disassociation but no amnesia. Decreases motor activity.
  - Anxiolytic & antiemetic. Response to pain and verbal commands remains intact.
  - Partially inhibits sympathetic post-ganglionic alpha-adrenergic receptor binding.
  - Vasodilator; decreases pulmonary arterial pressure.
- **Pregnancy category C:** (no adequate studies in pregnancy)

# Droperidol (2)

- **Peak effect:** 3-10 min.; peak 30 min.
- **Duration:** 2-6 hours (up to 12 h).
- **Dose:**
  - **Initial:** 1.25-2.5 mg ;
  - **Subsequent:** 1.25 mg q 5 min. (up to 10 mg)
- **Risk:**
  - Mild-moderate hypotension. Tachycardia.
  - **Paradoxical response to epinephrine (hypotension) but not to norepinephrine nor phenylephrine.**
  - Respiratory depression,
  - **QT prolongation & Torsades de Pointes,**
  - Contraindicated with QTc > 440 ms in males, > 450 ms in females, history of congestive heart failure, bradycardia, diuretic use, cardiac hypertrophy, hypokalemia, hypomagnesemia, ≥65 years of age, and/or alcohol abuse.
  - Neuroleptic malignant syndrome
  - Hallucinations. Extrapyrimaldal reaction. Drowsiness.

# Propofol (Diprivan) (1)

- **Effect:** Short-action sedative and hypnotic with amnesia but minimal analgesia.
- **Peak effect:** 30-60 seconds.
- **Half-life** 1.8-4.1 minutes. Recovery in 10-30 (15) min.
- **Cautions:**
  - Patients more likely to reach "deep sedation/analgesia".
    - "Balanced Propofol Sedation" (low dose propofol + narcotic +/- midazolam) is less likely to cause hypoventilation or deep sedation.
  - Can give injection-site pain and pancreatitis.
  - Infection if used after 6 hours.

# Propofol (Diprivan) (1)

- **Pregnancy (Cat B):** OK if given by anesthesiologist.
- **Breast feeding:** Not recommended (? How long)
- **Risk:** deep sedation/analgesia, respiratory depression, hypotension, loss of airway control.
- **Contraindications:**
  - Allergy to eggs, soybean, and lecithin.
  - Sulfites present only in generic formulation.



# Propofol (2)

- **Dose in "Balaced Propofol Sedation":**
  - **INITIAL:**
    - Age  $\leq 70$ : Fentanyl 75 mcg + Midazolam 0.5 mg; then 1 minute later: Propofol (10 mg/mL) 10 mg IV + additional 5-10 (rarely 15) mg q 30-60 sec until sedation (eyes closed) is reached.
    - Age  $> 70$ : Fentanyl 25-50 mcg +/- Midazolam 0.5 mg; then 1 minute later: Propofol (10 mg/mL) 10 mg IV + additional 5-10 mg q 30-60 sec until sedation (eyes closed) is reached.
  - **MAINTENANCE:**
    - 20-25% of total dose needed for induction (up to maximun of 15 mg)
    - Repeat at 30-60 sec intervals, provided that  $\text{SaO}_2$  is  $> 90\%$ , and  $\text{ETCO}_2$  is  $< 47$  mmHg.



# Propofol (2)

## ■ Dose when used alone:

- **Initial:** 40 mg bolus (20-30 mg in elderly)
- **Subsequent:** 10-20 mg as needed.

## ■ Monitoring:

- No change for moderate liver disease or kidney failure; decrease in heart failure or elderly.
- Needs a Nurse dedicated only to the observation/monitoring of the patient; many states do not allow RNs to give Propofol.
- Chest excursion and respiratory effort monitored by endoscopy RN.
- If  $\text{SaO}_2$  drops below 90%, jaw-chin thrust should be done.
- If  $\text{SaO}_2$  is  $< 90\%$  for 30 sec, give  $\text{O}_2$  at 4L/min.
- Capnography increases safety.

# Fospropofol (Lusedra)

- Water soluble prodrug of Propofol; hydrolyzed by alkaline phosphatases releasing propofol, formaldehyde and phosphate. Has rapid onset of action but lower plateau than propofol.
- No analgesic effect: Fentanyl or Meperidine are given before.
- **Side effects:** burning sensation, groin paresthesia, pruritus, hypotension, transient hypoxemia.
- **Dose:** 6.5 mg/kg ideal body weight.
- **Onset:** rapid
- **Duration:** 15-30 min
- **Pregnancy:** Category B

# Dexmedetomidine (Precedex)

- Alpha2 adrenoreceptor agonist, sedative, analgesic.
- **Mechanism:** Sedation by inhibition of neuronal activity by activation of alpha2-receptors in locus caeruleus, producing hypnotic-sedative-anxiolytic effect. Analgesia through receptors in spinal cord.
- **Antagonist:** Atipamezole (Antisedan)
- **Risks:** hypotension, bradycardia, vertigo, nausea, atrial fibrillation, and rarely hypoxia. Initially increases blood pressure, and 5-10 min later decreases blood pressure.
- **Advantage:** Does not depress ventilation.
- **Dose:** 1 mcg/kg, followed by 0.2 mcg/kg/h (IBW)
- **Onset:** < 5 min.; peak at 15 min.
- **Duration:** 85 min.
- **Pregnancy:** category C

# Oropharyngeal Anesthesia

(only skunks spray)

- Adds very little to comfort if sedation and/or analgesia is given.
- **Risk:** decreased gag reflex may facilitate aspiration (do not give in emergency procedure, GI bleed, or PEG)
- Absorption of the drug can cause
  - a) arrhythmia (lidocaine) or
  - b) methemoglobinemia (benzocaine) with cyanosis, altered mentation and brownish blood (Rp: 1% Methylene blue 1-2 mg/kg [7-15 ml] IV over 10-15 min.)
- **Pregnancy:** Lidocaine "gargle/spit" is Category B

# Antagonists

- Naloxone
- Flumazenil
- Atipamezole (for Dexmedetomidine)

# Naloxone (1)

## ■ **Effect:**

- Competitive antagonist of opioids.
- Reverses respiratory depression (1<sup>st</sup> choice), analgesia, pupillary constriction, dysphoria, coma, and convulsions due to narcotics.

## ■ **Peak:** 1-2 min. IV; 2-5 min. SQ.

## ■ **Half-life:** 1-2 hour.

## ■ **Pregnancy (Cat B):** OK to use except in opioid dependency.

## ■ **Dose:**

- a) To continue procedure: 0.1-0.2 mg IV q 2-3 min for respiratory depression.
- b) To abort procedure: 0.4 mg q 2-3 min. May need to repeat in 1-2 hours.



# Naloxone (2)

## ■ **Monitoring post-reversal:**

- a) Fentanyl = 2 hour
- b) Meperidine = 4 hour

## ■ **Risk:**

- Pain, agitation, nausea, vomiting, tachycardia, arrhythmia, pulmonary edema.
- Withdrawal syndrome in opioid-dependent.



# Flumazenil (1)

- **Effect:** Synthetic, water soluble, benzodiazepine antagonist.
- **Cautions:**
  - Does not alter benzodiazepine bio-availability nor kinetics (re-sedation may occur)
  - Delayed reversal of respiratory depression (less effective; second choice to naloxone)
- **Peak** effect: 2-5 min.
- **Duration:** 15 min -2 hours.
- **Pregnancy (Cat C)**

# Flumazenil (2)

- **Dose:**
  - **Initial:** 0.2 mg IV,
  - **Subsequent:** 0.1 mg q 3 min (usually 0.5 mg, total).  
For re-sedation, repeat in 20 min. MAXIMUM: 2 mg
- Can be given at continuous infusion 100 – 400 mcg/hour.
- **Monitor for re-sedation** for:
  - a) Midazolam < 10 mg = **2 hour.**
  - b) Midazolam > 10 mg or Diazepam any dose = **4 hour.**
- **Risk:** Seizures in benzodiazepine-habituated.

# Discontinuation of Monitoring

## Aldrete Score $\geq 9$

Points	Respiration	Oxygen saturation	Consciousness	Circulation	Activity
2	Able to take deep breath and cough	SaO <sub>2</sub> >95% on room air	Fully awake	BP $\pm$ 20 mm Hg baseline	Able to move 4 extremities
1	Dyspnea/shallow breathing	SaO <sub>2</sub> = 90%–95% on room air	Arousable on calling	BP $\pm$ 20–50 mm Hg baseline	Able to move 2 extremities
0	Apnea	SaO <sub>2</sub> <90% even with supplemental O <sub>2</sub>	Not responding	BP $\pm$ 50 mm Hg baseline	Able to move 0 extremities

Monitoring may be discontinued and patient discharged to home or appropriate unit when **Aldrete score is 9 or greater**

Patient should also have the ability to **dress and walk independently.**

# Post-Procedure

- Patient returns to baseline or near-baseline status: Aldrete Score.
- Written instructions for: diet, to resume activities, phone # to call for problems.
- Medicine Reconciliation: no change, added medications, medications temporarily held or discontinued.
- Follow-up arrangements.
- Complete written report for medical record and treating physician(s).
- Complete billing form with:
  - pre-procedure diagnosis/indication,
  - all services given + bill for Moderate Sedation (if given).
  - post-procedure diagnosis (billing form must correlate perfectly with endoscopy report).
- Check all Path., cytology and microbiology results

# Adult Sedation & Analgesia

DRUG	Initial Dose	Interval	Subsequent dose	Observation after last dose
<b>Droperidol</b>	1.25-2.5 mg	5 min	1.25 mg (total up to 10 mg; usually 2.5)	Until awake
<b>Fentanyl</b>	75-100 mcg	2 min	25-50 mcg	Until awake
<b>Meperidine</b>	25-75 mg	5 min	12.5-25 mg	Until Awake
<b>Naloxone (Abort)</b>	0.4 mg	2 min	0.4 mg	Fentan: 2h Meperid: 4h
<b>Naloxone (Continue)</b>	0.1-0.2 mg	2 min	0.1-0.2 mg	Fentan: 2h Meperid: 4h

# Adult Sedation & Analgesia

DRUG	Initial Dose	Interval	Subsequent Dose	Observation after last dose
Midazolam	1-2 mg	2 min	0.5-1 mg	Until awake
Diazepam	5-10 mg	5 min	2.5-5 mg	Until awake
Flumazenil	0.2 mg	1 min	0.2 mg	Midaz <10 : 2h Midaz >10 or Diazep : 4h

# Informed Consent

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# Informed Consent

- Based on principle of self determination
- Should follow process of disclosure and discussion
- Should be obtained for any Procedure or Treatment that involves significant risk.
  - In Research, informed consent is always needed.
- Obtained from patient, unless incompetent or unable to consent. Then from person legally authorized.
- Helps to build strong Doctor-Patient relationship

# Disclosure

- Information that a reasonable and prudent physician would disclose in similar situation, and
  - **A)** Information that reasonable and prudent person, in a patient's position, would like to know, **or**
  - **B)** What the actual patient wants to know

# Elements of Information

- **Diagnosis or Indication for the intervention**
- **Nature and purpose of treatment**
- **Risks**
- **Benefits**
- **Alternatives ( more and less hazardous)**
- **Prognosis without the procedure or treatment.**

# Endoscopy Informed Consent

## Areas to Cover

- **Sedation**/Analgesia
- Planned **Procedure** and possible interventions that may be needed as result of findings.
- **Blood** or blood products (in case of need)
- Inform about possible need for open surgery (but consent is not obtained here)

# Informed Consent in VAMC **iMED**

- You MUST choose ALL THREE, when you start iMED.
- **Procedure**: EGD, Colonoscopy, EGD/Colonoscopy, ERCP, Liver Bx, or Paracentesis (all subcomponents are part of "mother procedure")
- **Sedation**: Moderate sedation with other procedure.
- **Blood**: Blood Transfusion (Choose 1<sup>st</sup> to place it in the title)

# Complications of Colonoscopy and EGD

	Cardio-Pulm	Perforation	Bleed	Mortality	Infection	Pain	Post-Electrocoagulation Synd.	Gas Explosion
Colon	Hypoxia: 0.23% Hypotension: 0.48%	0.1 - 0.3%	Screening: 0.1 - 0.6% 0.21% Polypectomy: 0.87%	Colonoscopy Specific: 0.007%; All Cause: 0.07%	Transient bacteremia 4% Infection is rare	5 - 11%	0.1% - 0.03%	9 reported cases
EGD	0.58%	0.004% - 0.009%	Very rare	No data	Transient bacteremia 8% Infection is rare	Rare		

# Documentation of Consent

- Should **reflect the process:**  
Procedure-specific consent
- Should be in **simple**, layman, 5<sup>th</sup> grade level **language**.
- Document separately that informed consent was obtained (Sedation form, Endo-report)
- **Witnessing no longer required**



# Pitfalls

- Patient **unable to understand**: language, sedation, intellect, ...
- **Voluntariness**: avoid duress or coercion.
- **Incompleteness**: consent for EGD does not include dilation.
- **TO OBTAIN INFORMED CONSENT IS THE RESPONSIBILITY OF THE PHYSICIAN; DO NOT DELEGATE.**

# Exceptions to Obtain Informed Consent

- **Emergency:** life threatening condition in patient unable to consent, without time to find representative of patient
- **Therapeutic Privilege:** disclosure likely to cause emotional or physical harm
- **Waiver:** patient waives right to disclosure
- **Compulsory:** legally mandated treatment.

Questions ?

# Summary of Pre-sedation & Endoscopy History

- Stridor, snoring, sleep apnea
- Home O2
- COPD
- RA of neck
- Dental prosthesis, loose teeth
- CHF
- Recent MI, unstable angina
- Arrhythmia
- Pacemaker
- AICD
- Hx. Endocarditis\*
- Prosthetic heart valve\*
- Vascular graft < 1y\*
- Surg. Pulm-system shunt\*
- Cyanotic heart dz\*

\* Endocarditis prophylaxis is not recommended anymore

# Summary of Pre-sedation & Endoscopy History

- Active pulmonary TB
- Asthma
- Hx. difficult intubation
- Paradoxical sedation reaction
- Adverse reaction to sedation/anesthesia
- Seizures
- Oro-pharyn dysphagia
- Chronic benzodiazepin
- Chronic narcotic
- Alcohol abuse
- Street-drug abuse
- MAO inhibitor use (Nardil, Parnate)
- Cirrhosis
- Renal Insufficiency
- Diabetes mellitus

# Summary of Pre-sedation & Endoscopy History

- Bleeding disorder
- Thrombocytopenia
- Coumadin/warfarin
- Heparin
- Low molecular weight heparin (lovenox, innohep, normiflo, fragmin)
- Plavix, Ticlid
- HIV infection
- Hepatitis B or C

# Summary of Pre-Sedation & Endoscopy

## Physical Exam

- Obesity
- Cachexia
- Neck mass
- Tracheal deviation
- Mouth < 3 cm
- Hyoid- mental distance < 3 cm
- Non-visible uvula
- Cervical extension
- Neck size
- Loose teeth, dental prosthesis
- Evidence of volume overload
- Cyanosis
- Artificial valve click
- Wheezing



# Ramsey Sedation Scale

Score	Responsiveness
1	Patient is anxious and agitated or restless, or both
2	Patient is cooperative, oriented and tranquil
3	Patient responds to commands only
4	Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
5	Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
6	Patient exhibits no response

# Antibiotic Prophylaxis Required

ASGE 2003 & AHA 2007

<b>Procedure</b>	<b>Diagnosis</b>	<b>Regimen</b> (1 hour pre-procedure)
<b>Liver Biopsy</b>	<b>Bilio-Enteric anastomosis</b> <b>PSC w recurrent infection ?</b>	-Cipro 750 mg po -Amp 2 gm IV + Gent 1.5/kg
<b>ERCP or EUS guided FNA</b>	<b>Suspected biliary obstruction</b> <b>Pancreatic pseudocyst</b>	-Amp 2 gm IV + Gent 1.5/kg -Cipro 750 mg po
<b>PEG</b>	<b>Everybody</b>	Cefazolin 1 gm IV + oral care
<b>Any</b>	<b>Cirrhotic with GI bleed</b>	Cipro 500 mg po BID x 7 days Norfloxacin 400 mg BID x 7 days Ceftriaxone 1 gm IV QD x 7 days

# Anticoagulation & Endoscopy

ASGE 2003

PROCEDURE Type & Risk	Anticipated Procedure	Thrombotic Risk	Action
<b>URGENT</b>	<b>-GI bleed treatment</b>	<b>Any</b>	<b>Give FFP until INR 1.5-2.5</b>
<b>ELECTIVE LOW RISK</b>	-EGD, Colon, Enterosc, EUS, ERCP w/o sphincterot, ( +/- Stent/Bx)	<b>Any</b>	Proceed if INR is not Suprathreshold
<b>ELECTIVE HIGH RISK</b>	-Polypectomy, dilation, FNA, Sphincterotomy, variceal treatment, PEG, Laser therapy	<b>Low</b> DVT, Bioprosthetic valve, Mech Ao valve, A fib w/o valv dz	-Discontinue Warfarin 3-5 d before. -Reinstitute after procedure
<b>ELECTIVE HIGH RISK</b>	-Polypectomy, dilation, FNA, Sphincterotomy, variceal treatment, PEG, Laser therapy	<b>HIGH</b> A.Fib w valv dz, Mech Mitral valve, Mech valv w prev thromboemb	-Discont 3-5 d before, -IV heparin while subtherapeutic -D/C heparin 4-6 h before; restart 2-6 h after -Restart Warfarin

# Low Molecular Weight Heparin and Non-Aspirin Antiplatelet Agents ASGE 2005

<b>DRUG</b>	<b>PROCEDURE</b>	<b>ACTION</b>
Lovenox, Normiflo, Fragmin, Innohep	Polypectomy, Sphincterotomy, Dilation, FNA, Variceal Rp, Ablation	Discontinue at least 8 hours before
Lovenox, Normiflo, Fragmin, Innohep	Forceps Bx, Stent without cut, Diagnostic endoscopy	No change in Therapy
Plavix Ticlid	Polypectomy, Sphincterotomy, Dilation, FNA, Variceal Rp, Ablation	Discontinue 7- 10 days before
Plavix Ticlid	Forceps Bx, Stent without cut, Diagnostic endoscopy	No change in Therapy