Zander
CST Exam
Preparation Course

Zander Perioperative Education

www.periop-ed.com 803.271.0744
Certification Courses available for CNOR™, CAPA/CPAN, CST, and CRCST
Test Taking Strategies

Objectives:
1. Apply Test Taking Strategies for the CST exam
2. Create a Personal Study Plan
3. Eligibility

• Registering for the exam
• Exam Format
• Time Management
• Test Taking Strategies

Eligibility

• Current or previously Certified Surgical Technologist (CST)
  ▫ Evidence of CST Certification
• Graduate of a surgical technology program accredited by CAAHEP
  ▫ Evidence of proof of graduation
• Graduate of a surgical technology accredited by ABHES
  ▫ Evidence of proof of graduation
Military Eligible

- A graduate of a military training program in surgical technology is always eligible whether it was before, during or after having CAAHEP accreditation.
  - a copy of your DD214 (must state location of the base where program was completed),
  - a copy of your graduation certificate from the surgical technology training program
  - a smart transcript

Accelerated Alternate Delivery (AAD) Pathway

- Have on-the-job training in surgical technology
- Are a graduate from a surgical technology program that did not hold CAAHEP accreditation during your enrollment

CST Testing Fees

<table>
<thead>
<tr>
<th>First Time Test Takers</th>
<th>Exam Fee (AST Members)</th>
<th>Exam Fee (Non Members)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$190</td>
<td>$290</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current or Previous Certified Surgical Technologist Renewing Certification by Examination</th>
<th>Exam Fee (AST Members)</th>
<th>Exam Fee (Non Members)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$399</td>
<td>$499</td>
</tr>
</tbody>
</table>
Approval to test

- Apply to test at
  - www.nbtsa.org

- Authorization to test letter
  - Candidate identification number
  - Note the expiration date

- Scheduling the exam at
  - www.goAMP.com
  - or call 888-519-9901

The Day of the Exam

- Arrive on time

- Two forms of identification
  - Photo ID with signature
  - Second form of ID
  - Names on ID's and ATT letter must match

- The testing environment

About the Exam

- 200 questions
- 175 scored, 25 trial questions
- Multiple Choice only
- 4 hours to finish

- Pass / Fail Score Report
  - Correctly answer 118 questions to pass

- Off campus testing – scored within 5 minutes
- On campus testing - notification within 2 weeks
### Exam Subject Areas

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Percent of Exam</th>
<th>Number of Test Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preoperative Preparation</td>
<td>16%</td>
<td>29</td>
</tr>
<tr>
<td>2. Intra-Operative Procedures</td>
<td>37%</td>
<td>66</td>
</tr>
<tr>
<td>3. Post-Operative Procedures</td>
<td>6%</td>
<td>10</td>
</tr>
<tr>
<td>4. Administrative and Personnel</td>
<td>6%</td>
<td>10</td>
</tr>
<tr>
<td>5. Equipment Sterilization and Maintenance</td>
<td>6%</td>
<td>10</td>
</tr>
<tr>
<td>6. Anatomy and Physiology</td>
<td>17%</td>
<td>30</td>
</tr>
<tr>
<td>7. Microbiology</td>
<td>6%</td>
<td>10</td>
</tr>
<tr>
<td>8. Surgical Pharmacology</td>
<td>6%</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>175</td>
</tr>
</tbody>
</table>

### Keep in mind

- The exam is based on tasks/duties performed by CST's nationwide.
- Based on AST recommended practices
  - Free online
- This is an entry-level exam. No assumption of experience.

### What if you don’t know?

- Umbrella answer
- Same answers are ruled out
- Opposite answers
- Odd man wins
- Repeated words
- Absolutes
Study Tips

• Assess your level of competency
• Study according to your competency level in each area
• Organize a study group if you study best that way
• Take as many practice tests as you can

Choosing Study Aids

• Utilizes same test question structure as CST exam
• Covers all 8 subject areas of the exam
• Utilizes most current edition of:
  ▫ Surgical Technology: Principles and Practice
  ▪ Comes with free access to Elsevier instructional videos
  ▫ Alexander’s Care of the Patient in Surgery
  ▫ Surgical Technology for the Surgical Technologist: A Positive Care Approach

Don’t Freak out
Test Taking Strategies Quiz

- 11 Questions
- 13 Minutes
Test Taking Strategies

1. You’re assisting in the transport of a patient from the floor. When pushing the patient into the elevator how should the stretcher be oriented?

   A. Place the stretcher sideways in the elevator
   B. Enter head first, exit feet first
   C. Position in the elevator is irrelevant
   D. Enter feet first, exit head first

2. Which curved low transverse incision is commonly used for caesarian section?

   A. Subcostal incision
   B. McBurney’s incision
   C. Kocher incision
   D. Pfannenstiel

3. What type of procedure is the removal of teeth?

   A. Arch bar application
   B. Extractions
   C. Implants
   D. Cleft palate repair

4. Permission for treatment given with full knowledge of risks is called what?

   A. Tort action law suit
   B. Civil law suit
   C. Criminal negligence
   D. Informed consent

6. What factors reduce the exposure to ionizing radiation exposure?

   A. Type of procedure, time and distance
   B. Exposure, concentration, shielding
   C. Time, shielding and distance
   D. Radiation dose, shielding and distance
7. Which muscle type is the quadriceps?
   A. Visceral
   B. Cardiac
   C. Skeletal
   D. Smooth

8. Which procedure would you need this instrument?
   A. Total knee replacement
   B. Blepharoplasty
   C. Laminectomy
   D. Meniscectomy

9. How should the OR team decide to treat a Jehovah’s Witnesses
   A. Do not give the transfusion
   B. Two physicians may sign consent for the transfusion
   C. Always give a transfusion when needed
   D. Obtain a court order to provide the transfusion

10. Patient condition necessitates an emergency cesarean section. Which of the following might be omitted?
    A. Surgical skin prep
    B. Counts
    C. Draping
    D. Donning sterile gown

11. Which of the following is true when double peel packing an instrument for sterilization.
    A. The inner pack is folded to fit completely within the outer pack
    B. Bind multiple items together
    C. There is not a need to double peel pack heavy items
    D. The inner pack may not be folded
What is your learning style?

- How do you figure things out in an unstructured learning situation?

- Learning Style Quiz
WHAT IS YOUR LEARNING STYLE?
Here are some questions you can ask yourself to help determine the learning style you prefer. The questions are organized by which modality (kinesthetic, visual and auditory) a person prefers for different learning tasks: taking in and organizing new information, decision making, and remembering and creating.

Questions to determine the taking in and organizing preference:

1. I learn new information best by:
   k ( ) participating in an activity myself after a short explanation
   v ( ) reading or looking at a diagram or demonstration
   a ( ) listening to a lecture or spoken instructions

2. When I am inactive but need to stay alert, I:
   k ( ) find ways to move
   v ( ) stare, watch something, or doodle
   a ( ) listen to sounds around me, hum, or talk to myself

3. I have these qualities:
   k ( ) Interact best by moving, doing, physical contact and like hands-on activity
   v ( ) Connect with others through eye contact and need visual order
   a ( ) Interact easily by talking and like lectures and discussions

4. The kind of language I most commonly use is:
   k ( ) how do you feel about this, I can’t grasp that, that is comfortable for me
   v ( ) look at it this way, I just can’t see the point, that is crystal clear to me
   a ( ) can I tell you how I think about that, do you hear me, that sounds right to me

5. My emotions are apparent to others by:
   k ( ) muscular state and movement
   v ( ) facial expression
   a ( ) voice tone

Questions to determine the decision making or sorting preference:

1. As part of my sorting process, I:
   k ( ) use my hands to find words
   v ( ) use writing, drawing, or visual images to find words and feelings
   a ( ) recall information through words such as a quote or the line of a song that fits that fits the situation

2. If I am trying to make a decision, it helps me to:
   k ( ) do something physical like go for a walk
   v ( ) write, draw, or look at nature
   a ( ) speak to someone or listen to something
3. I can do these things at the same time:
   k ( ) move or touch something and also feel emotions deeply
   v ( ) see things externally and also have inner visual images
   a ( ) listen to external sounds and to own thoughts, listen to radio and read

4. For me intimacy involves:
   k ( ) talking about feelings and fantasies or having total silence and eye contact
   v ( ) seeing and being seen, especially deeply receiving someone with own eyes
   a ( ) hearing and being heard, speaking slower to become more personal

Questions to determine the remembering and creating preference:

1. It takes longer for me to access:
   k ( ) physical sensations
   v ( ) visual images
   a ( ) words and sounds

2. A characteristic I have is:
   k ( ) disliking most physical competition and being able to sit still a long time
   v ( ) becoming overwhelmed by visual detail and disliking eye contact
   a ( ) “spacing out” from lots of spoken words and navigating through questions

3. Another quality I have is that I:
   k ( ) am relatively unaware of bodily sensations
   v ( ) get lost in visual material
   a ( ) get lost in conversation or listening to a lecture

4. If I am listening to someone on the phone, I would be most distracted by:
   k ( ) someone putting their hand on my arm or massaging my shoulders
   v ( ) someone giving me something they want me to read
   a ( ) someone asking me a question or playing loud music
AVK - Must talk to learn

- Get in a Study Group
- Hand held recorder
  - Notes
  - Text book
- Share what you are learning with others
- Participate in class discussion
- Read out loud

AKV - Listen while moving

- Another AKV as a study partner. Not a study group
- Hand Held Recorder
  - Notes
  - Text books
  - Listen during movement
- Must get up to move about
- Memorize lists by putting to music or rhyme

KVA - Physical activity a must

- Study partner that will study and move with you is perfect
  - Not a study group
- Flash cards – visual notes on the move
- Retype notes into a word document
- Fidgeting = learning
KAV - Physical activity a must

- Hates to read directions – figures it out
- Study partner that will move with you - not a study group
- Hand held recorder
  - Notes
  - Text books
  - Must be moving while listening
- Retype notes into a word document
- Most ready to retain information during or immediately after physical activity

VAK - Must teach to learn

- Study best with minimal visual clutter
- Organize and rewrite your notes as if you are preparing to teach
- Create charts or tables for information
- Great note taker
  - Review notes often
- Video yourself doing this class using your notes

VKA - Traditional Learning Style

- Study groups work well for you
- Flash cards – make your own
- Make up stories about the topics you are learning
- Take notes and review them often
  - Highlight
  - Write thoughts in the margin as you study
How to study

- Tips from learning style
- Gather notes and study materials
- Assess your strengths and weaknesses
- Create study tools
- Schedule Study time
Perioperative Care

Objectives:
1. Describe the Surgical Technologist’s responsibility during the preoperative preparation
2. Describe the Surgical Technologist’s responsibility during the intraoperative procedure
3. Describe the Surgical Technologist’s responsibility during the post operative period

- Preference Cards
- Time out
- Positioning
- Counting
- Bone and Tissue Grafts
- Hemostasis
- Specialty equipment
- Traffic Control
- Medications
- Electrocautery
- Lasers
- Wound Closure
- Suture
- Post operative procedures

Pre-Operative Preparation

- Review surgeon’s preference card
- Verify availability of surgery equipment
- Prepare and maintain operating room environment according to surgical procedure

Pre-Operative Preparation

- Utilize preoperative documentation
- Obtain and apply additional equipment
- Personal protective equipment
  - Check integrity of packaging
  - Create and maintain sterile field
  - Scrub, gown and glove
  - Set up sterile instruments for every case—disassemble and inspect
  - Look at patient needs
Time Out
- Prior to procedure and ideally prior to anesthesia
- Done by a designated person, in a standardized manner defined by the organization
- Two way conversation. Information given and acknowledged as correct or not
- The process for reconciling discrepancy is defined
- One time out is performed for each procedure

Positioning
- Transfer/transport
  - Always check with anesthesia 1st
  - Four people to transfer
  - Remove restraints
  - Lock wheels

Positioning - Supine
<table>
<thead>
<tr>
<th>Indications</th>
<th>Safety Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most common position</td>
<td>Maintain Spinal Alignment</td>
</tr>
<tr>
<td></td>
<td>Legs parallel</td>
</tr>
<tr>
<td></td>
<td>Ankles uncrossed</td>
</tr>
<tr>
<td></td>
<td>Pad the head and elbows</td>
</tr>
<tr>
<td></td>
<td>Float the heels</td>
</tr>
</tbody>
</table>
Positioning Supine

Reverse Trendelenburg
- Insertion of the Verres needle
- Craniotomy
- Breast reconstruction
- Neck procedures

Trendelenburg
- Head down
- Helps with difficult insertion of neck lines
- Pelvic surgery

Positioning - Lithotomy

Indications
- Perineal surgery
  - Hemorrhoidectomy
  - Prostatectomy
  - Vaginal procedures
  - Variation = Frog leg
  - CABG for saphenous vein access
  - Fem Pop

Safety Precautions
- Stirrups should be even
- Buttocks to the edge of the bed
- Elevate legs evenly then lower legs one at a time if possible
- Maintain minimal external rotation of hips
- Place arms on abdomen or on arm boards at <90°
- Protect hands when raising or lowering the bottom of the bed

Positioning - Lateral

Indications
- Thoracic
- Kidney

Safety Precautions
- Support head and upper arm to prevent Brachial Plexus injury
- Flex lower leg
- Pillow between knees
Positioning - Prone

<table>
<thead>
<tr>
<th>Indications</th>
<th>Safety Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spine surgery</td>
<td>Arm boards should be lower than table</td>
</tr>
<tr>
<td>Arms tucked for cervical spine procedures</td>
<td>Chest roll from clavicle to iliac crest improves chest expansion</td>
</tr>
</tbody>
</table>

Positioning - Sitting

<table>
<thead>
<tr>
<th>Indications</th>
<th>Safety Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Craniotomies</td>
<td>Secure hands on lap</td>
</tr>
<tr>
<td>Shoulder</td>
<td>Foot board maintains dorsiflexion</td>
</tr>
</tbody>
</table>

Pre-Operative Preparation

- Apply patient safety measures
- Apply patient monitoring devices
- Consider patient needs
  - Latex Allergy
  - Mobility issues
Prepare for Skin antisepsis

- Verify the site before you prep

- Hair Removal at site only in select clinical situations.
  - Hair should be left in place
  - Remove outside of OR or in a manner that prevents dispersal of hair into the air
  - Disposable Clippers are preferred

Prepare for Skin antisepsis

- Wash superficial dirt and debris from skin before prep

- Areas of greater contamination should be cleansed before prep

- Isolate highly contaminated areas with a sterile barrier drape

Apply in a safe and effective manner

- Completed by non-scrubbed team member
  - Sterile gloves for sponge, non-sterile gloves for long applicator
  - Covered arms to prevent shedding
  - Prep from incision to periphery
Apply in a safe and effective manner

- Follow manufacturer’s instructions
- No unprepped skin should show through the fenestration in the drape
- Surgical site mark should remain after the prep
- Prep should be washed off after application of dressing

Apply in a safe and effective manner

- Highly contaminated sites
  - Prep low count area incision to periphery then highly contaminated site last
  - Cover an ostomy in the site with a sponge soaked in prep solution

- Abdominal / Perineal Prep
  - Prep vaginal area first and abdomen second

Review Abdominal Incisions
Pre-Operative Preparation

• Secure cords/tubing to drapes with non piercing clamp and apply light handles.

• Drape specialty equipment.

Preoperative Practice Test

• 15 Questions
• 18 Minutes

• 30 Questions on CST exam

*Hey, when he jokes us, how 'bout I talk but you make the notes?*
Preoperative Practice Test

1. When applying surgical drapes:
   A. Reposition the drape if the fenestration is in the wrong area
   B. Shake drapes to
   C. Cuff sterile hands and unfold away for surgical site
   D. Cuff sterile hands and unfold toward the surgical site

2. What is a shear injury?
   A. Two tissue planes are forcefully pulled in opposite directions
   B. A nerve injury caused by stretching or compressing a nerve
   C. Ischemic injury to the tissue caused by prolonged pressure over the area
   D. Nerve injury resulting in numbness or loss of function

3. You are escorting a patient to the OR when they begin to fall into you. How should you respond?
   A. Catch the patient and hold them up to prevent injury
   B. Assist the falling patient to the ground while protecting the person’s head
   C. Place the patient in a comfortable position on the floor and go get a wheelchair
   D. Quickly back away so the patient does not injure you

4. How would you prevent contamination of the gloved hands while placing a flat drape on the patient?
   A. Hold the edges of the drape sliding it over the patient until it’s in the correct position and then drop into place
   B. Use a piercing towel clamp to adjust the drape once it is positioned so you don’t touch the edge with your glove
   C. Place towels or drapes around the prepped site remaining between the patient and back table. Do not walk around the patient as this increases the likelihood of contamination
   D. Grasp the edge of the sheet and roll your hand inward to form a cuff before placing the drape. Once placed it is not adjusted.

5. What position is Reverse Trendelenburg:
   A. Head down
   B. semi-fowlers
   C. Jackknife
   D. Head up
6. When positioning the patient in prone it is important to use chest rolls to prevent:
   A. Ulnar nerve injury
   B. Respiratory compromise
   C. Pressure ulcers
   D. Corneal edema

7. Best practice for hair removal include which of the following:
   A. Use of razor is an acceptable way to remove hair
   B. Hair should be removed in the operating room
   C. Hair should be left in place
   D. Have patient remove hair the day before surgery

8. Position of choice for an inguinal hernia would be:
   A. Fowlers
   B. Prone
   C. Supine
   D. lithotomy

9. What incision would you use for an appendectomy:
   A. Pfannestiel
   B. Inguinal
   C. Mcburney’s
   D. Subcostal

10. You are preparing for an emergency laparotomy. The patient will be in the OR very soon. There is little time for the sterile setup. What do you prepare first?
    A. Towels, gowns, gloves and drapes
    B. Light handles, suction tubing, and ESU pencil
    C. Starting instruments
    D. Sponges, sharps, and sutures
11. You’re prepping an open tib-fib fracture with a povidone iodine solution. What is the appropriate procedure?
   A. Prep the skin from the edge of the wound then concentric circles out and then the inside of the wound last
   B. Prep from the knee down with long straight strokes starting at the level of the knee moving down toward the foot
   C. Prep concentric circles out beginning inside the wound and completely encircling the leg
   D. Prep solution should not be placed inside an open wound. The intact skin is prepped from the wound out.

12. In the supine position, areas especially susceptible to skin breakdown include the:
   A. Occipital area of the head, the shoulder blades, and coccyx area
   B. Elbows, the ileum, and the back of the heels
   C. Coccyx, the back of the heels, and the brachial plexus
   D. Shoulder blades, the buttocks, and the clavicle

13. The process of cataract removal in which the cataract is broken up by ultrasonic vibration and then aspirated is called
   A. Cryoextractor
   B. Diathermy coagulation
   C. Laser therapy
   D. Phacoemulsification

14. Potential adverse effects of the supine position include:
   A. Skin breakdown at the heels, sacrum and elbows
   B. Vasoconstriction in the lower extremities
   C. Increased mean arterial pressure
   D. Retinal detachment or cerebral edema

15. You are setting up the sterile field for an Nissen fundoplication. What dilating tool do you anticipate the surgeon will need to prevent esophageal strictures?
   A. Speculum
   B. Bougie
   C. Endoscope
   D. Probe
Intra-Operative Procedures

- Provide intra-operative assistance under the direction of the surgeon.
- Identify instruments by: function/application/classification

Counting sponges and sharps:

- Before the procedure
- Before closure of a hollow organ
- Before wound closure
- At skin closure or end of case if skin is not closed
- At time of permanent relief
- Count anything added to the field during the case
- Anytime a team member requests one

Counting sponges and sharps:

- Scrub person should separate each item as it is counted
- Visualized by both circulator and surgical technologist
- Visible count board in every room
When to count sponges and sharps:

- If interrupted during count must recount that item
- If there is a discrepancy
  - 1st make team aware
  - 2nd recount
- Search for missing item
  - Once found, recount that item
  - Not found then x-ray
- Trash not removed from room until patient leaves

Counts

- Never open sponges in a room that are not part of the count.
- Hospital policy can delete counts from a specific procedure
  - Cysto, Ophthalmology, ALIF
- Package of sponges containing an incorrect number must be isolated from the field, bagged and labeled.
- Don’t cut sponges
- Only x-ray detectable sponges during surgery

Counts

- Scrubbed person is responsible for knowing how many sponges and sharps are inside the patient at all times.
  - Count in sequence
    - Surgical site, mayo stand, back table then off field.
Counts

• When to count instruments
  ▪ Anytime you open a body cavity or there is a potential to open
  ▪ Initially
  ▪ Before wound closure
  ▪ Permanent relief
• Laparoscopy cases do initial count and subsequent only if you open

Counts

• Count instruments audibly

• Open instruments removed
  ▪ cannot be in the OR uncounted

• If something is broken it must be accounted for in its entirety

Prepare bone grafts

• Autografts – Pt’s own bone
  ▪ Tibia
  ▪ Iliac crest
• Allograft – Cadaver bone
• Keep moist with saline or antibiotic solution until used
  ▪ Never water – cellular damage
• During graft preparation cover wound with saline soaked sponge to prevent drying
• Surgeon trims graft with small bone rongeurs
• Extra bits of bone saved for possible use filling in gaps
Bone graft substitutes
- Ceramic – paste, chips and granules
- Polymer - resin
- Forms of bone graft substitutes
  ▫ Injectable paste
  ▫ Block form
  ▫ Granules
  ▫ Putty
  ▫ Chips
- Materials mixed with IV fluid or solutions using a graft preparation device

Bone Cement
- Grout between joint implant and tissue
- Polymethylmethacrylate powder and Methylmethacrylate liquid is mixed to form grout
  ▫ Vapor evacuation system - Use with suction
  ▫ Exothermic reaction
  ▫ Ready to use when no longer sticky
  ▫ Time to harden dependent on temperature
  ▫ Let Anesthesia know when placing in intramedullary canal.
- Instilled into joint manually or with a cement gun

Split thickness skin grafts
- Prepare dermatome in advance
  ▫ Depth gauge set at 0 when handed to surgeon
- Assist in taking the graft
  ▫ Mineral Oil applied to graft site
  ▫ Assistant pulls donor site taut using gauze or tongue blades
  ▫ As graft emerges from back of dermatome assistant grasps and elevates graft with fine Adson or Brown tissue forceps
  ▫ Cut graft to separate from donor site with scissors
- Place in basin or directly onto carrier plate
  ▫ Keep moist!
Split thickness skin grafts

- Surgeon spreads graft over recipient site
  - Trims with curved iris scissors
  - Secured with staples on back or abdomen
  - Absorbable synthetic suture (4-0 to 5-0) on face or hands
- Wet to dry pressure dressing applied to recipient site
  - Dressing commonly sutured in place
  - Synthetic non-absorbable sutures
- Dress donor site
  - Xeroform covered with flat dressing or synthetic dressing like OpSite

Full thickness skin grafts

- Cover a deep defect
  - Surgical removal of a lesion
  - Trauma
- Assist in taking the graft
  - Minor plastic set and Bipolar ESU
  - Template of recipient site
  - Harvested with #15 blade and sharp scissors
  - Fine tissue forceps (like Adson) to take graft
- Place in basin
  - Keep moist with saline

Full thickness skin grafts

- Surgeon trims subcutaneous tissue
  - Stevens or curved iris scissors
  - Implanted quickly for viability of tissue
- Graft sutured to recipient site
  - Interrupted sutures
  - Synthetic absorbable suture (4-0 or 5-0)
  - Taking sutures in center of graft to maintain contact with underlying tissue
- Place dressing
  - Xeroform gauze, flat gauze and fluffed gauze.
  - Not a pressure dressing
Anticipate

- Anticipate the steps of surgical procedures
  - Train with others
  - Orientation
  - Seek out assignments to increase knowledge

- Familiarize yourself
  - YouTube
  - Textbooks

Hemostasis

- Mechanical - Internal/External
  - Direct pressure
  - Capillary bleeding
  - Clamping
  - Size appropriate for vessel
  - Suture / Staples
  - Gelatin/collagen/cellulose
  - Tourniquet
  - Ligature tie - Vessel too large for electrocautery

- Thermal
  - Electrocautery
  - Laser
  - Ultrasound

- Chemical
  - Active Hemostats
  - Imitates body's clotting mechanism
  - i.e. Thrombin

Intra-Operative Procedures

- Specify methods of operative exposure
- Place and secure retractors.
- Verify with surgeon the correct type and/or size of implantable devices.
Intra-Operative Procedures

- Irrigate, suction, and sponge operative site
  - Visualization of surgical site

- Monitor and maintain aseptic technique throughout the procedure
  - Accidental contamination means assisted gloving or break and start over
  - No longer can re-glove self

Specialty Equipment

- Assemble, test and operate specialty equipment:
  - Microscopes
  - Robotic technology
  - Laser technology
  - Ultrasound technology
  - Endoscopic technology
  - Power equipment
  - Fracture sets

Microscopes

<table>
<thead>
<tr>
<th>Handling</th>
<th>Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Secure arms when moving</td>
<td>• Damp dust before use</td>
</tr>
<tr>
<td>• Push using vertical axis not</td>
<td>• Follow manufacturer’s</td>
</tr>
<tr>
<td>head to prevent tipping</td>
<td>recommendation for</td>
</tr>
<tr>
<td>• Balance to prevent ‘drift’</td>
<td>disinfection.</td>
</tr>
<tr>
<td>• Test before moving it to field</td>
<td>• Never put detergent or</td>
</tr>
<tr>
<td>• Adjust vertical oculars</td>
<td>disinfectant on the lens</td>
</tr>
<tr>
<td>• Break</td>
<td>• Do not touch the lenses</td>
</tr>
<tr>
<td>• Controls</td>
<td>• Cover at the end of the day to prevent dust</td>
</tr>
<tr>
<td>• Inspect cord</td>
<td></td>
</tr>
<tr>
<td>• Center X-Y axis if present</td>
<td></td>
</tr>
</tbody>
</table>
**Robotic Surgery**

**Components**
- Surgeon’s console
  - Remote nonsterile hand and foot controls
- Patient Cart (arms)
  - 2 or 3 instrument arms and 1 camera arm
- Imaging (vision) system
  - 3D image from camera to display screen and surgeon console

**Care**
- Damp dust before use
- Follow manufacturer’s recommendation for disinfection.
- Never put detergent or disinfectant on the lens
- Do not touch the lenses
- Cover at the end of the day to prevent dust

**Robotic Surgery**

**Room Set up**
- Components are connected by cables
  - Does not restrict traffic
  - Do not suspend. Must lie flat
- Surgeon can see and speak with assistant
  - Surgeon console outside sterile field
- Patient cart
  - Positioned after draping

**Surgical Technologist duties**
- Robotic specific training
  - Touch screen
  - Operate clutch system when arms outside of patient
- Directs draping of equipment
- After cannulas placed directs positioning of Patient Cart
- Assists in registration and white balance
- Retraction of instruments and patient cart after surgery
- Routine closure and postoperative activity

**Intra-operative cross contamination**

- Bowel Technique
  - Instruments and supplies used while bowel is open are kept separate
    - Confined to Mayo stand and designated basin
  - After bowel is closed all contaminated Mayo stand and instruments are removed from the field
- Before abdomen is closed
  - Surgical team dons new surgical gown/gloves
  - Fresh drapes placed over original drapes
  - Fresh sponges, suture, ESU and suction tips opened for closure
Standard Precautions

- Every patient may harbor potentially infectious microorganisms
- Wear PPE where there is potential contact with bodily fluid
  - Dirty linen
  - Drapes
  - Sharps
- Disinfection of surfaces between cases
- Encourage single use supplies and equipment

Movement around the field

- Avoid changing levels
- Pass each other back to back
- Remain close to the sterile field

Traffic Control

- Good Traffic control practices prevent cross contamination
- There are three surgical areas
  - Unrestricted
  - Semi-Restricted
  - Restricted
Traffic Control

- Only necessary personnel in restricted and semi-restricted areas
- ORs should have positive pressure in relation to corridors. **OR doors should remain closed**
- Supplies should be transported in covered carts with solid bottoms to semi-restricted / restricted areas
- Flow of sterile supply goes from clean core through OR to peripheral corridor

Medications and Solutions

- Dispense when needed
- Circulator should show manufacturer’s vial
- Label meds
- Name, concentration, date, time
- Keep med containers throughout case
- Relief personnel should verify all meds

Intra-Operative Procedures

- Monitor medication and solution use.
- Prepare drains, catheters, and tubing for insertion.
- Identify and label all specimens
- Observe patient’s intra-operative status
Electrosurgical Safety - Active Electrode

• Use non-conductive material to secure
• Prevent antenna coupling
  ▫ ESU and EKG leads off opposite sides
• Do not use in the presence of flammable agents
  ▫ Wet prep solutions
• Use the safety holster
• Remove char with scratch pad
• Use according to manufacturer’s recommendations

Electrosurgical Safety - Dispersive Electrode

• Keep dispersive electrode away from implanted metal prostheses and tattoos
• Be sure the dispersive electrode is adhered in its entirety – uniform body contact
  ▫ Avoid: bony, scarred or hairy surfaces
• Large Muscle mass close to the surgery site as feasible.
• Clean dry area. No pooling liquid
• Placed after patient positioned

Cutting v Coagulation

• Cutting mode
  ▫ High voltage
  ▫ Concentrated current
  ▫ Dissection with minimal effect on surrounding tissue
• Coagulation mode
  ▫ Low voltage
  ▫ Longer contact with tissue resulting in char
  ▫ Cooks surrounding tissue = longer wound healing
Electrosurgery

- **Patient Safety**
  - Piece of equipment most often associated with patient injury
  - Burn at dispersive electrode is still the most common injury

- ** Personnel should demonstrate competency**
  - Orientation and annual competency
  - Operating manual should be readily available

Electrosurgical Safety - ESU

- **Test safety features before each use**
  - Lights, alarms, volume loud enough to be heard

- **Keep clean and away from spills**
  - Use footswitch cover

- **Never use damaged equipment**

Electrosurgery

**Endoscopic Considerations**

- Use lowest possible settings
- Don’t use Hybrid Cannula (plastic and metal)
- Direct Coupling – active electrode touches another instrument
- Capacitive Coupling – electrical current passes through intact insulation to conductive material
- Insulation failure
Electrosurgical Safety

- ICD and Pacemakers
  - Use bipolar if possible
    - Keep the pacemaker out of the path of the device
    - Turn ICD off
- Use ONLY Bipolar with any nerve stimulator
- Argon
  - Prevent gas emboli avoid direct contact with tissue

LASER
Light Amplification by Stimulated Emission of Light

- Laser Team
  - Oversee training
  - Rules and Regulations (ANSI)
- Laser Safety Committee
  - Oversees implementation of LASER program
  - Teaching and credentialing staff members
- Laser Safety Officer
  - Fielding clinical questions
  - Implementation of safety standards

LASER
Light Amplification by Stimulated Emission of Light

- Laser must be in standby mode (key locked) when not in active use
- Footswitch in proper position
- Protect exposed tissue with moistened materials
- Non-reflective or ebonized instrument sets
- Pooled liquid can retain laser heat and cause burns
- High voltage equipment – don’t set fluids on it
- Use a smoke evacuator
LASER

- All who enter room wears eye protection
  - Wavelength and Density
  - No color code associated with LASERs
- Signage on all entrances to suite
- Flame resistant drapes
- Laser resistant ETT for procedures near airway
  - Balloon inflated with Methylene blue tents saline.
- Head and neck procedures
  - O2 off for 1 min before use

Wound Closure

- Primary Intention
  - All layers of wound are approximated
  - Most surgical wounds
- Secondary Intention
  - Granulation
  - Pressure ulcer
- Tertiary Intention
  - Delayed primary intention
  - High suspicion of contamination
  - Left open and packed

Suture

- Absorbable – Lose tensile strength <60 days
  - Hold wound edges in approximation temporarily
  - The strand is eventually completely dissolved
- Non-absorbable – Lose tensile strength >60 days
  - Exterior skin closure, to be removed after healing
  - Within the body cavity, where they will remain permanently encapsulated in tissue.
  - Prosthesis attachment
Absorbable sutures

- Prepared from:
  - Collagen of mammals
  - Synthetic polymers.
- Some absorb rapidly, others are treated or chemically structured to lengthen absorption time.
- May be impregnated or coated with agents to improve handling and colored to increase visibility.
- Natural absorbable sutures are digested by enzymes.
  - More irritating to tissue.
- Synthetic absorbable sutures are hydrolyzed.
  - Lesser degree of tissue reaction.

Nonabsorbable sutures

- **CLASS I**—Silk or synthetic fibers of monofilament, twisted, or braided construction.
- **CLASS II**—Cotton or linen fibers, or coated natural or synthetic fibers where the coating contributes to suture thickness without adding strength.
- **CLASS III**—Metal wire of monofilament or multifilament construction.

Cutting needles

- Sharpened to cut through tough, difficult-to-penetrate tissue.
- Cutting needles are ideal for skin sutures that must pass through dense, irregular, and relatively thick connective dermal tissue.
- Because of the sharpness of the cutting edge, care must be taken in some tissue (tendon sheath or oral mucous membrane) to avoid cutting through more tissue than desired.
TAPER POINT NEEDLES

• Also referred to as round needles
• Pierce and spread tissue without cutting it
• The needle point tapers to a sharp tip. The needle body then flattens to an oval or rectangular shape.
  ▪ Helps prevent twisting or turning in the needleholder
• Used in easily penetrated tissue
  ▪ Peritoneum, abdominal viscera, myocardium, dura, and subcutaneous layers
• Preferred when the smallest possible hole in the tissue and minimum tissue cutting are desired

BLUNT POINT NEEDLES

• Dissects friable tissue rather than cutting it
• Tapered body with a rounded, blunt point that will not cut through tissue
• Used for suturing the liver and kidney
• Used in obstetric and gynecological procedures when working in deep cavities prone to space and visibility limitations
• Used for general closure on at-risk patients

Intra-Operative Procedures

• Apply thermal surgical techniques and safety precautions.
• Prepare suture materials.
• Cut suture materials as directed.
Intra-Operative Procedures

- Initiate preventive actions in potentially hazardous situations.
- Connect and activate drains to suction apparatus.
- Prepare and apply sterile dressings.
- Assist in the application of casts, splints, braces, and similar devices.

Intraoperative Practice Test

- 30 Questions
- 36 Minutes
- 60 Questions on CST exam
Intraoperative Practice Test

1. A topical hemostatic substance used on bone is called:
   A. Surgicel
   B. Ostene
   C. Gelfoam
   D. Avitene

2. What is used to lubricate the donor site and reduce friction from the dermatome?
   A. Bacitracin ointment
   B. Iodophor solution
   C. Petroleum gel
   D. Mineral oil

3. How do you drape a patient for a split thickness skin graft?
   A. Donor site first, recipient site second
   B. Recipient site first, donor site second
   C. Donor site only
   D. Recipient site only

4. Which is an example of second intention wound healing?
   A. Granulation
   B. Evisceration
   C. Wound Vac closure
   D. Skin closure

5. Which of the following causes the least trauma and is used in suturing delicate tissue?
   A. Swaged multifilament
   B. Swaged monofilament
   C. Threaded multifilament
   D. Threaded monofilament

6. What is the proper response when opening a package of sponges containing an incorrect number after the patient has entered the surgical suite?
   A. Record the actual number in the pack and use them
   B. Hand off the sterile field and isolate
   C. Isolate on sterile backtable and don’t use them
   D. Remove from the OR suite
7. When adding 10ml of injectable saline to 10ml of 0.5% Marcaine, what strength does it become?
   A. 1.0%
   B. 0.5%
   C. 0.75%
   D. 0.25%

8. Which LASER is not for use on the posterior chamber of the eye?
   A. Argon
   B. Carbon dioxide
   C. Ho:YAG
   D. Excimer

9. The best position for placement of a dispersive pad on a patient with a left metal hip prosthesis undergoing a left mastectomy is:
   A. left upper thigh
   B. left calf
   C. right calf
   D. right upper thigh

10. While a scalpel blade is being changed during a hemicolectomy, the blade snaps and breaks into several pieces. You are unable to find a small piece of the blade. Which statement regarding counts is true?
    A. The count is considered correct because the blade broke on the back table and not near the wound
    B. The count is considered incorrect unless the entire blade is found
    C. The count is considered correct after the room and sterile field are searched
    D. The count is considered incorrect even if the entire blade is found

11. A recommended practice to be implemented to reduce the potential for microorganisms in the bowel being transferred to sterile tissue within the surgical site is called:
    A. Bowel Technique or Isolation technique
    B. Infection prevention technique
    C. Consolidation technique
    D. Sterile tissue technique
12. All personnel moving within or around a sterile field should do so with the goal of maintaining the sterile field. To best meet this goal, it is preferable that

A. The scrub person stays close to the sterile field
B. All scrubbed team members pass each other face to back
C. All unscrubbed team members maintain a 12 inch distance from the sterile field and pass facing away from it
D. All unscrubbed team members maintain a 6 inch distance from the sterile field and pass facing the sterile field

13. Which of the following actions would best prevent burn injuries resulting from use of the electrosurgical unit?
   A. Providing the surgeon with a hand-activated active electrode
   B. Placing the active electrode tip on a moist sponge when it is not in use
   C. Placing the active electrode tip in the holster when it is not in use
   D. Cleaning the active electrode tip with a sponge before each use

14. Adequate eye protection for staff members and patients during laser procedures is determined by the:
   A. Optical density and laser wavelength marked on the eyewear
   B. Surgeon operating the laser equipment
   C. Color of the eyewear
   D. Laser safety officer (LSO) in charge of the specific laser

15. A patient is undergoing a skin tag removal on his chest and scalp using electrosurgical unit. The patient has received conscious sedation and 1% lidocaine to the surgical area. His face is covered with drapes and he reports feeling ‘smothered’. To alleviate the patient’s discomfort, it is appropriate to:

A. Provide a nasal cannula at a low flow rate
B. Re-drape the patient between the removal on the chest and scalp to allow his face to remain uncovered.
C. Provide an oxygen mask with 30% or less O2
D. Tell the patient the procedure will be very quick and the drapes will be removed soon

16. How is the patient positioned on the OR table for a knee arthroscopy?
   A. Trendelenburg, knee over the center break
   B. Lateral, hip over the lower break
   C. Supine, knee at the lower break
   D. Low lithotomy, body centered
17. The most serious risk to a patient during laser laryngoscopy is:
   A. Airway injury from laser endotracheal tube placement
   B. Inadequate ventilation and airway management
   C. Burns to eyes and skin from reflected laser beams
   D. Airway explosion and fire of the endotracheal tube

18. During an ORIF of the ankle fluoroscopy is to be used. The perioperative nurse understands that which of the following considerations is most important regarding patient safety?
   A. Lead shields should be placed under the patient.
   B. Lead shields should be placed over the patient’s gonads
   C. Fluoroscopy produces more scatter radiation and staff require greater level of protection
   D. Scattered radiation is decreased during fluoroscopy.

19. In the positioning of a patient in the prone position, the primary reason for using chest rolls is to provide for:
   A. Better exposure of the operative site
   B. Adequate circulation
   C. Unrestricted respiratory exchange
   D. Protection of the nervous system

20. The Surgical Technologist and Circulator should audibly review and confirm medications:
   A. before the procedure begins
   B. before the end of the procedure
   C. after transfer to the sterile field
   D. before transfer to the sterile field

21. Polymethyl methacrylate would most likely be used on which procedure?
   A. Intramedullary nailing
   B. Total knee arthroplasty
   C. Triple arthrodesis
   D. Percutaneous pinning

22. What is the Verres needle used for during a laparoscopy and what position is safest for insertion?
   A. Instill CO2, Reverse Trendelenburg
   B. Aspirate fluid, Lateral
   C. Collect a specimen, supine
   D. Assist in trocar site closure, supine
23. What is the best site for obtaining cortical bone graft?
   A. Iliac crest
   B. Ischial spine
   C. Femoral head
   D. Symphysis pubis

24. Which LASER can penetrate clear fluids without heating them making it ideal during a vitrectomy?
   A. Argon
   B. Excimer
   C. Carbon Dioxide
   D. Neodymium

25. What is the first step taken when there is an incorrect sponge count?
   A. An x-ray is taken
   B. Repeat the count to insure there’s not a simple miscount
   C. Notify the surgeon
   D. Ask the circulator to search the garbage in the room

26. Which of the following is a mechanical method of hemostasis?
   A. Laser
   B. Ligature
   C. Thrombin
   D. Electrocautery

27. What is the purpose of a colorless prep solution for donor site when preparing a patient for a skin graft?
   A. To allow the surgeon the ability to properly visualize the skin, while taking the graft.
   B. To prevent tattooing the removed skin with pigment from the colored solution
   C. This is an individualized physician’s preference only
   D. Colorless solutions are more effective at reducing microorganisms on the skin during graft procedures

28. Where should the safety strap be on a supine patient?
   A. Below the knees to stay well out of the surgical site
   B. Across the waist
   C. Over the thighs
   D. Across the abdomen
29. Following which regulation below cause health care providers to consider all patient fluids infectious?
   A. Body fluid isolation standard
   B. Medical Device Safety Act
   C. Preprocedural Prophylaxis
   D. Standard Precautions

30. What is another name for Kraske position?
   A. Sitting
   B. Trendelenburg
   C. Jackknife
   D. Dorsal recumbent
Post-Operative Procedures

- Remove drapes and other equipment from patient
- Transfer patient from operating table to stretcher
- Report abnormal post-operative findings

Post-Operative Procedures

- Perform room clean up after surgery
- Dispose of contaminated waste, drapes and sharps after surgery in compliance with Standard Precautions

Post-Operative Procedures

- Report use of local anesthetic to circulator
- Complete terminal cleaning of operating room
- Transport laboratory specimens
- Participate in case debrief
Postoperative Practice Test

- 10 Questions
- 12 Minutes

- 10 questions on CST exam
Postoperative Practice Test

1. At the end of the procedure the patient leaves the OR suite. The surgical technologist should

   A. Remove the gown then the gloves
   B. Remove the gloves and eye protection
   C. Remove the gloves and then the gown
   D. Remove the mask and eye protection

2. Which statement reflects the correct procedure for cleaning the OR suite between cases?

   A. Clean all walls floor to ceiling
   B. Spot clean areas of the wall with obvious contamination or splash
   C. Cleaning walls and ceiling is done only at the end of the day
   D. Cleaning walls daily is not necessary because they are removed from the sterile field

3. Wound dressings should be opened

   A. After the final count is complete
   B. During skin closure
   C. Just before skin closure
   D. After the backtable is broken down

4. When breaking down the backtable, instruments with ratchets should be:

   A. Closed and placed in the instrument tray for transport to the decontamination area
   B. Placed in a basin with enzymatic solution in open position for transport to decontamination
   C. Rinsed with saline to remove debris and then returned to the instrument tray for transport
   D. Run through the flash sterilizer before transport to decontamination

5. Which of the following is a type of dressing for a wound left open because there is swelling or infection?

   A. Steri Strips
   B. Pressure dressing
   C. Wound Vac
   D. Rigid
6. Which type of drain will be connected to a bulb evacuator?
   A. Hemovac
   B. Jackson-Pratt
   C. Stryker
   D. Cigarette drain

7. Turning over an OR between cases is a team effort. The surgical technologist should:
   A. Damp mop around furniture
   B. Wipe down walls from floor to ceiling
   C. Move OR table and mop under and around with clean mop head
   D. Never wipe down overhead lights until the end of the day

8. Knife blades should be removed from the handle with
   A. Needle holder
   B. Allis clamp
   C. Sterile gloved hand
   D. DeBakey forceps

9. What is produced by the Thymus gland during an immune response?
   A. Antigens
   B. T-cells
   C. Lymphocytes
   D. Interferon

10. Which of the following events is the best indicator that a patient is ready to be moved to the post anesthesia care unit (PACU)?
    A. The nursing documentation is completed
    B. The anesthesia care provider indicated that the patient is ready
    C. The surgery is completed and the dressing is in place
    D. The surgeon indication that the patient is ready
ADDITIONAL DUTIES

Objectives:
1. Describe the Surgical Technologist’s Administrative and Personnel Duties
2. Relate Correct Sterilization and Maintenance of Equipment

Preference Cards
Disaster preparedness
Death
Coroner’s case
Organ procurement

Ethics
Cultural Awareness
Cleaning of instruments
Sterilization

Administrative and Personnel

• Revise surgeon’s preference card as necessary
  ▪ Detailed cards make good patient outcomes
  ▪ Electronic or paper
    ▪ Must be kept up to date and accurate
  ▪ Have everything ready before it is needed
  ▪ Efficiency
  ▪ Avoid delays
  ▪ Patient safety

Administrative and Personnel

• Follow hospital and national disaster plan protocol
  ▪ Disaster preparedness training is required for all health care professionals

Terms to know:
  ▪ Disaster
    ▪ Catastrophic event that poses a large scale risk to human life and property
    ▪ Requires federal assistance
  ▪ Vulnerable Populations
    ▪ In disaster management this includes those with higher than normal risk
Administrative and Personnel

• Terms to know:
  ▫ Emergency:
    • Geographically isolated event handled by local services
  ▫ Mass Casualty Event (MCE)
    • Local emergency with large number of victims
    • Overwhelms local health care services
    • Does not require federal assistance

Administrative and Personnel

• Disaster Classifications
  ▫ Level I
    • Local emergency teams are able to manage immediate consequences and aftermath
  ▫ Level II
    • Requires regional assistance from surrounding communities
  ▫ Level III
    • Local and regional resources are overwhelmed
    • Statewide and federal assistance is required

Administrative and Personnel

• Recognize safety and environmental hazards
  ▫ If you see something say something
  ▫ Sharps safety
  ▫ Fire safety
  ▫ Deescalate work place violence

• Follow proper cost containment processes
  ▫ Good preference cards
  ▫ Open vs. Available

• Tray management
  ▫ Minimum number and types of instruments needed
Ethical and legal practices

- Practice with respect for every person
- Primary responsibility is to patient
- Protect rights of patient
  - Patient Bill of Rights and HIPAA information given to each patient on admission
- Accountable for individual practice and tasks delegated

Cultural Diversity

- Understand the importance of cultural diversity
  - Treat everyone with the same respect that you wish to be treated with
- Lifestyle, values, religion not your own
  - Don’t have to condone or agree with, but respect it

Administrative and Personnel

- Use interpersonal skills and group dynamics
  - Be a team player
  - Learn from everyone and every experience
  - A great attitude goes a long way
- Improves outcomes!
Administrative and Personnel

- Serve as preceptor to perioperative personnel
  - Surgical Technologists
    - New or experienced in other areas or hospitals
    - Surgical tech students
  - RN’s new to the OR
  - OR aids
  - Residents
- Share knowledge freely
  - Morale
  - Safety

Death and Dying

- Psychological aspects
  - Kubler-Ross Model
    - Denial – Forestalls full impact of fact, a defense
    - Anger – Towards patient, self or healthcare provider
    - Bargaining – Patients bargain with God for more time
    - Depression – Clinically treated
    - Acceptance – Death no longer a source of psychological stress

- Procedural aspects
  - DNR
    - Not automatically suspended in the OR
    - In full effect until order written by MD to change
    - Cannot be protocol order
    - Patient Bill of Rights
    - Self Determination Act
  - Post mortem care
    - Prepare the body to be viewed by the family
    - Protocol defined by the facility
Death and Dying

- Procedural aspects
  - Natural Changes
    - Relaxation of muscle
    - Sphincters relax allowing body fluids to escape
    - Jaw drops open, eyes half mast
    - Fluid collects in tissue—bruising on dependent body parts
    - Rigor mortis
      - Peaks at 15-18 hours after death but begins in about 15 min
      - Begins at the head (eyelids first) and moves toward the feet
      - Relaxes in opposite direction at about 24 hours after death

Coroner’s Cases

- Condition of the body remains intact for examination
  - Tubes and drains left in place
    - Chest tubes, ET Tube, IV’s
  - Patient’s property given to coroner
    - Bloody possessions are not cleaned
    - Put possessions in paper bag
  - Bullets removed
    - No metal instruments
    - Chain of custody
    - Bag patient’s hands to preserve any gun powder residue

Organ Recovery

- Work together to provide oversight and standards
  - American Association of Tissue Banks (AATB)
  - Joint Commission (JC)
  - Food and Drug Administration (FDA)
- Points to know
  - Autologous tissue should be separated from allografts.
  - Expiration time of tissue
  - Refrigerator and freezer have limited access and temperature monitoring with an alarm
  - End of life v. Brain Death
    - End of life: period where death cannot be avoided
    - Brain Death: brain ceases to function
Organ Recovery

- **Heart Beating Cadaver**
  - Tissue perfusion maintained
  - Critical organs and hard tissues taken

- **Non-Heart Beating Cadaver**
  - Hard tissues only
  - Cornea, blood vessels, heart valves, bone, tendon, skin

- **Ethical Dilemmas**
  - Patient did not indicate wishes before death
  - Family may consent for patient
  - Sometimes family members have conflicting opinions
  - Some cultures and faiths forbid it

Administrative and Personnel Test

- 10 Questions
- 12 Minutes

- 10 Questions on CST exam
Administrative and Personnel Test

1. The following tissue may be taken from a non-heart beating cadaver

   A. Liver
   B. Kidneys
   C. Lungs
   D. Cornea

2. When removing a bullet what is used to grasp it for extraction?

   A. A gloved hand
   B. Yankauer Suction tip
   C. Kocher
   D. clamp

3. A patient with a Do Not Resuscitate (DNR) order has come to the OR for an ORIF of the tibia after a fall. The surgical technologist should be aware that:

   A. A DNR automatically is suspended when in the surgical department
   B. Should the patient experience distress only as a result of surgery all life saving measures are taken
   C. A DNR is in full effect in the OR unless an order is written in the patient’s chart to temporarily amend or suspend
   D. Patients with a DNR do not come to surgery

4. You are setting up for a dilation and curettage when you recognize the name on the schedule as somebody you know personally and is your friend. How do you respond?

   A. You maintain your professionalism and continue with the case as usual
   B. You ask to be removed from the room and never mention it to your friend or others
   C. Ask to be removed from the room and later tell your friend
   D. You ask your friend if it is alright for you to be in the case and respond accordingly
5. A passenger train has derailed near your town and you expect more than 150 patients in need of care. This will overwhelm your first responders and hospital requiring help from surrounding facilities. This is considered a/an:

A. Disaster  
B. Emergency  
C. Mass Casualty Event (MCE)  
D. Rough day at work

6. The preference card should
A. Be accurate and up to date
B. Contain general information only to easily adapt to variations
C. Be specific to procedure, not surgeon
D. Contain general information so the details are only known by those he prefers to work with

7. During a hurricane the homeless are considered
A. Prone to disaster  
B. A downtrodden population  
C. A vulnerable population  
D. Outside of mass communication capability

8. Widespread fires over hundreds of square miles in the southwest rage for weeks. This is an example of:
A. A level I disaster  
B. A level II disaster  
C. A level III disaster  
D. A level IV disaster

9. Failing to perform a surgical skin prep with an approved solution is an example of what? This act of omission can contribute to injury to the patient. This can result in a civil tort action lawsuit.
A. Battery  
B. Negligence  
C. Assault  
D. A sentinel event
10. A new employee unknowingly dispensed an unsterile solution to the sterile field. The following day, the supervisor learns of the incident. The supervisor’s first action would be to:

A. Initiate an incident report  
B. Instruct the employee on the technique of reading labels  
C. Counsel the employee verbally  
D. Notify the surgeon of the break in technique
Spaulding Classification System

- **Critical**
  - Must be sterile
  - Will enter sterile tissue or the vascular system
- **Semi-critical**
  - Should be sterile but High level disinfection acceptable
  - Contacts broken skin or mucous membrane
- **Non-critical**
  - Intermediate or low level disinfection or cleaning
  - Will come in contact with skin

Spaulding Classifications Examples

- **Critical**
  - Instruments
  - Cutting endoscopic accessories and endoscopes
    - Cardiac and urinary catheters
  - Needles
- **Semi-critical**
  - Respiratory Therapy / anesthesia equipment
  - Bronchoscopes / GI endoscopes
- **Non-critical**
  - OR bed
  - Linens

Equipment Sterilization and Maintenance

- Follow Manufacturer’s recommendation for cleaning and processing any instruments or equipment.
Workflow for sterile processing

- There should be a physical separation between a decontamination and processing area

- Work flow should progress from:
  - Decontamination
  - To preparation and packaging
  - To sterilization processing
  - To clean distribution / storage

Decontamination of Instruments

- Cleaning is the most critical step to prevent infection
- Pre-treating recommended
- Disassemble anything that can be
- Brush lumens, channels, crevices and joints
- Automated cleaning
  - Ultrasonic
  - Washer

Inspect, Test and Assemble

- Inspect, test, and assemble instruments and equipment.
  - Before assembling check for cleanliness and function
  - Use a tray listing to verify set
  - Check your rigid container for cleanliness and/or damages
  - Place instrument basket in container, cover, lock, and load on cart
Sterilization - Steam

- Pre-vacuum autoclave (Dynamic Air-Removal)
  - Sucks air out of the chamber
  - Clean drains are essential

- Gravity displacement autoclave
  - Steam forces air from chamber
  - Thermometer closes drain
  - At (270° F)

Steam Sterilization - Avoiding Condensation

- Allow air flow between trays
- Remove loads immediately. Leaving the door ajar to cool increases likelihood of condensation
- Don’t put hot items on a cool solid surfaces or racks.
- If condensation occurs and the items are moist, they are considered non-sterile

Immediate Use Steam Sterilization

- Sterilization for immediate use
- Packaging, wrapped items and textiles are never to be used
- Must have same decontamination process including brushing and flushing lumens
- Must use a class 5 chemical integrator
- Rigid Sterilization containers with lid
- Never an implant unless emergent.- biological 1st
- Sterilization log must be kept
Sterilization - Glutaraldehyde

- "Cold sterilization"
- Point of use only.
- Takes 10 hours of immersion
- Bad for instruments

- Not a recommended form of sterilization
  - Environmental problems
  - Poor ease of use

Sterilization - Ethylene Oxide

- For heat and moisture sensitive items
- 2-5 hours exposure
- Aeration time 8-12 hours
- Human Carcinogen
  - Exposure limited to 1 ppm in an 8 hour period
- Lumens must be completely Dry
- Environmentally hazardous

Low Temp Hydrogen Peroxide
Plasma Gas Sterilization

- Sterrad
- Used for heat and moisture sensitive items
- No aeration cycle needed. This is Dry Sterilization
- Cycle time is 75 minutes
- Environmentally sound
Peracetic Acid

- Steris
- For items that can be immersed
- Corrosive to instruments and people
- Temp 120°-130°F
- 20-30 min
- Micron filtered tap water rinse
- For point of care use only
- Documentation

Ozone

- Low Temperature Sterilization
- Only one manufacturer in the USA
- FDA has cleared ozone for sterilization of metal and plastic.
- Exhaust is passed through a catalytic converter
- Environmentally sound
- No aeration cycle is necessary

Dry Heat

- High Temperature
- Best for heat stable powders and oils
- Dental instruments
- Burrs
- Reusable Needles
- Glassware
- Don’t use tape
Endoscopes -

- Leak testing is performed before placed in cleaning solutions
- Manual cleaning ASAP in fresh cleaning solution
  - Not allowed to dry
  - Brush channels, raise and lower elevator if present
  - Tap water rinse
- Kept damp or wet but not submerged during transport to decontam
- Clean within an hour or follow delayed processing instructions.

Endoscopes -

- Visually inspected after manual cleaning
- Mechanical Processing according to manufacturer's instructions
  - Processor is approved for cleaning scopes
  - Soaking for high-level disinfection no longer recommended
  - Positioned so all surfaces come in contact with the solution
- Rinse with sterile water or alcohol

Endoscopes - Storage

- Not stored in procedure rooms
- Stored in a drying cabinet.
- If drying cabinet is not available:
  - Cabinet has HEPA filtered air with positive pressure
- Storage times established by a multidisciplinary team
  - Infection preventionists, endoscopy nurses, processing personnel, endoscopists
- The team should take into consideration the results of cleaning verification tests
Quality Control

- Items should be traceable from the method of sterilization.
- Lot control #, load or cycle # and date and time should be documented for each item sterilized.
- Sterile technique is founded in individual's surgical conscience.

Sterilization - Quality Control

- Biological Challenge (spore testing)
  - Autoclave
    - Daily biological (Ideally) for gravity displacement and Pre-vacuum
    - Daily Bowie-Dick for Pre-vacuum
      - Uniform pattern indicates that the vacuum cycle has functioned properly
    - With every implant
  - Ethylene Oxide
    - With every load
  - Sterilization Log required

Packaging

- Must work with the type of sterilization
- Must allow for identification of the contents
- Count sheets should not be placed inside wrapped sets or rigid containers
- Lint free
- Free of holes
- Sterile storage areas must not exceed 78° F or 60% humidity
Packaging and Sterilization
- No textiles, peel pouches or rubber mats inside of the tray
- Instruments disassembled
- Instruments in open, unlocked position
- Integrator in the corner of the tray
- Indicator on the inside and outside of the tray
- Count sheets on the outside of trays

Peel Pouches
- Not stacked inside of Sterilization chamber
- Write on the plastic, not on the paper
- Not for use with heavy items, i.e. drills
- Double pouching:
  - Inner pouch fits without being folded.
  - Facing same direction.

Equipment, Sterilization and Maintenance Test
- 10 Questions
- 12 Minutes

- 10 Questions on CST exam
Equipment, Sterilization and Maintenance

1. The bowie-dick test is used to determine:
   A. Proper functioning of the vacuum cycle
   B. The concentration of ethylene oxide gas
   C. Achievement of sterilization
   D. Adequate temperature requirements

2. Prior to sterilization, all items with lumens must first be flushed with:
   A. Distilled water
   B. Alcohol
   C. Glutaraldehyde
   D. Normal saline

3. After the sterile field is set up there is a delay in the operative procedure. Which of the following is false?
   A. Team members should observe for contamination.
   B. Direct observation of the sterile field increases the likelihood of detecting a break in sterility
   C. The sterile field should be prepared as close to the time of surgery as possible.
   D. The sterility of an opened sterile field is time related

4. Which type of sterilizer must be tested with a Bowie-Dick chemical indicator daily?
   A. Gravity displacement
   B. Dry heat
   C. Pre- Vacuum
   D. Ozone

5. The leak testing of an endoscope should be performed:
   A. After mechanical processing and before storage
   B. On the surgical field, immediately after use
   C. After handing off the field, prior to processing
   D. Before every use
6. The total weight of an instrument containment device, including contents, should not exceed

   A. Weight is irrelevant as long as the integrator has changed
   B. 25 pounds
   C. 35 pounds
   D. 40 pounds

7. Which item according to the Spaulding Classification System is considered critical and therefore must be sterile?

   A. Laparoscope
   B. Cystoscope
   C. Bronchoscope
   D. Colonoscope

8. Which is true about aseptic technique:

   A. Only the table top is sterile
   B. Self gowning and gloving can take place off a sterile back table
   C. Sleeves of a gown are considered sterile from 2” above the elbow to the distal end of the cuff
   D. When dispensing sterile fluids to sterile field it is acceptable for a non sterile person to reach over a sterile field

9. Immediate Use steam sterilization must use a:

   A. Class 3 chemical integrator
   B. Class 4 chemical integrator
   C. Class 5 chemical integrator
   D. Class 6 chemical integrator

10. Endoscopes must be stored

    A. In a cabinet in the procedure room for easy accessibility
    B. In a drying cabinet or a positive pressure cabinet with a HEPA filter
    C. Vertically for no more than 5 days
    D. With accessory ports closed
BASIC SCIENCE
Objectives:
1. Describe Anatomy and Physiology important to the Surgical Technologist
2. Recite Important Microbiology Concepts to be aware of during a surgical procedure
3. Describe Surgical Pharmacology for Patient Safety

Medical terminology
• Anastomosis – Joining of two hollow anatomical structures, i.e. vessels, bowel etc
• Approximate – Bring together, i.e. skin is reapproximated during closure
• Blunt Dissection – separation of tissue without a blade. Tease apart delicate tissue with a sponge
• Debridement – Cut away dead tissue or debris in a wound with blade or scissors
• Dog ear – pucker in the skin caused by poor suture placement

Medical terminology
• Debulk – Remove a large portion but not all of a tumor. Usually because of precarious placement
• Dissect – Separation of anatomical structures
• Elevate – To lift an anatomical structure
• Excise – Removal of tissue. Usually a small lesion
• Expose – Enable precise viewing
• Exteriorize – Bring an interior part of the body out
• Ligate – Constrict by tying. Ligate a vessel
Anatomy and Physiology

- Demonstrate knowledge of anatomical systems as they relate to the surgical procedure:
  - cardiovascular
  - otorhinolaryngology
  - gastrointestinal
  - skeletal
  - endocrine
  - genitourinary
  - integumentary
  - ophthalmic
  - lymphatic
  - muscular
  - neurological
  - peripheral vascular
  - reproductive
  - pulmonary

Pathologies

- **Abnormal anatomy**: structure may not conform to the normal appearance of what it should look like. The abnormality may be on its gross appearance or abnormality in its microscopic make-up (histology).

- **Disease process**: the natural progression of a disease, its symptoms and treatment, from first diagnosis to its final outcome, death.

Pathologies

- **Traumatic injury**: traumatic injury is caused by something outside the person’s body as opposed to a sickness or a disease.

- **Malignancies**: is the tendency of a medical condition, especially tumors, to become progressively worse and to potentially result in death.
Anatomy and Physiology

- 15 Questions
- 18 Minutes
- 30 Questions on CST exam
Anatomy and Physiology

1. The thick, white, fibrous tissue that encloses about three fourths of the eyeball is called:
   A. Conjunctiva
   B. Cornea
   C. Sclera
   D. Choroid Layer

2. Paired organs that lie on the medial side of the upper kidney and excrete glucorticoids.
   A. Ureters
   B. Adrenal glands
   C. Glomerulus
   D. Seminal vesicles

3. How many ventricles are found between the various sections within the brain?
   A. Two
   B. Four
   C. One
   D. Six

4. Kidney shaped organ that is extremely vascular and lies under the diaphragm in the left upper abdomen
   A. Pancreases
   B. Spleen
   C. Gallbladder
   D. Liver

5. Muscle is attached to the bone with:
   A. Fascia
   B. Tendon
   C. Ligament
   D. Cartilage

6. The colon begins at the
   A. Cecum
   B. Jejunum
   C. Ileum
7. Which of these vessels runs along the medial aspect of the knee to the medial aspect of the Achilles tendon?
   A. Saphenous
   B. Jugular
   C. Subclavian
   D. Brachial

8. Cutting away dead tissue or Debris with a blade or scissors
   A. Blunt Dissection
   B. Debulk
   C. Excise
   D. Debridement

9. A Patella is the:
   A. Shin
   B. Knee cap
   C. Ankle
   D. Back of the knee

10. The system having to do with the skin is called:
    A. Digestive
    B. Endocrine
    C. Integumentary
    D. Respiratory

11. The medical term for the elbow is
    A. Radial condyles
    B. Olecranon process
    C. Ischial Tuberosities
    D. Acromion Process

12. A patient with an appendicitis complains of pain in the
    A. Left upper quadrant
    B. Lower abdomen
    C. Right lower quadrant
    D. Epigastric area
13. Extravasation is:
   A. Reduced blood flow to an area
   B. Excessive bleeding
   C. Clotting process
   D. Leaking of fluid into the tissues

14. What are Ribosomes?
   A. Cellular organelle and site of protein synthesis
   B. Cellular organelle that destroy invading microbes
   C. Cellular organelle that digest old organelles and viruses
   D. Creates energy rich molecules for the cell

15. The Pallet is the medical terminology for:
   A. The boney socket for the root of the tooth
   B. The roof of the mouth
   C. Fleshy tissue hanging down at the back of the mouth
   D. Area between the back of the mouth and the hyoid bone
Microbiology

• Gram-positive
  ▫ About 1/3 of all bacterial infections in humans
  ▫ Some are resistant to antibiotics

• Gram-negative
  ▫ Most are aerobic but not all
  ▫ More unusual bacterial infections in humans

Microbiology

• Rod shaped
  ▫ Called Bacilli
  ▫ Occur in chains or pairs

• Spiral shaped
  ▫ Called Spirochetes
  ▫ Coiled or loosely curved

• Spherical shaped
  ▫ Called Cocci
  ▫ Single (micrococci), paired (diplococci), clusters (staphylococci)

Transmission-based precautions

• Airborne – (TB, Rubeola, Varicella)
  ▫ Stay out of my OR unless emergent
  ▫ Intubate in Isolation room. Bacterial filter on the ETT.
  ▫ If not intubated use industrial grade HEPA filter positioned near patient’s breathing zone
  ▫ Unit is OFF during the surgical procedure
    • Provide air exchanges as usual
  ▫ Room stands empty for 28 minutes after case
  ▫ Do not make room negative pressure
Transmission-based precautions

- **Droplet**
  - Released during coughing, sneezing and talking
  - Do not remain suspended in the air
  - Utilize the 3 feet rule (PPE within 3 feet of pt)

- **Contact** – (medication-resistant pathogens)
  - PPE
  - Precautions during transport
  - Adequate disinfectant and cleaning

Prions

- Creutzfeldt-Jakob Disease (CJD)
  - Brain, spinal cord, CSF, Cornea
  - Also present in low concentration in other tissue
- Use disposable instruments if possible
- Clean area with Bleach or Lye
  - Sodium Hypochlorite, Sodium Hydroxide
- Instruments can be steam sterilized
  - Pervac – 18 minutes
  - Gravity displacement – 60 minutes
Microbiology

- Stay in the environment longer, difficult to control and increase morbidity and mortality
  - MRSA
  - VRE
  - Vancomycin Resistant Staphylococcus Aureus
  - Extended spectrum β-Lactamase producing bacilli
  - Clostridium difficile
  - Carbapenem resistant enterobacteriacae
  - Klebsiella Pneumoniae
- Cleaning with effective products

Microbiology

- Tissue Handling
  - Gentle handling of tissue
  - Strict aseptic technique during preparation and surgery
  - Sharp anatomic dissection of tissues
  - Careful hemostasis to improve conditions for the procedure and limit infection and dead space
  - Obliteration of dead space and adequate removal of material
  - Avoidance of tension

Wound Healing - Phases

- Inflammatory (0-3 days)
  - Redness, edema, phagocytosis
- Proliferation (4-24 days)
  - Granulation and epithelial tissue forms
- Maturation (24 days – 1 yr)
  - Scar formation and contracture
Wound Healing - Risk factors

- Nutrition
- Age
- Immunosuppression
- Circulation / Oxygenation
  - Smoking
  - COPD
  - Hypothermia
- Diabetes

Wound Healing - Risk factors

- Length of surgery
- Trauma
- Prolonged Stress
- Coagulopathies

Wound Healing - Complications

- Infection
  - Redness
  - Edema
  - Tenderness
  - Fever
  - Leukocytosis (Elevated WBCs)
  - Usually a week out or more

- Deep infection
  - Joint or body cavity
  - Something going on while the patient is open

- Superficial
  - Within the layers of the skin
  - Most likely related to post-op wound care
Wound Healing - Complications

- **Separation**
  - Wound edges come apart
- **Dehiscence**
  - Separation to the fascial layer
  - New development of drainage
- **Evisceration**
  - Abdominal contents spilling out
  - Surgical emergency

Wound Classification

- **Class 1 (Clean)**
  - Infection rate less than 5%.
  - Primary closure. No break in technique
- **Class 2 (Clean / contaminated)**
  - Expected infection rate 8-11%.
  - Includes cases in which GI, GU, Respiratory tract are entered under controlled conditions and without spillage
  - Bowel Resection, Hysterectomy, T&A, Cholecystectomy
- **Class 3 (Contaminated)**
  - Expected infection rate 15-20%.
  - Fresh traumatic injury (<4 hours delay)
  - Break in technique/spillage
  - Appendectomy for appendicitis, Cholecystectomy for cholecystitis
- **Class 4 (Infected)**
  - Expected infection rate 27-40%
  - Clinical infection, perforated viscera, necrotic tissue
  - I&D of abscess, ruptured appendix, GSW to abdomen

www.cdc.gov
Microbiology Quiz

- 10 Questions
- 12 Minutes

- 10 Questions on CST exam

WHAT DO YOU CALL AN ACID WITH AN ATTITUDE?

A-mean-oh acid.
Microbiology Practice Test

1. An appendectomy performed for acute, unruptured appendicitis is classified as which type of wound?

   A. Class 1 (clean)
   B. Class 2 (clean contaminated)
   C. Class 3 (contaminated)
   D. Class 4 (dirty)

2. Organisms that are very difficult to destroy

   A. Cocci
   B. Spores
   C. Aerobes
   D. Anaerobes

3. Documentation regarding wound classification for a patient having a vaginal hysterectomy would identify the wound as:

   A. Class I
   B. Class II
   C. Class III
   D. Class IV

4. Phagocytosis is:

   A. The ingestion of liquid into a cell
   B. The process by which leukocytes engulf and destroy bacteria
   C. An association between two organisms in which one benefits and the other derives neither benefit nor harm
   D. The practice of living as a parasite in or on another organism

5. Surgical procedures performed on the alimentary respiratory or genitourinary tract without spillage are classified as

   A. Clean
   B. Clean/contaminated
   C. Contaminated
   D. Dirty
6. A deep infection is one that:
   A. Occurs within 30 days of surgery
   B. Causes purulent drainage
   C. Is present in joint or body cavity
   D. Is in the layers of the dermis

7. Agents used to reduce the microorganisms on the patient’s skin are called:
   A. Sporicidal
   B. Germicidal
   C. Disinfectants
   D. Antiseptics

8. Which organization has legal oversight for the safety of healthcare providers at work?
   A. EPA
   B. CDC
   C. OSHA
   D. NIOSH

9. A gram stain is used to differentiate between:
   A. Living and dead organisms
   B. Fungi
   C. Bacteria
   D. Viruses and Bacteria

10. Two cocci joined together are referred to as a:
     A. Diplococci
     B. Micrococci
     C. Staphylococci
     D. A cell
Pharmacology

Common Abbreviations

- bid – twice a day
- h, hr – hour
- PRN, prn – As necessary (pro re nata)
- q – every
- qh – every hour
- q2h – every two hours
- qid – four times a day
- tid – three times a day
- stat - immediately
- IM – intramuscular
- IV – intravenous
- PO, po – orally (Per os)
- cap – capsule
- gtts – drops
- soln – solution
- susp – suspension
- tab – tablet
- ung - ointment

Pharmacology

Many abbreviations associated with medication administration are on the "Do Not Use" list.

1. U – Mistaken for a 0
2. IU – Mistaken for 10 or IV
3. QD, qd – Often illegible
4. QOD – O mistaken for I (QID means four times a day)
5. Trailing zero (1.0 mg) – decimal point is missed
6. Leading zero (.1 mg) Decimal point is missed
7. MS – can mean Morphine Sulfate or Magnesium Sulfate
8. MSO4 and MgSO4 – too close and are confused

Pharmacology

- Agonists – attracted to receptors, i.e. neurotransmitters like acetylcholine and hormones that occur naturally. They are attracted to receptors and cause a response.

- Antagonists – receptor blockers, keeps agonists from attaching to receptors, i.e. paralytics prevent acetylcholine from causing muscle movement
Pharmacokinetics
How the body processes drugs

- Absorption – enters body through system of administration. (IM, PO, topical)
- Distribution – drug hits the bloodstream and moves throughout the body
- Metabolism – body processes change medication to a water soluble molecule that can be excreted by the body. (usually liver, also kidneys lungs, bowel)
- Excretion – most drugs excreted through kidneys Feces and skin less commonly

Types of Anesthesia

- Local
- Moderate Sedation
- Monitored Anesthesia Care (MAC)
- Regional Anesthesia
- General Anesthesia

Regional Anesthesia

- Topical
  - Drops or ointment
- Local infiltration
  - Injected into incision site
  - Epinephrine delays absorption for post op pain control
- Regional nerve blockade
  - The injection of local anesthetic onto or near nerves for temporary control of pain
IV Regional Anesthesia - Bier Block

- Used in hand procedures
- 20 – 60 minute cases are ideal
- Bloodless field
- Rapid onset < 5 min
- Motor function returns rapidly then sensation

Epidural

**Peridural or Epidural / Caudal**

- Medication injected into the epidural space
- Local given first
- Epidural needle placed
- Catheter advanced through needle
- Needle withdrawn
- Catheter secured with tape
- Empty 3 cc syringe aspirates catheter. No CSF should come

- Test dose first then full dose
  - Bupivacaine
  - Lidocaine
  - Ropivacaine
- Can be injected into Thoracic and Lumbar region
  - Caudal means it will be sacral region

Spinal

**Subdural or Spinal / Saddle**

- Medication injected into the spinal fluid
- Small volumes of medication
- Injected below L2

- Patient is in a sitting or side lying position
- Skin is prepped and fenestrated drape
- Local given first
- Spinal needle is inserted
  - Should see CSF drop
- Agent injected
  - Tetracaine
  - Bupivacaine
- Needle removed
Epidural & Spinal Complications

- Hypotension – there is vasodilatation from area of anesthesia down. Position with care
- Spinal Headache – CSF leaking from insertion site
- Respiratory Depression – usually from sedative given with spinal / epidural. However, can be affecting phrenic nerve (diaphragm)
- Bladder distention – Sacral fibers last to recover. Muscle control returns first. Sensation to void last

Inhalation gases

- Halothane
  - Strongest
  - Can cause arrhythmias in conjunction with epinephrine
- Ethrane
  - Contraindicated in people with seizures
- Isoflurane (Forane)
  - Rapid recovery / Neuro
- Sevoflurane
  - Rapid recovery / Neuro
- Desflurane
  - Fastest onset and offset
  - Coughing is common
- Nitrous Oxide
  - Can support combustion like oxygen
  - Eliminated through lungs

Common IV medications

*All of these decrease or eliminate respiratory function*

- Analgesics – Relieves pain
  - Opioids
    - Morphine
    - Fentanyl
- Sedative – reduces level of consciousness
  - Benzodiazapines
    - Versed – also an amnesic
    - Valium – also controls muscle spasms
- Anticholinergics – blocks neurotransmitter acetylcholine
  - Paralytic
  - Vecuronium
  - Atracurium
Blood Components

- Plasma
  - Fluid - Makes up blood volume
  - Helps maintain blood pressure
- Erythrocytes - Red Cells (RBC)
  - Contains Hemoglobin
- Hemoglobin
  - Holds oxygen molecule onto red cells
- Hematocrit
  - The number of red cells in a given volume of blood
- Leukocytes – White Cells (WBC)
  - Fight infection

Estimating blood loss

Dry sponges
- 4x4 hold ~ 10 mL blood
- Ray-techs ~ 10-20 mL blood
- Lap sponges ~ 100 mL blood

Pediatric cases should have sponges & gauze weighed for blood loss

Blood loss replacement

Replace 1 mL blood with:
- 3 mL crystalloid (i.e. NS, Dextrose, LR)
  - 3:1 ratio
- 1 mL colloid (i.e. Albumin, Hespan®, Dextran®)
  - 1:1 ratio
- 1 mL PRBC
  - 1:1 ratio
Pharmacology Quiz

- 10 Questions
- 12 Minutes
- 10 Questions on CST exam

"...and this is Ralph, your anesthesiologist."
Pharmacology Practice Test

1. Sodium Citrate (Bi-Citra) is an example of:
   A. A preoperative medication used to neutralize stomach acid
   B. A Benzodiazepine used for anxiety
   C. A hypnotic/sedative
   D. Given for hypotension

2. How is Naloxone Hydrochloride (Narcan) used?
   A. As a reversal agent for Heparin
   B. As a narcotic antagonist
   C. It's a paralytic
   D. For muscle spasms

3. If a postoperative order for pain medication was written to be given PO, TID, PRN How can it be taken?
   A. Percutaneous injection twice daily
   B. By mouth as needed to control pain
   C. By mouth three times a day as needed
   D. Percutaneous injection three times a day as needed

4. When the patient is NPO we say they are:
   A. To have nothing by mouth
   B. Hungry
   C. Not allowed food after midnight
   D. Allowed clear liquids only

5. 1cc of a solution is the equivalent of:
   A. 1 liter
   B. 1 ml
   C. 100 milliliters
   D. 10 milliliters
6. A normal body temperature in Fahrenheit is 98.6. What is a normal body temperature in Celsius?
   A. 35
   B. 36
   C. 37
   D. 38

7. Microfibrillar collagen (Avetene) is a/an:
   A. Antibiotic
   B. Hemostatic agent
   C. Steroid hormone
   D. CNS depressant

8. All of these medications inhibit blood coagulation except:
   A. Warfarin
   B. Calcium
   C. Heparin
   D. Aspirin

9. You’re working in the labor and deliver department. The patient is being prepped for an emergency cesarean section. The surgeon says the patient had been on a oxytocin (Pitocin) drip for two hours. Why was oxytocin (Pitocin) given?
   A. It is an epidural medication for pain control during the cesarean section
   B. It’s to control the blood pressure in this pre-eclampsic patient
   C. It is a medication to induce labor
   D. It’s a prophylactic antibiotic

10. Which of the following is considered a ‘basic right’ for correct drug handling?
    A. Drug and dosage
    B. Manufacturer
    C. Type of syringe
    D. The label includes the concentration
Practice Test

1. Which self-retaining instrument would be used to facilitate visualization in an inguinal hernia:
   A. Richardson
   B. Weitlander
   C. Army Navy
   D. Debakey

2. Blunt/round needle would be used for:
   A. Liver
   B. Vessel
   C. Tendons
   D. Scelera

3. What incision would you use for an appendectomy?
   A. Pfannestiel
   B. Inguinal
   C. Mcburneys
   D. Subcostal

4. An example of mechanical hemostasis includes:
   A. Electrocautery
   B. Throbmin
   C. Ultrasound
   D. Tourniquet

5. When using bone cement, it is important to inform anesthesia because it can cause:
   A. Hypotension
   B. Hypoxia
   C. Hypertension
   D. Hyperthermia
6. An example of semi-critical equipment (Spaulding Classifications):
   A. Sterile instruments
   B. OR bed
   C. Blood pressure cuff
   D. Urinary catheters

7. Pre-vacuum autoclave is also known as:
   A. Immediate use sterilization
   B. Sterrard
   C. Steris
   D. Dynamic Air Removal

8. What is reverse isolation?
   A. When all members transporting the patient wear a mask
   B. When the patient only wears a mask
   C. When no one wears the mask
   D. When only the person at the head of the bed when transporting the patient wears a mask

9. Another name for the electrosurgical grounding pad is:
   A. Active electrode
   B. Dispersive pad
   C. Bovie
   D. Generator

10. Bowel resection would be an example of what wound classification:
    A. Clean
    B. Clean/contaminated
    C. Contaminated
    D. Dirty/infected
11. All of the following are safety precautions when using the laser except:

A. Use moist sponges and towel around operative area
B. Wear laser eyewear for that specific laser
C. Use reflective instruments for the case
D. Post signs outside the operating room door indicating laser in use

12. Which of the following medications is a diuretic?

A. Furosemide
B. Corticosteroid
C. Cephalosporin
D. Halothane

13. Which of the following had the highest tensile strength but poor handling qualities?

A. Silk
B. Polyester fiber
C. Dacron
D. Stainless Steel

14. Emergence is:

A. Arousal from general anesthesia
B. Initiating anesthesia
C. The period of rapid eye movement immediately after anesthesia meds are given
D. When the head of the baby is visible during a vaginal birth

15. All of the following procedures you would expect the use of a pneumatic tourniquet except:

A. Hip arthroplasty
B. Knee arthroplasty
C. Ankle fracture
D. ORIF radius
16. What is the name of this suction tip?
   A. Baron
   B. Poole
   C. Frazier
   D. Antrum

17. Which of the following is false?
   A. A specimen is handed off the field after the surgeon gives permission to do so
   B. Stones and teeth are placed in a container without preservative
   C. Cultures are sent to pathology immediately
   D. Frozen sections are sent to pathology on a Raytec sponge

18. The most commonly used thermal hemostasis used during neurosurgery is:
   A. Cryosurgery
   B. Bipolar electrosurgery
   C. Monopolar electrosurgery
   D. Harmonic scalpel

19. Which suture would work well in the presence of infection?
   A. Silk
   B. Chromic Gut
   C. Steel
   D. Polyglycolic acid

20. During an appendectomy which muscle is encountered first and divided in the direction of its fibers?
   A. Transverse abdominis
   B. Rectus abdominis
   C. Internal oblique
   D. External oblique
21. How many questions must you answer correctly to pass the CST exam?
   A. 175
   B. 118
   C. 125
   D. 152

22. A urinary tract infection after a cystoscopy is an example of what type of infection?
   A. Recurrent
   B. Healthcare-associated infection
   C. Latent
   D. Community-acquired infection

23. During what type of surgery would this needle holder be used?
   A. Vaginal hysterectomy
   B. Repair of a rotator cuff
   C. Tonsillectomy
   D. Craniotomy

24. Endocarditis means:
   A. Inflammation of the upper portion of the stomach near the cardiac sphincter
   B. An endoscopic cardiac procedure
   C. Inflammation of the inner lining of the heart
   D. An indication for a carpal tunnel release

25. The prefix pseudo- means:
   A. False
   B. Again
   C. Under
   D. With