Self – Assessment and Study Questions

(1) Airway management

a. List steps involved in a Rapid Sequence Intubation
    i. Consider rationale for each
        1. Rapid Sequence Intubation Algorithm
            i. Prepare
            ii. Pretreat
            iii. Position
            iv. Preoxygenate
            v. Pressure
            vi. Paralyze
            vii. Placement
            viii. Position of tube

b. Prepare the necessary equipment
    i. IV access, cardiac monitor, pulse oximetry
    ii. Bag-valve mask (Ambu bag)
    iii. Suction Equipment (make sure it works)
    iv. Laryngoscope with blade (check lightbulb)
    v. ETT (7.0 adult females/8.0 adult male)
    vi. Insert ETT stylet (if desired)
    vii. Medications
    viii. Prepare adjunct airway
        1. Laryngeal mask airway, cricothyroidotomy tray

c. Pretreat
    i. Lidocaine for head injury patients
        1. Decreases IC pressure
    ii. Atropine for children
        1. Prevents bradycardia

d. Position the patient
    i. Raise bed to height appropriate for intubation
    ii. Pace head in sniffing position
        1. With neck extended
            a. Except when C-spine injury suspected

e. Pre-oxygenate
    i. Bag-valve mask with 100% oxygen
    ii. Pulse oximetry should read 100%
    iii. Hyperventilate patient to accomplish nitrogen washout

f. Pressure on cricothyroid cartilage
    i. Sellick maneuver compresses esophagus to limit risk of aspiration

g. Sedation
    i. Etomidate
        1. Does not cause hypotension
    ii. Thiopental
        1. Barbiturate
            a. Can cause hypotension
        2. Midazolam
            a. Benzodiazepine
                i. Quite safe

h. Paralyze the patient
    i. Succinylcholine
        1. 1.5 mg/kg IVP
            a. Onset 45-60 seconds
            b. Duration 5-10 minutes
        2. Do not use
            a. Hyperkalemia
            b. Crush injuries
            c. History of NMD
    ii. Vecuronium
        1. 0.1 mg/kg
            a. Onset 2-3 minutes
                i. Duration 25 to 30 minutes

i. Place the tube
    i. Open the mouth and displace the jaw inferiorly
    ii. Holding the laryngoscope in the left hand
        1. Insert the blade along the right side of the tongue
            a. And the tongue is swept toward the left
        2. If using a curved (macintosh) blade
            a. The tip should be inserted to the vallecula
                i. Space between the base of the tongue and the epiglottis
        3. If using a straight (miller) blade
            a. The tip is inserted beneath the epiglottis
    iii. The laryngoscope is then used to lift the tongue, soft tissues, and epiglottis to reveal the vocal cords
        1. Remember it is a lifting motion
    iv. Upon direct visualization of the cords
        1. The tube is directed through the cords
            a. The stylet (if used) is removed
            b. The tube is connected to an oxygen source
            c. And it is secured after proper placement is confirmed

j. Confirm position of the tube by two methods
    i. Bilateral breath sounds (check both apical lung fields)
    ii. Absence of breath sounds in abdomen
    iii. End-tidal carbon dioxide detection
    iv. Portable CXR
    v. Condensation in ETT corresponding to bag-valve mask breaths
ii. What other patients need a RSI?
    1. Patients undergoing Respiratory failure
        a. ARDS
        b. Respiratory fatigue
        c. Burn victims

b. What can be done to improve mask ventilation
    1. Good position
        a. The facemask should be held to the patient's face with the fingers of the anesthesia provider's left hand lifting the mandible (chin lift, jaw thrust) to the facemask
            i. Pressure on the submandibular soft tissue should be avoided because it can cause airway obstruction
        b. The anesthesia provider's left thumb and index finger apply counter pressure on the facemask
    2. Displacement of the mandible, atlanto-occipital joint extension, chin lift, and jaw thrust combine to maximize the pharyngeal space
    3. A two- or three handed facemask technique can be used
        a. Assistant can help by squeezing the reservoir bag
            i. While the anesthesia provider uses the right hand to mirror the hand position of the left and improve the facemask seal
    4. Airway adjuncts
        a. Oral or nasal airways
            i. Are designed to create an air passage by displacing the tongue from the posterior pharyngeal wall
ii. What clues do you have to indicate you're adequately ventilating the patient?
    1. Condensation in ETT corresponding to bag-valve mask breaths
    2. Improving pulse ox reading

c. Following induction of anesthesia
    i. You cannot ventilate and cannot intubate the patient
        1. What can be done
            a. Needle cricothyroidotomy
                i. Temporizing measure to provide oxygen to a patient emergently after a failed or impossible endotracheal intubation
                    1. The procedure entails inserting a large bore angiocatheter through the cricothyroided membrane
                        a. And providing oxygen through the catheter
                ii. It is important to note that while oxygen delivery can be established with this procedure
                    1. Adequate elimination of carbon dioxide is not achieved

b. Surgical cricothyroidotomy
    i. Allows for rapid establishment of an airway when ET has failed or is impossible
        1. Severe facial trauma
        2. Burns
        3. Impacted obstruction
    ii. Permits both oxygen delivery and ventilation for elimination of carbon dioxide

d. Direct laryngoscopy on an infant
    i. What differences, compared to the adult airway, are you expecting?
        a. The infant airway versus the adult airway
            i. Larynx positioned higher in the neck
                1. C3-C4 (4-5 in adults)
                    a. Tongue to shift more superiorly closer to the palate
                        i. Tongue more easily apposes the palate
                        ii. Which can cause airway obstruction in situations such as the inhalation induction of anesthesia
            ii. Tongue larger relative to the mouth
                1. Relative large size of the tongue makes direct laryngoscopy more difficult
                    a. And can contribute to obstruction of the upper airway during sedation
            iii. Epiglottis larger, stiffer, and angled more posteriorly (more omega shaped)
                1. Blocking visualization of the vocal cords during direct laryngoscopy
                    a. Therefore it is necessary
                        i. Lift the epiglottis with the tip of the blade of the laryngoscope to visual the vocal cords and successfully intubate
                    b. Straight laryngoscopes
                        i. Which have a smaller profile than curved blades
                        ii. More easily fit in the smaller infant mouth
                        iii. Narrower tip also more effectively lift the epiglottis allowing better visualization of the vocal cords
            iv. Head and occiput larger relative to body size
                1. Infant requires a shoulder roll or neck roll to establish an optimal position for facemask ventilation and direct laryngoscopy
            v. Short neck
            vi. Narrow nares
            vii. Cricoid ring is the narrowest region

b. All these differences resolve as the child grows
    i. And usually by the time the child is about 10 years old
        1. The upper airway has taken on more adult like characteristics

2. How do you determine the size and length of an endotracheal tube for infants and children
    a. The most common is the **modified Cole formula** (uncuffed)
        i. [4 + (age/4)] for children aged 2 and older
            1. With standard recommendations for younger children, based on both age and weight
    b. **Khine formula**
        i. The formula used to calculate the correct size of cuffed endotracheal tube
            1. [(age/4) + 3]

(2) ASA Physical Status, NPO guidelines, and Airway Evaluation

a. ASA Physical Status
    i. ASA II/III with or without E
    ii. ASA IV/V with or without E
b. NPO Status
    i. NPO fasting guidelines
        1. Fasting periods (assuming no risk for increased gastric emptying time
            a. Adults
                i. 2-4 hours clear liquids (do not cancel the surgery)
                ii. 6-8 hours for solids
            b. Pediatrics
                i. 2 hours clear liquids (do not cancel the surgery)
                ii. 4 hours breast milk
                iii. 6 hours formula, non- human milk
c. List the key features of a complete airway evaluation
    i. Assessment of:
        1. Oropharyngeal space
            a. Examine the mouth and oral cavity
                i. Noting the extent and symmetry of opening (three fingerbreaths is optimal
                    1. The health of the teeth
                        a. Loose, missing, or cracked teeth should be documented
                            i. As well as the presence of dental appliances
                        b. Prominent buck teeth may interfere with the use of a laryngoscope
                    2. Size of tongue
                        a. Large tongues –more difficult
                    3. Arch of the palate

b. Mallampati score
    i. Class I
        1. The soft palate, fauces, uvula, and tonsillar pillars are visiable
    ii. Class II
        1. The soft palate, fauces, and uvuala are visible
    iii. Class III
        1. The soft palate and base of the uvula are visible
    iv. Class IV
        1. The soft palate is not visible
2. Atlanto-occipital extension/neck mobility
    a. Flexion of the beck, by elevating the head approximately 10 cm
        i. Aligns the laryngeal and pharyngeal axes
    b. Extension of the head on the atlanto-occipital joint is important for aligning the oral and pharyngeal axes to obtain a line of vision during direct laryngoscopy
3. Thyromental/sternomental distance
    a. A thyromental distance (mentum to thyroid cartilage)
        i. Less than 6-7 cm correlates with poor laryngoscopic view
            1. This is typically seen in patients with a receding mandible or a short neck
    b. Distance is often estimated in fingerbreadths
        i. Three ordinary fingerbreaths approximate this distance
4. Submandibular compliance
5. Body habitus
6. Length of the neck
7. Thickness of the neck

d. What are the basic anesthesia monitors that American Society of Anesthesiologists requires?
    i. Cardiac monitor
    ii. Pulse Ox
    iii. Capnography
    iv. Oxygen analyzer
    v. Disconnect alarms
    vi. Body temperature measurements
    vii. Visual display of an electrocardiogram during the intraoperative period in all patients
    viii. Systemic BP and HR must be evaluated every 5 minutes

(3) Fluid Management and Invasive Hemodynamic Monitoring

a. Calculate the body fluid deficit for a 5 year old 20 kg child who has been NPO for 8 hours.
    i. Fluid deficit
        1. Equals the maintenance fluid replacement multiplied by the hours since last intake plus unreplaced preoperative external and interstitial/third space losses
            a. So equals 480 ml deficit
        2. 20 kg
            a. 40 +20 = 60 x 8 = 480 ml fluid deficit
        3. Remember 3 to 1 rule
            a. Replace 3 times what has been lost
b. What is this patient's blood volume? Why is this important to know? How do you asses and replace intra-op fluid and blood losses?
    i. EBV (estimated blood volume)
        1. =weight (kg) x average blood volume
            a. Infants =80 ml/kg
                i. So 20 kg x 80 ml/kg
                    1. 1600 ml
    ii. Important to determine EBV so can be aware of acceptable blood loss
    iii. Routine intraoperative fluids
        1. Key aspects of the traditional approach include replacement of preoperative deficits, maintenance fluids, third space fluids, insensible loss, and blood loss
            a. Rate of fluid
                i. CVE + Deficit +maintenance administration + loss +third space
c. During repair of an AAA, there is an acute blood loss of several units of blood. What are your concerns regarding massive transfusion?
    i. Concerns for transfusions
        1. Transmission of infectious diseases
        2. Transfusion related acute lung injury
        3. Transfusion related immunomodulation
        4. Hypothermia
        5. Coagulation
        6. Anaphylaxis
d. A 70 yr old with known cardiomyopathy with an EF of 20% presents with bowel obstruction for emergency ex. Lap.
    i. What invasive monitoring would you use?
        1. Direct arterial pressure monitoring
            a. Continuous blood pressure monitoring is accomplished by placement of a catheter in a peripheral (usually radial artery)
                i. Direct blood pressure monitoring is indicated
                    1. Cardiopulmonary bypass
                    2. Wide swings in blood pressure are expected
                    3. Rigorous control of blood pressure is necessary
                    4. Need for multiple analyses of ABGs

2. Central Venous Pressure Catheter
    a. Used to monitor ventricular filling when it is the clinically critical structure or to measure left ventricular filling
        i. Normal CVP – 2 and 7 mm Hg
        ii. Waveforms consist of 3 positive waveforms
            1. Called
                a. A
                    i. Represents the Right atrial pressure increase during the phase of atrial contraction
                b. C
                    i. Caused by the bulging of the closed tricuspid valve into the right atrium during the beginning of the ventricular systole
                c. V
                    i. Representing filling of the atrium while the tricuspid valve is closed
        iii. And two negative slopes
            1. X
                a. Occurs during ventricular systole and corresponds to atrial relaxation
            2. Y
                a. Descent occurs when the tricuspid valve opens and the atrium starts to empty
3. Pulmonary artery catheter measurement
    a. PA (pulmonary artery) catheter is 110 cm long
        i. With a balloon at the tip with a capacity of 1.5 ml
            1. Used to measure
                a. CO
                b. Mixed venous oxygen tension
                c. Pulmonary arterial and right atrial pressures
                d. LVEDP
                e. Pulmonary artery occlusive pressure (PAOP)
                    i. Used as a measure of LVEDP
                    ii. Normal occlusive pressure is about 8 to 12 mm Hg
        ii. Indications for insertion of a pulmonary artery catheter
            1. Poor left ventricular function
                a. EF <40%
            2. Assessment of IV fluid volume
            3. Evaluation of the response to fluid administration
            4. Valvular heart disease
            5. Recent MI
            6. ARDS
            7. Massive trauma

4. Echocardiography
    a. TEE
        i. Information derived from an Intraoperative Transesophageal Echo
            1. Regional wall motion abnormalities
            2. Stroke volume (EF)
            3. Cardiac valve function
            4. Intracardic air
            5. Effects of anesthesia and surgery on heart function
            6. Adequacy of IV fluid volume

ii. What special complications must you consider with these monitors?
    1. CVP
        a. Carotid artery puncture
        b. Trauma to the brachial plexus
    2. Complications from the placement of PA catheters are infrequent (<0.5%)
        a. Dysarhythmias
        b. Catheter knotting
        c. Cardiac valve injury
        d. Pulmonary artery rupture
    3. TEE
        a. Oral and pharyngeal injuries occur with introduction of the TEE probe into the esophagous
            i. Esophageal rupture
            ii. Bronchial and arterial compression can occur

iii. Review the insertion techniques for these invasive lines.

iv. You place a pulmonary artery catheter without complications - the cardiac output is 4 L/min and the heart rate is 80/min.
    1. What is the calculated stroke volume?
        a. 50 ml

v. If the patient's Oxygen saturation is 95% and the Hgb is 10 and the PaO; is 90
    1. Calculate the O2 carrying capacity?
        a. Blood **oxygen carrying capacity** = Hb(gm %) x 1.34 (ml O2/gm of Hb) x 10

vi. What is a "wedge" pressure and what does it reflect?
    1. Wedge pressure or PAOP
        a. Used as a measure of the LVEDP
            i. To measure the occlusive pressure, the distal balloon is inflated
                1. Thus isolating the distal lumen
        b. Theoretically blood flow ceases between the tip of the catheter and left atrium
            i. During diastole
                1. When the mitral valve is open
                    a. The pressure between the left atrium and left ventricle should equalize
                2. Thus allowing the tip of the catheter to register the LVEDP

vii. Would a central venous pressure give you the same information?
    1. No

(4) Drug Classes

a. The most commonly used IV induction agents are **propofol, pentothal and etomidate**.
    i. Which would be appropriate choices for intravenous induction agents in the following case scenarios?
        1. Consider some drawbacks and benefits of each choice.
    ii. Healthy 18 year old scheduled for outpatient inguinal hernia repair.
        1. Propofol
            a. Most frequently administered anesthetic agent for induction of anesthesia
                i. Increasingly it is utilized for conscious sedation and short duration general anesthesia
    iii. 85 year old with known CAD and hypovolemia for emergency surgery.
        1. Etomidate
            a. A characteristic and desired feature of induction of anesthesia with etomidate is cardiovascular stability after bolus injection
                i. In this regard
                    1. Arterial blood pressure decreases are modest or absent
                    2. Etomidate produces minimal changes in heart rate and cardiac output
                        a. Depressive effects of etomidate on myocardial contractility are minimal at concentrations used for induction of anesthesia
    iv. 50 year old with large intracranial mass and known increased ICP.
        1. Pentothal (thiopental)
            a. Barbiturates
                i. Produce dose dependent CNS depression ranging from sedation to general anesthesia
                ii. Barbiturates are potent cerebral vasoconstrictors and produce predictable decreases in CBF, cerebral blood volume, and ICP.
                    1. The ability of barbiturates to decrease ICP makes these drugs useful in the management of patients with space occupying lesions
b. A surgeon tells you he just returned home from the Amazon Jungle.
    i. He says most anesthetics there were performed using ketamine (and sometimes oxygen) alone by IM injection.
        1. He wants to know **why ketamine isn't used as the sole anesthetic here as well.**
            i. Ketamine, a phencyclidine derivative, is different from most other IV anesthetics in that it produces significant analgesia
                1. The characteristic cataleptic state observed after induction dose of ketamine is known as “dissociative anesthesia
                    a. Wherein the patient’s eyes remain open with a slow nystagmic gaze
            b. What potential problems might occur using ketamine?
                i. Unpleasant emergence reactions after ketamine
                    1. Are the main factors limiting its use
                        a. Vivid colorful dreams
                        b. Hallucinations
                        c. Out-of-body experiences
                        d. Increased an ddistored visual, tactile, and auditory sensitivity

2. These reactions can be associated with fear and confusion
    a. But a euphoric state may be also induced
        i. Explains the potential for abuse of the drug

c. In **what operating room situations would you choose to use fentanyl vs. morphine vs. meperidine vs. nubain?**??
    i. What characteristics of these narcotics lead to your choices?
        1. Fentanyl
            a. May be the most important opioid used in modern anesthesia practice
                i. Can be delivered in numerous ways
                    1. IV, transdermal, transmucosal, transnasal, and transpumonary
            b. Transdermal and transmucosal
                i. Avoidance of first pass effect results in substantially greater bioavailability
                    1. Non-invasive and rapid in onset has made it a successful therapy for breathrough pain in opioid-tolerant cancer patients
        2. Morphine
            a. Slow onset time
                i. pKa is almost completely ionized at physiologic pH
                    1. this property along with its low lipid solubility
                        a. accounts for morphine's prolonged latency time
                            i. penetrates the CNS slowly
                ii. both advantages and disadvantages
                    1. prolonged latency to peak
                        a. means that morphine is perhaps less likely to cause Acute respiratory despression after bolus injection
                    2. slow onset time means that clinicians are perhaps more likely to inappropriately stack multiple morphine doses in a patient experiencing pain
                        a. thus creating the potential for toxic overshoot

d. A 45 year old with ESRD, IDDM, right sided weakness from previous CVA and end-stage alcoholic liver disease presents for bowel obstruction surgery .....
    i. What muscle relaxant(s) might you choose to use in this patient?
        1. Why?
    ii. What paralytic agent(s) should you definitely avoid here?
        1. In this situation I would avoid paralytic agents which are renally excreted and undergo hepatic degradation due to the patients ESRD and end stage alcoholic liver disease
            a. I would avoid Pancuronium, Vecuronium, Rocuronium
                i. Instead use Atraccurium, cisatracurium, and mivacurium
                    1. Because they undergo hydrolysis in plasma
    iii. Why **do we use paralytic agents for intubation**?
        1. Principal clinical use of paralytic agents is to produce skeletal muscle relaxation for facilitation of tracheal intubation and to provide optimal surgical working conditions

e. The surgeon is ready to make incision and the expired Sevoflurane concentration is 1.2%.
    i. If no other anesthetics are being used
        1. Will the patient move with surgical stimulus or are they adequately anesthetized?
            i. **In this case I do think that the patient will move**
                1. **MAC or Minimum alveolar concentration**
                    a. Defined as the concentration of the vapour in the lungs that is needed to prevent movement (motor response) in 50% of subjects in response to surgical (pain) stimulus
                2. In this case the MAC for sevoflurane is 1.8%
                    a. So 1.2% is actually less than the MAC for sevoflurance
                        i. So there is an increased chance that the patient will move
    ii. How do you know?
        1. Test for reflexes
            a. Palpebral (blink) reflex
                i. Tested by lightly tapping the medial or lateral canthus of the eye and observing whether there is a blink
            b. Pedal
                i. Elicited by pinching a digit and observing whether there is flexion of the leg and withdrawal from the stimulus
    iii. What effects will Sevoflurane and Isoflurane have on your patient's cardiovascular and respiratory systems?
        1. Cardiac
            a. Mean arterial pressure decreases with increasing concentrations of sevoflurane and isoflurane
                i. On the otherhand
                    1. Heart rate increases with dosage of sevoflurane and isoflurane
                        a. But with minimal impact on the cardiac index
        2. Respiratory
            a. Chest wall changes
                i. Cephalad displacement of the diaphragm and inward displacement of the rib cage occur from enhanced expiratory muscle activity
                    1. Net result **contributes to a decrease in FRC**
                        a. Increased risk of atelectasis
            b. Hypoxic pulmonary vasoconstriction
                i. Inhaled anesthetics alter pulmonary blood flow, but inhibition of hypoxic pulmonary vasoconstriction is minimal
            c. Airway resistance is reduced
            d. Irritant effects
                i. Sevoflurance – non-irritating
                ii. Isoflurance - irritating
f. Are there any special medications you would want to give preoperatively:
    i. To an extremely anxious patient?
        1. Benzofiazepines
            a. Midazolam
            b. Lorazepam
        2. Opioids
            a. Fentanyl
            b. hydromorphine

ii. What about the patient at very high aspiration risk?
    1. Antoemetics
        a. Scopolamine and ondansetron
    2. PPI
        a. Omeprazole and pantoprazole
    3. Gastrointestinal stimulants
        a. Metoclopramide

(5) Regional Anesthesia Cases

a. Infiltrate a large leg wound with local anesthetic to suture
    i. He wants to know how much lidocaine he can use (pt is 70 kg)
        1. Usual adult does for anesthesia
            a. 4.5 mg/kg/dose (do not repeat within 2 hours)
                i. 315 mg
    ii. How much bupivacaine?
        1. Usual adult dose for local anesthesia
            a. Single dose up to 175 mg
                i. Doses may be repeated up to once every 3 hours
            b. Maximum dose: 400 mg/24 hours
            c. Local infiltration
                i. 0.25% concentration
b. What sorts of problems would you expect with a local anesthetic overdose?
    i. Systemic toxicity often results from high plasma concentrations or often from accidental intravascular injections
        1. CNS
            a. Visual changes, numb tongue, lightheadedness, restlessness
            b. Perioral paresthesia, muscle twitch, slurred speech, drowsiness
            c. Seizures, cardiorespiratory depression, com
        2. Cardiovascular
            a. Palpitations, vasodilation, HTN, ventricular arrhythmias, myocardial depression, hypotension, bradycardia, CV collapse
        3. Respiratory
            a. Hypoventilation, respiratory arrest
        4. Allergy
            a. More common in esters
c. What properties of lidocaine would make it a better or worse medicine than bupivacaine to infiltrate?
        1. Lidocaine would be better because it has a shorter onset time and has a shorter duration (30-60 minutes) which would correspond better to shorter procedures
            a. It would be worse in the fact that bupivacaine is more potent than lidocaine and that bupivacaine has a longer duration of action
    ii. Should he use epinephrine containing solutions?
        1. I would use epinephrine in this situation
            a. It is added to provide longer duration of anesthesia, promote hemostasis, and slow systemic absorption

d. How does a spinal anesthetic differ from an epidural anesthetic?
    1. Spinal
        a. Rapid onset analgesia that provides excellent pain relief for procedures of limited duration (30-250 minutes)
            i. A form of regional anesthesia involving injection of a local anesthetic into the subarachnoid space
                1. Generally through a fine needle (usually 9 cm long)
    2. Epidural
        a. Most effective form of pain relief
            i. Can also be used for cesarean delivery or postpartum tubal ligation
        b. A technique whereby a local anesthetic drug is injected through a catheter placed into the epidural space
            i. This technique has some similarities with spinal anesthesia
                1. The involved space is larger for an epidural and subsequently the injected dose is larger
                    a. Being about 10-20 ml in epidural anesthesia
                        i. Compared to 1.5-3.5 ml in spinal
                2. In an epidural an indwelling catheter may be placed that avails for additional injections later
                    a. While a spinal is almost always a one shot only
        c. The onset of analgesia is 15-30 minutes in an epidural
            i. While it is about 5 minutes in a spinal
    ii. What are the risks associated with each?
        1. Spinal
            a. Limited duration, puts patients at risk for hypotension, postdural puncture headache, and transient neurologic symptoms
        2. Epidural
            a. Can result in prupritus, fever, hypotension, and transient FHR deceleerations
e. What are the benefits of a regional vs general anesthesia?
    i. Regional (local) anesthesia
        1. Lidocaine
            a. Excellent anesthesia before episiotomy and during repair of lacerations
                i. Can be used to perform a pudendal block
            b. Rarely
                i. Causes seizures, hypotension, and transient FHR decelerations
    ii. General anesthesia
        1. Can be used in emergent cesarean delivery and indicated in some cases of FHR abnormality
            a. Can be useful in cases where regional anesthesia is absolutely contraindicated or fails
        2. Requires airway control, carries significant risk of maternal aspiration, neonatal depression (inhaled anesthetic agents readily cross the placenta)
            a. Associated with higher maternal morbidity rates than epidural anesthesia

f. Would you perform a spinal on a patient who is on Coumadin?
    i. No
g. What about someone who was on therapeutic heparin dose and 6 hours prior to coming to the OR it was discontinued?
    i. No, you must wait 12 hours after last administration
        1. What are your concerns in the anticoagulated patient?
            a. Bleeding
h. While performing an axillary block using the trans-arterial approach
    i. The patient begins to shake wildly
        1. What would cause this?
            a. Systemic effects of local anesthetics such as lidocaine
            b. PMH of seizures in the patient
        2. How would you treat the patient?
            a. If lidocaine toxicity is suspected
                i. Stop the injection immediately
            b. Ensure adequate oxygenation (ABCS)
            c. Benzodiazepines are the drugs of choice for seizure control
                i. Phenytoin is not effective and should be avoided
                    1. Succinylcholine
                        a. Is sometimes used to terminate the neuromuscular effects of seizures
                            i. But requires intubation
            d. In severe reactions
                i. Monitor CV systems
                    1. And support the patient with IV fluids and vasopressors
                        a. Small boluses doses of epinephrine are preferred