

CORE CURRICULUM

FOR SURGICAL TECHNOLOGY



SEVENTH EDITION

Core Curriculum for Surgical Technology

Seventh Edition



Association of Surgical Technologists
6 West Dry Creek Circle
Littleton, CO 80120
(303) 694-9130
www.ast.org



Accreditation Review Council on Education in Surgical Technology and Surgical Assisting
19751 East Mainstreet, Suite #339
Parker, CO 80138
303-694-9262
<https://arcstsa.org/>

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INTRODUCTION TO THE *CORE CURRICULUM* FOR SURGICAL TECHNOLOGY

Introduction

The Core Curriculum Revision Panel began the process of completing a peer-reviewed revision of the *Core Curriculum for Surgical Technology* (CCST), 7th edition, in February 2019. The Panel consisted of representatives of the Association of Surgical Technologists (AST), the Accreditation Council on Surgical Technology and Surgical Assisting (ARC/STSA), and the National Board of Surgical Technology and Surgical Assisting (NBSTSA). The Panel focused on multiple transformations that have occurred in the profession since the publication of the 6th edition while preserving the principles of the entry-level knowledge that the graduate needs to provide safe, quality surgical patient care.

In revising the CCST, the Panel undertook the review of documents that served as guides for the revision.

- In October 2018, AST and ARC/STSA hosted the *Surgical Technology Education for 21st Century Summit*. The summit focused on identifying areas of knowledge and skills that require an increased emphasis in the student's education. A post-summit report summarized the results that the Panel used as a reference.
- Two important NBSTSA documents were also reviewed – Task Statements and the Examination Content Outline from the 2020 CST Candidate Handbook.
- The AST *Guidelines for Best Practices in Surgical Technology* were reviewed according to the respective subject area of a CCST document.

Based upon the gathered information, new subject areas were identified that the entry-level surgical technologist should learn. Examples include:

- Surgical supplies
- Interventional radiology
- Establishing the sterile field
- Basics of leadership and management
- Enhanced minimally invasive (MIS) applications

Features of the 6th edition that have been left in place in the 7th edition and some of which are given more emphasis, and new features include the following.

- The 7th edition of the CCST offers a reformatted table of contents centered around the three pillars of surgical technology education: didactic, lab, and clinical sections. In addition to this, each focused section of the CCST includes its own itemized table of contents to assist with user navigation.
- There are instances when information is repeated for purposes of scope and sequence within multiple subject areas. For example, cells are listed in both Anatomy and Physiology and Microbiology. When this occurs, information boxes are provided for reference.
- The AST *Guidelines for Best Practices in Surgical Technology* have been given more emphasis, and when applicable, the educator is referred to a specific guideline.
- For sections that highlight physical skills that may be assessed in a lab or clinical environment, learning objectives were separated into didactic and skill applications.

- Interpersonal relationships such as conflict management were added to the Professionalism section of the CCST.
- The Technical Science Concepts section of the CCST was enhanced to include Interventional Radiology and MIS applications such as endoscopy and navigation systems.
- Perioperative case management sections were added to the Surgical Technology portion of the CCST and address didactic and lab skills-related content such as establishing, maintaining, and breaking down the sterile field.
- A preface page and learning objectives were added to the surgical procedures – didactic section to provide additional guidance related to the co-related, minimally invasive (MIS), and interventional radiology procedure concepts.
- Separate sterile processing sections “Methods of Disinfection” and “Sterile Storage and Distribution” in the 6th edition have been combined into one “Sterile Processing” section in the 7th edition.
- A perioperative lab skills assessments section has been added to assist educators in creating appropriate skills competency checklists in the lab and clinical environment. Throughout this section, references are provided to relevant didactic sections of the core.
- The surgical rotation requirements have primarily been kept the same, including the 120-case requirement. However, portions of this section have been revised to support counting cases and redefining roles during clinical practice. The formatting of this section was also updated to align with the rest of the CCST sections.
- New surgical procedure exemplars have been added to Appendix A, including interventional radiology, robotic, and ORIF procedures to assist the educator in standardizing teaching surgical procedures in the classroom.

AST, ARC/STSA, and NBSTSA very much appreciate the time and energy that the Core Curriculum Revision Panel volunteer members put into revising the CCST, 7th edition. Through their dedication to students and the profession, surgical technology education can continue to advance to address the ever-evolving role of the surgical technologist with a focus on producing graduates who provide safe, quality surgical patient care.

**CONTRIBUTORS TO THE *CORE CURRICULUM*
FOR *SURGICAL TECHNOLOGY***

Seventh Edition Revision Panel

Libby McRae, CST, FAST (Chair)
Surgical Technology Program Director
Yakima Valley College
Yakima, Washington

Amanda Minor, CST, FAST
Surgical Technology Program Director
Mount Aloysius College
Cresson, Pennsylvania

Angie Burton, CST, FAST (Vice-Chair)
General Surgery Team Coordinator
Black Hills Surgical Hospital
Rapid City, South Dakota

Mary Jo Nowicki, CST, FAST
Surgical Technology Program Director
Baker College
Grosse Pointe Woods, Michigan

Robert Blackston, CST, CSFA, FAST
Surgical Technology Program Director
North Idaho College
Coeur d'Alene, Idaho

TC Parker, CST, FAST
Surgical Technology Program Director
Gwinnett Technical College
Statham, Georgia

Janice Grewatz, CST, CSFA, CSPDT, FAST
Surgical Technology Program Director
Parkland College
Champaign, Illinois

Sharon Rehn, CST, RN
Associate Dean of Health Sciences
Southeast Community College
Lincoln, Nebraska

Tiffany Howe, CST, CSFA, FAST
Vice President for Teaching and Learning
Western Dakota Tech
Hill City, South Dakota

Logan Threet, CST
Surgical Technology Program Director
Wichita State University
Wichita, Kansas

Robin Keith, CST, CNOR, RN, FAST
Surgical Technology Program Director
Ashville-Buncombe Technical Community
College
Asheville, North Carolina

Seventh Edition Review Panel

Dana Bancroft, CST, FAST
Surgical Technology Program Manager
Daytona State College
Daytona, Florida

Erin Ivey, CST, FAST
Surgical Technology Assistant Chair
Horry-Georgetown Technical College
Myrtle Beach, South Carolina

Richard Clark, CST, FAST
Surgical Technology Program Director
MassBay Community College
Framingham, Massachusetts

Grant Wilson, CST, FAST
Surgical Technology Program Director
Calhoun Community College
Decatur, Alabama

AST acknowledges the contribution to previous editions by the following individuals:

Sixth Edition

Dana Grafft, CST; Connie Bell, CST; Benson Bradley, CST; Jeff Bidwell, CST, CSFA; Angie Burton, CST; Lorrie Campbell, CST; Kevin Craycraft, CST; Gemma Fournier, CST, RN; Kathy Lee, CST; Mary McNaron, CST, RN, CNOR; Lisa Reed, CST, RN, CNOR; Edward Watts, CST, CSFA

Fifth Edition

Amy Croft, CST, CFA; Gemma Fournier, CST, RN; Julia Jackson, CST; Ann McGuinness, CST, RN; Emily Rogers, CST, CNOR; Tracey Ross, CST; Donovan Traverse, CST

Fourth Edition

Nelda Coleman, RN; Terry Davis, CST; Donna Donley, RN; Diane Fleming, CST; Chris Keegan, CST; Claire Olsen, RN; Katherine Snyder, CST; Linda Ward-English, CST, CFA; George Clarke, CST, CSPDT; Ann McGuinness, CST, RN

Third Edition

Nancy Allmers, RN; Susan Austin, CST; Joyce Borndahl, RN; Marifrances Burger, CST; Beatrice Franklin, CST; Margrethe May, CST; Dorothy Moore, RN; Claire Olsen, RN; Kay Yurko, CST; Deborah Rowland, CST

Second Edition

Beverly Baker, CST; Sheila Berglund, CST; Joyce Borndahl, RN; Judith Carlson, RN; Jill Crider, CST; Myra Daniels; Lawrence Demarest, Ph.D.; Linda Ward-Dyo, CST; Sherry Flansburg, CST; Katherine Hasenhorl, RN; Annette T. Jones, RN; Valerie Jumper, RN; Ronald Lucchino, Ph.D.; Dorothy Main, RN; Gerald Rahn, MD; Daniel Sheridan, CST; Ann Steele, RN; Kathleen Uribe, CST; Marilyn Walsh, RN

First Edition

Joyce Borndahl, RN; Judith Carlson, RN; Gary DeNota, CST; Linda Ward-Dyo, CST; Angela M. Fazzolari, CST; Sherry Flansburg, CST; Barbara Gay, CST; Sister Mary Louise Hoeller, DC, RN; Annette T. Jones, RN; Valerie Jumper, RN; Ronald Lucchino, Ph.D.; Dorothy Main, RN; Daniel Sheridan, CST; Ann Steele, RN

GENERAL EDUCATION RECOMMENDATIONS FOR THE ASSOCIATE DEGREE

Programs should be familiar with the general education requirements of their respective state board of higher education when transitioning to the associate degree. However, there are general education courses that can be assumed to be standard requirements to complete an associate degree. The following are recommended freshman college-level general education courses that most state boards of higher education require.

- English
 - Includes reading skills across the curriculum.
 - It also includes writing skills across the curriculum.
- Mathematics
- Humanities, sociology, or psychology
- Demonstrated proficiency in computer skills or completion of a freshman-level course.

Many programs require introductory science courses as prerequisites to meet the requirements of the CCST. The following are the CCST requirements that are recommended as prerequisites.

- Pharmacology
- Medical Terminology
- Anatomy and Physiology, I and II that includes a lab component.
- Microbiology that includes a lab component.

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DIDACTIC
HEALTHCARE SCIENCES

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MEDICAL TERMINOLOGY

Objectives: The learner will:

1. Combine prefixes, word roots, and suffixes to create medical terms.
2. Pronounce medical terms.
3. Write medical terms.
4. Identify abbreviations.

Content:

- I. Rules for combining forms
 - A. Combining word parts
 - B. Compound words
 - C. Plural forms
- II. Prefix, suffix, direction, amount, and color
 - A. Prefix
 1. A-
 2. Ab-
 3. Ad-
 4. Ambi-
 5. An-
 6. Ante-
 7. Anti-
 8. Brady-
 9. Contra-
 10. Crypt-
 11. Dia-
 12. Dys-
 13. Ecto-
 14. En-
 15. Endo-
 16. Epi-
 17. Eu-
 18. Ex-
 19. Exo-
 20. Hemi-
 21. Hyper-
 22. Hypo-
 23. Inter-
 24. Intra-
 25. Macro-
 26. Mal-
 27. Micro-
 28. Para-
 29. Per-
 30. Peri-

31. Post-
 32. Pre-
 33. Retro-
 34. Semi-
 35. Sub-
 36. Super-
 37. Supra-
 38. Tachy-
- B. Suffix**
1. -al
 2. -algia
 3. -cele
 4. -centesis
 5. -ectasia
 6. -ectasis
 7. -ectomy
 8. -edema
 9. -emesis
 10. -gram
 11. -graph
 12. -graphy
 13. -ia
 14. -iasis
 15. -ism
 16. -ist
 17. -itis
 18. -ium
 19. -logist
 20. -logy
 21. -lysis
 22. -malacia
 23. -megaly
 24. -oid
 25. -oma
 26. -osis
 27. -pathy
 28. -pexy
 29. -plasty
 30. -ptosis
 31. -rrhage
 32. -rrhagia
 33. -rrhaphy
 34. -rrhea
 35. -sclerosis
 36. -scope
 37. -scopy

- 38. -sis
- 39. -spasm
- 40. -stasis
- 41. -stomy
- 42. -tome
- 43. -tomy
- 44. -tripsy

C. Word roots/combining forms

1. Forms describing planes and direction of reference

- a) Anter/o
- b) Caud/o
- c) Cephal/o
- d) Centr/o
- e) Dist/o
- f) Dors/o
- g) Extern/o
- h) Infer/o
- i) Intern/o
- j) Later/o
- k) Medi/o
- l) Pariet/o
- m) Peripher/o
- n) Poster/o
- o) Proxim/o
- p) Super/o
- q) Ventr/o
- r) Viscer/o

2. Forms describing amount or number

- a) Bi-
- b) Di-
- c) Mono-
- d) Multi-
- e) Nulli-
- f) Poly-
- g) Primi-
- h) Quad-
- i) Quadra-
- j) Tetra-
- k) Tri-
- l) Uni-

3. Forms describing color or description

- a) Alb/o, Albin/o
- b) Chlor/o
- c) Cyan/o
- d) Erythr/o
- e) Leuk/o

- f) Melan/o
- g) Poli/o
- h) Xanth/o

III. Medical term components by system

A. Integumentary system

1. Word roots

- a) Adip/o
- b) Caus/o
- c) Cauter/o
- d) Cutane/o
- e) Derm/o
- f) Dermat/o
- g) Diaphor/o
- h) Erythem/o
- i) Erythemat/o
- j) Hidr/o
- k) Kerat/o
- l) Leuk/o
- m) Lip/o
- n) Melan/o
- o) Myc/o
- p) Onych/o
- q) Phyt/o
- r) Pil/o
- s) Py/o
- t) Seb/o
- u) Sebace/o
- v) Squam/o
- w) Steat/o
- x) Trich/o
- y) Ungu/o
- z) Xer/o

B. Musculoskeletal system

1. Word roots

- a) Ankyl/o
- b) Arthr/o
- c) Burs/o
- d) Calc/o
- e) Carp/o
- f) Cervic/o
- g) Chondr/o
- h) Claviclu/o
- i) Coccyg/o
- j) Cost/o
- k) Crani/o
- l) Femor/o

- m)** Fibul/o
- n)** Humer/o
- o)** Ili/o
- p)** Ischi/o
- q)** Lumb/o
- r)** Metacarp/o
- s)** Metatars/o
- t)** Musculo/o
- u)** My/o
- v)** Myel/o
- w)** Oste/o
- x)** Patell/o
- y)** Pelv/i
- z)** Phalang/o
- aa)** Pub/o
- bb)** Radi/o
- cc)** Sacr/o
- dd)** Scapul/o
- ee)** Spondyl/o
- ff)** Stern/o
- gg)** Tars/o
- hh)** Ten/o
- ii)** Tend/o
- jj)** Thorac/o
- kk)** Tibi/o
- ll)** Uln/o
- mm)** Vertbr/o

C. Nervous system

1. Word roots

- a)** Alges/o
- b)** Angi/o
- c)** Caus/o
- d)** Cerebell/o
- e)** Cerebr/o
- f)** Comat/o
- g)** Crani/o
- h)** Cry/o
- i)** Dur/o
- j)** Encephal/o
- k)** Gli/o
- l)** Hydr/o
- m)** Mening/o
- n)** Meningi/o
- o)** My/o
- p)** Myel/o
- q)** Narc/o

- r) Neur/o
- s) Pont/o
- t) Radicul/o
- u) Spin/o
- v) Syncop/o
- w) Tax/o
- x) Thalam/o
- y) Troph/o
- z) Vag/o

D. Sensory system

1. Eye

a) Word roots

- 1) Aque/o
- 2) Ambly/o
- 3) Blephar/o
- 4) Conjunctiv/o
- 5) Cor/o
- 6) Corne/o
- 7) Cycl/o
- 8) Dacry/o
- 9) Dipl/o
- 10) Glauco/o
- 11) Ir/o
- 12) Irid/o
- 13) Kerat/o
- 14) Lacrim/o
- 15) Mi/o
- 16) Mydr/o
- 17) Ocul/o
- 18) Ophthalm/o
- 19) Opt/o
- 20) Optic/o
- 21) Palpebr/o
- 22) Papill/o
- 23) Phac/o
- 24) Phot/o
- 25) Presby/o
- 26) Pupill/o
- 27) Retin/o
- 28) Scler/o
- 29) Uve/o
- 30) Vitre/o
- 31) Xer/o

b) Suffixes

- 1) -opia
- 2) -opsia

- 2. Ear
 - 3) -tropia
 - a) Word roots
 - 1) Acous/o
 - 2) Audi/o
 - 3) Aur/o
 - 4) Auricul/o
 - 5) Cochle/o
 - 6) Mastoid/o
 - 7) Myring/o
 - 8) Ossicul/o
 - 9) Ot/o
 - 10) Staped/o
 - 11) Tympan/o
 - b) Suffixes
 - 1) -cusis
 - 2) -otia

E. Circulatory system - blood

- 1. Word roots
 - a) Agglutin/o
 - b) Bas/o
 - c) Chrom/o
 - d) Coagul/o
 - e) Cyt/o
 - f) Eosin/o
 - g) Erythr/o
 - h) Granul/o
 - i) Hem/o
 - j) Hemat/o
 - k) Hemoglobin/o
 - l) Leuk/o
 - m) Mon/o
 - n) Morph/o
 - o) Neutr/o
 - p) Nucle/o
 - q) Phag/o
 - r) Thromb/o
- 2. Suffixes
 - a) -apheresis
 - b) -blast
 - c) -cytosis
 - d) -emia
 - e) -globin
 - f) -globulin
 - g) -lytic
 - h) -phoresis

- i) –plasia
 - j) –poiesis
 - F.** Cardiovascular system
 - 1.** Word roots
 - a) Aneurysm/o
 - b) Angi/o
 - c) Aort/o
 - d) Arter/o
 - e) Arteri/o
 - f) Ather/o
 - g) Atri/o
 - h) Cardi/o
 - i) Coron/o
 - j) Cyan/o
 - k) Isch/o
 - l) Lymph/o
 - m) Lymphat/o
 - n) My/o
 - o) Pericardi/o
 - p) Phleb/o
 - q) Sphygm/o
 - r) Valv/o
 - s) Vas/o
 - t) Ven/o
 - u) Ventricul/o
 - G.** Lymphatic system
 - 1.** Word roots
 - a) Cervic/o
 - b) Immun/o
 - c) Lymph/o
 - d) Lymphaden/o
 - e) Lymphangi/o
 - f) Splen/o
 - g) Thym/o
 - H.** Respiratory system
 - 1.** Word roots
 - a) Alveol/o
 - b) Bronch/o
 - c) Bronchi/o
 - d) Bronchiol/o
 - e) Laryng/o
 - f) Lob/o
 - g) Nas/o
 - h) Ox/o
 - i) Pharyng/o
 - j) Phren/o

- k) Pleur/o
 - l) Pneum/o
 - m) Pneumon/o
 - n) Pulm/o
 - o) Pulmon/o
 - p) Rhin/o
 - q) Thorac/o
 - r) Trache/o
2. Suffixes
- a) -ole
 - b) -pnea
- I. Digestive system
1. Word roots
- a) Abdomin/o
 - b) An/o
 - c) Append/o
 - d) Appendic/o
 - e) Bil/i
 - f) Cec/o
 - g) Chol/e
 - h) Cholecyst/o
 - i) Col/o
 - j) Colon/o
 - k) Dent/i
 - l) Dent/o
 - m) Doch/o
 - n) Duoden/o
 - o) Enter/o
 - p) Esophag/o
 - q) Gastr/o
 - r) Gingiv/o
 - s) Gloss/o
 - t) Hepat/o
 - u) Ile/o
 - v) Intestin/o
 - w) Jejun/o
 - x) Lapar/o
 - y) Lingu/o
 - z) Odont/o
 - aa) Omphal/o
 - bb) Or/o
 - cc) Pancreat/o
 - dd) Periton/o
 - ee) Proct/o
 - ff) Rect/o
 - gg) Sial/o

- 3) Orchi/o
- 4) Orchid/o
- 5) Pen/o
- 6) Prostat/o
- 7) Scrot/o
- 8) Semin/o
- 9) Spermat/o
- 10) Test/o
- 11) Testic/o
- 12) Varic/o
- 13) Vas/o

L. Endocrine system

1. Word roots

- a) Aden/o
- b) Adren/o
- c) Adrenal/o
- d) Calc/o
- e) Cortic/o
- f) Crin/o
- g) Estr/o
- h) Gluc/o
- i) Glyc/o
- j) Home/o
- k) Kal/i
- l) Pancreat/o
- m) Parathyroid/o
- n) Pituitar/o
- o) Thyr/o
- p) Thyroid/o

IV. Abbreviations

A. Commonly used abbreviations

- 1. ABG arterial blood gas
- 2. ACLS advanced cardiac life support
- 3. AD right ear
- 4. AF atrial fibrillation
- 5. AIDS acquired immunodeficiency syndrome
- 6. AK above the knee
- 7. A/P anterior-posterior
- 8. ARDS acute respiratory distress syndrome
- 9. AS left ear
- 10. ASD atrial septal defect
- 11. A/V atrioventricular
- 12. BCLS basic cardiac life support
- 13. b.i.d. twice a day
- 14. BK below the knee
- 15. BP blood pressure

16. BPH benign prostatic hypertrophy
17. BSA body surface area
18. BUN blood urea nitrogen
19. Bx biopsy
20. Ca cancer
21. CABG cardiac artery bypass graft
22. CAD coronary artery disease
23. CAT computed axial tomography
24. CBC complete blood count
25. CHF congestive heart failure
26. CNS central nervous system
27. COPD chronic obstructive pulmonary disease
28. CPR cardiopulmonary resuscitation
29. CSF cerebrospinal fluid
30. CVA cerebrovascular accident
31. CVP central venous pressure
32. D & C dilation (dilatation) and curettage
33. D/C discontinue
34. DIC disseminated intravascular coagulation
35. DJD degenerative joint disease
36. DNR do not resuscitate
37. DX diagnosis
38. ECG (EKG) electrocardiogram; electrocardiograph
39. EEG electroencephalogram; electroencephalograph
40. ENT ear, nose, and throat
41. Fx fracture
42. GERD gastroesophageal reflux disease
43. gm gram
44. GSW gunshot wound
45. gt (gtt) drop
46. GU genitourinary
47. GYN gynecology
48. H & P history & physical
49. HBV hepatitis B virus
50. HCT hematocrit
51. HIV human immunodeficiency virus
52. I & D incision & drainage, irrigation & debridement
53. ICP intracranial pressure
54. ICU intensive care unit
55. IM intramuscular
56. IOP intraocular pressure
57. IV intravenous
58. KUB kidney, ureter, bladder
59. L & D labor & delivery
60. LLQ left lower quadrant
61. LUQ left upper quadrant

- 62. MRI magnetic resonance imaging
- 63. NKA no known allergies
- 64. NPO (n.p.o.) nothing by mouth
- 65. NS normal saline
- 66. OD right eye
- 67. OS left eye
- 68. OU both eyes
- 69. P/A posterior-anterior
- 70. PAD peripheral artery disease
- 71. PACU post-anesthesia care unit
- 72. PDA patent ductus arteriosus
- 73. PET positron emission tomography
- 74. PID pelvic inflammatory disease
- 75. PRN as needed
- 76. PVC premature ventricular contraction
- 77. RBC red blood cell
- 78. RLQ right lower quadrant
- 79. ROM range of motion
- 80. RUQ right upper quadrant
- 81. RX drug prescription
- 82. stat immediately
- 83. STD sexually transmitted disease
- 84. TAH/BSO total abdominal hysterectomy with bilateral salpingo-oophorectomy
- 85. T & A tonsillectomy & adenoidectomy
- 86. TB tuberculosis
- 87. TENS transcutaneous electrical nerve stimulation
- 88. TIA transient ischemic attack
- 89. t.i.d. three times a day
- 90. TMJ temporomandibular joint
- 91. TPR temperature, pulse, respiration
- 92. TURP transurethral resection of the prostate
- 93. UA (U/A) urinalysis
- 94. URI upper respiratory infection
- 95. UTI urinary tract infection
- 96. VSD ventricular septal defect
- 97. WBC white blood cell count

B. The Joint Commission “Do Not Use” abbreviation list

Do Not Use

U, u (unit)
 IU (International Unit)
 Q.D., QD, q.d., qd (daily)
 Q.O.D., QOD, q.o.d., qod (every other day)
 Trailing zero (X.0 mg)
 Lack of leading zero (.X mg)
 MS

Use Instead

Write “unit”
 Write “International Unit”
 Write “daily”
 Write “every other day”
 Write X mg
 Write 0.X mg
 Write “morphine sulfate”

M₂SO₄ and MgSO₄

Write “magnesium sulfate”

C. The Joint Commission abbreviations for possible future inclusion on “Do Not Use” list

Do Not Use

> (greater than)

< (less than)

Abbreviations for drug names

Apothecary units

@

cc

µg

Use Instead

Write “greater than”

Write “less than”

Write drug names in full

Use metric units

Write “at”

Write “mL”, “ml” or “milliliters”

Write “mcg” or “micrograms”

Note: This list is current as of the publishing date of the *Core Curriculum for Surgical Technology*. It is the responsibility of the program director to periodically review the list for updates.

[do-not-use-list-8-3-20.pdf \(jointcommission.org\)](#)

ANATOMY AND PHYSIOLOGY

Objectives: The learner will:

1. Identify the basic organizational structures of the human body, including body planes, general organization, and terms of reference.
2. Analyze the basic structure of cells and relate cellular components to integrated cell function.
3. Analyze the types of tissue that makeup organs and the characteristics of each.
4. Compare and contrast organs of the body.
5. Analyze the different body systems for composition and function.

Content:

- I. Organization of the human body
 - A. Body planes
 1. Coronal/frontal
 2. Midsagittal
 3. Oblique
 4. Sagittal
 5. Transverse
 - B. Directional terms
 1. Anterior
 2. Distal
 3. Inferior
 4. Lateral
 5. Medial
 6. Posterior
 7. Proximal
 8. Superior
 - C. Quadrants
 1. LLQ
 2. LUQ
 3. RLQ
 4. RUQ
 - D. Regions
 1. Epigastric
 2. Hypogastric
 3. Iliac (right and left)/inguinal
 4. Left hypochondriac
 5. Left lumbar
 6. Right hypochondriac
 7. Right lumbar
 8. Umbilical

- E.** Cavities
 - 1. Abdominal
 - 2. Cranial
 - 3. Dorsal
 - 4. Pelvic
 - 5. Spinal
 - 6. Thoracic
 - 7. Ventral
- F.** Body organizations
 - 1. Cell types
 - a) Connective cell
 - b) Epithelial
 - c) Muscle
 - d) Neurons
 - 2. Tissue types
 - a) Connective
 - b) Epithelial
 - c) Muscle
 - d) Nervous
 - 3. Organs
 - 4. Systems
 - a) Circulatory
 - b) Digestive
 - c) Endocrine
 - d) Genitourinary
 - e) Immune
 - f) Integumentary
 - g) Lymphatic
 - h) Muscular
 - i) Nervous
 - j) Reproductive
 - k) Respiratory
 - l) Sensory
 - m) Skeletal

II. Cells

- A.** Basic structure and function
 - 1. Cell membrane
 - 2. Cytoplasm
 - a) Centrosome and centrioles
 - b) Cilia
 - c) Endoplasmic reticulum
 - 1) Rough
 - 2) Smooth
 - d) Flagella
 - e) Golgi apparatus
 - f) Lysosomes

- g) Mitochondria
 - h) Ribosomes
 - i) Vacuoles
 - j) Vesicles
 - 3. Nucleus
 - a) Chromatin and chromosomes
 - b) Nuclear membrane
 - c) Nucleolus
 - 4. Nucleic acids
 - a) DNA
 - b) RNA
 - 1) Messenger
 - 2) Transfer
 - 3) Ribosomal
 - B. Cell division
 - 1. Cellular respiration
 - a) Glycolysis
 - b) Anaerobic oxidation
 - c) Aerobic oxidation
 - 2. DNA replication
 - 3. Meiosis
 - 4. Mitosis
 - C. New technology
 - 1. Cell cloning
 - a) Cartilage
 - b) Skin
 - 2. Stem cell
- III. Tissues**
- A. Definition
 - 1. Cellular attachments
 - 2. Collection of like cells
 - 3. Common specialized function
 - 4. Intercellular substances
 - B. Types and functions
 - 1. Connective
 - 2. Epithelial
 - 3. Muscle
 - 4. Nervous
 - C. Structure and location
 - 1. Epithelial tissue
 - a) Simple
 - 1) Columnar
 - 2) Cuboidal
 - 3) Squamous
 - b) Stratified
 - 1) Columnar

- 2) Cuboidal
- 3) Lining epithelium
- 4) Squamous
- 2. Connective tissue
 - a) Structural characteristics
 - 1) Cells
 - 2) Fibers
 - b) Classification and location
 - 1) Adipose tissue
 - 2) Blood
 - 3) Bone
 - 4) Cartilage
 - 5) Dense fibrous connective tissue
 - 6) Dense irregular connective tissue
 - 7) Loose areolar connective tissue
 - 8) Lymph
- 3. Muscle tissue
 - a) Cardiac
 - b) Skeletal
 - c) Visceral
- 4. Nervous tissue
 - a) Types of neurons
 - 1) Afferent/sensory
 - 2) Efferent/motor
 - b) Types of neuroglia
- 5. Muscle contraction
 - a) Contractile elements
 - b) Sliding filament mechanism
- 6. Neuromuscular excitability
 - a) Nerve impulse
 - b) Neuromuscular junction

IV. Organs

- A. Organ
 - 1. Complex structure
 - 2. Interrelated unit
 - 3. Specific functions
 - 4. Two or more basic tissues
- B. Types of tissues in organs
 - 1. Brain
 - 2. Heart
 - 3. Nerves
 - 4. Stomach
- C. Organ systems activities
 - 1. Exchange of materials
 - 2. Homeostasis
 - 3. Regulation and feedback mechanisms

4. Response to an external and internal environment
- D.** Abnormalities
 1. Anaplasia
 2. Aplasia
 3. Atrophy
 4. Dysplasia
 5. Hyperplasia
 6. Hypertrophy
 7. Hypoplasia
- V.** Integumentary systems
 - A.** Functions of skin
 1. Absorption
 2. Excretion
 3. Monitoring of external environment
 4. Prevention of loss of body fluids
 5. Protection
 6. Regulation of body temperature
 - B.** Epidermal layers and functions
 1. Structure
 - a) Basal stratum
 - b) Outermost stratum
 2. Functions
 - C.** Dermis
 1. Structure
 2. Functions
 3. Auxiliary structures
 - a) Glands
 - b) Hair follicles
 - c) Nails
 - d) Sensory nerve endings
 - D.** Hypodermis/subcutaneous tissue
 1. Structure
 2. Functions
- VI.** Skeletal system
 - A.** Skeletal regions and specific bones
 1. Appendicular skeleton
 2. Axial skeleton
 - B.** Types of bones
 1. Flat
 2. Irregular
 3. Long
 4. Sesamoid
 5. Short
 - C.** Functions of bones
 1. Attachment for muscles
 2. Blood cell production

3. Framework
4. Protection
5. Storage of calcium
6. Support
- D.** Formation of bone
 1. Callus formation
 2. Endochondral bone formation
 3. Haversian system
 4. Intramembranous bone formation
 5. Ossification
 6. Osteoblasts
 7. Osteoclasts
 8. Osteocytes
- E.** Cartilage
 1. Types
 - a) Labrum
 - b) Meniscus
 2. Characteristics
 3. Locations
- F.** Structure of long bones
 1. Articular cartilage
 2. Cancellous bone
 3. Cortical bone
 4. Diaphysis
 5. Endosteum
 6. Epiphyseal plate/line
 7. Epiphysis
 8. Medullary canal/cavity
 9. Periosteum
- G.** Bone markings and features
 1. Articulating surfaces
 2. Depressions
 3. Projections
- H.** Vertebral column
 1. Vertebral regions
 - a) Cervical
 - b) Coccyx
 - c) Lumbar
 - d) Sacrum
 - e) Thoracic
 2. Parts of a vertebra
 - a) Cervical
 - b) Lumbar
 - c) Thoracic
 3. Intervertebral disk components
 4. Spinal ligaments

- I. Joints**
 - 1. Amphiarthrotic
 - 2. Bursae
 - 3. Capsule
 - 4. Diarthrotic
 - 5. External ligaments
 - 6. Intraarticular ligaments
 - 7. Synarthrotic
 - 8. Synovial membrane
- VII. Muscular system**
 - A. Functions of muscle**
 - 1. Heat production
 - 2. Movement
 - 3. Posture
 - B. Types of muscle**
 - 1. Cardiac
 - 2. Skeletal
 - 3. Smooth
 - C. Actions of muscles**
 - 1. Abduction
 - 2. Adduction
 - 3. Depression
 - 4. Dorsiflexion
 - 5. Elevation
 - 6. Eversion
 - 7. Extension
 - 8. Flexion
 - 9. Inversion
 - 10. Lateral rotation
 - 11. Medial rotation
 - 12. Plantar flexion
 - 13. Pronation
 - 14. Retraction
 - 15. Supination
 - D. Categories of skeletal muscles**
 - 1. Agonist/prime mover
 - 2. Antagonist
 - 3. Fixator
 - 4. Synergist
 - E. Terminology related to skeletal muscle**
 - 1. Bursa
 - 2. Fascia
 - 3. Insertion
 - 4. Muscle belly
 - 5. Origin
 - 6. Tendon

- F.** Name, location, and actions of major muscles
- 1.** Face and head
 - a)** Muscles of facial expression
 - b)** Muscles of mastication
 - 1)** Temporalis
 - 2)** Masseter
 - 3)** Intrinsic
 - 4)** Extrinsic
 - c)** Scalp muscles
 - 2.** Neck
 - a)** Omohyoid
 - b)** Platysma
 - c)** Scalene muscles
 - d)** Sternocleidomastoid
 - e)** Sternohyoid
 - f)** Sternothyroid
 - g)** Thyrohyoid
 - 3.** Back
 - a)** Erector spinae
 - b)** Latissimus dorsi
 - c)** Trapezius
 - 4.** Shoulder
 - a)** Deltoid
 - b)** Rotator cuff components
 - 5.** Arm
 - a)** Biceps brachii
 - b)** Triceps brachii
 - 6.** Forearm
 - a)** Extensor group
 - b)** Flexor group
 - 7.** Hand and fingers
 - a)** Extensor carpi group
 - b)** Extensor digitorum group
 - c)** Flexor carpi group
 - d)** Flexor digitorum group
 - 8.** Chest wall
 - a)** Intercostals
 - b)** Pectoralis major
 - c)** Pectoralis minor
 - 9.** Diaphragm
 - 10.** Abdominal wall
 - a)** External oblique
 - b)** Internal oblique
 - c)** Rectus abdominis
 - d)** Transversus abdominis

11. Thigh
 - a) Adductor group
 - b) Biceps femoris
 - c) Gluteal muscles
 - 1) Gluteus maximus
 - 2) Gluteus medius
 - 3) Gluteus minimus
 - d) Iliopsoas
 - e) Quadriceps femoris
 - f) Sartorius
12. Leg
 - a) Extensors
 - b) Gastrocnemius
 - c) Peroneus brevis
 - d) Peroneus longus
 - e) Plantaris
 - f) Soleus
13. Foot and toes
 - a) Extensor digitorum group
 - b) Flexor digitorum group
 - c) Peroneus longus
 - d) Tibialis anterior

VIII. Nervous system

- A. Parts of a neuron and their functions
 1. Axon
 2. Cell body
 3. Dendrites
 4. Myelin
 5. Neurilemma
 6. Schwann cells
- B. Major divisions of the nervous system
 1. Central nervous system (CNS)
 - a) Brain
 - b) Spinal cord
 2. Peripheral nervous system (PNS)
 - a) Cranial nerves
 - b) Spinal nerves
 - c) Autonomic nervous system (ANS)
 - 1) Parasympathetic
 - 2) Sympathetic
- C. Terminology related to the central nervous system
 1. Cell types
 - a) Astrocytes
 - b) Ependymal cells
 - c) Glial cells
 2. Gray matter

3. Nucleus
4. Pathways
5. White matter
- D. Major divisions and functions of the brain**
 1. Parts of the brain
 - a) Cerebrum
 - 1) Basal ganglia
 - 2) Fissures
 - 3) Hemispheres
 - 4) Limbic system
 - 5) Lobes
 - b) Diencephalon
 - 1) Hypothalamus
 - 2) Thalamus
 - c) Mesencephalon
 - 1) Brain stem
 - (a) Medulla oblongata
 - (b) Midbrain
 - (c) Pons
 - 2) Cerebellum
 2. Coverings of the brain and cord: meninges
 - a) Arachnoid mater
 - b) Dura mater
 - c) Pia mater
 3. Ventricular system
 - a) Structures
 - 1) Ventricles
 - (a) Lateral
 - (b) Third
 - (c) Fourth
 - (1) Choroid plexus
 - 2) Connections
 - (a) Aqueduct of Sylvius
 - (b) Foramen of Luschka
 - (c) Foramen of Magendie
 - (d) Interventricular foramen of Monro
 - b) Functions
 - 1) Circulation of cerebrospinal fluid
 - 2) Production of cerebrospinal fluid
- E. Cranial nerves**
 1. Olfactory: I
 - a) Sensory function
 - 1) Smell
 2. Optic: II
 - a) Sensory function

- 1) Vision
3. Oculomotor: III
 - a) Motor function
 - 1) Eye globe movement
 - 2) Iris muscle movement
4. Trochlear: IV
 - a) Motor function
 - 1) Oblique eye globe movement
5. Trigeminal: V
 - a) Motor function
 - 1) Mandibular branch
 - (a) Jaw
 - (b) Tympanic membrane
6. Abducens: VI
 - a) Motor function
 - 1) Lateral eye muscle movement
7. Facial: VII
 - a) Motor function
 - 1) Motor muscles of facial expression
 - 2) Parasympathetic innervations of salivary glands
 - 3) Parasympathetic innervations of oral cavity mucous membranes
 - b) Sensory function
 - 1) Sensation
 - 2) Taste
8. Vestibulocochlear/auditory/acoustic: VIII
 - a) Sensory function
 - 1) Hearing
 - 2) Proprioception
9. Glossopharyngeal: IX
 - a) Motor function
 - 1) Parasympathetic innervations of the smooth muscle and glands of the pharynx, larynx, and viscera of the thorax and abdomen
 - 2) Stylopharyngeus muscle
 - b) Sensory function
 - 1) Carotid sinus and body
 - 2) Sensory information of the ear, pharynx, and tongue
 - 3) Taste
10. Vagus: X
 - a) Motor function
 - 1) Muscles of the pharynx and most of the larynx, trachea, and abdominal and thoracic viscera
 - 2) Receptors of the aortic arch and body

- 4) Maxilla
- 5) Palatine bone
- 6) Sphenoid bone
- 7) Zygomatic bone
- b) Eyelids
 - 1) Eye lashes
 - 2) Meibomian glands
 - 3) Palpebrae
 - 4) Tarsal plate
- c) Extraocular muscles
 - 1) Rectus muscles
 - (a) Inferior
 - (b) Lateral
 - (c) Medial
 - (d) Superior
 - 2) Oblique muscles
 - (a) Inferior
 - (b) Superior
- d) Lacrimal apparatus
 - 1) Lacrimal canals
 - 2) Lacrimal ducts
 - 3) Lacrimal glands
 - 4) Nasolacrimal duct
 - 5) Nasolacrimal sac
 - 6) Puncta
- e) Conjunctiva
- f) Globe
 - 1) Fibrous tunic
 - (a) Cornea
 - (b) Sclera
 - 2) Vascular tunic
 - (a) Choroid
 - (b) Ciliary body
 - (c) Iris
 - (d) Pupil
 - 3) Nervous tunic
 - (a) Retina
 - 4) Chambers of the eye
 - (a) Anterior cavity
 - (1) Anterior chamber
 - (2) Posterior chamber
 - 5) Fluids
 - (a) Aqueous humor
 - (b) Vitreous humor
 - 6) Optic nerve

- 2. Photoreception
 - a) Accommodation
 - b) Brain pathways
 - c) Fovea centralis
 - d) Light regulation
 - e) Macula lutea
 - f) Optic disc
 - g) Photoreceptors
 - h) Refractive media
- C. Ear
 - 1. Structures
 - a) External ear
 - 1) Auricle (pinna)
 - 2) Tragus
 - b) Middle ear
 - 1) Eustachian tube
 - 2) Mastoid sinus
 - 3) Ossicles
 - (a) Incus
 - (b) Malleus
 - (c) Stapes
 - 4) Oval window
 - 5) Round window
 - c) Internal ear
 - 1) Cochlea
 - 2) Labyrinth
 - 2. Physiology of hearing
 - a) Bone conduction
 - b) Fluid conduction
 - c) Nerve conduction
 - d) Sound wave reception
 - 3. Physiology of balance/equilibrium
 - a) Semicircular canals and vestibule
 - b) Vestibular nerve
- X. Circulatory system: blood
 - A. Components of blood
 - 1. Formed elements
 - 2. Plasma
 - B. Functions of blood
 - 1. Acid-base (pH) buffers
 - 2. Clotting mechanism
 - 3. Protection (immune system)
 - 4. Transportation of oxygen, nutrients, and wastes
 - C. Structure and function of formed elements
 - 1. Erythrocytes
 - 2. Leukocytes

- a) Polymorphonuclear leukocytes
 - 1) Basophils
 - 2) Eosinophils
 - 3) Neutrophils
 - b) Mononuclear leukocytes
 - 1) Lymphocytes
 - 2) Monocytes
 - 3. Thrombocytes
 - D. Terminology related to hematology
 - 1. Hematocrit
 - 2. Hemoglobin
 - 3. Platelet count
 - 4. Red blood cell count
 - 5. Serologic studies
 - 6. White blood cell count
 - E. Blood types
 - 1. Antigen types
 - 2. Antibodies
 - a) Rh factor
 - 1) Implications in pregnancy
 - 2) Rh-negative
 - 3) Rh-positive
- XI. Cardiovascular system
 - A. Terminology for cardiovascular function
 - 1. Blood pressure
 - 2. Bradycardia
 - 3. Cardiac output
 - 4. Ectopic beat
 - 5. Fibrillation
 - 6. Heart block
 - 7. Heart rate/pulse rate
 - 8. Infarction
 - 9. Normal sinus rhythm
 - 10. Stroke volume
 - 11. Tachycardia
 - B. Structures of the heart
 - 1. Layers
 - a) Endocardium
 - b) Myocardium
 - c) Pericardium
 - 2. Chambers
 - a) Atria
 - b) Ventricles
 - 3. Valves
 - a) Aortic
 - b) Mitral

- c) Pulmonary
 - d) Tricuspid
 - 4. Vena cava
 - a) Inferior
 - b) Superior
 - 5. Pulmonary arteries
 - 6. Pulmonary veins
 - 7. Aorta
 - 8. Coronary arteries and veins
 - a) Anterior cardiac vein
 - b) Coronary sinus
 - c) Great cardiac vein
 - d) Left anterior descending artery
 - e) Left circumflex artery
 - f) Left main coronary artery
 - g) Oblique vein of the left atrium
 - h) Right coronary artery
 - C. Location and position of the heart
 - 1. Apex
 - 2. Mediastinum
 - D. Flow of blood
 - 1. Atrial contraction
 - 2. Relaxation
 - 3. Ventricular contraction
 - E. Heart sound source
 - 1. First heart sound
 - 2. Second heart sound
 - F. Regulating mechanisms of heart rate
 - 1. Autonomic regulation
 - G. Conductive pathway of the heart
 - 1. Atrial myocardium
 - 2. Atrioventricular node
 - 3. Bundle of His and bundle branches
 - 4. Purkinje fibers
 - 5. Sinoatrial node
 - 6. Ventricular myocardium
- XII.** Circulatory system: peripheral vascular
- A. Types of blood vessels
 - 1. Arteriole
 - 2. Artery
 - 3. Capillary
 - 4. Vein
 - 5. Venous sinuses
 - 6. Venule
 - B. Structure of each type
 - 1. Tunica adventitia

2. Tunica intima
 - a) Valves
 3. Tunica media
- C.** Major systemic arteries
1. Aortic arch
 2. Brachiocephalic (innominate)
 3. Common carotid
 - a) External carotid
 - b) Internal carotid
 4. Circle of Willis
 5. Subclavian
 - a) Axillary
 - b) Brachial
 - c) Internal thoracic/mammary
 - d) Radial
 - e) Ulnar
 - f) Vertebral
 6. Thoracic aorta
 - a) Intercostals
 7. Abdominal aorta
 - a) Anterior tibial
 - b) Celiac trunk/axis
 - c) Common iliac
 - 1) Internal iliac
 - 2) External iliac
 - d) Dorsalis pedis
 - e) Femoral
 - 1) Superficial
 - 2) Deep (profunda)
 - f) Gastric
 - g) Gonadal
 - h) Hepatic
 - i) Inferior mesenteric
 - j) Peroneal
 - k) Popliteal
 - l) Posterior tibial
 - m) Renal
 - n) Splenic
 - o) Superior mesenteric
- D.** Major systemic veins
1. Azygos system
 2. Cranial venous sinuses
 3. Inferior vena cava
 4. Internal jugular
 5. Portal system
 6. Superior vena cava

- 7. Superficial system, upper limb
 - a) Basilic
 - b) Cephalic
- 8. Superficial system, lower limb
 - a) Greater saphenous
 - b) Lesser saphenous
- E. Fetal circulation
 - 1. Ductus arteriosus
 - 2. Ductus venosus
 - 3. Foramen ovale
 - 4. Placenta
 - 5. Umbilical arteries
 - 6. Umbilical vein
- F. Pulse points
 - 1. Brachial
 - 2. Carotid
 - 3. Dorsalis pedis
 - 4. Facial
 - 5. Femoral
 - 6. Popliteal
 - 7. Posterior tibial
 - 8. Radial
 - 9. Superficial temporal
- G. Factors that affect blood pressure
 - 1. Blood viscosity
 - 2. Blood volume
 - 3. Cardiac output
 - 4. Elasticity of arteries
 - 5. Peripheral vascular resistance
 - a) Dilation
 - b) Vasoconstriction

XIII. Lymphatic system

- A. Types and locations of lymphoid tissue
 - 1. Tonsils
 - a) Pharyngeal
 - b) Palatine
 - c) Lingual
 - 2. Thymus
 - 3. Spleen
 - 4. Peyer's patches
 - 5. Regional lymph nodes
- B. Functions of lymph glands
 - 1. Antibody formation
 - 2. Filter lymph fluid
 - 3. Produce monocytes
 - 4. Produce T and B lymphocytes

- 5. Special functions of the spleen
 - C. Lymph fluid
 - 1. Composition
 - 2. Drainage pathways
 - D. Lymph ducts
 - 1. Thoracic duct
 - 2. Right lymphatic duct
- XIV. Respiratory system
 - A. Respiratory pathway: structures and functions
 - 1. Alveolar ducts
 - 2. Alveoli
 - 3. Bronchioles
 - 4. Carina
 - 5. Epiglottis
 - 6. Laryngopharynx
 - 7. Larynx
 - 8. Nares
 - 9. Nasal cavity (choanae)
 - 10. Nasal conchae (turbinates)
 - 11. Nasopharynx
 - 12. Oropharynx
 - 13. Primary bronchi
 - 14. Pulmonary capillaries
 - 15. Secondary bronchi
 - 16. Trachea
 - 17. Vocal cords (arytenoids)
 - B. Lungs
 - 1. Bronchopulmonary segments
 - 2. Hilum
 - 3. Lobes
 - 4. Right and left sides
 - C. Blood supply
 - 1. Pulmonary artery
 - 2. Pulmonary vein
 - D. Pleural space
 - 1. Parietal pleura
 - 2. Pleural fluid
 - 3. Pleural recesses
 - 4. Visceral pleura
 - E. Mechanisms of inspiration and expiration
 - 1. Nervous control
 - a) Medullary respiratory center
 - b) Phrenic and intercostal nerves
 - c) Vagus nerve
 - 2. Chemical control
 - a) Carbon dioxide

- b) Function
- 3. Esophagus
 - a) Structure
 - 1) Layers
 - 2) Lower esophageal sphincter
 - b) Function
- 4. Stomach
 - a) Structure
 - 1) Antrum
 - 2) Body
 - 3) Cardiac sphincter
 - 4) Fundus
 - 5) Greater curvature
 - (a) Lesser
 - 6) Lesser curvature
 - (a) Greater
 - (b) Lesser
 - 8) Pyloric sphincter
 - 9) Pylorus
 - 10) Rugae
 - b) Functions
 - 1) Secrete mucus
 - 2) Chemical digestion of carbohydrates, proteins
 - (a) Gastric acid
 - (b) Hydrochloric acid
 - (c) Pepsin
 - 3) Mechanical digestion of carbohydrates, proteins
 - 4) Absorption
 - (a) Alcohol
 - (b) Salts
 - (c) Simple sugars
 - (d) Some medications
 - (e) Water
- 5. Small intestine
 - a) Structure
 - 1) Duodenum
 - (a) Duodenal bulb (cap)
 - (b) Second portion
 - (c) Third portion
 - 2) Ileocecal valve
 - 3) Ileum
 - 4) Jejunum
 - 5) Microvilli

- b) Functions
 - 1) Digestion
 - 2) Absorption
 - (a) Electrolytes
 - (b) Liquids
 - (c) Nutrients
 - (d) Vitamins
 - 3) Hormone secretion
 - c) Layers of digestive tube wall
 - 1) Mucosa
 - 2) Muscularis
 - 3) Serosa
 - 4) Submucosa
- 6. Large intestine
 - a) Structure
 - 1) Appendix
 - 2) Ascending colon
 - 3) Cecum
 - 4) Descending colon
 - 5) Mesocolon
 - 6) Sigmoid colon
 - 7) Transverse colon
 - b) Associated structures
 - 1) Epiploic appendices
 - 2) Haustra
 - 3) Hepatic flexure
 - 4) Ligament of Treitz
 - 5) Mesentery
 - 6) Splenic flexure
 - 7) Tenia
 - c) Functions
 - 1) Absorption/production
 - (a) Vitamins
 - (1) B complex
 - (2) Vitamin K
 - 2) Compaction
 - 3) Decompose bilirubin
 - 4) Final digestion
- 7. Rectum
 - a) Structure
 - b) Function
- 8. Anal canal
 - a) Structure
 - 1) Anus
 - 2) Sphincters
 - (a) External

- (b) Internal
 - b) Functions
 - 1) Defecation
 - 2) Storage of stool
- C. Liver
 - 1. Structure
 - a) Capsule
 - b) Falciform ligament/ligamentum teres
 - c) Left lobe
 - d) Right lobe
 - 2. Functions
 - a) Conversion of ammonia to urea
 - b) Conversion of glucose/glycogen storage
 - c) Filtering the blood of drugs and toxins
 - d) Production of bile
 - e) Production of cholesterol
 - f) Production of immune factors
 - g) Production of proteins for blood plasma
 - h) Regulation of blood clotting
 - i) Regulation of blood levels of amino acids
 - j) Removal of bacteria from blood
 - k) Synthesis of hemoglobin
- D. Biliary system
 - 1. Structure
 - a) Gallbladder
 - 1) Cystic artery
 - 2) Cystic duct
 - 3) Location
 - 4) Pear-shaped organ
 - 5) Triangle of Calot
 - b) Biliary tree
 - 1) Ampulla/papilla of Vater
 - 2) Common bile duct
 - 3) Common hepatic duct
 - 4) Right and left hepatic duct
 - 5) Sphincter of Oddi
 - 2. Functions
 - a) Gallbladder
 - 1) Concentration of bile
 - 2) Storage of bile
 - b) Biliary tree
 - 1) Transport
 - (a) Bile
 - (b) Waste
- E. Pancreas
 - 1. Structure

- a) Body
 - b) Head
 - c) Neck
 - d) Tail
 - e) Islet of Langerhans
 - 1) Alpha cells
 - 2) Beta cells
 - f) Pancreatic duct of Wirsung
2. Functions
- a) Productions and secretions
 - 1) Glucagon
 - 2) Insulin
 - 3) Somatostatin
 - b) Enzymes of protein digestion
 - 1) Amylase
 - 2) Chymotrypsin
 - 3) Lipase
 - 4) Trypsin
 - c) Sodium bicarbonate
- F. Basic nutrients
1. Carbohydrates
 2. Fats
 3. Mineral salts
 4. Proteins
 5. Vitamins
 6. Water
- G. Terminology related to digestion and elimination
1. Absorption
 2. Anabolism
 3. Bolus
 4. Catabolism
 5. Chyme
 6. Constipation
 7. Defecation
 8. Diarrhea
 9. Digestion
 10. Flatus
 11. Incontinence
 12. Ingestion
 13. Jaundice
 14. Metabolism
 15. Peristalsis
 16. Reflux
 17. Regurgitation
 18. Swallowing
 19. Ulcer

XVI. Genitourinary

A. Kidneys

1. Structures

- a) Nephron**
 - 1) Bowman's capsule**
 - 2) Distal convoluted tubule**
 - 3) Glomerulus**
 - 4) Juxtaglomerular apparatus (JGA)**
 - 5) Loop of Henle**
 - 6) Proximal convoluted tubule**
 - 7) Renal tubule**
- b) Calyx**
 - 1) Major**
 - 2) Minor**
- c) Renal pelvis**

2. Function

- a) Filters and excretes waste**
- b) Homeostasis of fluid volume**
- c) Metabolizes vitamin D and Ca^{2+}**
- d) Regulates blood pressure**
- e) Releases angiotensin**
- f) Secretes rennin**

3. Renal vessels

- a) Renal artery**
- b) Renal vein**

4. Ureters

- a) Structure**
- b) Function**

5. Bladder

- a) Structure**
 - 1) Dome**
 - 2) Bladder neck/sphincters**
 - 3) Layers**
 - (a) Mucous membrane**
 - (b) Muscle**
 - (c) Wall**
 - 4) Trigone**
- b) Function**
 - 1) Storage of urine**
 - 2) Evacuation of urine**

6. Urethra

- a) Structure**
 - 1) Male**
 - (a) Bladder neck**
 - (b) Distal urethra**
 - (c) Meatus**

- (d) Prostatic urethra
 - 2) Female
 - (a) Meatus
 - (b) Urethra
 - b) Function
 - 1) Transports
 - (a) Semen
 - (b) Urine
 - c) Urine composition
 - 1) Normal components
 - (a) Mineral salts
 - (b) Nitrogenous/metabolic wastes
 - (c) Pigment
 - (d) Water
 - 2) Abnormal components
 - (a) Albumin
 - (b) Bacterial/pus cells
 - (c) Blood
 - (d) Casts
 - (e) Crystals
 - (f) Glucose
 - (g) Ketones/acetone
 - (h) Plasma proteins

XVII. Reproductive system

A. Structures and functions of the female reproductive system

- 1. External
 - a) Vulva
 - b) Labia
 - 1) Majora
 - 2) Minora
 - c) Clitoris
 - d) Vestibule
 - 1) Distal urethral meatus
 - 2) Introitus
 - e) Perineum
- 2. Internal
 - a) Vagina
 - b) Glands
 - 1) Bartholin's glands
 - 2) Skene's glands
 - c) Ovaries
 - 1) Hormone production
 - (a) Estrogen
 - (b) Progesterone
 - 2) Oocyte formation
 - 3) Ovarian ligament

- d) Uterine tubes (Fallopian tubes)
 - e) Uterus
 - 1) Cervix
 - 2) Corpus
 - 3) Endometrium
 - 4) Fundus
 - 5) Ligaments
 - (a) Broad
 - (b) Cardinal
 - (c) Round
 - (d) Uterosacral
 - 6) Myometrium
 - 7) Perimetrium
 - 8) Visceral peritoneum
 - 3. Breast
 - a) Areola/nipple
 - b) Mammary ducts
 - c) Mammary glands
- B. Menstrual cycle**
- 1. Proliferative phase
 - 2. Ovulation
 - 3. Progestational phase
 - 4. Menstrual phase
 - a) Terminology related to pregnancy
 - 1) Abortion
 - (a) Spontaneous
 - (b) Induced
 - 2) Amnion
 - 3) Chorion
 - 4) Embryo
 - 5) Fertilization
 - 6) Fetus
 - 7) Gestation
 - 8) Gravity
 - 9) Implantation
 - 10) Parity
 - 11) Placenta
 - 12) Premature
- C. Structures and functions of the male reproductive system**
- 1. External
 - a) Scrotum
 - b) Penis
 - 1) Shaft
 - (a) Urethra
 - (1) Internal
 - (2) Meatus

- 2. Functions
 - a) Melatonin
 - 1) Secretes
 - 2) Synthesize
- C. Thyroid gland
 - 1. Structure
 - a) Isthmus
 - b) Left lobe
 - c) Right lobe
 - 2. Functions
 - a) Production of hormones
 - 1) Thyroxine (T₄)
 - 2) Calcitonin
 - b) Regulation of body metabolism
- D. Parathyroid glands
 - 1. Structure
 - a) 4-6 glands
 - 2. Functions
 - a) Production of parathyroid hormone (PTH)
 - 1) Parathormone
- E. Adrenal and suprarenal glands
 - 1. Structure
 - a) Medulla
 - 1) Chromaffin cell
 - b) Cortex
 - 2. Functions
 - a) Production and secretion of hormones
 - 1) Androgens
 - 2) Catecholamines
 - 3) Glucocorticoids
 - 4) Mineralocorticoids
- F. Pancreas: Islets of Langerhans
 - 1. Structure
 - 2. Functions
 - a) Production and secretion of hormones
 - 1) Glucagon
 - 2) Insulin
 - 3) Somatostatin
- G. Thymus
 - 1. Structure
 - a) Mediastinum
 - 2. Functions
 - a) Production and secretion of hormones
 - 1) Thymosin

MICROBIOLOGY

Objectives: The learner will:

1. Correlate the impact of microbiology concerning the practice of sterile technique and infection control in the operative setting.
2. Identify the name and function of various parts of the compound microscope.
3. Compare and contrast the structure and characteristics of different microorganisms.
4. Analyze the various immune responses that occur in the body as defenses against invasion by pathogens.
5. Relate the infectious process to surgical practice.

Content:

- I. Introduction
 - A. Basic chemistry of life
 - B. History
 - C. Microbiology today
- II. Cells
 - A. Classification
 1. Eukaryotic
 2. Prokaryotic
 - B. Cytoplasmic membrane transport
 1. Active
 - a) Endocytosis
 - 1) Phagocytosis
 - 2) Pinocytosis
 - b) Exocytosis
 2. Passive
 - a) Diffusion
 - b) Filtration
 - C. Structure
 1. Eukaryotic
 - a) Cell (plasma) membrane
 - b) Cell wall
 - c) Cytoplasm
 - d) Endoplasmic reticulum
 - e) Golgi apparatus
 - f) Mitochondria
 - g) Nucleus
 - h) Ribosomes
 2. Prokaryotic
 - a) Capsule
 - b) Cell (plasma) membrane
 - c) Cell wall
 - d) Cytoplasm

- 1) Ectoplasm
 - 2) Endoplasm
 - e) Flagella
 - f) Nucleoid
 - g) Pili and fimbriae
 - h) Plasmids
 - i) Ribosomes
- III. Microscopes
 - A. Types
 - B. Parts
 - C. Uses
- IV. Staining methods
 - A. Simple
 - B. Differential
 - 1. Acid-fast
 - 2. Capsule
 - 3. Endospore
 - 4. Gram
- V. Culture media
 - A. General
 - 1. Anaerobic
 - 2. Complex
 - 3. Defined
 - 4. Differential
 - 5. Selective
 - 6. Transport
 - B. Preserving
 - C. Special techniques
 - 1. Animal
 - 2. Cell
 - 3. Enrichment
 - 4. Low oxygen
- VI. Nomenclature
 - A. Taxonomy
 - 1. Class
 - 2. Domains
 - a) Archaea
 - b) Bacteria
 - c) Eukarya
 - 3. Family
 - 4. Genus
 - 5. Kingdoms
 - 6. Order
 - 7. Phylum
 - 8. Species
 - B. Binomial

- VII. Host-microbe relationships**
 - A. Normal flora**
 - B. Symbiosis**
 - 1. Commensalism**
 - 2. Mutualism**
 - 3. Parasitism**
- VIII. Microorganism types**
 - A. Algae**
 - 1. Characteristics**
 - B. Bacteria**
 - 1. Characteristics**
 - a) Arrangement**
 - 1) Diplococci**
 - 2) Staphylococci**
 - 3) Streptococci**
 - b) Biofilms**
 - c) Classification**
 - d) Endospores**
 - e) Growth factors**
 - 1) Environment**
 - 2) Nutrients**
 - 3) Oxygen**
 - f) Healthcare concerns**
 - g) Morphology**
 - 1) Bacilli**
 - 2) Cocci**
 - 3) Spiral**
 - h) Pathogenicity**
 - i) Reproduction**
 - j) Significance**
 - C. Fungi**
 - 1. Characteristics**
 - D. Prion**
 - 1. Environmental factors**
 - 2. Healthcare concerns**
 - 3. Morphology**
 - 4. Pathogenicity**
 - 5. Significance**
 - E. Protozoa**
 - 1. Characteristics**
 - F. Virus**
 - 1. Bacteriophages**
 - 2. Environmental factors**
 - 3. Classification**
 - 4. Healthcare concerns**
 - 5. Morphology**

- 6. Pathogenicity
- 7. Role in cancer
- 8. Significance
- 9. Transmission
- 10. Viral replication
 - a) Lysogenic
 - b) Lytic
- G. Viroid
 - 1. Characteristics
- IX. Common causative agents
 - A. Bacteria
 - 1. *Acinetobacter*
 - 2. *Bacillus anthracis*
 - 3. *Bacteroides fragilis*
 - 4. *Bartonella*
 - 5. *Bordetella pertussis*
 - 6. *Campylobacter jejuni*
 - 7. *Chlamydia trachomatis*
 - 8. *Clostridium botulinum*
 - 9. *Clostridium difficile*
 - 10. *Clostridium perfringens*
 - 11. *Clostridium tetani*
 - 12. *Corynebacterium diphtheriae*
 - 13. *Enterococcus*
 - 14. *Escherichia coli*
 - 15. *Gardnerella vaginalis*
 - 16. *Haemophilus influenzae*
 - 17. *Helicobacter pylori*
 - 18. *Klebsiella pneumoniae*
 - 19. *Lactobacillus*
 - 20. *Legionella pneumophila*
 - 21. *Listeria monocytogenes*
 - 22. Methicillin-resistant *Staphylococcus aureus* (MRSA)
 - 23. Methicillin-resistant *Staphylococcus epidermidis* (MRSE)
 - 24. *Moraxella catarrhalis*
 - 25. *Mycobacterium leprae*
 - 26. *Mycobacterium tuberculosis*
 - 27. *Mycoplasma hominis*
 - 28. *Neisseria gonorrhoeae*
 - 29. *Neisseria meningitidis*
 - 30. *Porphyromonas gingivalis*
 - 31. *Pseudomonas aeruginosa*
 - 32. *Rickettsia rickettsia*
 - 33. *Salmonella enterica*
 - 34. *Staphylococcus aureus*
 - 35. *Staphylococcus epidermidis*

- 36. *Streptococcus agalactiae*
- 37. *Streptococcus mutans*
- 38. *Streptococcus pneumoniae*
- 39. *Streptococcus pyogenes*
- 40. *Treponema pallidum*
- 41. Vancomycin-resistant *Enterococcus* (VRE)
- 42. Vancomycin-resistant *Staphylococcus aureus* (VRSA)
- 43. *Vibrio cholerae*
- B. Fungi
 - 1. *Blastomyces dermatitidis*
 - 2. *Candida albicans*
 - 3. *Coccidioides*
 - 4. *Histoplasma capsulatum*
 - 5. *Pneumocystis jirovecii*
- C. Prion
 - 1. Creutzfeldt-Jakob disease (CJD)
- D. Protozoa
 - 1. *Trichomonas vaginalis*
- E. Viruses
 - 1. Cytomegalovirus
 - 2. Enteroviruses (Polio virus)
 - 3. Hepatitis A (HAV)
 - 4. Hepatitis B (HBV)
 - 5. Hepatitis C (HCV)
 - 6. Hepatitis D (HDV)
 - 7. Hepatitis E (HEV)
 - 8. Herpes simplex virus-1 (HSV-1)
 - 9. Herpes simplex virus-2 (HSV-2)
 - 10. Human herpes virus 4 (HHV-4 or Epstein-Barr virus (EBV))
 - 11. Human immunodeficiency virus (HIV)
 - 12. Human papillomavirus (HPV)
 - 13. Lyssavirus (Rabies virus)
 - 14. Morbillivirus (measles virus)
 - 15. Rubella virus
 - 16. Corona Virus Disease-19 (COVID-19)
 - 17. Varicella-zoster virus
 - 18. Variola virus
- X. Immunology
 - A. Acquired
 - 1. Components
 - 2. Immune response
 - a) Cell-mediated
 - b) Humoral
 - 3. Types
 - B. Immune disorders
 - 1. Autoimmune diseases

- a) Single organ
 - b) Systemic
 - 2. Hypersensitivities
 - a) Type I
 - b) Type II
 - c) Type III
 - d) Type IV
 - 3. Immunodeficiency diseases
 - a) Acquired
 - b) Primary
 - C. Immunization
 - 1. Active
 - a) Attenuated
 - b) Inactivated
 - c) Recombinant gene technology
 - d) Toxoid
 - 2. Passive
 - D. Innate
 - 1. First line of defense
 - 2. Second line of defense
- XI. Process of infection
 - A. Epidemiology
 - 1. Frequency of disease
 - 2. Epidemiological studies
 - 3. Health care facility epidemiology
 - 4. Public health
 - a) Endemic
 - b) Epidemic
 - c) Pandemic
 - B. Infection
 - 1. Contamination
 - 2. Classification of infectious disease
 - 3. Modes of transmission
 - a) Direct
 - b) Indirect
 - 4. Portal of entry
 - 5. Portal of exit
 - C. Nature of infectious disease
 - 1. Etiology
 - 2. Stages of disease
 - a) Incubation
 - b) Prodromal
 - c) Illness
 - d) Decline
 - e) Convalescence
 - 3. Symptoms, signs, and syndromes

- 4. Virulence
- D. Reservoirs of infectious pathogens
 - 1. Animal
 - 2. Human
 - 3. Non-living
- E. Symbiotic relationships (microbe and host)
 - 1. Normal microbiota
 - a) Resident
 - b) Transient
 - 2. Opportunistic pathogens

PATHOPHYSIOLOGY

Objectives: The learner will:

1. Relate pathophysiology to surgical interventions.
2. Analyze the relationship between cell pathology and disease.
3. Examine hemodynamic disorders, inflammation, and infection.
4. Compare and contrast the various surgical pathologies of each body system.

Content:

- I. Introduction to disease
 - A. Causes of disease
 1. Etiology
 2. Idiopathic
 3. Pathogenesis
 - B. Manifestations of disease
 1. Diagnosis
 2. Signs
 3. Symptoms
 4. Syndrome
 - C. Terminology
 1. Acute
 2. Chronic
 3. Complication
 4. Exacerbation
 5. Morbidity
 6. Mortality
 7. Prognosis
 8. Relapse
 9. Remission
 10. Terminal
- II. Tumors
 - A. Terminology
 - B. Classifications
 1. Benign
 2. Malignant
 - C. Causes of cancer
 - D. Diagnosis of cancer
 1. Grading of cancer
 2. Staging of cancer
 - E. Surgical treatments according to location, grade and stage
 - F. Systemic effects of cancer
 1. Anemia
 2. Bleeding
 3. Infections
 4. Paraneoplastic syndromes

- 5. Weight loss
 - a) Cachexia
- III. Fluid and hemodynamic disorders
 - A. Dehydration
 - B. Edema
 - C. Electrolyte imbalances
 - D. Embolism
 - E. Hemorrhage
 - F. Hyperemia
 - G. Shock
 - H. Sodium/potassium
 - I. Thrombosis
- IV. Inflammation and infection
 - A. Inflammation's effect on healing of the surgical wound
 - B. Trauma and effects on tissue healing
 - C. Types of infection and effect on surgical wound healing
- V. Surgically treatable diseases and disorders
 - A. Treatment types
 - 1. Adjunct
 - a) Chemotherapy
 - b) Radiation
 - 2. Curative
 - 3. Palliative
 - B. Integumentary system
 - 1. Diagnostic tests
 - 2. Diseases and disorders
 - a) Chemical injury
 - b) Electrical injury
 - c) Infectious and inflammatory disease
 - 1) Cellulitis
 - 2) Frost bite
 - 3) Nevus
 - 4) Warts
 - d) Mechanical injury
 - e) Neoplasms
 - 1) Basal cell carcinoma
 - 2) Keratosis
 - 3) Melanoma
 - 4) Squamous cell
 - f) Pressure injury
 - g) Radiation injury
 - h) Thermal injury
 - 1) Burns
 - 2) Hyperthermia
 - 3) Hypothermia

- C. Musculoskeletal system
 - 1. Diagnostic tests
 - 2. Diseases and disorders
 - a) Bone
 - 1) Bone tumors
 - 2) Cancer
 - 3) Circulatory disturbances
 - (a) Avascular necrosis
 - 4) Cysts
 - 5) Deformities
 - (a) Kyphosis
 - (b) Osteitis deformans
 - (1) Paget's disease
 - (c) Osteomalacia
 - (1) Rickets
 - (d) Pectus excavatum
 - (e) Pectus carinatum
 - (f) Radial dysplasia
 - (g) Scoliosis
 - (h) Talipes
 - (1) Clubfoot
 - 6) Fractures
 - (a) Closed
 - (b) Colles'
 - (c) Comminuted
 - (d) Compression
 - (e) Depressed
 - (f) Dislocations
 - (g) Greenstick
 - (h) Impacted
 - (i) Linear
 - (j) Oblique
 - (k) Open
 - (l) Pathologic
 - (m) Potts
 - (n) Simple
 - (o) Spiral
 - (p) Sprains
 - (q) Stress
 - (r) Transverse
 - (s) Trauma
 - b) Joints
 - 1) Ankylosing spondylitis
 - 2) Gout
 - 3) Infectious arthritis
 - 4) Osteoarthritis

- 5) Rheumatoid arthritis
- c) Muscle and connective tissue
 - 1) Bursitis
 - 2) Carpal tunnel syndrome
 - 3) Fibromyalgia
 - 4) Marfan's syndrome
 - 5) Muscular dystrophies
 - 6) Myasthenia gravis

D. Nervous system

- 1. Diagnostic tests
- 2. Diseases and disorders
 - a) Central nervous system infections
 - b) Cranial nerve tumors
 - c) Disorders
 - 1) Cerebral palsy
 - 2) Epilepsy
 - 3) Hydrocephalus
 - 4) Parkinson's
 - 5) Spina bifida
 - d) Functional
 - 1) Abscess
 - 2) Degenerative disk disease
 - 3) Encephalitis
 - 4) Neurodegenerative disease
 - (a) Dementia
 - e) Neoplasms of the central nervous system
 - 1) Astrocytoma
 - 2) Glioma
 - 3) Meningioma
 - 4) Metastases to the brain
 - 5) Neural cell precursor tumor
 - f) Trauma
 - 1) Brain
 - 2) Spinal cord
 - g) Vascular
 - 1) Arteriovenous malformation
 - 2) Epidural hematoma
 - 3) Infarction
 - 4) Intracerebral hemorrhage
 - 5) Ischemia
 - 6) Subarachnoid hemorrhage due to aneurysm repair

E. Sensory system

- 1. Diagnostic tests
 - a) Ear

- b)** Eye
- 2.** Diseases and disorders
 - a)** Ear
 - 1)** Otitis externa
 - 2)** Otitis media
 - 3)** Otosclerosis
 - 4)** Mastoiditis
 - 5)** Meniere's disease
 - 6)** Tinnitus
 - 7)** Trauma
 - (a)** Ruptured tympanic membrane
 - 8)** Vertigo
 - 9)** Cholesteatoma
 - b)** Eye
 - 1)** Cataract
 - 2)** Conjunctivitis
 - 3)** Corneal damage requiring transplant
 - 4)** Eye muscle disorders
 - 5)** Glaucoma
 - 6)** Macular degeneration
 - 7)** Retinal detachment
 - 8)** Trauma

F. Cardiovascular system

- 1.** Diagnostic tests
- 2.** Diseases and disorders
 - a)** Arterial
 - 1)** Arteriosclerosis
 - 2)** Atherosclerosis
 - (a)** Ischemia
 - (b)** Plaque
 - b)** Blood cell
 - 1)** Types of clotting disorders
 - (a)** Anemias
 - (b)** DIC
 - (c)** Hemophilia
 - (d)** Leukemias
 - (e)** Lymphoma
 - (f)** Myeloma
 - c)** Embolus
 - 1)** Air embolus
 - 2)** Fat embolus
 - 3)** Foreign body
 - 4)** Thrombus

- d) Heart
 - 1) Angina
 - 2) Cardiomyopathy
 - 3) Conduction disorders
 - (a) Fibrillation
 - (1) Atrial
 - (2) Ventricular
 - (b) Tachycardia
 - (c) Complete heart block
 - 4) Congenital heart disease
 - (a) Coarctation of aorta
 - (b) Patent ductus arteriosus
 - (c) Tetralogy of Fallot
 - 5) Congestive heart failure
 - 6) Inflammatory conditions
 - (a) Endocarditis
 - (b) Myocarditis
 - (c) Pericarditis
 - 7) Hypertensive heart disease
 - 8) Myocardial infarction
 - 9) Rheumatic heart disease
 - 10) Valvular disorders
 - (a) Mitral stenosis
 - (b) Murmur
- e) Peripheral vascular
 - 1) Aneurysms
 - 2) Coronary artery disease
 - 3) Embolus
 - 4) Gangrene
 - 5) Intermittent claudication
 - 6) Raynaud's disease
 - 7) Thrombophlebitis
- f) Veins
 - 1) Varicose veins

G. Respiratory system

- 1. Diagnostic tests
- 2. Diseases and disorders
 - a) Lower respiratory diseases
 - 1) Atelectasis
 - 2) Aspiration
 - 3) Chronic obstructive pulmonary diseases
 - (a) Pleural effusion
 - (b) Pulmonary embolus
 - 4) Congenital diseases

- (a) Cystic fibrosis
 - 5) Infectious diseases
 - (a) Bronchitis
 - (b) Empyema
 - (c) Legionnaires' disease
 - (d) Pneumonia
 - (e) Tuberculosis
 - 6) Neoplasms of the respiratory tract
 - 7) Pleuritis
 - 8) Trauma
 - (a) Pneumothorax
 - (b) Hemothorax
 - b) Upper respiratory diseases
 - 1) Congenital diseases
 - (a) Subglottic stenosis
 - 2) Laryngitis
 - 3) Nasal polyps
 - 4) Sinusitis
 - 5) Tonsillitis and adenoiditis
- H. Digestive system
 - 1. Diagnostic tests
 - 2. Diseases and disorders
 - a) Mouth
 - 1) Cancer of the mouth and mandible
 - 2) Congenital defects
 - 3) Infections
 - 4) Inflammatory disease
 - 5) Salivary gland disorders
 - 6) Trauma
 - b) Esophagus
 - 1) Atresia
 - 2) Cancer
 - 3) Esophageal varices
 - 4) Fistula
 - 5) Hiatal hernia
 - 6) Reflux esophagitis
 - 7) Trauma
 - 8) Zenker's diverticulum
 - c) Stomach
 - 1) Cancer
 - 2) Gastritis
 - 3) Pyloric stenosis
 - 4) Trauma
 - 5) Ulcer

- d) Small intestine
 - 1) Celiac disease
 - 2) Chronic inflammatory bowel disease
 - 3) Crohn's disease
 - 4) Duodenal ulcer
 - 5) Hernia entrapment
 - 6) Meckel's diverticulum
 - 7) Obstruction
- e) Colon
 - 1) Appendicitis
 - 2) Cancer
 - 3) Diverticular disease
 - 4) Inflammatory bowel disease
 - 5) Intussusception
 - 6) Obstruction
 - 7) Peritonitis
 - 8) Polyps
 - 9) Trauma
 - 10) Ulcerative colitis
 - 11) Volvulus
- f) Diseases of the rectum
 - 1) Cancer
 - 2) Fissure
 - 3) Hemorrhoids
 - 4) Pediatric atresia
 - 5) Trauma
- 3. Nutrition
 - a) Anorexia nervosa
 - b) Bulimia nervosa
 - c) Obesity
- I. Biliary system
 - 1. Diagnostic tests
 - 2. Diseases and disorders
 - a) Gallbladder
 - 1) Cancer
 - 2) Cholecystitis
 - 3) Cholelithiasis
 - b) Liver
 - 1) Cancer
 - 2) Cirrhosis
 - 3) Hepatitis
 - 4) Portal hypertension
 - 5) Trauma
 - c) Pancreas
 - 1) Cancer

- 2) Diabetes
- 3) Pancreatitis

J. Urinary system

1. Diagnostic tests
2. Diseases and disorders
 - a) Kidney
 - 1) Cancer
 - 2) Glomerulonephritis
 - 3) Hydronephrosis
 - 4) Nephrosclerosis
 - 5) Polycystic disease
 - 6) Pyelonephritis
 - 7) Renal calculi
 - 8) Renal failure
 - 9) Wilms' tumor
 - b) Bladder
 - 1) Calculi
 - 2) Cancer
 - 3) Cystitis
 - 4) Neurogenic bladder
 - 5) Retention
 - 6) Trauma
 - 7) Urinary incontinence
 - 8) Urinary reflux
 - 9) Urinary tract infection

K. Endocrine system

1. Diagnostic tests
2. Diseases and disorders
 - a) Adrenal gland
 - 1) Cancer
 - 2) Hyperadrenalism
 - (a) Cushing's disease
 - 3) Hypoadrenalism
 - (b) Addison's disease
 - b) Parathyroid gland
 - 1) Hyperparathyroidism
 - c) Pituitary gland
 - 1) Tumor
 - d) Thyroid gland
 - 1) Cancer
 - 2) Goiter
 - 3) Hyperthyroidism
 - (a) Graves' disease
 - 4) Hypothyroidism

- (b) Hashimoto's disease
- L. Reproductive system
 - 1. Female reproductive system
 - a) Diagnostic tests
 - b) Diseases and disorders
 - 1) Breast diseases
 - (a) Cancer
 - (b) Fibrocystic disease
 - (c) Paget's disease
 - 2) Cancer
 - (a) Cervical
 - (b) Ovarian
 - (c) Uterine
 - (d) Vulvar
 - 3) Emergency obstetrical disorders
 - (a) Abruptio placentae
 - (b) Breech presentation
 - (c) Cephalopelvic disproportion
 - (d) Ectopic pregnancy
 - (e) Nuchal cord
 - (f) Placenta previa
 - (g) Prolapsed cord
 - (h) Spontaneous abortion
 - (i) Toxemia
 - 4) Endometriosis
 - 5) Herniations
 - (a) Cystocele
 - (b) Rectocele
 - 6) Leiomyoma uteri or fibroid tumor
 - 7) Menstrual disorders
 - (a) Dysfunctional uterine bleeding
 - (b) Menorrhagia
 - 8) Ovarian cyst and torsion
 - 9) Pelvic inflammatory disease
 - (a) Toxic shock syndrome
 - 10) Uterine prolapse
 - 2. Male reproductive system
 - a) Diagnostic tests
 - b) Diseases and disorders
 - 1) Balanoposthitis
 - 2) Benign prostatic hypertrophy
 - 3) Cryptorchidism
 - 4) Epididymitis

- 5) Urethral congenital disorder
 - (a) Epispadias
 - (b) Hypospadias
- 6) Erectile dysfunction
- 7) Hydrocele
- 8) Orchitis
- 9) Penile cancer
- 10) Phimosis
- 11) Paraphimosis
- 12) Prostatic cancer
- 13) Prostatitis
- 14) Spermatocele
- 15) Testicular cancer
- 16) Testicular torsion
- 17) Varicocele
- c) Congenital and genetic disorders
 - 1) Dwarfism
 - 2) Marfan's syndrome
 - 3) Polydactyly
 - 4) Syndactyly
 - 5) Albinism
 - 6) Phenylketonuria (PKU)
 - 7) Sickle cell anemia
 - 8) Tay-Sachs
 - 9) Down syndrome
 - 10) Defects
 - 11) Developmental disorders
- d) Sexually transmitted diseases
 - 1) Chlamydia
 - 2) Genital herpes
 - 3) Genital warts
 - 4) Gonorrhea
 - 5) Human immunodeficiency virus (HIV)
 - 6) Human papillomavirus (HPV)
 - 7) Syphilis
 - 8) Trichomoniasis

ANESTHESIA AND PHARMACOLOGY

Objectives: The learner will:

Didactic:

1. Analyze the principles of anesthesia administration and explain the necessity of each component of anesthesia preparation of the surgical patient.
2. Compare and contrast methods, agents, and techniques of anesthesia administration and preparation.
3. Correlate anesthesia monitoring devices with patient homeostasis.
4. Explain anesthesia complications and interventions.
5. Calculate medication conversions and dosages.
6. Apply general terminology to medication use.

Skills Demonstration:

1. Demonstrate the safe use of medications and solution handling in a surgical environment.

Content:

I. Anesthesia

A. Terminology

1. Anesthesia
2. Equipment
3. Devices

B. Considerations

1. Choice of administration
 - a) General
 - 1) Inhalation
 - 2) Intravenous
 - b) Regional
 - 1) Bier block
 - (a) Infiltration
 - 2) Caudal
 - 3) Epidural
 - 4) Monitored anesthesia care (MAC)
 - 5) Nerve block (local)
 - (a) Intramuscular
 - (b) Retrobulbar
 - (c) Topical
 - 6) Rectal
 - 7) Spinal
 - (a) Intrathecal

¹Refer to *AST Guidelines for Best Practices for Safe Medication Practices in the Perioperative Area*.

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2. Patient factors
 - a) Age
 - b) Allergies
 - c) Classification
 - 1) American Society of Anesthesiologists (ASA)
 - d) Co-morbid conditions
 - 1) Diabetes
 - 2) Elevated blood pressure
 - 3) Heart disease
 - e) Current medications and supplements
 - f) Emergency conditions
 - g) General health
 - h) Height
 - i) Psychological state
 - j) Substance abuse
 - k) Weight
 3. Procedure type
 - a) Duration
 - b) Surgical position
 4. Preference
 - a) Anesthesia provider
 - b) Patient
 - c) Surgeon
- C. Equipment and device types
1. Application
 - a) Airway management
 - 1) Bite block
 - 2) Bougie
 - 3) Endotracheal tube
 - 4) Laryngeal mask airway (LMA)
 - 5) Laryngoscope
 - 6) Mask
 - 7) McGill forceps
 - 8) Nasal airway
 - 9) Oral airway
 - 10) Stylet
 - b) Anesthesia machine
 - c) Double-cuffed pneumatic tourniquet
 - d) Fluid infusion pump
 - e) Fluid warming devices
 - f) Hypo- and hyperthermia unit
 - g) Infusion control device
 - h) Nerve stimulator

- i) Patient monitoring devices
 - 1) Blood pressure cuff
 - 2) Electrocardiogram (ECG, EKG)
 - 3) Pulse oximeter
 - 4) Temperature probes
 - 5) Transesophageal echocardiogram (TEE)
 - 6) Urinary catheter
- D. Preoperative medications
 - 1. Analgesic
 - a) Natural opioid
 - 1) Morphine
 - b) Synthetic opioids
 - 1) Alfentanil
 - 2) Fentanyl
 - 3) Meperidine
 - 4) Remifentanyl
 - 5) Sufentanil
 - 2. Antacid/H₂-receptor blocking agents
 - a) Cimetidine
 - b) Famotidine
 - c) Sodium citrate with citric acid
 - 3. Anti-cholinergic
 - a) Atropine
 - b) Glycopyrrolate
 - c) Scopolamine
 - 4. Antiemetic
 - a) Metoclopramide
 - b) Ondansetron
 - c) Promethazine
 - 5. Sedative-hypnotic agents
 - a) Diazepam
 - b) Lorazepam
 - c) Midazolam
- E. General anesthesia
 - 1. Anesthetic agents
 - a) Antagonistic
 - 1) Benzodiazepine reversal
 - (a) Flumazenil
 - 2) Opioid reversal
 - (a) Nalmefene
 - (b) Naloxone
 - (c) Naltrexone

*Refer to section **I.D.5**
Preoperative medications
for a list of sedative-
hypnotic agents.

- b)** Inhalation
 - 1) Desflurane
 - 2) Isoflurane
 - 3) Nitrous oxide
 - 4) Oxygen
 - 5) Sevoflurane
 - c)** Intravenous
 - 1) Benzodiazepines*
 - 2) Dissociative
 - (a) Ketamine
 - 3) Etomidate
 - 4) Methohexital
 - 5) Propofol
 - 6) Thiopental
 - d)** Neuromuscular blocking
 - 1) Depolarizing
 - (a) Succinylcholine
 - 2) Non-depolarizing
 - (a) Atracurium
 - (b) Cisatracurium
 - (c) Rocuronium
 - (d) Vecuronium
 - 3) Neuroleptic
 - (a) Droperidol
 - 4) Reversal (non-depolarizing)
 - (a) Edrophonium
 - (b) Neostigmine
- 2.** Patient concepts
- a)** Position for induction
 - 1) Supine
 - b)** Monitoring
 - 1) Arterial blood gases
 - 2) Blood pressure
 - (a) Normal values
 - 3) Depth of anesthesia
 - (a) Bispectral index (BIS)
 - 4) Carbon dioxide
 - (a) Capnography
 - 5) Electrocardiogram (ECG)
 - (a) Normal values
 - 6) Intravascular catheters
 - (a) Arterial line
 - (b) Swan-Ganz pulmonary

- a) Corneal
 - b) Oral
 - 5. Malignant hyperthermia
 - 6. Shock
 - a) Cardiogenic
 - b) Hemorrhagic
 - 7. Spasm
 - a) Bronchospasm
 - b) Laryngospasm
 - H. Roles of surgical team during administration
 - 1. Assisting anesthesia personnel
 - a) General anesthesia
 - 1) Sellick's maneuver
 - b) Local anesthesia
 - c) Regional anesthesia
 - d) Spinal or epidural anesthesia
 - 2. Documenting
 - 3. Handling medications and solutions
 - 4. Healthcare facility policy
 - 5. Monitoring
 - a) Dosage
 - b) Patient
- II. Pharmacology
 - A. Terminology
 - 1. Pharmacology
 - 2. Pharmacokinetics
 - a) Absorption
 - b) Distribution
 - c) Metabolism
 - d) Excretion
 - 3. Pharmacodynamics
 - a) Onset
 - b) Peak affect
 - c) Duration of action
 - B. Medication concepts
 - 1. Nomenclature
 - a) Chemical name
 - b) Generic name
 - c) Trade or brand name
 - 2. Classifications
 - a) Alternative medications
 - b) Controlled substance
 - 1) Schedule I-V

- c) Nonprescription (over the counter - OTC)
 - d) Prescription
 - e) U.S. Food and Drug Administration Pregnancy and Lactation Labeling Rule (PLLR) categories
3. Sources
- a) Animals
 - b) Biotechnology
 - c) Laboratory synthesis
 - d) Minerals
 - e) Plants
4. Drug forms
- a) Gas
 - b) Liquid
 - 1) Emulsion
 - 2) Solution
 - 3) Suspension
 - c) Semisolid
 - d) Solid
5. Actions
- a) Additive
 - b) Agonist
 - c) Antagonist
 - d) Synergist
 - e) Therapeutic
 - 1) Indications
 - 2) Contraindications
6. Effects
- a) Adverse
 - b) Side
7. Routes of administration
- a) Enteral
 - 1) By mouth (PO)
 - 2) Rectal
 - b) Parenteral
 - 1) Intra-articular
 - 2) Intracardiac
 - 3) Intradermal
 - 4) Intramuscular (IM)
 - 5) Intrathecal
 - 6) Intravenous (IV)
 - 7) Retrobulbar
 - 8) Subcuticular (SC or SQ)

- c) Topical
 - 1) Buccal
 - 2) Inhalation
 - 3) Intraocular
 - 4) Instillation
 - 5) Sublingual
 - 8. Laws, policies, and procedures
 - a) Healthcare facility policies and procedures
 - b) Medication and solution violations
 - 1) Consequences to patient
 - 2) Narcotic precautions
 - 3) Personnel negligence
 - c) State and federal laws
 - d) Types of medication orders
 - 1) PRN
 - 2) Standing
 - (a) Surgeon's preference card
 - 3) Stat
 - 4) Verbal
 - 9. Publications
 - a) *Physician's Desk Reference*
 - b) The Joint Commission National Patient Safety Goals
- C. Medication measurements
 - 1. System and conversion
 - a) Household
 - b) Metric
 - c) Temperature
 - 2. Basic mathematics
 - a) Decimals*
 - b) Fractions
 - c) Military time (Coordinated Universal Time (UTC))
 - d) Percentages
 - e) Proportions
 - f) Ratios
 - 3. Dosage calculations
 - a) Amount and dosage delivered
 - b) Unit per milliliter dosages
 - 4. Mixing medications
 - a) Combining
 - b) Diluting
 - c) Reconstituting
- D. Care and handling
 - 1. Delivery devices

*According to The Joint Commission's "Do Not Use" abbreviation list, a trailing zero may not be used in medication orders or other medication-related documentation.

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- a) Syringes
 - 1) Irrigating
 - (a) Asepto
 - (b) Bulb syringe
 - (c) Catheter tip
 - (d) Toomey
 - 2) Finger control
 - 3) Leur-lock
 - 4) Preloaded
 - 5) Slip-tip
 - 6) Tubex (carpuject)
 - b) Injection needles
 - 1) Angiocatheter
 - 2) Filter
 - 3) Hypodermic
 - 4) Spinal
2. Label information
- a) Amount
 - b) Concentration
 - c) Directions for reconstitution or dilution
 - d) Expiration date
 - e) Generic name
 - f) Route of administration
 - g) Storage
 - 1) Handling precautions
 - 2) Warnings
 - h) Trade name
3. Preparation
- a) Identification
 - 1) Containers on sterile field
 - 2) Labeling
 - 3) Six rights
 - (a) Right drug
 - (b) Right dose
 - (c) Right route
 - (d) Right patient
 - (e) Right time
 - (f) Right documentation
 - 4) Verification
 - b) Nonsterile circulator role
 - 1) Draw up medication into syringe
 - c) Transfer of medication(s) to the sterile field
 - 1) Roles and responsibilities

- (a) Circulator
 - (1) Transfer medication to sterile field
- (b) Surgical technologist

2) Methods of transfer

E. Medications used in surgery*

1. Classification of agents

- a) Analgesic
- b) Analgesic antipyretic
- c) Anticoagulant and fibrinolytic
- d) Anticonvulsant
- e) Antiemetic and antihistamine
- f) Anti-infective
 - 1) Aminoglycoside
 - 2) Antimicrobial
 - 3) Penicillins and cephalosporins
 - 4) Polymyxins
 - 5) Sulfonamides
 - 6) Tetracyclines
- g) Autonomic
 - 1) Adrenergic (alpha and beta)
 - 2) Adrenergic blockers
 - 3) Cholinergic
 - 4) Cholinergic blockers
- h) Blood replacement interventions
 - 1) Autologous blood
 - (a) Autotransfusion
 - (1) Principles
 - (2) Techniques
 - 2) Donated blood products
 - (a) Component therapy
 - (1) Principles
 - (b) Type-and-cross matching
 - 3) Whole blood
 - (a) Principles
 - 4) Plasma expanders
 - (a) Infusion
 - (b) Medication
- i) Cardiac
 - 1) Antiarrhythmic
 - 2) Coronary dilators
 - 3) Inotropic
- j) Central nervous system stimulants
 - 1) Analeptic

<p>*Several classes of agents are repeated throughout this document for purposes of continuity.</p>

- 2) Neuroleptic
- k) Coagulants, hemostatic, and sealants
- l) Contrast media
- m) Diuretic
- n) Dyes
- o) Emergency drugs
 - 1) Cardiac arrest
 - 2) Malignant hyperthermia
 - 3) Respiratory arrest
- p) Gastric
 - 1) H2-receptor blockers
 - 2) Proton-pump inhibitor (PPI)
- q) Hormone
 - 1) Corticosteroid
 - 2) Insulin and glucagon
 - 3) Prostaglandin
 - 4) Estrogen cream
- r) Inhalation
 - 1) Nasal sprays
- s) Irrigation solutions
- t) IV fluids
- u) Narcotic
- v) Narcotic antagonist
- w) Obstetrical
 - 1) Oxytocic
 - 2) RhoGAM
- x) Ophthalmic
 - 1) Antibiotic
 - 2) Dyes and stains
 - 3) Enzymes
 - (a) Zonulysis
 - 4) Irrigating solutions
 - 5) Local anesthesia adjuncts
 - 6) Lubricant
 - 7) Miotic
 - 8) Mydriatic
 - 9) Viscoelastic
- y) Sedative-hypnotic
- z) Staining
- aa) Tranquilizers

**DIDACTIC
PROFESSIONAL PRACTICE**

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PROFESSIONALISM

PROFESSIONAL MANAGEMENT

Objectives: The learner will:

1. Describe the characteristics of the professional surgical technologist.
2. Compare and contrast professional organizations related to the profession.
3. Describe the credentialing options available to the surgical technologist.

Content:

- I. Professionalism
 - A. Traits of the professional surgical technologist
 1. Personal and professional behaviors
 - a) *Aeger Primo* (patient centered)
 - b) Critical thinking skills
 - 1) Identify problem
 - (a) Anticipate and plan for the unexpected
 - 2) Define problem
 - 3) Gather information
 - 4) Identify solutions
 - 5) Evaluate outcomes
 - (a) Analyze role in prevention strategies
 - c) Surgical conscience
 2. Supports profession (e.g., membership in AST)
 3. Participates in professional self-development
 4. Educates others about the profession
 - B. Obtains and maintains national certification
 - C. Supports and participates in continuing education
 - D. Community service
 - E. Service to others
 1. Mentor
 2. Role model
 - F. Ethical behavior
 - II. Professional organizations and credentialing
 - A. Commission on Accreditation of Allied Health Education Programs (CAAHEP)
 - B. Accreditation Review Council on Education in Surgical Technology & Surgical Assisting (ARC/STSA)
 - C. Association of Surgical Technologists (AST)
 1. Historical background
 2. Goals
 3. Purpose
 4. Membership composition
 5. Committees
 6. Meetings

- 7. Annual national conference
- 8. Workshops and forums
- 9. State Assemblies
- 10. Professional liability insurance
- 11. AST journal *The Surgical Technologist*
- D. Credentialing organizations
 - 1. National Board of Surgical Technology & Surgical Assisting (NBSTSA)
- E. Related professional organizations
 - 1. American College of Surgeons (ACS)
 - 2. American Medical Association (AMA)
 - 3. American National Standards Institute (ANSI)
 - 4. American Society of Anesthesiologists (ASA)
 - 5. Association for Professionals of Infection Control and Epidemiology (APIC)
 - 6. Association for the Advancement of Medical Instrumentation (AAMI)
 - 7. Association of periOperative Registered Nurses (AORN)
 - 8. Centers for Disease Control and Prevention (CDC)
 - 9. Emergency Services Advanced Registry for Volunteer Health Professionals (ESAR-VHP)
 - 10. Environmental Protection Agency (EPA)
 - 11. Food and Drug Administration (FDA)
 - 12. International Association of Healthcare Central Service Materiel Management (IAHCSMM)
 - 13. The Joint Commission
 - 14. Medical Reserve Corps (MRC)
 - 15. National Disaster Life Support Education Consortium (NDLSEC)
 - 16. National Fire Protection Association (NFPA)
 - 17. National Institute of Occupational Safety and Health (NIOSH)
 - 18. Occupational Safety and Health Administration (OSHA)
 - 19. World Health Organization (WHO)
- F. Private volunteer agencies
 - 1. Local
 - 2. State
 - 3. Federal

INTERPERSONAL RELATIONSHIPS COMMUNICATION SKILLS

Objectives: The learner will:

Didactic:

1. Define and describe types of communication relationships.
2. Discuss goals of communication.
3. Describe the significance of content and tone in communication.

Skill Applications:

1. Demonstrate principles of communication in the surgical setting.
2. Demonstrate body language and non-verbal communication.

Content:

- I. Relationships
 - A. Professional
 - B. Social
 - C. Therapeutic
- II. Goals of communication
 - A. Express oneself
 - B. Obtain information
 - C. Persuade audience
 - D. Prevent error
 - E. Promote patient safety
 - F. Provide information
 - G. Solve problems
- III. Principles of communication
 - A. Types
 1. Verbal
 - a) Tone
 2. Nonverbal
 - a) Body language
 - b) Eye contact
 - c) Tone
 - d) Touch
 3. Written
 - a) Netiquette
 - b) Tone
 - B. Components
 1. Feedback
 2. Message
 3. Receiver
 4. Sender
- IV. Qualities of communication
 - A. Respect

- B.** Positive language
- C.** Active listening
- D.** Eye contact
- E.** Feedback
- F.** Sensitivity
- G.** Understanding
- H.** Clarity

INTERPERSONAL RELATIONSHIPS TEAMWORK

Objectives: The learner will:

Didactic:

1. Discuss methods for successful surgical team participation.
2. Discuss strategies for the attainment of effective team goals.
3. Compare and contrast individual skills vs. collaboration roles and responsibilities.

Skill Applications:

1. Demonstrate principles of teamwork in the surgical environment.

Content:

- I. Principles of teamwork and group interaction
 - A. Define
 1. Acceptance
 2. Collaboration
 3. Constructive criticism
 - a) Educate
 - b) Giving and receiving
 - c) Handling negativity
 - d) Positive reinforcement
 - e) Providing rational
 - f) Speak out
 - g) Understanding perspective
 4. Flexibility
 5. Politeness
 6. Team
- II. Organizing a team
 - A. Stages of team development
 - A. Forming
 - a) Initiation of quality discussions and goals
 - b) Roles and responsibilities
 - c) Selection criteria
 - d) Timeline
 - B. Storming
 - a) Clarification
 - b) Handling personality conflicts
 - c) Providing information
 - C. Norming
 - a) Examining strengths and weaknesses
 - b) Development of cohesive patterns of work performance

INTERPERSONAL RELATIONSHIPS CONFLICT RESOLUTION

Objectives: The learner will:

1. Identify the skills necessary to resolve conflict in the workplace.
2. Distinguish the types of behavioral concerns found in society.
3. Discuss the strategies to negotiate effective problem resolution.
4. Evaluate the methods to prevent conflict in the surgical arena.

Content:

- I. Conflict management
 - A. Necessary skills
 1. Active listening
 2. Communication (See *Communication Skills*)
 3. Emotional agility
 4. Problem-solving
 5. Stress management
 6. Teamwork (See *Teamwork*)
 - B. Solution strategies
 1. Avoidance
 2. Eliminate Us vs. Them mentality
 3. Evaluate non-negotiable issues vs. pseudo importance
 4. Identify deeper concerns
 5. Recognizing bias
- II. Identification of behavioral concerns
 - A. Verbal abuse
 1. Causes
 2. Coping
 - B. Lateral violence
 1. Chronic
 2. Coping
 3. Reporting
 - C. Bullying
 1. Chronic, covert
 2. Coping
 3. Reporting
 - D. Disruptive behaviors
 1. Argumentative
 2. Blaming others
 3. Poor temperament control
 4. Questioning authority or standards
 5. Refusing to follow rules
 6. Rumors
 - E. Sexual harassment and hostile environment
 1. Coping
 2. Misuse of power
 3. Legal implications

- III.** **4.** Reporting
 - Prevention strategies
 - A.** Active listening
 - B.** Designated prevention coordinators
 - C.** Participation of all
 - D.** Stress management plans

ETHICAL AND MORAL ISSUES

Objectives: The learner will:

Didactic:

1. Review the American Hospital Association's (AHA) Patient Care Partnership
2. Understand the influence of ethics in professional practice.
3. Discuss the role of morality during ethical decision-making.
4. Discuss examples of ethical situations and problems in the health profession.
5. Discuss the key elements related to developing a surgical conscience.
6. Review principles of problem-solving in ethical decision-making.
7. Discuss principles of patient confidentiality, including verbal and written.

Skill Applications:

1. Demonstrate the key elements related to developing a surgical conscience.

Contents:

- I. AHA Patient Care Partnership
- II. Elements of ethical decision making
 - A. Accountability
 - B. Autonomy
 - C. Beneficence
 - D. Confidentiality
 - E. Corporate integrity
 - F. Cultural beliefs
 - G. Deontology
 - H. Ethical factors
 - I. Ethical principles
 - J. Informed consent
 - K. Justice
 - L. Morality
 - M. Nonmaleficence
 - N. Personal values
 - O. Philosophy
 - P. Problem-solving
 - Q. Religious beliefs
 - R. Responsibility
 - S. Truthfulness
 - T. Utilitarianism
- III. Surgical conscience
 - A. Concepts
 1. Commitment to cost containment
 2. Confidentiality
 3. HIPAA
 4. Nondiscriminatory treatment

- 5. Moral integrity
 - 6. Principles of asepsis
 - 7. Professional honesty
 - B. Barriers
 - 1. Lack of resources
 - 2. Peer apathy
 - 3. Stress
- IV. Ethical considerations in clinical practice
 - A. Abortion
 - B. Animal experimentation
 - C. Communicable diseases
 - D. Elective sterilization
 - E. Genetic engineering
 - F. Gender reassignment
 - H. Human experimentation
 - I. Insurance fraud
 - J. Organ donation and transplantation
 - K. Refusal of treatment
 - L. Reproductive technology
 - 1. Artificial insemination
 - 2. In-vitro fertilization
 - M. Right-to-die
 - 1. Assisted suicide
 - 2. End-of-life decisions
 - N. Substance abuse
 - 1. Impaired health care provider
 - 2. Patient
 - 3. Self
 - O. Stem cell research
 - P. Workplace violence

LEGAL ISSUES AND RISK MANAGEMENT

Objectives: The learner will:

1. Analyze the concepts of law.
2. Define the various types of legal doctrines.
3. Discuss the concepts that influence the standards of conduct.
4. Analyze the legal elements of proper documentation.
5. Describe the types of sentinel events.
6. Summarize the intentions of risk management.

Content:

- I. Terminology
 - A. Law
 1. Common
 2. Statutory
 - B. Liability
 1. Corporate
 2. Personal
 - C. Torts
 1. Intentional
 - a) Civil assault
 - b) Civil battery
 - c) Defamation
 - d) False imprisonment
 - e) Invasion of privacy
 2. Unintentional
- II. Negligence
 - A. Actual damages occurred
 - B. Commission of an act
 - C. Foreseeable harm
 - D. Malpractice
 1. Defendant
 2. Deposition
 3. Jury
 4. Perjury
 5. Plaintiff
 6. Subpoena
 7. Trial
 - E. Omission of an act
 - F. Standard of care
 1. Failure to meet
- III. Legal doctrines
 - A. Advanced directives
 - B. Doctrine of Borrowed Servant
 - C. Doctrine of Foreseeability
 - D. Doctrine of Personal Liability

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Positioning*
2. *Patient Identification, Correct Surgery Site and Correct Surgical Procedure*
3. *Safe Medication Practices in the Perioperative Area*
4. *Handling and Care of Specimen in the OR*

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- E. Doctrine of *respondeat superior*
 - F. Doctrine of *res ipsa loquitur*
 - G. Informed consent
 - H. Traditional principles
 - 1. *Aeger primo*
 - 2. *Primum non-nocere*
- IV. Professional standards of conduct (See *Ethical and Moral Issues*)
- A. AST Code of Ethics
 - B. AST Guidelines for Best Practices *
 - C. Federal
 - 1. Agencies
 - 2. Laws
 - D. Healthcare facility policy
 - E. Legal precedent
 - F. Private agencies
 - G. Professional agencies
 - H. State
 - 1. Laws
 - 2. Regulations
- V. Documentation concepts
- A. Patient care (See *Perioperative Documentation*)
 - 1. Evaluation
 - 2. Intervention
 - 3. Outcomes
 - B. Legal elements
 - 1. Correction of errors
 - 2. Factual information
 - 3. Legal signatures
 - 4. Legibility
 - 5. Spelling
 - 6. Terminology and abbreviations
 - a) The Joint Commission “do not use” list**
 - C. Types of documents
 - 1. Anesthesia record
 - 2. Certificates
 - a) Birth
 - b) Death
 - 3. Consent forms
 - a) Anesthesia
 - b) Implants
 - c) Sterilization
 - d) Surgical
 - 4. Counts
 - 5. Incident report
 - 6. Intraoperative record

**Refer to *Medical Terminology* section for information regarding The Joint Commission “do not use” list.

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- 7. Laboratory
 - 8. Pathology
 - 9. Patient charges
 - 10. Patient medical record
 - 11. Preference card
 - 12. Sentinel event report
 - 13. Timeout
- VI. Operating room sentinel events**
- A.** Abandonment
 - B.** Assault
 - C.** Battery
 - D.** Breach of confidentiality
 - 1. Confidentiality statement
 - 2. HIPAA
 - E.** Critical events
 - 1. Failure to act
 - 2. Failure to recognize
 - F.** Defamation
 - G.** Documentation errors
 - H.** Exceeding authority or accepted functions
 - I.** Harm secondary to major break in sterile technique
 - J.** Harm secondary to use of defective equipment and instruments
 - 1. Safe Medical Devices Act
 - K.** Inadvertent burns
 - L.** Incorrect positioning of patient¹
 - 1. Inadequate padding
 - 2. Injury
 - M.** Incorrect procedure²
 - N.** Invasion of privacy
 - O.** Lack of informed consent
 - P.** Loss or damage of patient property
 - Q.** Medication errors³
 - 1. Incorrect administration
 - 2. Incorrect medication(s)
 - R.** Patient falls
 - S.** Patient misidentification²
 - T.** Retained foreign bodies
 - U.** Specimen⁴
 - 1. Improper identification
 - 2. Loss
- VII. Risk management**
- A.** Objectives
 - 1. Minimize risks
 - a) To employees
 - b) To patients
 - 2. Policy enforcement

- a) Eliminate or reduce sentinel events
 - 3. Procedures
 - a) Data collection
 - 1) Identify potential causes of sentinel events
- B. Managing events
 - 1. Injuries
 - a) Employee
 - b) Patient
 - 2. Malfunctioning equipment
 - 3. Reporting unsafe conditions
- C. Prevention practices
 - 1. Continuing education
 - a) Annual updates
 - b) Review of policies and procedures
 - 2. Preventative maintenance
 - a) Equipment
- D. Reporting
 - 1. Documentation

EMPLOYABILITY SKILLS

Objectives: The learner will:

Didactic:

1. Assess employment opportunities for the surgical technologist.
2. Evaluate personal employability qualities and develop an employment strategy that includes positive characteristics.
3. Compare and contrast various types of employment applications and follow-up correspondence.
4. Analyze various interview strategies.
5. Compare and contrast the various roles in the surgical technology profession.

Skill Applications:

1. Develop a plan of action to secure employment in the healthcare field.
2. Develop a professional resume.
3. Demonstrate responsible and accountable behavior within the role and competencies of the surgical technologist.

Content:

- I. Employment in the healthcare field
 - A. Career information
 1. Job description
 - B. Employment opportunities
 1. Anesthesia technician
 2. Educator
 3. Labor and delivery
 4. Medical sales
 5. Manager (See *Management and Leadership*)
 - a) Ambulatory surgery center (ASC)
 - b) Central sterile supply (CSS)
 - c) Materials
 - d) Operating room
 6. Organ and tissue procurement and preservation
 7. Private surgical technologist
 8. Research assistant
 9. Surgery scheduler
 - C. Employment facilities and institutions
 - D. Transition from student to employee
- II. Employability skills
 - A. Applied knowledge
 1. Applied academic skills
 - a) Mathematical strategies
 - b) Reading

- c) Scientific principles and procedures
 - d) Writing
 - 2. Critical thinking skills
 - a) Analyze
 - b) Organize
 - c) Plan
 - d) Problem solves
 - e) Reason
 - B. Workplace skills
 - 1. Communication (See *Communication Skills*)
 - 2. Information use
 - 3. Resource management
 - a) Prioritization
 - b) Time management
 - 4. Technology use
 - C. Effective relationships (See *Interpersonal Relationships*)
 - 1. Interpersonal skills
 - a) Collaboration
 - b) Effective communication
 - c) Facility goals
 - d) Independence
 - e) Positive attitude
 - 2. Personal qualities
 - a) Disciplined
 - b) Flexible
 - c) Initiative
 - d) Integrity
 - e) Responsible
 - f) Willingness to learn
- III. Resume preparation
- IV. Types of correspondence
- A. Acceptance letter
 - B. Cover letter
 - C. Letter of refusal
 - D. Professional reference letter
 - E. Thank-you letter
- V. Employment application form
- A. Hard copy
 - B. Online
- VI. Interview preparations
- VII. Resignation
- A. Notice
 - 1. Verbal
 - 2. Written
 - B. Exit interview

MANAGEMENT AND LEADERSHIP

Objectives: The learner will:

1. Identify the characteristics of a successful leader.
2. Discuss the functions and roles of leadership.
3. Explore pathways to advance in management roles.

Content:

- I. Leadership characteristics
 - A. Time management
 1. Timelines
 2. Deadlines
 3. Multiple projects
 - B. Emotional intelligence
 1. Open mindset
 2. Personal emotions
 3. Positive relationships
 4. Stressful situations
 - C. Accountability
 1. Responsibility
 2. Commitment
 - a) Follow-through
 3. Results-focused
 - D. Financial knowledge
 1. Budget management
 2. Resource familiarity
 - E. Effective communication (See *Communication Skills*)
 - F. Decision Making
 1. Delegation
 2. Problem-solving
 - G. Creativity
 1. Effective ideas
 2. Team inspiration
- II. Roles of a Leader
 - A. Aligning goals with facility values
 1. Measurable
 2. Communicating to employees
 - a) Relating goals to specific tasks
 3. Monitoring for success or restructure
 - B. Recruitment
 1. Available technology
 2. Referral process
 3. Hiring criteria
 - a) Job description
 - b) Qualifications
 4. Candidates

- b) External
 - c) Internal
 - C. Performance
 - 1. Staff coaching
 - a) Orientation
 - b) Defining duties
 - 1) Measurable progress
 - c) Training
 - 2. Growth development
 - a) Constructive feedback
 - b) Continual assessment
 - c) Employee satisfaction
 - d) Positive work environment
 - e) Resolution of corrective action (See *Conflict Resolution*)
 - 3. Low retention strategies
 - 4. Termination
 - a) Assessment documentation
 - 1) Performance concerns
 - b) Facility policy
 - D. Budget development
 - 1. Facility resources
 - 2. Funding allocation
 - 3. Performance goals and facility objectives
 - 4. Flexibility for future advantages
- III. Leadership pathway development
 - A. Leadership characteristics
 - 1. Involvement
 - a) Internal and external committees
 - b) Professional organizations
 - 2. Meet or exceed current expectations
 - a) Dedicate extra effort toward duties
 - B. Professional job posting criteria
 - 1. Methods to obtain knowledge or credentials
 - 2. Employment advancement
 - 3. Networking
 - 4. Mentorship
 - C. Plan for success
 - 1. Timeline development
 - 2. Dedication

DIDACTIC
HEALTHCARE FACILITY INFORMATION

HEALTHCARE FACILITY ORGANIZATION AND MANAGEMENT

Objectives: The learner will:

1. Compare the different roles of the team members in the surgical setting.
2. Identify the proper chain of command in the operating room.
3. Describe the healthcare facility (HCF) departments that provide direct and indirect patient care.
4. Describe the healthcare agencies that impact the provision of surgical services.

Content:

- I. Sterile team members and roles
 - A. First and second scrub
 - B. Surgical first assistant
 1. Nonphysician surgical first assistant
 2. Surgeon
 - C. Surgeon
 1. Medical Doctor (MD)
 2. Doctor of Osteopathy (DO)
 3. Doctor of Dental Science (DDS)
 4. Doctor of Dental Medicine (DDM)
 5. Doctor of Podiatric Medicine (DPM)
- II. Nonsterile team members and roles
 - A. Circulator
 1. Registered nurse (primary)
 2. Surgical technologist (See *Assistant Circulator Duties*)
 - B. Anesthesia provider
 1. Anesthesiologist (MD or DO)
 2. Certified Registered Nurse Anesthetist (CRNA)
 - C. Support personnel
 1. Anesthesia technician or technologist
 2. Biomedical engineering technician (BMET)
 3. Central sterile supply technician
 4. Clerical
 5. EEG technician
 6. Medical sales representative
 7. Patient care technician
 8. Perfusionist
 9. Radiological technologist
 10. Sterile processing department liaison
- III. Healthcare facility chain of command
 - A. Organizational chart
 1. Facility wide
 2. Surgical services

- IV. Related healthcare facility departments**
 - A. Direct patient care**
 - 1. Blood bank
 - 2. Clinical laboratories
 - 3. Diagnostic imaging
 - 4. Nursing care units
 - 5. Pathology
 - 6. Surgery department
 - B. Indirect patient care**
 - 1. Biomedical engineering
 - 2. Environmental services
 - 3. Facilities management
 - 4. Law enforcement and security
 - 5. Nutrition services
 - 6. Pharmacy
 - 7. Sterile processing
- V. Healthcare agencies**
 - A. Health insurance**
 - 1. Health maintenance organization (HMO)
 - 2. Medicaid
 - 3. Medicare
 - 4. Preferred provider organization (PPO)
 - 5. Private
 - B. Prospective payment systems**
 - 1. Diagnosis-related group (DRG)
 - C. Impact of health insurance DRG**

PHYSICAL ENVIRONMENT

Objectives: The learner will:

1. Discuss the location of the surgical services within the healthcare facility.
2. Describe basic floor plan designs for surgical services.
3. Explain the principles underlying the design of the surgical department.
4. Describe the floor plan of the operating room.
5. Summarize the components that comprise the environmental systems.
6. Describe the principles of environmental system safety controls.

Content:

- I. Surgical services
 - A. Locations within the healthcare facility
 - B. Floor plan
 1. Racetrack
 2. Hotel-style
 3. Central core
- II. Principles of the layout
 - A. Traffic patterns
 - B. Environmental control
 - C. Communication systems
- III. Operating room
 - A. Location
 - B. Floor plan
 - C. Environmental systems
 1. Gases within the surgical suite
 - a) Oxygen
 - b) Nitrous oxide
 - c) Nitrogen
 - d) Compressed air
 2. Suction
 3. Electrical outlets
 - a) Red outlets
 - b) Standard outlets
 4. Environmental control
 - a) Temperature
 - b) Humidity
 - c) Ventilation systems
 - 1) Positive pressure
 - 2) Negative pressure
 - 3) Air exchange rate
 - 4) Laminar flow

- 5.** Environmental safety
 - a)** Electrical hazards
 - b)** Fire safety
 - c)** Radiation precautions
 - d)** Surgical plume
 - e)** OSHA guidelines
 - 1)** Safety Data Sheets (SDS)
 - 2)** Standard precautions
 - f)** CDC guidelines
 - 1)** Post-exposure protocol

ALL-HAZARDS PREPARATION

Objectives: The learner will:

1. Describe the types of disasters or public health emergencies.
2. Discuss the effects of emerging infectious diseases.
3. Describe the effect disasters can have on the environment.
4. Describe how healthcare facilities can manage waste.
5. Describe the purpose and coordination of the all-hazards systems, including the hospital incident command system, national incident management systems, and national response framework.
6. Describe the components of a healthcare facility emergency operations plan.
7. Explain the personal and professional responsibilities of healthcare workers when participating in the management of a disaster or hazard.
8. Describe how to mitigate casualties according to specific types of hazards.
9. Describe the four responses that apply to every type of disaster.
10. Describe the triage procedures.
11. Describe the role of the surgical technologist during triage.
12. Describe the processes used to control contamination.
13. Describe the support roles of the surgical technologist.
14. Discuss the moral and ethical issues relevant to hazards.

Content:

- I. Types of disasters
 - A. Manmade
 - B. Natural
 - C. Natural – manmade (e.g., defective dam)
- II. Emerging infectious diseases
 - A. Epidemic
 - B. Pandemic
- III. Environmental health in disasters
 - A. Water
 1. Sanitation methods during disaster
 - B. Contaminated atmospheric air
 1. Methods of protection during disaster
 - a) Building
 - b) PPE
 - C. Healthcare facilities
 1. Waste management during disaster
- IV. Disaster support services
 - A. Hospital Incident Command System (HICS)
 - B. National Incident Management Systems (NIMS)
 - C. National Response Framework (NRF)
- V. Healthcare facility disaster planning
 - A. Healthcare facility emergency operations plan (EOP)
 1. Components of plan
 - a) Mitigation

DIDACTIC
BIOPSYCHOSOCIAL CONCEPTS

NEEDS OF THE PATIENT

Objectives: The learner will:

1. Evaluate the holistic needs of the surgical patient.
2. Identify responses concerning the needs of the patient population.
3. Discuss the needs of susceptible populations.

Content:

- I. Holistic needs
 - A. Cultural
 - B. Maslow's Hierarchy
- II. Susceptible patient populations
 - A. Communication barriers
 1. Nonphysical
 2. Physical
 - B. Immunocompromised
 - C. Intellectually disabled
 - D. Mental or physical trauma
 - E. Older adult
 - F. Patient in isolation unit
 - G. Pediatric
 - H. Person with diabetes
 - I. Person with mental health history
 - J. Person with substance use history
 - K. Physically disabled
 - L. Pregnant
 - M. Unhealthy BMI

DEATH AND DYING

Objectives: The learner will:

1. Evaluate perceptions regarding death and dying.
2. Define the various causes of death.
3. Discuss the definitions of death.
4. Compare and contrast responses to the process of death.
5. Evaluate the various coping strategies and mechanisms.
6. Analyze quality vs. quantity of life.
7. Evaluate the process when a patient's death occurs in the operating room.
8. Discuss the issues regarding organ and tissue recovery from a deceased individual.
9. Discuss the issues related to suicide.

Content:

- I. Death and dying
 - A. Perceptions of death and dying
 1. Attitudes
 - a) Caregivers
 - b) Family members
 2. Beliefs
 - a) Cultural
 - b) Ethnicity
 - c) Religious
 - B. Causes of death
 1. Accidental
 2. Prolonged (chronic)
 3. Sudden
 4. Suicide
 5. Terminal
 - C. Definitions of death
 1. Brain
 - a) Higher
 - b) Whole
 2. Cardiac
 - D. Responses to loss
 1. Grief
 - a) Complicated
 - b) Disenfranchised
 2. Kubler-Ross
 - E. Quality vs. quantity of life
 1. Advance directives
 2. Patient care
 - a) Palliative
 - b) Therapeutic
 3. Life-support systems

- 4. Life-sustaining therapy
- 5. Right to die
 - a) Euthanasia
- F.** Death of a patient in the operating room
 - 1. Debriefing sessions
 - 2. Documentation
 - 3. Notification
 - a) Chaplain, clergy
 - b) Family and significant others
 - c) Mortician
 - d) Perioperative manager
 - 4. Forensic issues and coroner's cases
 - 5. Preparation of the body for family viewing
 - 6. Postmortem patient care
 - 7. State and federal law and hospital policy
- G.** Coping strategies
- H.** Organ and tissue recovery and transplantation
 - 1. Organ and tissue recovery
 - a) Determination of death
 - b) Consent for donation
 - c) Recovery team
 - d) Types of recovery
 - 1) Recovery on life support
 - 2) Recovery without life support
 - 2. Transplantation
 - a) Ethical implications
- I.** Implications of suicide

**DIDACTIC
TECHNOLOGICAL SCIENCE CONCEPTS**

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INFORMATION TECHNOLOGY

Objectives: The learner will:

1. Describe the basic components of a computer system.
2. Evaluate basic electronic medical records (EMR) systems used.
3. Evaluate safe practices for implementing information technology.
4. Describe best practices in securing protected health information (PHI).

Content:

- I. Computer systems
 - A. In the surgical setting
 1. Basic computer components
 2. Computer applications and document processing
 3. Computer hardware
 - B. Hospital digital scheduling boards
 - C. EMR systems
- II. Safe practice
 - A. Bar code systems
 - B. Counts and retained foreign bodies
 - C. Digital documentation
 - D. Instrument tracking
 - E. Medication tracking
 - F. Patient identification
 - G. Patient Transportation
 - H. Verification
- III. Patient confidentiality and securing PHI
 - A. Access relevant patient information
 - B. Keep login information secure
 - C. Log out of terminals after use
 - D. Remove patient identifiers from scheduling boards

ELECTRICITY

Objectives: The learner will:

Didactic:

1. Define terminology.
2. Describe the principles of electrical flow.
3. Describe the various components of the electrosurgical unit.

Skill Applications:

1. Demonstrate electrical safety.
2. Demonstrate knowledge of operating the electrosurgical unit.

Content:

- I. Terminology
 - A. Circuit
 - B. Conductor
 - C. Current
 - D. Frequency
 - E. Ground
 - F. Insulator
 - G. Isolated circuit
 - H. Radio frequency
 - I. Resistance
 - J. Voltage
- II. Types of current
 - A. Alternating current (AC)
 - B. Direct current (DC)
- III. Components of the ESU
 - A. Bipolar
 - B. Monopolar
- IV. Electrical safety¹
 - A. Electrical shock
 - B. Equipment safety
 - C. Fire risk assessment
 - D. Grounded plug
 - E. Insulators
 - F. Protecting self

¹Refer to AST
Guidelines for Best
Practice for *Use of
Electrosurgical Unit*

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LASERS

Objectives: The learner will:

Didactic:

1. Describe the biophysics of lasers.
2. Discuss the advantages of using lasers.
3. Describe the types of lasers.
4. Describe the specific applications of each type of laser.

Skill Applications:

1. Demonstrate proper care and handling of surgical lasers.
2. Demonstrate patient and healthcare provider safety in relationship to lasers in a surgical setting.

Content:

- I. Biophysics
- II. Advantages
- III. Systems
 - A. Argon
 - B. CO₂
 - C. Diode
 - D. Krypton
 - E. Tunable dye
 - F. Yttrium-aluminum Garnet (YAG)
 1. Erbium
 2. Holmium
 3. Neodymium (Nd)
 - a) KTP
- IV. Safety for surgical team and patient¹
 - A. Fire
 - B. Laser safety checklist
 - C. Plume
 - D. Protection

¹Refer to the *AST Guidelines for Laser Safety* and the *Laser Institute standards for Laser safety*.

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MINIMALLY INVASIVE APPLICATIONS

Objectives: The learner will:

1. Discuss the applications of each type of MIS system.
2. Discuss the advantages of each type of MIS system.
3. Discuss the risks associated with the use of each type of MIS system.
4. Discuss the components of MIS systems.

Content:

- I. MIS systems
 - A. Endoscopy
 1. Applications
 2. Advantages
 3. Risks
 - B. Robotics¹
 1. Overview
 - a) Terminology
 - b) Accessories and emerging technology
 - 1) Firefly[®]
 - c) Components
 - d) Docking
 - e) Draping
 - f) Troubleshooting
 2. Applications
 3. Advantages
 4. Risks
 - C. Navigation*
 1. Components
 - a) Computer tomography (CT)
 - b) Magnetic resonance imaging (MRI)
 - c) O-arm
 - d) Ultrasound
 2. Applications
 - a) Fiducial markers
 3. Advantages
 4. Risks

¹Refer to *AST Guidelines for Best Practices on the Role and Duties of the Surgical Technologist During Robotic Procedures*

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*For the purposes of this document, navigation systems were included but may not be exclusive to MIS applications (e.g., joint replacement procedures).

INTERVENTIONAL RADIOLOGY APPLICATIONS

Objectives: The learner will:

1. Describe the purpose of interventional radiology (IR).
2. Discuss the considerations for the use of IR.
3. Describe imaging modalities.
4. Evaluate the role of the surgical technologist.

Content:

- I. Concepts
 - A. Purpose
 1. Diagnostic
 2. Therapeutic
 - B. Patient preparation
- II. Considerations
 - A. Anatomical access
 - B. Patient complications
 - C. Environment
 1. IR suite
 2. Standard OR
 - D. Radiation safety¹
 1. Patient
 2. Surgical team
 - E. Item selection and use (See *Supplies*)
 1. Catheters
 2. Contrast media
 3. Guidewires
- III. Imaging modalities
 - A. Computer tomography (CT)
 - B. Digital fluoroscopy
 - C. Magnetic resonance imaging (MRI)
 - D. Nuclear medicine
 - E. Sonography
- IV. Role of the surgical technologist

¹Refer to *AST Guidelines for Best Practices for Ionizing Radiation Exposure in the Perioperative Setting*

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**DIDACTIC
SURGICAL TECHNOLOGY**

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EQUIPMENT

Objectives: The learner will:

Didactic:

1. Identify the purposes of the various types of equipment.
2. Review the uses of the various types of equipment.
3. Describe the perioperative handling of equipment.

Skill Applications:

1. Demonstrate the assembly of various types of equipment.
2. Demonstrate the use of various types of equipment.
3. Demonstrate the care of various types of equipment.

Content:

- I. Basic equipment
 - A. OR table
 1. Attachments and positioning aids
 - a) Anesthesia screen
 - b) Arm boards
 - c) Chest rolls
 - d) Foot boards
 - e) Gel positioning and padding aides¹
 - f) Headrest
 - g) Pegboard
 - h) Restraints
 - i) Shoulder
 - j) Sleds
 - k) Stirrups
 - l) Vacuum bag
 2. Specialty
 - a) Bariatric
 - 1) Side extenders
 - b) Fracture
 - 1) Hand table
 - 2) Leg holder
 - c) Spine
 - d) Urology
 - 1) Drain pan
 - 2) Leg holder
 - B. Furniture
 1. Back table
 2. IV poles
 3. Kick bucket

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Positioning*
2. *Electrosurgery Unit (ESU)*
3. *Safe Use of Pneumatic Tourniquets*
4. *Intraoperative Cell Salvage*
5. *Role and Duties of the Surgical Technologist During Robotic Procedures*
6. *Establishing the Sterile Field*
7. *Breaking Down the Sterile Field*

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- 4. Mayo stand
- 5. Prep stand
- 6. Ring stand
- C. Lights
 - 1. Ceiling
 - 2. Headlights
 - 3. Portable
- D. Video tower or boom
 - 1. Camera box
 - 2. Insufflation unit and CO₂ source
 - 3. Light source
 - 4. Monitor
 - 5. Shaver system
 - 6. Thermal energy source
- E. Hyperthermia and hypothermia unit
 - 1. Types
 - a) Blanket
 - b) Fluids
- F. Electrosurgical unit (ESU)²
 - 1. Bipolar
 - 2. Monopolar
- G. Sequential compression device (SCD)
- H. Suction system
- I. Tourniquet system³
- J. Patient transfer devices
- II. Specialty equipment
 - A. Basin warmer
 - B. Cardiopulmonary bypass machine
 - C. C-arm
 - D. Cell salvage system⁴
 - E. Cryotherapy unit
 - F. Doppler unit
 - G. Image guidance system
 - H. Irrigating bipolar system
 - I. Liposuction system
 - J. Low thermal radiofrequency device
 - 1. Uterine ablator
 - K. Microscope
 - L. Nerve monitoring device
 - M. Phacoemulsifier
 - N. Robotic systems⁵
 - 1. Patient cart
 - 2. Surgeon console
 - 3. Vision cart
 - O. Slush machine
 - P. Smoke evacuator

- Q. Ultrasonic unit
- R. Vacuum curettage machine
- III. Perioperative handling
 - A. Preoperative⁶
 - 1. Arranging
 - 2. Damp dusting
 - B. Intraoperative⁶
 - 1. Testing for use
 - 2. Troubleshooting
 - C. Postoperative⁷
 - 1. Care
 - 2. Cleaning
 - 3. Tag for repair

INSTRUMENTATION

Objectives: The learner will:

Didactic:

1. Identify the manufacturing characteristics of surgical instruments.
2. Compare the grades of surgical instruments.
3. Describe the categories of surgical instruments.
4. Apply knowledge of surgical instrumentation to specific surgical specialties.
5. Evaluate perioperative instrumentation handling concepts.

Skill Applications:

1. Demonstrate perioperative instrument handling.
2. Demonstrate proper transport of instrumentation.

Content:

- I. Instrumentation concepts
 - A. Composition
 1. Stainless steel
 2. Titanium
 - B. Finishes
 1. Black ebonized
 2. Diamond dusted (jaws or tips)
 3. Gold plated
 4. Polished
 5. Satin matte
 - C. Inserts
 1. Diamond
 - a) Blade
 2. Tungsten carbide
 - D. Grades
 1. Disposable
 2. Floor grade
 3. Surgical
 - E. Categories
 1. Classifications
 - a) Accessory
 - b) Aspirating and suctioning
 - c) Clamping and occluding
 - d) Cutting and dissecting
 - e) Dilating
 - f) Grasping and holding
 - g) Probing
 - h) Retracting
 - 1) Hand-held

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Role and Duties of the Surgical Technologist During Robotic Procedures*
2. *Establishing the Sterile Field*
3. *Breaking Down the Sterile Field*

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- 2) Self-retaining
 - (a) Ratcheted
 - (b) Bed attachments
 - i) Suturing
 - j) Viewing
 - 2. Parts of handheld surgical instruments
 - a) Box lock
 - b) Handles
 - 1) Finger rings
 - 2) Pistol grip
 - 3) Spring
 - c) Jaw
 - d) Ratchet
 - e) Shank
 - f) Tip
 - 3. Powered
 - a) Burs
 - b) Dermatomes
 - c) Drills
 - d) Reamers
 - e) Saws
 - 4. Endoscopic
 - a) Parts and accessories
 - 1) Camera
 - 2) Eyepiece
 - 3) Lens
 - 4) Light cord
 - 5) Light post
 - 6) Telescope
 - b) Uses
 - 1) Diagnostic
 - 2) Operative
 - c) Flexible
 - d) Rigid
 - 5. Robotic¹
 - a) Single port
 - b) Multi-port

Refer to the manufacturers IFU for information on product multi-use and shelf-life specifications.

- II. Specialty instrumentation
 - A. Cardiothoracic
 - B. General
 - C. Genitourinary
 - D. Neurosurgical
 - E. Obstetrics and gynecology
 - F. Ophthalmology
 - G. Oral and maxillofacial

- H. Orthopedic
 - I. Otorhinolaryngology
 - J. Peripheral vascular
 - K. Plastics and reconstructive
- III. Perioperative handling
- A. Preoperative²
 - 1. Inspection (See *Establishing the Sterile Field*)
 - a) Cleanliness
 - b) Damage
 - c) Functionality
 - B. Intraoperative^{2,3} (See *Maintaining the Sterile Field*)
 - 1. Procedural concepts
 - a) Clamp, clamp, cut, tie (CCCT)
 - b) Hand signals
 - c) Maintenance
 - d) Organization
 - e) Passing
 - 2. Point-of-use (POU) preparation
 - a) Disassembly
 - b) Fragile items
 - 1) Cameras
 - 2) Endoscopes
 - 3) Micro-instruments
 - c) Loaner and vendor trays
 - d) Pre-cleaning
 - e) Repairs and replacements
 - f) Sharps
 - 1) Isolation
 - 2) Disposal
 - C. Postoperative³ (See *Breaking Down the Sterile Field*)
 - 1. Transport
 - a) Closed cart
 - b) Open cart

SURGICAL SUPPLIES

Objectives: The learner will:

Didactic:

1. Identify surgical supplies.
2. Explain the usage of surgical supplies.
3. Explain the principles of handling the various types of surgical supplies.
4. Evaluate the selection of surgical supplies.

Skill Applications:

1. Demonstrate the role of the surgical technologist in the application of surgical supplies.

Content:

- I. Basic supplies
 - A. Blades¹
 1. Types
 2. Characteristics
 - a) Shape
 - b) Size
 - c) Safety
 - B. Drains
 1. Types
 2. Characteristics
 - a) Flat
 - b) Open or closed
 - c) Reservoir
 - d) Tube
 3. Materials
 - a) Latex
 - b) PVC
 - c) Rubber
 - d) Silastic
 - e) Silicone
 4. Mechanism of action
 - a) Active
 - 1) Suction
 - (a) Hemovac[®]
 - (b) Jackson-Pratt
 - 2) Negative pressure
 - (a) Vacuum-assisted closure (VAC)
 - b) Passive
 - 1) Capillary action or gravity
 - (a) Penrose
 - (b) Sump

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Sharps Safety and Use of the Neutral Zone*
2. *Surgical Drapes*
3. *Electrosurgery Unit (ESU)*
4. *Establishing the Sterile Field*
5. *Safe Medication Practices in the Perioperative Area*
6. *Safe Use of Pneumatic Tourniquets*
7. *Natural Rubber Latex Allergic Patient*
8. *Breaking Down the Sterile Field*

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- c) Chest drainage system (CDS)
 - 1) Water-sealed or suction
 - (a) Pleur-evac

C. Draping materials²

1. Types

- a) Adhesive barrier
 - 1) Steri-drape™
- b) Equipment
 - 1) Camera
 - 2) Imaging
 - 3) Microscope
 - 4) Probe
 - 5) Robotic
- c) Fenestrated
 - 1) Cystoscopy
 - 2) Extremity
 - 3) Eye
 - 4) Head
 - 5) Laparotomy
 - 6) Lithotomy
 - 7) Transverse
 - 8) Thyroid
- d) Fluid-collection pouch
- e) Incise
 - 1) Impregnated
 - 2) Plain
- f) Non-fenestrated
 - 1) Full
 - 2) Half
 - 3) Three-quarter
- g) Stockinette
 - 1) Impervious
 - 2) Pervious
 - 3) Coban
- h) Split
- i) Towels
- j) Utility
- k) U-drape
- l) Universal

2. Characteristics

- a) Adhesive
- b) Clear
- c) Fenestrated
- d) Impervious
- e) Impregnated
- f) Non-impervious

- D.** Dressings (See *Application of Dressings*)
- E.** Electrosurgical³
 - 1.** Types
 - a)** Accessories
 - 1)** Holster
 - 2)** Scratch pad
 - b)** Electrodes
 - 1)** Active
 - (a)** Forceps
 - (b)** Pencil
 - 2)** Patient return pad (grounding)
 - 3)** Tips
 - (a)** Ball
 - (b)** Blade
 - (c)** Coated
 - (d)** Extended
 - (e)** Insulated
 - (f)** Loops
 - (g)** Needle
 - c)** Handpieces
 - 1)** Argon beam coagulator
 - 2)** Radiofrequency (RF) ablation
 - 3)** Vessel sealing
 - 4)** Harmonic scalpel
 - 2.** Characteristics
 - a)** Irrigating and non-irrigating
 - b)** Suction coagulation
 - 3.** Mechanisms of action
 - a)** Bipolar
 - b)** Cryotherapy
 - c)** Diathermy
 - d)** Monopolar
 - e)** Radiofrequency (RF)
 - f)** Thermal
 - g)** Ultrasonic wave
- F.** Injection needles⁵
 - 1.** Types
 - a)** Angiocatheter
 - b)** Hypodermic
 - c)** Filter
 - d)** Spinal
 - 2.** Characteristics
 - a)** Gauge
 - b)** Length
- G.** Ligating clips
 - 1.** Types

2. Characteristics
 - a) Aperture
 - b) Closure
 - c) Length
 3. Materials
 - a) Stainless steel
 - b) Titanium
- H. Sponges**
1. Types
 - a) Cottonoids
 - b) Cellulose sponges
 - 1) Weck-Cel[®]
 - c) Dental
 - d) Dissectors
 - 1) Cherries
 - 2) Kittners
 - 3) Peanuts
 - e) Laparotomy
 - f) Raytec
 - g) Tonsil
- I. Staplers**
1. Types
 - a) Endoscopic
 - b) Open
 - c) Powered
 - d) Robotic
 - e) Skin and subcuticular
 2. Characteristics
 - a) Circular
 - b) Linear
 3. Materials (staple)
 - a) Stainless steel
 - b) Titanium
- J. Sterile containers⁴**
1. Types
 - a) Basins
 - b) Cups
 - 1) Medicine
 - 2) Specimen
 - c) Pitchers
 - d) Trays
 - e) Petri dish
 2. Characteristics
 - a) Shape
 - b) Graduated measurements

- K.** Sterile field management⁴
 - 1.** Types
 - a)** Light covers
 - b)** Magnetic mat
 - c)** Marking pen, ruler, and labels
 - d)** Neutral zone items
 - e)** Suture bag

- L.** Suction
 - 1.** Types
 - a)** Tips
 - b)** Tubing
 - 1)** Basic
 - 2)** Cell salvager
 - 3)** Large bore
 - 4)** Smoke evacuation

- M.** Syringes⁵
 - 1.** Types
 - a)** Asepto
 - b)** Bulb
 - c)** Control
 - d)** Insulin
 - e)** Leur-lock
 - f)** Slip-tip
 - g)** Toomey
 - h)** Tuberculin (TB)
 - i)** Tubex (carpuject)
 - 2.** Characteristics
 - a)** Graduated measurements
 - b)** Locking vs. nonlocking tip
 - c)** Plunger vs. finger control
 - d)** Size
 - 3.** Materials
 - a)** Glass
 - b)** Plastic

- N.** Tissue repair and replacement
 - 1.** Types
 - a)** Adhesives and glues
 - 1)** Dermabond[®]
 - b)** Grafts
 - c)** Mesh
 - 2.** Characteristics
 - a)** Biological
 - 1)** Allograft
 - 2)** Autograft
 - 3)** Xenograft
 - b)** Synthetic

- O. Additional supplies
 - 1. Pain pumps
 - 2. Non-latex items⁷ (patient allergy)
 - 3. Emergency items
- II. Specialty supplies
 - A. Anesthesia (See *Pharmacology and Anesthesia*)
 - B. Cardiothoracic and peripheral vascular
 - 1. Aortic punch
 - 2. Balloon pump
 - 3. Blower (mister)
 - 4. Bull dogs
 - 5. Catheters
 - 6. Defibrillator paddles
 - 7. Doppler probe
 - 8. Extracorporeal bypass
 - 9. Interventional radiology
 - a) Access sheath
 - b) Guidewires
 - c) Stents
 - d) Tunneler
 - e) Vascular port devices
 - 10. Off-bypass system
 - 11. Pacemaker
 - 12. Pledgets
 - 13. Rummel tourniquet
 - 14. Shunts
 - 15. Suture boots
 - 16. Thoracentesis kit
 - 17. Umbilical tape
 - 18. Valvulotome
 - 19. Valve prosthesis
 - 20. Vascular clamp inserts
 - 21. Vein harvesting system
 - 22. Vein stripper
 - 23. Vessel loops
 - C. General
 - 1. Bolsters
 - 2. Bowel bag
 - 3. Cholangiogram catheter
 - 4. Core biopsy needle
 - 5. Esophageal dilators
 - 6. Gastroplasty band
 - 7. Intestinal clamp shods
 - 8. Ostomy care
 - a) Butterfly anchors
 - b) Rod

- c) Stoma pouch
 - 9. Viscera retainer (FISH®)
 - 10. Wound protector
 - D. Obstetrics and gynecologic
 - 1. Cord blood tubes
 - 2. Falope-ring® system
 - 3. Filshie® clips
 - 4. Intrauterine thermal balloon kit
 - 5. MyoSure® handpiece
 - 6. NovaSure® handpiece
 - 7. Transvaginal sling, tape, and mesh
 - 8. Umbilical clamp
 - E. Laparoscopic and robotic
 - 1. Antifog
 - 2. Endo Stitch™
 - 3. Endoloop®
 - 4. Hand-assisted port
 - 5. Insufflation tubing
 - 6. Irrigation and aspiration device
 - 7. Port closure device
 - 8. Scope warmer
 - 9. Specimen retrieval pouch
 - 10. Stopcock
 - 11. Trocars
 - 12. Veress needle
 - F. Neurologic
 - 1. Aneurysm clips
 - 2. Burs
 - 3. Cavitronic ultrasonic surgical aspirator (CUSA®) sleeve
 - 4. Hydrocephalus shunts
 - 5. Intracranial pressure kit
 - 6. Kyphoplasty device
 - 7. Perforator
 - 8. Radiation wafers
 - 9. Raney clips and applier
 - 10. Skull pins
 - 11. Stereotactic fiducials
 - G. Ophthalmic
 - 1. Conformer
 - 2. Corneal shield
 - 3. Eye pad
 - 4. Eye-port
 - 5. Eye shield
 - 6. Intraocular lens
 - 7. Microblade
 - 8. Phacoemulsification kit

- 9. Scleral buckle
- 10. Silastic tube/lacrimal intubation kit
- 11. Sphere
- 12. Vitrectomy kit
- H.** Oral and maxillofacial
 - 1. Arch bars
 - 2. Stainless steel wires
 - 3. Silastic sheeting
- I.** Orthopedic
 - 1. Arthrocentesis kit
 - 2. Arthroscopic
 - a) Anchor tacker
 - b) Burr's
 - c) Fluid management tubing
 - d) Shaver's
 - e) Tissue ablation devices
 - 3. Bone graft materials
 - 4. Buttons
 - 5. Cement mixing kit
 - a) Polymethylmethacrylate (PMMA)
 - 6. Esmarch
 - 7. Pins and wires
 - 8. Pneumatic tourniquet cuff⁶
 - 9. Pulse lavage irrigator
 - 10. Saw blades
- J.** Otorhinolaryngologic
 - 1. Ear
 - a) Burs
 - b) Cochlear implant
 - c) Myringotomy blade
 - d) Ossicle prosthesis
 - e) Pressure equalizing tubes
 - 2. Nose
 - a) Balloon sinuplasty kit
 - b) Navigation kit
 - c) Splints
 - 3. Pharynx and larynx
 - a) Coblator™ handpiece
 - b) Esophageal dilator
 - c) Nerve stimulator
 - d) Sputum collection container
 - e) Tonsil snare
 - f) Tracheotomy tube
- K.** Plastics and reconstructive
 - 1. Dermatome blade
 - 2. Liposuction cannula and tubing

3. Mesh graft carrier
 4. Prosthetic implants
 5. Tissue expanders
- L. Urologic**
1. Catheters
 - a) Suprapubic
 - 1) Malecot
 - 2) Pezzer
 - b) Ureteral
 - 1) Acorn
 - 2) Olive
 - 3) Round
 - 4) Spiral
 - 5) Whistle
 - c) Urethral
 - 1) Coude
 - 2) Foley
 - (a) 2-way
 - (b) 3-way
 - 3) Red Robinson
 - 4) Rubin (straight)
 - 5) Silicone
 - 6) Whistle
 2. Dilating balloon
 - a) Pressure syringe
 3. Ellick evacuator
 4. Guidewires
 5. Introducer sheath
 6. Laser fibers
 7. Penile prosthesis kit
 8. Stents
 9. Stone retrieval basket
 10. Urethral dilators, filiforms, and followers
 11. Urinary incontinence devices
 12. Y-irrigation tubing

III. Perioperative handling

- A. Selection
 1. Advantages vs. disadvantages
 2. Disposable
 3. Multiple use
- B. Application
 1. Inspection⁴ (See *Establishing the Sterile Field*)
 2. Operation⁴ (See *Maintenance of the Sterile Field*)
 - a) Preparation for use
 - b) Loading, reloading, unloading
 - c) Tracking usage

ASEPSIS AND STERILE TECHNIQUE

Objectives: The learner will:

Didactic:

1. Describe the terms related to asepsis and sterile technique.
2. Apply concepts related to asepsis.
3. Evaluate sources of contamination.
4. Discuss principles and practices of sterile technique.

Skill Applications:

1. Demonstrate proper sterile technique in a surgical environment.

Content:

- I. Terminology
 - A. Airborne contamination
 - B. Antiseptic
 - C. Asepsis
 - D. Bactericidal
 - E. Bacteriostatic
 - F. Bioburden
 - G. Contamination
 - H. Cross-contamination
 - I. Decontamination
 - J. Disinfectant
 - K. Droplet
 - L. Event-related sterility
 - M. Fomite
 - N. Fungicide
 - O. Hospital-acquired infections (HAI)
 1. Nosocomial
 - P. Infection
 - Q. Mode of transmission
 - R. Pathogen
 - S. Resident flora
 - T. Sepsis
 - U. Spore
 - V. Sporicidal
 - W. Sterile
 - X. Sterile field
 - Y. Sterile technique
 - Z. Sterilization
 - AA. Strike-through contamination
 - BB. Surgical conscience
 - CC. Surgical site infection (SSI)
 - DD. Surgically clean

¹Refer to the *AST Guidelines for Best Practices regarding Aseptic Technique*

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- EE. Terminal disinfection
- FF. Transient flora
- GG. Vector
- HH. Virucide
- II. Concepts
 - A. Airborne
 - B. Contamination
 - C. Cross-contamination
 - D. Mode of transmission
 - E. Sterile technique
 - F. Strike through contamination
 - G. Sterile field
 - H. Surgically clean
 - I. Surgical conscience
 - J. Wicking
- III. Sources of contamination
 - A. Endogenous
 - 1. Patient
 - B. Exogenous
 - 1. Personnel
 - 2. Environment
- IV. Principles of asepsis¹
 - A. A sterile field is created for each surgical procedure
 - 1. Only sterile items are used within the sterile field.
 - 2. Sterile draped tables are sterile only at tabletop level.
 - 3. Edges of anything that encloses sterile contents are considered nonsterile.
 - 4. Sterile packages and fields are opened or created as close as possible to the time of actual use.
 - 5. Open sterile supplies and sterile field are continuously monitored.
 - 6. Damage to the integrity of microbial barrier results in contamination.
 - 7. Bottles or containers of sterile solutions or medications must not be recapped or re-poured once opened.
 - 8. Sterile and nonsterile team members must verify sterile items' processing and package integrity before placing them in the sterile field.
 - B. Sterile team members must be appropriately attired before entering the sterile field.
 - 1. Self-gowning and gloving are performed on a separate surface other than an open back table.
 - 2. Closed gloving is used by persons transitioning into the sterile role when unassisted. Open gloving is used by nonsterile persons to perform sterile tasks, for example, urinary catheterization.

3. Surgical gowns are considered sterile only in the front from mid-chest to the table level (waist) and sleeves from proximal cuff to 2" above the elbow.
 4. Sterile persons touch only sterile items or areas; nonsterile persons touch only nonsterile items or areas.
 5. The bias stockinette cuff of the surgical gown is considered contaminated once the hand has passed through it. The cuff must always remain inside of the sterile glove.
- C. Movement in and around the sterile field must not compromise the field.
1. Nonsterile persons may not touch, reach across, lean over, or pass over a sterile field.
 2. Sterile persons may not touch, reach across, lean over, or pass over a nonsterile item or area.
 3. Nonsterile individuals must maintain a minimum of 12" distance from sterile individuals, items, or areas.
 4. Sterile items, such as the back table and Mayo stand, must be positioned a minimum of 12" from nonsterile areas.
 5. Sterile team members pass one another either face to face or back-to-back.
 6. Movement and talking within the sterile field should be kept to a minimum.
 7. Sterile persons should sit only when an entire procedure is done in the sitting position.
 8. When a sterile person comes within 12" of a nonsterile person or area for the purpose of applying a sterile gown or drapes, the sterile person must protect their sterile gloves by cuffing the gown or drape before approaching the nonsterile person or area.
- D. Microorganisms must be kept to an irreducible minimum.
1. When in doubt about sterility, discard the potentially contaminated item.
- V. Options for addressing a breach in asepsis
- A. Remove
 - B. Isolate and cover with an impervious barrier
 - C. Acknowledge and report

STERILE PROCESSING

Objectives: The learner will:

Didactic:

1. Define terms related to sterile processing.
2. Describe the processes of decontamination.
3. Describe the manual methods used for cleaning surgical instrumentation and equipment.
4. Describe the mechanical methods used for cleaning.
5. Describe the concepts of disinfection.
6. Discuss the principles related to preparing items for sterilization.
7. Analyze the requirements for sterilizing items.
8. Discuss the principles of sterile storage.
9. Discuss the principles of distributing sterile supplies.

Skill Applications:

1. Demonstrate point-of-use cleaning methods.
2. Demonstrate the use of various types of sterilization machines.
3. Demonstrate proper technique in storing, handling, and distributing sterile supplies.

Content:

- I. Terminology
 - A. Bioburden
 - B. Biofilm
 - C. Decontamination
 1. Cavitation
 2. Chelation
 - D. Disinfection
 1. Disinfectant
 2. Thermal
 - E. Sterilization
 1. Event-related
- II. Decontamination
 - A. Purpose
 1. Reduce bioburden
 2. Reduce risk of transmission of pathogens
 - B. Safety precautions
 1. Personal protective equipment
 - C. Point of use preparation
 1. Handling concepts
 - a) Cords
 - b) Delicate instruments
 - c) Disassembly
 - d) Isolation and disposal of sharps

Reference the ANSI/AAMI ST79:2017 standard for inclusive information regarding steam sterilization in a healthcare facility.

Reference the ANSI/AAMI ST58:2013 standard for inclusive information regarding chemical sterilization and high-level disinfection in a healthcare facility.

www.ansi.org

- 3. Specialty instrumentation
 - a) Endoscopes
 - 1) Flexible
 - (a) Camera
 - 2) Rigid
 - (a) Camera
 - (b) Light cord
 - b) Laparoscopic
 - c) Micro-instruments
 - 1) Ophthalmic
 - 2) Plastics and reconstruction
 - 3) Vascular
 - d) Robotic
 - e) Quality assurance monitoring
 - F. Suspicion of prion contamination*
- IV. Disinfection
- A. Terminology
 - 1. Bactericidal
 - 2. Fungicidal
 - 3. Sporicidal
 - 4. Tuberculocidal
 - 5. Virucidal
 - B. Selection Factors
 - 1. Levels of disinfection
 - a) High
 - b) Intermediate
 - c) Low
 - 2. Spaulding classification
 - a) Critical
 - b) Semi-critical
 - c) Non-critical
 - C. Factors that affect efficiency
 - 1. Amount of bioburden
 - 2. Device composition
 - 3. Disinfectant concentration
 - 4. Duration of exposure
 - 5. Moisture
 - 6. Physical factors
 - a) Temperature
 - b) Humidity
 - c) pH
 - 7. Resistance of microbes
 - D. Types of disinfectant agents
 - 1. Alcohol
 - a) Action
 - b) Advantages

*Reference CDC and WHO for infection control guidelines for transmissible spongiform encephalopathies in healthcare settings.

www.cdc.gov

www.who.int

- c) Disadvantages
 - d) Uses
 - 2. Glutaraldehyde
 - a) Action
 - b) Advantages
 - c) Disadvantages
 - d) Uses
 - 3. Orthophthalaldehyde (OPA)
 - a) Action
 - b) Advantages
 - c) Disadvantages
 - d) Uses
 - E. Safety precautions
- V. Preparation
 - A. Process
 - 1. Inspection
 - 2. Assembly and disassembly
 - a) Special considerations
 - 1) Basin sets
 - 2) Powered instruments
 - 3. Organization
 - a) Count sheet
 - b) Internal chemical indicator
 - c) Item placement (in tray)
 - 4. Labeling
 - a) Contents
 - b) Cycle number
 - c) Date of sterilization
 - d) Employee initials
 - e) Lot control number
 - f) Receiving department
 - g) Sterilizer identification
 - 5. Loading and unloading
 - a) Sterilization cart
 - B. Packaging concepts
 - 1. Advantages vs. disadvantages
 - 2. Considerations
 - a) Item protection
 - 1) Corners
 - 2) Instrument tips
 - b) Weight of instrument trays
 - 3. Materials
 - a) Dust covers
 - b) Pouches
 - 1) Concepts of use
 - 2) Types

- (a) Paper and plastic combination
 - (b) Tyvek® and paper combination
 - 3) Sealing methods
 - (a) Heat
 - (b) Adhesive
 - c) Sterilization trays and cases
 - 1) Concepts of use
 - 2) Types
 - d) Wrapped
 - 1) Concepts of use
 - 2) Types
 - (a) Disposable nonwoven
 - (b) Reusable woven
 - 3) Methods of application
 - (a) Sequential
 - (b) Simultaneous
 - 4) Techniques – folding
 - (a) Envelope
 - (b) Square
 - 5) Sealing methods
 - (a) Chemical tape (external monitor)
- 4. Performance characteristics
 - a) Ease of opening
 - b) Efficiency
 - c) Safety
 - d) Seal integrity
 - e) Sterility maintenance
 - f) Sterilizing agent penetration
 - g) Strength
 - h) Support impermeability

VI. Sterilization

A. Concepts

- 1. Related to the items to be sterilized
 - a) Bioburden
 - b) Bowie Dick test
 - c) Human prion diseases
 - d) Lumened instruments
 - e) Package density
 - f) Sensitivity to heat
 - g) Submersible vs. non-submersible instruments

B. High temperature

- 1. Steam
 - a) Methods
 - 1) Dynamic air removal
 - 2) Gravity displacement
 - 3) Immediate use steam sterilization

- 4) Pre-vacuum
- b) Mechanism of action
 - 1) Contact
 - (a) Temperature
 - (b) Time
 - (c) Moisture
 - (d) Pressure
- c) Concepts
 - 1) Advantages vs. disadvantages
 - 2) Considerations
 - (a) Preparation
 - (b) Loading
 - (c) Unloading
 - 3) Cycles
 - (a) Conditioning
 - (b) Exposure
 - (c) Exhaust
 - (d) Drying
 - 4) Monitoring
 - (a) Administrative
 - (b) Biological
 - (1) Bowie dick
 - (2) *Geobacillus stearothermophilus*
 - (3) Placement
 - (4) Process challenge packs
 - (5) Incubation and results
 - (6) Implantables
 - (c) Chemical
 - (1) Six types of indicators
 - (d) Physical

C. Low Temperature

- 1. Ethylene oxide (EO)
 - a) Mechanism of action
 - 1) Concentration of gas
 - 2) Exposure time
 - 3) Humidity
 - 4) Temperature
 - b) Advantages vs. disadvantages
 - c) Monitoring
 - 1) Administrative
 - 2) Biological
 - (a) *Bacillus atrophaeus*
 - (b) Placement
 - (c) Process challenge packs
 - (d) Incubation and results
 - 3) Chemical indicators (CI)

- 4) Physical
2. Hydrogen Peroxide
 - a) Types
 - 1) Low-temperature gas plasma (95% H₂O₂)
 - 2) Vaporized hydrogen peroxide (59% H₂O₂)
 - b) Mechanism of action
 - 1) Time
 - 2) Temperature
 - 3) Sterilant concentration
 - c) Advantages vs. disadvantages
 - d) Considerations
 - 1) Preparation
 - 2) Packaging materials
 - 3) Handling
 - (a) Loading
 - (b) Unloading
 - e) Monitoring
 - 1) Biological
 - (a) *Geobacillus stearothermophilus*
 - 2) Chemical indicators (CI)
 - 3) Physical

D. Miscellaneous

1. Chlorine dioxide gas
 - a) Mechanism of action
 - b) Advantages and disadvantages
2. Dry heat
 - a) Mechanism of action
 - b) Advantages vs. disadvantages
3. Glutaraldehyde
 - a) Mechanism of action
 - b) Advantages vs. disadvantages
4. Ionizing Radiation
 - a) Mechanism of action
 - b) Advantages and disadvantages
5. Ozone (trioxygen)
 - a) Mechanism of action
 - b) Advantages vs. disadvantages
6. Vaporized peracetic acid
 - a) Mechanism of action
 - b) Advantages and disadvantages

VII. Storage and distribution

A. Sterile storage

1. Arrangement of sterile supplies
 - a) Shelving
 - (1) Open
 - (2) Closed

- b) Storage bins
 - c) Shipping containers
 - 2. Event-related sterility
 - a) Advantages
 - b) Disadvantages
 - 3. Manufacturer package symbols
 - 4. Storage concerns
 - a) Moisture
 - b) Dust and dirt
 - c) Package damage
 - 5. Inventory
 - a) Arrangement of sterile supplies
 - (1) Stock rotation
 - (2) Transport
 - (3) Out dates
 - (a) Manufacturer processed items
 - (4) Handling
 - (5) Inventory control

B. Distribution

- 1. Systems
 - a) Automated
 - b) Case cart
 - 1) Surgeon preference cards
 - c) Demand distribution and requisition
 - d) Just-in-time delivery
 - e) Par level replenishment
 - f) Specialty cart
- 2. Patient charging methods
- 3. Tracking

PERIOPERATIVE CASE MANAGEMENT
PREOPERATIVE

SURGICAL ATTIRE

Objectives: The learner will:

Didactic:

1. Identify select types of surgical attire.
2. Describe the purposes of surgical attire.
3. Identify the types of accessory attire.
4. Discuss restrictions involving surgical attire.

Skill Applications:

1. Demonstrate the principles involved in donning or doffing surgical attire.

Content:

- I. Surgical attire^{1,2,4} (See *Establishing the Sterile Field*)
 - A. Head covering
 - B. Mask
 - C. Scrub suit
 - D. Shoe covers
 - E. Shoes
 - F. Warm-up jacket
- II. Accessory attire
 - A. Identification badge
 - B. Cover apparel¹
 1. Lab coat
 2. Cover gown
 - C. Personal protective equipment (PPE)
 1. Eye protection^{3,4}
 - a) Face shield
 - b) Glasses with side protection
 - c) Goggles
 - d) Mask with shield
 2. Helmet or hood system
- III. Application^{1,4}
 - A. Selection
 - B. Donning
 - C. Doffing
- IV. Restrictions¹
 - A. Artificial nails or nail coverings
 - B. Facial hair (uncovered)
 - C. False eyelashes
 - D. Jewelry⁵
 1. Facial and oral piercings¹
 - E. Makeup

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Attire, Surgical Scrub, Hand Hygiene, and Handwashing*
2. *Laundrying of Scrub Attire*
3. *Use of Eye Protection During Surgical Procedures*
4. *Establishing the Sterile Field*
5. *Wearing of Jewelry*

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- F.** Non-surgical attire
- G.** Perfume
- H.** Poor hygiene
- I.** Tattoos
 - 1.** Offensive
 - 2.** Compromised skin integrity¹

ESTABLISHING THE STERILE FIELD

Objectives: The learner will:

Didactic:

1. Describe the principles associated with establishing the sterile field.
2. Explain the steps for preparing an operating room.
3. Describe the use of the surgeon's preference card.
4. Describe the concepts that are applied for opening sterile items.
5. Explain the sequence of opening sterile supplies.
6. Explain the steps for organizing the back table.
7. Explain the steps for organizing the Mayo stand.
8. Describe the final steps required to finish establishing the sterile field.
9. Analyze special circumstances that require adjusting the normal routine for establishing the sterile field.

Skill Applications:

1. Demonstrate opening sterile supplies.
2. Demonstrate the procedure to correct contaminations during the opening process.
3. Demonstrate the process of organizing the sterile field.
4. Demonstrate the principles of economy of motion.
5. Demonstrate the principles of spatial awareness when organizing the sterile field.
6. Demonstrate the finalization of the sterile field.
7. Demonstrate modifications to setting up the sterile field that must be taken when a special circumstance occurs.

Content:

- I. Concepts
 - A. Monitoring²
 1. Item inspection¹
 2. Surgical conscience
 3. Traffic¹
 - B. Patient considerations
 1. Allergies
 2. Comorbidities
 3. Height
 4. Physical limitations
 5. Weight
 - C. Principles*
 1. Asepsis (See *Asepsis and Sterile Technique*)
 2. Economy of motion¹

- D. Purpose
- E. Sequencing¹
- F. Timing¹
- II. Preparing the OR¹
 - A. Environment³
 - 1. Air exchange
 - 2. Damp dusting
 - 3. Doors closed
 - 4. Equipment
 - a) Positioning
 - b) Testing
 - 5. Furniture
 - a) Positioning
 - 6. Humidity
 - 7. Temperature
 - B. Personnel⁴
 - 1. Attire
 - 2. Medical handwash
 - 3. PPE
 - C. Surgeon's preference card¹
 - 1. Collect and verify
 - a) Equipment
 - b) Hold items
 - c) Instrumentation
 - d) Fluids
 - 1) Irrigation
 - 2) Medication(s)
 - 3) Solutions
 - (a) Skin prep
 - e) Patient positioning and aides
 - f) Supplies
 - 1) Dressings
 - 2) Gown and gloves
 - 3) Specialty
 - 4) Suture
- III. Opening sterile items¹
 - A. Considerations
 - 1. Location
 - a) Grouping
 - 1) Increase efficacy
 - 2) Minimize movements
 - 2. Item delivery
 - a) Container system(s)

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Establishing the Sterile Field in the OR*
2. *Monitoring Sterility*
3. *Humidity in the OR*
4. *Surgical Attire, Surgical Scrub, and Hand Hygiene*
5. *Safe Medication Practices in the perioperative Area*
6. *Sharps Safety and Use of the Neutral Zone*
7. *Surgical positioning*
8. *Patient Identification, Correct Surgery Site, and Correct Procedure*
9. *Transfer of Care During Intraoperative Case Management*
10. *Guideline for Counts*
11. *Bowel Technique*
12. *Gowning and Gloving*
13. *Surgical Drapes*
14. *Skin Prep of the Patient*
15. *Handling and Care of specimens*
16. *Use of Eye Protection During Surgical Procedures*

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- b) Envelope-folded
 - c) Fluids
 - d) Medication⁵
 - e) Peel packs
 - 3. Sequential¹
 - a) Back table pack
 - b) Basin set
 - c) Small, wrapped items
 - d) Peel packs
 - e) Container system(s)
 - B. Sterile technique (See *Asepsis and Sterile Technique*)
 - C. Verification¹
 - 1. Expiration date
 - 2. Filters (container system)
 - 3. Integrity
 - a) Dust cover
 - b) Locking mechanism
 - c) Packaging
 - d) Wrapper
 - 4. Sterility
 - a) Closed ratchets
 - b) Foreign particles
 - c) Internal indicators²
 - d) Strike-through or moisture
- IV. Organization of back table and mayo stand
 - A. Preparation¹
 - 1. Personnel
 - a) Surgical scrub⁴
 - b) Eye protection¹⁶
 - 2. Items for use
 - a) Assembly (as applicable)
 - 1) Instruments
 - 2) Supplies
 - b) Medication⁵
 - c) Ratchet position
 - d) Sharps
 - e) Sleeve or tip protection removal
 - f) Suture
 - B. General setup and placement¹
 - 1. Accessory items
 - a) Suture bag
 - 2. Container system(s)
 - a) Inspection
 - b) Basket removal
 - 3. Instrumentation
 - a) Frequent use

- b) Curved
 - c) Heavy
 - d) Powered
 - e) Stringer
 - 1) Roll towel
 - 4. Labeling^{1,5}
 - a) Basin
 - b) Medicine cup
 - c) Syringes
 - 5. Medication⁵
 - 6. Sharps⁶
 - 7. Supplies
 - 8. Surface reinforcement¹
 - a) Towels
 - 9. Suture
 - C. Considerations
 - 1. Order of use¹
 - a) Gowns and gloves
 - b) Drapes
 - c) Light handle covers
 - d) Cords and tubing
 - 2. Similar items (grouping)¹
 - a) Basins and cups
 - 1) Irrigation
 - 2) Medication
 - 3) Specimen
 - b) Drapes
 - c) Instrument set(s)
 - d) Sharps
 - e) Sponges
 - f) Suture
- V. Finalizing the sterile field
 - A. Prepping the patient¹⁴ (as applicable)
 - B. Gowning and gloving team members¹²
 - C. Draping the patient¹³
 - D. Transitioning of the primary sterile field¹
 - 1. Furniture handling
 - 2. Placement considerations
 - a) Back table
 - b) Basin stand
 - c) Cords and tubing
 - d) Non-penetrating securement
 - e) Light handle covers
 - f) Mayo stand
 - g) Neutral zone establishment⁶
 - h) Sponges

- 3.** Time-out⁸
- VI.** Special considerations
 - A.** Emergent situations
 - 1.** Cesarean section
 - 2.** Converting to open procedure
 - 3.** Trauma
 - B.** Priority of tasks
 - C.** Procedure classification or specialty
 - 1.** Multiple setups^{1,11}
 - D.** Reducing contamination¹
 - 1.** Corrective interventions
 - a)** Item that fell on floor
 - b)** Item extending below edge of the sterile field
 - c)** Item contacting a nonsterile surface
 - d)** Item integrity is compromised
 - e)** Foreign particles are present
 - 2.** Strategies

HAND HYGIENE AND SURGICAL SCRUB

Objectives: The learner will:

Didactic:

1. Describe the considerations that are important to maintaining hand and skin integrity.
2. Discuss the concepts for performing the medical hand wash.
3. Discuss the concepts of the surgical scrub as related to infection control.

Skill Applications:

1. Demonstrate the steps of a medical hand wash.
2. Demonstrate the steps for preparing to complete a surgical scrub.
3. Demonstrate the steps of performing a surgical scrub.

Content:

- I. Hand and skin integrity¹
 - A. Care and maintenance
 1. Cuticles
 2. Fingernails
 3. Skin
 - B. Considerations
 1. Allergic reactions
 2. Non-intact skin
 - a) Abrasions
 - b) Burns
 - c) Cuts
 - d) Infection
 - e) Lesions
 3. Overly dry skin
- II. Medical hand wash¹
 - A. Purpose
 - B. Function
 - C. Situational requirements
 1. After removal of gloves (surgical or exam)
 2. Between patient contact
 3. Prior to opening sterile supplies
 4. Return from break, consumption, or restroom use
 - D. Technique
 - E. Use of sanitizing agents
- III. Surgical scrub¹
 - A. Purpose
 - B. Function
 - C. Preparation
 1. Scrub brush and solution selection
 2. Jewelry removal

¹Refer to *AST Guidelines for Best Practices for Surgical Attire, Surgical Scrub, Hand Hygiene, and Handwashing.*

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3. Roll-up sleeves (if applicable)
 4. Don PPE
 5. Skin inspection
- D.** Methods
1. Counted brushstroke
 2. Timed
 3. Waterless and brushless
- E.** Critical elements
1. Hand and arm prewash
 2. Scrub solutions
 - a) Principles of asepsis
 - 1) 2" above elbow
 - 2) Elbows bent
 - 3) Clean technique
 - 4) Four planes
 - b) Healthcare facility policy
 - c) Manufacturer's recommendations

GOWNING AND GLOVING

Objectives: The learner will:

Didactic:

1. Describe the types of surgical gowns and gloves.
2. Describe the factors that affect the selection process.
3. Describe the methods of gowning.
4. Evaluate each method of gloving.

Skill Applications:

1. Apply the principles of asepsis to gowning and gloving self.
2. Apply the principles of asepsis to gowning and gloving other team members.

Content:

- I. Types
 - A. Gloves
 - B. Gowns
- II. Selection
 - A. Procedure type
 - B. Protection level
 - C. Surgeon preference
- III. Application¹
 - A. Gowning
 1. Assisted
 2. Self
 3. Principles of asepsis (See *Asepsis and Sterile Technique*)
 4. Removal (doffing)
 - B. Gloving
 1. Assisted
 2. Self
 - a) Closed
 - b) Open
 3. Double
 4. Principles of asepsis
 5. Removal (doffing)

¹Refer to the *AST Guidelines for Best Practices for Gowning and Gloving*

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SURGICAL COUNTS

Objectives: The learner will:

Didactic:

1. Describe the purpose of surgical counts.
2. Describe the types of documentation.
3. Identify the items that must be counted.
4. Describe the methods for counting.
5. Discuss the frequency and timing of surgical counts.
6. Explain the intraoperative sequence for completing surgical counts.
7. Identify when additional counts are necessary.

Skill Applications:

1. Demonstrate the procedure for counting sponges, sharps, instruments, and accessory items on the field.

Content:

- I. Concepts
 - A. Purpose
 1. Legalities (See *Legal Issues and Risk Management*)
 - B. Documentation (See *Documentation*)
 1. Standard
 2. Emergency
 3. Discrepancies
 - a) Preoperative
 - b) Intraoperative
- II. Considerations
 - A. Countable items and sequence^{1,2}
 1. Sponges
 2. Sharps
 3. Instrumentation
 4. Accessories
 - B. Techniques¹
 1. Concurrent counting
 - a) Two-person verification
 - b) Visual and audible
 2. Frequency and timing
 - a) Initial
 - b) Closure
 - 1) Organ
 - 2) Body cavity
 - 3) Subcutaneous and skin
 3. Intraoperative sequence
 - a) Field

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Counts*
2. *Establishing the Surgical Field*
3. *Transfer of Care During Intraoperative Case Management*

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- b)** Mayo stand
- c)** Back table
- d)** Off-the-field
- e)** Confirmation
- f)** Documentation

- C.** Additional counts
 - 1.** Addition of subsequent items
 - 2.** Incorrect count resolution
 - 3.** Transfer of care³ (staff change)

DRAPING

Objectives: The learner will:

Didactic:

1. Describe the characteristics of draping materials.
2. Describe the types of draping materials.
3. Explain the application of drapes to equipment and furniture.
4. Explain the selection of drapes concerning anatomical regions.
5. Describe the draping sequence as related to surgical procedures.

Skill Applications:

1. Demonstrate the principles of asepsis when draping the patient, furniture, and equipment.

Contents:

- I. Materials
 - A. Characteristics
 1. Anti-static
 2. Fire retardant
 3. Impervious
 4. Lint-free
 5. Permeable
 6. Puncture resistant
 7. Semi-permeable
 - B. Type
 1. Plastic
 2. Woven
 3. Non-woven
- II. Types (See *Supplies*)
 - A. Fenestrated
 - B. Incise
 - C. Non-fenestrated
 - D. Specialty
 - E. Towels
- III. Application^{1,2}
 - A. Equipment
 1. C-arm
 2. Microscope
 3. Robot
 - B. Furniture
 1. Back table
 2. Mayo stand
 3. Ring stand
 - C. Patient
 1. Anatomical region

*Refer to the following
AST Guidelines for specific
information regarding
content in this section:

1. *Establishing the Sterile Field*
2. *Surgical Drapes*

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- a) Abdominal
 - b) Extremity
 - c) Head
 - d) Hip
 - e) Perineal
 - f) Shoulder
2. Fire prevention strategies
3. Principles of asepsis¹ (See *Asepsis and Sterile Technique*)
- a) Handling and passing
 - 1) Cuffing
 - 2) Placement
 - 3) Fixation
 - b) Contamination
 - 1) Recognition
 - 2) Correction

PERIOPERATIVE DOCUMENTATION

Objectives: The learner will:

Didactic:

1. Summarize the purpose of documentation.
2. Describe the documents found in the surgical patient's chart.
3. Discuss the purpose of informed consent.
4. Describe the types of informed consent.

Skill Applications:

1. Demonstrate participation in the *Surgical Safety Checklist* process.

Content:

- I. Documentation
 - A. Purpose
- II. Chart review
 - A. Allergies
 - B. Diagnostic tests and interventions
 - C. History and physical
 - D. Signed consent(s)
 - E. Surgeon orders
 - F. Surgical Safety Checklist
- III. Patient consent
 - A. Purpose
 - B. Types
 1. General
 2. Informed
 - a) Contents
 - b) Requirements
 3. Specific
 - a) Anatomical sterilization
 - b) Anesthesia
 - c) Blood products
 - d) Investigative or research device
 - e) Specimen and limb disposal
 - f) Surgical
- IV. Surgical safety checklist (See *Patient ID and Time Out*)
 - A. Purpose
 - B. Process
 1. Identification¹
 2. Time-out

¹Refer to the *AST Guidelines for Best Practices for Patient Identification, Correct Surgical Site and Correct Procedure*

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PATIENT IDENTIFICATION AND TIME-OUT PROCEDURE

Objectives: The learner will:

Didactic:

1. State the purpose of patient identification.
2. Describe the patient identification procedure according to the patient situation.
3. Describe the purpose of the time-out procedure.
4. Identify the sequence for the time-out procedure.
5. Recall who will participate in the time-out procedure.
6. Identify the time-out components.

Skill Applications:

1. Participate in the identification process of a surgical patient.

Content:

- I. Patient identification¹
 - A. Purpose
 - B. Procedure
 1. Emergency
 2. Standard
 - C. Documentation
- II. Time-out^{1,2}
 - A. Purpose
 - B. Sequence
 - C. Participants
 - D. Verification components
 1. Patient identity
 2. Patient allergies
 3. Procedure being performed
 4. Operative site and side
 5. Correct position
 6. Availability of equipment and supplies
 - E. Facility policy*

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Patient Identification, Correct Surgery Site and Correct Surgical Procedure*
2. *Establishing the Sterile Field*

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*For related information, refer to the World Health Organization (WHO) Patient Safety Checklist.

<https://www.who.int/patientsafety/safesurgery/checklist/en/>

PHYSICAL PREPARATION OF THE PATIENT

Objectives: The learner will:

Didactic:

1. Describe the physical preparation that the surgical patient may receive before the surgical procedure.
2. Identify methods of patient transport.
3. Discuss the principles of transporting a patient.
4. Discuss the principles of transferring a patient.
5. Identify equipment utilized for transferring the surgical patient.
6. List the indications for urinary catheterization.
7. List the items to be taken under consideration when performing urinary catheterization.
8. List the supplies required to perform urinary catheterization.
9. Explain the steps for performing urinary catheterization.
10. Discuss the principles of monitoring urine output.
11. Explain the factors to be taken under consideration when the patient position is selected.
12. Identify the sections of the OR table.
13. Explain the functions of the OR table.
14. Describe the surgical positions.
15. Describe the various types of accessory devices.
16. Evaluate the uses of accessory devices.
17. Explain the factors to be taken under consideration to perform the patient skin prep.
18. Describe the various types of skin prep supplies.
19. Compare different skin prep solutions.
20. Explain the steps for completing a patient skin prep.

Skill Applications:

1. Demonstrate the principles of safe patient transport and transfer.
2. Demonstrate basic positioning of the surgical patient.
3. Demonstrate urinary catheterization.
4. Demonstrate skin preparation.

Contents:

- I. Preoperative preparation
 - A. Bowel prep
 - B. Communication barriers
 - C. Hair removal⁴

- D. Medications (See *Pharmacology and Anesthesia*)
- E. Monitoring devices (See *Pharmacology and Anesthesia*)
 - 1. Vital signs
- F. Nothing by mouth (NPO)
- G. Personal belongings
- H. Prosthetics
- I. Removal of jewelry and nail polish
- J. Voiding and catheter placement³
- II. Transport¹
 - A. Principles
 - 1. Ergonomics
 - a) Patient
 - 1) Head and feet first
 - b) Personnel position
 - 2. Communication (See *Communication Skills*)
 - a) Patient identification
 - 3. Patient dignity
 - 4. Patient safety
 - a) Self-protection (patient)
 - b) Side rails
 - c) Slow and maintain control
 - d) Wheels and locks
 - B. Considerations
 - 1. Accessory devices
 - 2. Fluid collection devices
 - C. Methods of transport
- III. Transfer¹
 - A. Principles
 - 1. Ergonomics
 - 2. Patient dignity
 - 3. Patient safety
 - a) OR table locked
 - b) Safety strap
 - c) Secure drains and tubes
 - d) Stretcher wheels locked
 - e) Wheelchair locked
 - B. Considerations
 - 1. Transfer devices
 - C. Methods of transfer
 - 1. Assisted
 - 2. Self

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Patient Transportation*
2. *Urinary Catheterization*
3. *Surgical Positioning*
4. *Skin Prep of the Surgical Patient*
5. *Safe Use of Pneumatic tourniquets*
6. *Maintenance of Normothermia in the Perioperative Patient*

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- IV. Urinary catheterization²
 - A. Indications
 1. Control bleeding
 2. Bladder decompression
 3. Divert urine from surgical wound
 4. Incontinence
 5. Monitoring output
 6. Prevent trauma
 7. Promote healing
 8. Provide visualization
 9. Specimen collection
 10. Urine retention
 - B. Considerations
 1. Catheter size
 2. Duration of catheterization
 3. Patient modesty
 4. Physician orders
 5. Positioning and lighting
 6. Sterile technique
 7. Patient safety
 - a) Allergy
 - b) Positioning injuries
 - c) Trauma to bladder or urethra
 - d) Urinary tract infection (UTI)
 - C. Supplies (See *Supplies*)
 1. Catheter set and tray
 2. Catheter type
 - a) Indwelling
 - b) Irrigating
 - c) Temporary
 3. Collection devices
 - D. Procedural steps
 1. Preparation of supplies
 2. Insertion
 3. Positioning
 4. Securing
 - E. Monitoring output
 1. Assessment
 2. Measurement
 3. Documentation
- V. Positioning³
 - A. Considerations
 1. Anesthesia method
 2. Procedure and incision site
 3. Patient considerations
 - a) Anatomical

- C.** Types (See *Supplies*)
 - 1.** Applicators
 - a)** Cotton tip swab
 - b)** Gauze
 - c)** Impregnated
 - 2.** Disposable prep kit
 - 3.** Solutions
 - a)** Chlorohexidine gluconate
 - b)** Hexachlorophene
 - c)** Iodine-based
 - d)** 70% isopropyl alcohol
 - e)** Parachlorometaxyleneol (PCMX)
 - 4.** Additional supplies
 - a)** Sterile gloves
 - b)** Towel(s)
- D.** Procedural steps⁴
 - 1.** Patient communication
 - a)** Explain procedure
 - b)** Confirm allergies
 - 2.** Hair removal
 - 3.** Incision to periphery

PERIOPERATIVE CASE MANAGEMENT
INTRAOPERATIVE

SURGICAL INCISIONS AND WOUND EXPOSURE

Objectives: The learner will:

Didactic:

1. Identify the anatomy as related to each type of incision.
2. Distinguish among the various types of incisions.
3. Identify surgical incision selection based upon proper planning.
4. Describe the principles of exposure.

Skill Applications:

1. Demonstrate techniques for tissue exposure.

Content:

I. Surgical incisions

A. Abdominal

1. Relative anatomy (See *Anatomy and Physiology*)
 - a) Regions
 - b) Tissue layers
2. Common incisions
 - a) Vertical
 - 1) Median (midline)
 - 2) Paramedian rectus
 - b) Oblique
 - 1) Chevron
 - 2) Lower oblique inguinal
 - 3) Lumbar
 - (a) Flank
 - (b) Gibson
 - 4) McBurney
 - 5) Subcostal
 - (a) Kocher (right subcostal)
 - 6) Thoracoabdominal
 - c) Transverse
 - 1) Midabdominal
 - 2) Pfannenstiel

B. Specialty

1. Relative anatomy (See *Anatomy and Physiology*)
 - a) Critical structures
 - b) Tissue layers

C. Incision planning

1. Blade choice
2. Langer's lines
3. Skin marking
4. Placement
5. Size

- II. Principles of exposure
 - A. Purpose
 - 1. Tissue protection
 - 2. Wound exposure
 - B. Application
 - C. Device types (See *Instrumentation and Supplies*)
 - 1. Disposable
 - 2. Instrumentation
 - 3. Moist sponges
 - 4. Penrose drain
 - 5. Suture
 - 6. Umbilical tape
 - 7. Vascular loops
 - D. Device selection
 - 1. Surgical procedure
 - 2. Tissue condition (See *Wound Management*)
 - a) Diseases affecting durability
 - 3. Surgeon preference
 - 4. Wound size and depth

MANAGEMENT OF THE STERILE FIELD

Objectives: The learner will:

Didactic:

1. Discuss the concepts that apply to the maintenance of the sterile field.
2. Explain the duties of the surgical technologist to maintain the sterile field.
3. Describe special considerations that require the surgical technologist to make adjustments to maintain the sterile field.

Skill Applications:

1. Demonstrate sharps safety.
2. Demonstrate fire safety precautions during the intraoperative surgical phase.
3. Demonstrate correctly passing instruments.
4. Demonstrate methods for monitoring the sterile field.
5. Demonstrate performing counts.
6. Demonstrate transfer of care.
7. Demonstrate managing medications.
8. Demonstrate techniques for handling various types of specimens.
9. Demonstrate handling of various types of sponges on the sterile field.
10. Demonstrate application of various types of dressings.

Content:

- I. Concepts
 - A. Critical thinking
 - B. Maintaining pace
 1. Anticipation
 1. Instruments
 2. Supplies
 3. Additional items
 2. Team expectations
 - C. Monitoring
 1. Principles of asepsis (See *Asepsis and Sterile Technique*)
 1. Breaks in asepsis⁷
 - 1) Recognizing
 - 2) Correcting
 2. Spatial perception
 - D. Teamwork (See *Teamwork and Communication*)
 1. Communication
 2. Reporting
 1. Counts¹
 2. Estimated blood loss
 3. Fluids

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Guidelines for Counts*
2. *Sharps Safety and Use of the Neutral Zone*
3. *Transfer of Care During Intraoperative Case Management*
4. *Safe Medication Practices in the Perioperative Area*
5. *Handling and Care of Specimen in the OR*
6. *Monitoring Sterility*
7. *Establishing the Sterile Field in the OR*
8. *Electrosurgery Unit (ESU)*
9. *Laser Safety*
10. *Bowel Technique*

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- 4. Implants (as applicable)
- 5. Medications⁴
- II. Managing the sterile field
 - A. Closing counts¹ (see *Surgical Counts*)
 - B. Dressings (see *Application of Dressings*)
 - C. Fire safety
 - 1. Endoscopes
 - 1. Cautery devices^{7,8}
 - 2. Lasers⁷
 - 3. Light cords
 - D. Implants
 - 1. Handling
 - 2. Tracking
 - E. Instrument handling
 - 1. Field visibility
 - a) Retractors
 - 1) Selection
 - 2) Placement
 - 2. Suction
 - 1) Selection
 - 2) Techniques
 - 3) Tubing placement
 - 2. Passing
 - a) Hand signals
 - b) Instrument function
 - c) Paired instruments
 - d) Position in relation to the surgeon
 - e) Ring-handled
 - f) Sharps²
 - 1) Scalpel
 - 2) Suture needle
 - 3) Hypodermic needle
 - 3. Point of use
 - a) Care
 - 4. Powered equipment
 - 5. Sharps²
 - a) Exposure prevention
 - 1) Counting
 - 2) Hands-free techniques
 - (a) Exceptions
 - 3) Storage
 - b) Scalpel
 - 1) Loading and unloading blades
 - 2) Location and tracking on field
 - 3) Safety principles

- c) Staplers
 - 1) Loading and reloading
 - 2) Tracking usage
 - d) Suture needles
 - 1) Loading and unloading
 - 2) Location and tracking on field
 - 3) Safety principles
 - e) Hypodermic needle
 - F. Medications and fluid handling⁴ (see *Pharmacology and Anesthesia*)
 - 1. Drawing
 - 2. Delivering
 - 3. Tracking usage
 - G. Specimens⁵ (see *Specimen Care*)
 - H. Sponges
 - 1. Location and tracking
 - 2. Monitoring blood loss
 - 3. Replacement
 - 4. Size and type
 - 5. Spinging techniques
 - I. Wound closure (see *Wound Management*)
- III. Special considerations
 - A. Procedural techniques
 - 1. Bowel¹⁰
 - 2. Cancer
 - 3. Isolation
 - B. Transfer of care³ (intraoperative)
 - 1. Communication
 - 2. Counting
 - 3. Timing

HEMOSTASIS

Objectives: The learner will:

Didactic:

1. Analyze the principles of surgical hemostasis.
2. Differentiate between various methods of hemostasis.

Skill Applications:

1. Demonstrate the surgical technologist's role in hemostasis.

Content:

- I. Concepts
 - A. Blood components (See *Anatomy and Physiology*)
 - B. Clotting mechanisms
 - C. Monitoring blood loss
- II. Methods
 - A. Chemical (See *Pharmacology*)
 - B. Hemostatic adjuncts
 1. Ablation
 2. Hypothermia
 - a) External
 - b) Internal
 - C. Mechanical
 1. Bone wax
 2. Hemoclips
 3. Instruments
 4. Ligatures
 5. Pledgets
 6. Pressure
 7. Sponges
 8. Tourniquet¹
 - D. Thermal
 1. Argon beam coagulator
 2. Electrosurgical unit (ESU)²
 - a) Accessories
 - b) Devices
 - 1) Bipolar
 - 2) Monopolar
 3. Laser (See *MIS Applications*)
 4. Tissue-sealing device
 5. Ultrasonic scalpel
- III. Usage and handling (See *Management of the Sterile Field*)
 - A. Preparation³
 - B. Anticipation
 - C. Application

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Safe Use of Pneumatic Tourniquets*
2. *Electrosurgery Unit (ESU)*
3. *Establishing the Sterile Field*

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WOUND MANAGEMENT

Objectives: The learner will:

Didactic:

1. Define terminology related to sutures.
2. Discuss the requirements of suture packaging.
3. List the desired characteristics of suture materials.
4. Describe the factors that must be considered when choosing suture material.
5. Explain the characteristics used to classify suture material.
6. Analyze the characteristics of each type of suture material.
7. Describe the characteristics of suture needles.
8. Identify the factors that must be considered when choosing a suture needle.
9. Describe the parts of a suture needle.
10. Explain the principles of handling suture needles.
11. Describe the various types of suture techniques.
12. Define the types of wound closure.
13. Identify the factors that must be considered when selecting the type of needle holder.
14. Describe the techniques for cutting suture material.
15. Summarize the skin closure techniques.
16. Describe the various types of wound closure accessories.
17. Define the terminology related to wound healing.
18. Describe the various types of wounds.
19. Analyze the mechanisms of wound healing.
20. Evaluate the classification of surgical wounds.
21. Analyze the factors that influence wound healing.
22. Describe the complications that interrupt normal wound healing.

Skill Applications:

1. Demonstrate proper suture selection, preparation, handling, and cutting techniques.
2. Demonstrate proper placement, handling, loading, and disposal of surgical needles.
3. Demonstrate the application of the principles of asepsis to basic wound care techniques.

Content:

I.

Suture

A.

Terminology

1. Absorbable
2. Approximation
3. Bioactivity
4. Braided
5. Capillarity
6. Coefficient of friction
7. Coated/uncoated
8. Elasticity
9. Encapsulation
10. Endoscopic suture
11. Enzymatic action
12. Gauge
13. Hydrolysis
14. Inert
15. Knot security
16. Ligate
17. Memory
18. Monofilament
19. Multifilament
20. Natural
21. Nonabsorbable
22. Pigment
 - a) Dyed
 - b) Undyed
23. Pliability
24. Size
25. Spinning
26. Suture(s)
27. Swaged
28. Synthetic
29. Tensile strength
30. Tissue drag
31. Twisted

B.

Packaging

1. Types
 - a) Box
 - b) Color coding
 - c) Overwrap
 - d) Primary packet
2. Characteristics
 - a) Ease of transfer to the sterile field
 - b) Protection
 - c) Sterility assurance

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Sharps Safety and Use of the Neutral Zone*
2. *Surgical Counts*
3. *Establishing the Sterile Field*
4. *Breaking Down the Sterile Field*
5. *Bowel technique*

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3. Label information
 - a) Barbed
 - b) Knotless
 - c) Looped
 - d) Material
 - e) Needle type and size
 - f) Reel
 - g) Strand length
 - h) Suture size
 - i) Suture style
 - 1) Pre-cut strands
 - (a) Lengths
 - (b) Free tie
 - (c) Uses
 - 2) Single strand
 - (a) Single armed
 - (b) Double armed
 - 3) Multi-strand
 - (a) Single armed
 - (b) Double armed
 - (c) Control release
 - j) Product number
 - k) Lot number
 - l) Expiration date
- C. Characteristics of suture material
 1. Appropriate diameter
 2. Easy to handle
 3. Knot security
 4. Minimal tissue reaction
 5. Sterile packaging
 6. Uniform size
 7. Uniform tensile strength
- D. Selection of suture material
 1. Suture type
 2. Tissue type
 3. Surgical specialty area
 4. Incision type (See *Surgical Incisions and Exposure*)
 5. Wound status
 - a) Absence or presence of infection
 - b) Traumatic injury
 - c) Drainage from wound
 6. Patient factors that influence healing (See *Pathophysiology*)
 7. Surgeon preference³
- E. Suture classifications
 1. Origin
 - a) Natural

- b) Synthetic
 - 2. Strand composition
 - a) Monofilament
 - b) Multifilament
 - c) Braided vs. twisted
 - d) Coated vs. uncoated
 - e) Dyed vs. undyed
 - 3. Degradation properties
 - a) Absorbable
 - 1) Enzymatic (natural)
 - 2) Hydrolysis (synthetic)
 - 3) Uses
 - 4) Contraindications
 - b) Non-absorbable
 - 1) Encapsulation
 - 2) Uses
- F. Suture materials
 - 1. Natural absorbable suture
 - a) Materials
 - b) Absorption
 - 1) Rate vs. tissue healing timeframe
 - 2) Process
 - c) Applications
 - d) Contraindications
 - e) Handling characteristics
 - 2. Synthetic absorbable suture
 - a) Materials
 - b) Absorption
 - 1) Rate
 - 2) Process
 - c) Applications
 - d) Handling characteristics
 - 3. Natural non-absorbable suture
 - a) Materials
 - b) Applications
 - c) Handling characteristics
 - d) Advantages
 - e) Disadvantages
 - 4. Synthetic non-absorbable suture
 - a) Materials
 - b) Applications
 - c) Handling characteristics
 - d) Advantages
 - e) Disadvantages
- G. Suture needles
 - 1. Characteristics

- a) Size
- b) Shape
- c) Diameter
- 2. Selection
 - a) Tissue type
 - b) Surgeon preference³
- 3. Parts of a needle
 - a) Eye
 - 1) Closed
 - 2) French
 - 3) Swaged
 - b) Body
 - 1) Straight
 - 2) Curved
 - (a) Types
 - c) Point
 - 1) Cutting
 - (a) Conventional cutting
 - (b) Reverse cutting
 - (c) Side cutting spatula
 - 2) Taper
 - 3) Blunt
- 4. Handling (See *Management of the Sterile Field*)
 - a) Accountability
 - 1) Exchange basis
 - 2) Inspection on return
 - 3) Counts²
 - b) Preparation³ (See *Establishing the Sterile Field*)
 - 1) Memory reduction
 - 2) Package removal
 - 3) Anticipating suture needs
 - 4) Loading
 - c) Safety precautions¹
 - 1) Intraoperative
 - 2) Postoperative
 - d) Disposal^{1,4}

- II. Closure techniques
 - A. Halsted's principles
 - B. Techniques
 - 1. Continuous (running)
 - 2. Interrupted
 - 3. Ligature
 - 4. Suture ligature (stick tie)
 - 5. Purse string
 - 6. Retention sutures
 - a) Bolsters

1. Abrasion
 2. Adhesion
 3. Avulsion
 4. Collagen
 5. Contracture
 6. Contusion
 7. Cicatrix
 8. Dead space
 9. Debridement
 10. Edema
 11. Extravasation
 12. Exudate
 13. Fistula
 14. Gangrene
 15. Granulation tissue
 16. Granuloma
 17. Hematoma
 18. Hemostasis
 19. Ischemia
 20. Keloid
 21. Laceration
 22. Perforation
 23. Proud flesh
 24. Nosocomial infection
 25. Scar
 26. Seroma
 27. Serosanguinous
 28. Sinus tract
 29. Tissue tensile strength
- B.** Types of wounds
1. Intentional and surgical
 2. Unintentional and traumatic
 - a) Blunt
 - b) Chemical
 - c) Penetrating
 - d) Thermal
 3. Chronic and persistent
 - a) Pressure sores
 - b) Ulcers
- C.** Phases of wound healing
1. Lag
 - a) Inflammatory response
 2. Proliferative
 - a) Tissue tensile strength
 3. Maturation and differentiation

- D.** Wound classifications
 - 1. Class I Clean
 - 2. Class II Clean Contaminated
 - 3. Class III Contaminated
 - 4. Class IV Dirty or infected
- E.** Factors affecting wound healing (See *Pathophysiology*)
 - 1. Physical condition of the patient
 - a) Age
 - b) Disease and comorbidities
 - c) Nutritional status
 - 1) Malnourished
 - 2) Obese
 - d) Fluid electrolyte balance
 - 2. External factors
 - a) Chemotherapy
 - b) Medications
 - 1) Prescription
 - 2) Illicit
 - c) Smoking
 - d) Radiation
 - 3. Surgical technique (See *Asepsis and Sterile Technique*)
 - a) Principles of asepsis
 - b) Bowel technique (clean/dirty)⁴
 - c) Dissection technique
 - d) Duration of surgery
 - e) Methods of hemostasis (See *Hemostasis*)
 - f) Tissue
 - 1) Approximation
 - 2) Handling
 - 3) Perfusion
 - g) Wound
 - 1) Drains
 - 2) Irrigation
- F.** Complications
 - 1. Infection
 - a) Endogenous
 - b) Exogenous
 - 2. Hemorrhage
 - 3. Necrosis
 - 4. Tissue disruption
 - a) Dehiscence
 - b) Evisceration
 - c) Herniation
 - d) Re-injury
 - e) Rejection (graft/implant)
 - 5. Suture complications and wound tensile strength

SPECIMEN CARE AND HANDLING

Objectives: The learner will:

Didactic:

1. Describe specimen types.
2. Discuss methods of obtaining specimens.
3. Identify specimen collection containers.
4. Describe the procedures for handling the transfer of specimens.
5. List required labeling components.
6. Discuss the procedure for managing a specimen incident.

Skill Applications:

1. Demonstrate specimen handling and the validation process.

Content:

- I. Types of specimens
 - A. Cytology
 1. Cultures
 2. Fluids and washings
 3. Smears
 4. Tissue
 - B. Fresh
 1. Foreign objects
 2. Forensic evidence
 3. Limbs and digits
 4. Stones
 5. Tissue
 - C. Frozen
 - D. Permanent
 - E. Specialty
 1. Fetal demise
 2. Products of conception
 3. Radioactive and chemotherapeutic implants
- II. Methods of obtaining
 - A. Aspiration
 - B. Excisional
 - C. Swab
- III. Collection containers (See *Supplies*)
 - A. Sterile
 1. Culture tubes
 2. Leuken (specimen trap)
 3. Specimen cup
 - B. Non-sterile
 1. Clean containers and pans
 2. Specimen cup
 3. Vacutainers

¹Refer to *AST Guidelines for Best Practices for Handling and Care of Specimens in the Operating Room*

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- IV. Care and handling¹
 - A. Field placement and preparation
 - B. Multiples
 - C. Orientation and markings
 - D. Validation
 - 1. Circulator
 - 2. Lab or pathology (as applicable)
 - 3. Surgeon
 - 4. Surgical technologist
 - E. Transfer
 - 1. Direct to lab or pathology
 - 2. Fixative (preservative) (as applicable)
 - 3. Off-field to circulator
 - 4. Specimen storage area(s)
- V. Labeling
 - A. Departmental policy
 - B. Content
 - 1. Date and time
 - 2. Patient name
 - 3. Medical identification number
 - 4. Specimen identification and source
 - 5. Specific location and orientation (as applicable)
 - 6. Specimen type and handling instructions
 - 7. Surgeon name and contact information (as applicable)
 - 8. Circulator signature
 - C. Standardized labels
- VI. Incident management
 - A. Error types
 - B. Documentation
 - C. Prevention
 - D. Reporting

PERIOPERATIVE CASE MANAGEMENT
POSTOPERATIVE

APPLICATION OF DRESSINGS

Objectives: The learner will:

Didactic:

1. Describe the types of surgical dressings.
2. Evaluate the functions of surgical dressings.

Skill Applications:

1. Demonstrate the preparation of surgical dressings.
2. Demonstrate the application of surgical dressings.

Content:

- I. Surgical dressings
 - A. Types
 1. Biological
 - a) Grafts
 2. One-layer
 - a) Adhesives
 - 1) Skin preparation agents
 - b) Films
 - c) Hydrocolloids
 3. Packing
 - a) Impregnated
 - b) Non-impregnated
 4. Rigid
 - a) Casts
 - b) Splints
 5. Specialty
 - a) Abdominal binders
 - b) Bolster
 - c) Bulky
 - d) Drain
 - e) Eye pad and shield
 - f) Montgomery straps
 - g) Ostomy pouch
 - h) Perineal
 - i) Post-op bra
 - j) Scrotal support
 - k) Skin adhesives
 - l) Skin graft
 - 1) Donor site
 - 2) Recipient site
 - m) Stent
 - n) Thyroid collar
 - o) Tracheotomy

¹Refer to *AST Guidelines for Best Practice for Establishing and Breaking Down the Sterile Field*

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- p) Tube gauze
- q) Wet-to-dry
- r) Wound vac
- 6. Three-layer
 - a) Inner (primary, nonadherent, contact layer)
 - 1) Occlusive (nonpermeable)
 - 2) Semi-occlusive (semipermeable)
 - 3) Nonocclusive (permeable)
 - b) Intermediate (secondary, absorbent)
 - 1) ABD pad
 - 2) Gauze
 - c) Outer (securing, tertiary)
 - 1) Tape
 - 2) Transparent
 - 3) Wrap
- B. Function (See *Wound Management*)
 - 1. Absorption
 - 2. Aesthetics
 - 3. Hemostasis
 - 4. Moisture control
 - 5. Pressure
 - 6. Protection
 - 7. Support
 - 8. Tissue preservation
- II. Perioperative handling¹
 - A. Preparation
 - B. Application

BREAKDOWN OF THE STERILE FIELD

Objectives: The learner will:

Didactic:

1. Discuss the concepts for the breakdown of the sterile field.
2. Explain the steps that are taken to break down the sterile field.

Skill Applications:

1. Demonstrate the breakdown of the sterile field.

Content:

- I. Concepts
 - A. Environmental disinfection of the OR*
(see *Decontamination of the Surgical Environment*)
 1. Room turnover efficacy
 - B. Principles
 1. Economy of motion³
 2. Point-of-use (POU) decontamination³
 - C. Standard precautions^{1,3}
 1. PPE
 - a) Doffing
 - b) Disposal
 - c) Replacement
 2. Medical handwash
 - D. Timing
 1. Maintaining sterility³
- II. Breaking down the sterile field³
 - A. Handling
 1. Disposables
 - a) Biohazard
 - b) Trash
 2. Non-disposables
 - a) Instrumentation
 - 1) Disassembly
 - 2) Pre-cleaning
 - 3) Tagged for repair
 - b) Reprocessed devices
 3. Linens
 - a) Removal
 4. Sharps
 - a) Removal
 - b) Disposal
 5. Specimen² (see *Specimen Care*)

*Refer to the following
AST Guidelines for
specific information
regarding content in this
section:

1. *Environmental Practices in the OR*
2. *Handling and Care of Specimen in the OR*
3. *Breaking Down the Sterile Field*

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POST-ANESTHESIA CARE UNIT (PACU)

Objectives: The learner will:

1. Analyze the postoperative care of the surgical patient.
2. Describe potential surgical patient complications.
3. Describe the assistive role of the surgical technologist.
4. Describe equipment and supplies.
5. Discuss the criteria for patient discharge.

Content:

- I. Patient care management
 - A. Airway maintenance (See *Pharmacology and Anesthesia*)
 - B. Considerations
 1. Comfort level
 - a) Pain
 - b) Position
 2. Dressings (See *Application of Dressings*)
 3. Fluid collection devices
 4. Intravenous (IV) line
 5. Nausea and vomiting
 6. Patient privacy
 7. Skin condition
 8. Urinary catheters
 9. Vital signs
 - a) Monitors
 - C. Complications
 1. Airway occlusion
 2. Cardiac arrest¹
 3. Hemorrhage
 4. Malignant hyperthermia²
 5. Neurological deficits
 6. Patient injury
 7. Wound disruption (See *Wound Management*)
 - D. Assistive role of the surgical technologist
 1. Emergency response
 2. Observe and communicate
- II. Equipment and supplies (See *Equipment and Supplies*)
 - A. Patient monitoring (See *Pharmacology and Anesthesia*)
 1. Airway
 2. Dressings
 3. Electrocardiogram
 4. Glucometer
 5. IV setup
 6. Oxygen

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Technologist During a Code Blue in the OR*
2. *Treatment of Surgical Patients Experiencing Malignant Hyperthermia in the OR*

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- 7. Pulse oximeter
- 8. Sphygmomanometer
- 9. Stethoscope
- 10. Urinary catheter
- B.** Patient accessories
 - 1. Bedpan
 - 2. Emesis basin
 - 3. Side rail pads
- C.** Specialty considerations
 - 1. Crash cart¹
 - 2. Malignant hypothermia cart²
 - 3. Sterile supplies
 - a) Drapes
 - b) Gloves
 - c) Gowns
 - d) Minor tray
 - 4. Suction
 - 5. Suture
 - 6. Tracheotomy tray or cart
- III.** Patient discharge
 - A.** Facility policy
 - 1. Against medical advice (AMA)
 - 2. Patient evaluation
 - a) Aldrete score*
 - 3. Post-operative instructions

*Refer to the National Institutes of Health (NIH) for information regarding the development of the postoperative safety scoring system.

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DISINFECTION OF THE SURGICAL ENVIRONMENT

Objectives: The learner will:

Didactic:

1. Describe the purpose of disinfection of the surgical environment.
2. Describe the cleaning process utilizing disinfecting agents.
3. Describe disinfecting agents.

Skill Applications:

1. Demonstrate disinfection of the surgical environment.

Content:

- I. Purpose
 - A. Patient
 - B. Healthcare provider
 1. Prevent employee exposure
 - C. Infection control
 1. Prevention (See *Asepsis and Sterile Technique*)
 - a) Cross-contamination
 - b) Healthcare acquired infection (HAI)
 2. Reduction
 - a) Bioburden
- II. Cleaning
 - A. Before first case of the day^{1,2}
 1. Damp dust
 2. Removal of unnecessary equipment
 - B. Concurrent
 1. Gross spillage¹
 - C. Room turnover³
 1. Routine
 2. Isolation cases (e.g., *C.difficile*)
 - D. Terminal
 1. Routine
 2. Isolation cases (e.g., CJD)
- III. Disinfecting agents
 - A. Types
 1. Alcohols
 - a) Ethyl
 - b) Isopropyl
 2. Glutaraldehyde
 3. Halogen compounds
 - a) Chlorine
 - 1) Chlorinated lime

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Environmental Practices in the OR*
2. *Establishing the Sterile Field*
3. *Breaking Down the Sterile Field*

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ASSISTANT CIRCULATOR DUTIES

Objectives: The learner will:

Didactic:

1. Discuss the perioperative duties of the assistant circulator.

Skill Applications:

1. Demonstrate the perioperative duties of the assistant circulator to include documentation.

Content:

- I. Preoperative
 - A. Room preparation¹
 1. Furniture
 - a) Selection
 - b) Positioning
 2. Equipment
 - a) Selection
 - b) Positioning
 - c) Testing
 3. Supplies
 - a) Selection
 - b) Open
 - B. Counts²
 - C. Patient preparation
 1. Assessment
 - a) Baseline vitals (See *Pharmacology and Anesthesia*)
 2. Urinary catheterization³ (See *Physical Preparation of the Patient*)
 3. Anesthesia support
 4. Positioning⁴
 5. Application of accessory devices
 6. Skin prep⁵
 7. Draping⁶
 - D. Tie surgical team gowns¹
- II. Intraoperative
 - A. Anticipate needs of team
 - B. Counts²
 - C. Documentation (See *Documentation*)
 - D. Monitoring traffic¹
 - E. Specimen care⁷
- III. Postoperative
 - A. Drains (See *Supplies*)

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Establishing the Sterile Field*
2. *Surgical Counts*
3. *Urinary Catheterization*
4. *Surgical Positioning*
5. *Skin Prep of the Surgical Patient*
6. *Surgical Drapes*
7. *Handling and Care of Specimen in the Operating Room*

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- B.** Dressings (See *Application of Dressings*)
- C.** Anesthesia support
- D.** Patient transfer (See *Physical Preparation of the Patient*)
- E.** Patient transport
- F.** Specimen care (See *Specimen Care*)
- G.** Documentation
- H.** Environmental disinfection (See *Disinfection of the Surgical Environment*)

DIDACTIC
SURGICAL PROCEDURES BY SPECIALTY

SURGICAL PROCEDURES – DIDACTIC PREFACE

Objectives: The learner will be able to:

1. Apply medical terminology as it relates to each procedure.
2. Compare and contrast the approach for each procedure.
3. Review the anatomy and physiology for each procedure.
4. Discuss the diagnostic procedures and pathology used to obtain a diagnosis.
5. Describe preoperative patient preparation and considerations for each procedure.
6. Discuss the operative sequence for each procedure.
7. Recognize the necessary supplies, instrumentation, and equipment for each procedure.
8. Evaluate the use of medications for each procedure.
9. Identify the wound classifications for each procedure.
10. Discuss postoperative care, considerations, and potential complications for the surgical patient.

Co-related Procedures Concept

There are similar surgical procedures as far as instrumentation, supplies, patient positioning, and operative sequence. This is referred to as the “Co-Related Procedures Concept.” The purpose of using the Co-Related Procedures Concept is to allow the instructor time to teach surgical procedures and avoid repetition.

For example, colon resection is listed in the core and is required to be taught. However, small bowel resection is not listed because the content is similar and therefore considered a co-related procedure. The instructor has the academic freedom to either inform the student that small bowel resection is performed like a colon resection, or they may choose to teach small bowel resection in more depth.

Minimally Invasive Surgery (MIS) Concept

As with co-related procedures, the concept of minimally invasive surgery (MIS) as an approach is used and describes any surgical approach other than open. Robotic-assisted and endoscopic procedures are categorized as MIS.

Surgical approaches other than open are discussed in each specialty area. For example, in the Genitourinary procedures section, the robotic approach for prostatectomy is listed along with the open approach. The similarities in anatomy, physiology, pathology, and differentiation in teaching this approach for the procedure will occur with the equipment, instrumentation, and other special considerations and thus can be demonstrated to the student. Another example of an MIS concept is the laparoscopic approach for a cholecystectomy.

Interventional Radiology (IR)

Interventional radiology is a medical subspecialty that refers to a range of techniques utilizing radiologic image guidance and minimally invasive procedures to diagnose and treat diseases in several surgical specialties. Procedures that may be performed with IR are listed in various didactic procedures sections.

SURGICAL PROCEDURES – DIDACTIC CARDIOTHORACIC

Content:

- I. Thoracic**
 - A. Approach**
 - 1. Open
 - 2. Minimally invasive
 - a) Endoscopic
 - b) Robot-assisted
 - c) Video-assisted thoracic surgery (VATS)
 - B. Procedures**
 - 1. Bronchoscopy
 - 2. Lobectomy
 - 3. Lung decortication
 - 4. Lung transplant
 - 5. Mediastinoscopy
 - 6. Pectus excavatum/carinatum repair
 - 7. Pneumonectomy
- II. Cardiac**
 - A. Approach**
 - 1. Open
 - a) Sternotomy
 - b) Thoracotomy
 - 2. Minimally invasive
 - a) Robot-assisted
 - 3. Percutaneous
 - B. Procedures**
 - 1. Aneurysm
 - a) Aortic arch
 - b) Ventricular
 - 2. Arrhythmic
 - a) Implantable cardioverter defibrillator (ICD)
 - b) Pacemaker
 - c) Radiofrequency ablation
 - 3. Congenital
 - a) Aorta coarctation repair
 - b) Atrial septal defect
 - c) Closure patent ductus arteriosus
 - d) Tetralogy of Fallot
 - 4. Coronary
 - a) Angioplasty
 - b) Coronary artery bypass graft (CABG)
 - 1) With or without cardio-pulmonary bypass (CPB)
 - 5. Transplant
 - 6. Valvular
 - a) Aortic valve replacement

- b)** Mitral valve replacement
- 7.** Support devices
 - a)** Cardio-pulmonary bypass (CPB)
 - b)** Extracorporeal membrane oxygenation (ECMO)
 - c)** Intra-aortic balloon pump (IABP)
 - d)** Ventricular assist device (VAD)

**SURGICAL PROCEDURES – DIDACTIC
GENERAL**

Content:

- I. Gastrointestinal**
 - A. Approach**
 - 1. Open
 - 2. Minimally invasive
 - 1. Endoscopic
 - 2. Laparoscopic
 - 3. Robot-assisted
 - B. Procedures**
 - 1. Appendectomy
 - 2. Cholecystectomy
 - a) With or without cholangiography
 - 3. Colonoscopy
 - 4. Colon resection
 - a) With or without colostomy
 - 5. Esophagoscopy
 - 6. Esophagogastroduodenoscopy (EGD)
 - a) With or without endoscopic retrograde cholangiopancreatography (ERCP)
 - 7. Gastrectomy
 - a) With or without gastrostomy
 - 8. Nissen fundoplication
 - 9. Liver resection
 - 10. Pancreaticoduodenectomy
 - a) Whipple procedure
 - 11. Unhealthy BMI
 - a) Gastric sleeve
 - b) Lap band
 - c) Roux-en-Y (gastric bypass)
- II. Breast**
 - A. Approach**
 - 1. Open
 - B. Procedures**
 - 1. Biopsy
 - a) Needle localization
 - b) Sentinel node
 - 2. Modified radical mastectomy
 - a) With or without axillary node dissection
 - b) With or without reconstruction
- III. Endocrine**
 - A. Approach**
 - 1. Open
 - 2. Minimally invasive
 - a) Laparoscopic

SURGICAL PROCEDURES – DIDACTIC GENITOURINARY

Content:

- I. Kidney, Adrenal gland**
 - A. Approach**
 - 1. Open
 - 2. Percutaneous
 - 3. Minimally invasive
 - a) Endoscopic
 - b) Laparoscopic
 - c) Robot-assisted
 - B. Procedures**
 - 1. Kidney
 - a) Extracorporeal shock wave lithotripsy (ESWL)
 - b) Kidney transplant
 - c) Nephrectomy
 - d) Pyelolithotomy
 - e) Wilms tumor excision
 - 2. Adrenal Gland
 - a) Adrenalectomy
- II. Ureter, Bladder, Urethra**
 - A. Approach**
 - 1. Open
 - 2. Minimally invasive
 - a) Endoscopic
 - b) Laparoscopic
 - B. Procedures**
 - 1. Bladder
 - a) Cystectomy with creation of ileal conduit
 - b) Cystoscopy
 - c) Suburethral sling
 - d) Suprapubic cystostomy
 - e) Transurethral resection of bladder tumor (TURBT)
 - 2. Ureter
 - a) Balloon dilation
 - b) Retrograde pyelogram
 - c) Stent placement
 - d) Ureteropyelithotomy
 - e) Ureteroscopy
 - 3. Urethra
 - a) Artificial urinary sphincter (AUS)
 - b) Dilation
 - c) Meatoplasty
 - d) Meatotomy
- III. Prostate**
 - A. Approach**

1. Open
 2. Minimally invasive
 - a) Endoscopic
 - b) Robot-assisted
- B. Procedures**
1. Brachytherapy
 2. Prostatectomy
 3. Transurethral resection of the prostate (TURP)
- IV. Penile, Testicular**
- A. Approach**
1. Open
- B. Procedures**
1. Penile
 - a) Circumcision
 - b) Epispadias repair
 - c) Hypospadias repair
 - d) Penectomy
 - e) Penile implant
 2. Testicular
 - a) Hydrocelectomy
 - b) Orchiectomy
 - c) Orchiopexy and orchidopexy
 - d) Prosthetic Implant
 - e) Varicocelectomy
 - f) Vasectomy
 - g) Vasovasostomy
- V. Gender Confirmation**
- A. Approach**
1. Open
- B. Procedures**
1. Female to Male
 - a) Phalloplasty
 - b) Testicular implants
 - c) Vaginectomy
 2. Male to Female
 - a) Labiaplasty
 - b) Penectomy
 - c) Vaginoplasty

**SURGICAL PROCEDURES – DIDACTIC
NEUROLOGIC**

Content:

- I.** Peripheral Nerve
 - A.** Approach
 - 1. Minimally invasive
 - a)** Endoscopic
 - 2. Open
 - B.** Procedures
 - 1. Carpal tunnel release
 - 2. Ulnar nerve release or transposition
- II.** Spine: Cervical, Thoracic, Lumbar, Sacral
 - A.** Approach
 - 1. Minimally invasive
 - a)** Robot-assisted
 - 2. Image-guided navigation
 - 3. Open
 - a)** Anterior
 - b)** Lateral
 - c)** Posterior
 - B.** Procedures
 - 1. Discectomy
 - 2. Fusion
 - a)** Instrumented
 - b)** Interbody
 - 3. Kyphoplasty
 - 4. Laminectomy
 - 5. Spinal cord stimulator placement
 - 6. Vertebroplasty
- III.** Cranium
 - A.** Approach
 - 1. Image-guided navigation
 - 2. Minimally invasive
 - a)** Endoscopic
 - b)** Percutaneous
 - c)** Robot-assisted
 - 3. Open
 - B.** Procedures
 - 1. Aneurysm repair
 - 2. Cranioplasty
 - 3. Craniostomy repair
 - 4. Evacuation of hematoma
 - 5. Shunt placement
 - a)** Ventriculoperitoneal
 - b)** Ventriculoarterial
 - 6. Stereotactic

7.
 - a) Transsphenoidal hypophysectomy
Tumor resection

**SURGICAL PROCEDURES – DIDACTIC
OBSTETRIC AND GYNECOLOGIC**

Content:

- I. Cervix**
 - A. Approach**
 - 1. Open
 - a) Vaginal
 - 2. Minimally invasive
 - b) Endoscopic
 - B. Procedures**
 - 1. Cervical biopsy
 - 2. Cervical cerclage
 - a) McDonald
 - b) Shirodkar
 - 3. Dilation and curettage (D&C)
 - 4. Dilation, curettage, and evacuation (DC&E)
 - 5. Loop electrosurgical excision procedure (LEEP)
- II. Uterus, uterine (fallopian tubes), ovaries**
 - A. Approach**
 - 1. Open
 - a) Abdominal
 - b) Vaginal
 - 2. Minimally invasive
 - a) Endoscopic
 - b) Laparoscopic
 - c) Robot-assisted
 - B. Procedures**
 - 1. Uterus
 - a) Brachytherapy
 - b) Cesarean section
 - c) Endometrial ablation
 - d) Hysterectomy
 - e) Hysteroscopy
 - f) Myomectomy
 - 2. Uterine (fallopian) tubes
 - a) Salpingectomy
 - b) Salpingotomy for ectopic pregnancy
 - c) Sterilization
 - d) Tuboplasty
 - 3. Ovary
 - a) Cystectomy
 - b) Oophorectomy
- III. External genitalia**
 - A. Approach**
 - 1. Open

- B.** Procedures
 - 1. Ablation of condylomas
 - 2. Labiaplasty
 - 3. Marsupialization of Bartholin's gland
 - 4. Perineal laceration
 - 5. Vulvectomy
- IV.** Vagina
- A.** Approach
 - 1. Open
 - B.** Procedures
 - 1. Colpocleisis
 - 2. Fistula repair
 - a) Rectovaginal
 - b) Vesicovaginal
- V.** Pelvic
- A.** Approach
 - 1. Open
 - a) Vaginal
 - 2. Minimally invasive
 - a) Endoscopic
 - b) Laparoscopic
 - c) Robot-assisted
 - B.** Procedures
 - 1. Anterior and posterior repair
 - a) Colporrhaphy
 - 2. Diagnostic laparoscopy
 - 3. Radical hysterectomy
 - a) Wertheim-Meigs
 - 4. Total pelvic exenteration

SURGICAL PROCEDURES – DIDACTIC OPHTHALMIC

Content:

- I.** Conjunctiva, cornea, iris
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** Iridotomy
 - 2.** Keratoplasty
 - 3.** Laceration repair
 - 4.** Pterygium excision
- II.** Eyelid
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** Chalazion excision
 - 2.** Entropion and ectropion repair
- III.** Globe
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** Enucleation and evisceration
 - 2.** Trabeculectomy and trabeculoplasty
 - 3.** Vitrectomy
- IV.** Lens
 - A.** Approach
 - 1.** Open
 - a)** Laser-assisted
 - B.** Procedures
 - 1.** Cataract excision
 - a)** Phacoemulsification
 - b)** Femtosecond laser-assisted cataract surgery (FLACS)
- V.** Muscle
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** Strabismus correction
 - a)** Recession and resection
- VI.** Retina
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** Pneumatic retinopexy
 - 2.** Scleral buckle

- VII.** Tear duct
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** Dacryocystorhinostomy (DCR)
 - 2.** Duct dilation/stent

**SURGICAL PROCEDURES – DIDACTIC
ORAL AND MAXILLOFACIAL**

Content:

- I.** Facial
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** Open reduction internal fixation (ORIF)
 - a)** Le Fort I
 - b)** Le Fort II
 - c)** Le Fort III
 - d)** Maxillary and mandibular
 - e)** Zygomatic
 - 2.** Orthognathic
- II.** Oral
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** Arch bar application
 - 2.** Bone grafting
 - 3.** Cleft repair
 - a)** Cheiloplasty
 - b)** Palatoplasty
 - 4.** Implants
 - 5.** Odontectomy
- III.** Cranial
 - A.** Approach
 - 1.** Open
 - B.** Procedures
 - 1.** ORIF
 - a)** Orbital
 - b)** Frontal

SURGICAL PROCEDURES – DIDACTIC ORTHOPEDIC

Content:

- I.** Shoulder and clavicle
 - A.** Approach
 - 1. Open
 - 2. Closed
 - 3. Minimally invasive
 - a) Arthroscopic
 - b) Percutaneous
 - B.** Procedures
 - 1. Acromioplasty
 - 2. Arthroplasty
 - a) Total
 - b) Hemi
 - c) Reverse
 - 3. Arthroscopy
 - 4. Bankart repair
 - 5. Open reduction internal fixation (ORIF) of clavicle
 - 6. Rotator cuff repair
- II.** Arm, elbow, forearm
 - A.** Approach
 - 1. Open
 - 2. Closed
 - 3. Minimally invasive
 - a) Percutaneous
 - B.** Procedures
 - 1. Arthroplasty
 - a) Radial head
 - 2. IM nail
 - a) Humeral shaft fracture
 - 3. ORIF
 - a) Proximal humeral fracture
 - b) Olecranon fracture
 - c) Radial and ulnar shaft fracture
 - 4. Application of external fixation device
- III.** Wrist and hand
 - A.** Approach
 - 1. Open
 - 2. Closed
 - 3. Minimally invasive
 - a) Arthroscopic
 - b) Percutaneous
 - B.** Procedures
 - 1. Arthroplasty

- 2. Arthroscopy
 - 3. ORIF
 - a) Distal radius fracture
 - 4. Application of external fixation device
- IV. Pelvis and hip**
- A. Approach**
 - 1. Open
 - 2. Closed
 - 3. Minimally invasive
 - a) Arthroscopic
 - b) Percutaneous
 - B. Procedures**
 - 1. Arthroplasty
 - a) Total
 - 1) Anterior approach (THA)
 - b) Hemi
 - 2. Arthroscopy
 - 3. Application of external fixation device
 - 4. ORIF
 - a) Acetabular fracture
 - 5. IM nail/Pins
 - a) Shaft and trochanteric fractures
- V. Leg and knee**
- A. Approach**
 - 1. Open
 - 2. Closed
 - 3. Minimally invasive
 - a) Arthroscopic
 - b) Percutaneous
 - B. Procedures**
 - 1. Amputation
 - a) Above the knee (A/K)
 - b) Below the knee (B/K)
 - 2. Arthroscopy
 - a) Ligament repairs
 - b) Meniscal repair
 - 3. Arthroplasty
 - a) Total
 - b) Partial
 - 4. IM nail
 - a) Femoral and tibial shaft fractures
 - 5. ORIF
 - a) Tibial plateau fracture
 - b) Patellar fracture

- VI.** Ankle and foot
 - A.** Approach
 - 1. Open
 - 2. Minimally invasive
 - a) Arthroscopic
 - b) Percutaneous
 - 3. Closed
 - B.** Procedures
 - 1. Achilles' tendon repair
 - 2. Arthroscopy
 - 3. Amputation
 - 4. Bunionectomy
 - 5. ORIF
 - a) Calcaneal fracture
 - b) Malleolus fracture
 - 6. Triple arthrodesis

SURGICAL PROCEDURES – DIDACTIC OTORHINOLARYNGOLOGIC

Content:

- I.** Ear
 - A.** Approach
 - 1. Open
 - 2. Minimally invasive
 - a)** Endoscopic
 - B.** Procedures
 - 1. Acoustic neurectomy
 - 2. Bone anchored hearing aid (BaHA®)
 - 3. Cochlear implant
 - 4. Mastoidectomy
 - 5. Myringotomy
 - 6. Ossicular chain reconstruction
 - 7. Stapedectomy
 - 8. Tympanoplasty
- II.** Nasal
 - A.** Approach
 - 1. Open
 - 2. Minimally invasive
 - a)** Endoscopic
 - b)** Robot-assisted
 - B.** Procedures
 - 1. Choanal atresia repair
 - 2. Fracture reduction
 - 3. Functional endoscopic sinus surgery (FESS)
 - a)** Balloon sinuplasty
 - b)** With or without image guidance or navigation assistance
 - 4. Polypectomy
 - 5. Radical antrostomy
 - a)** Caldwell-Luc
 - 6. Septoplasty
 - 7. Turbinectomy
 - 8. Valve reconstruction
- III.** Oral cavity, throat, neck
 - A.** Approach
 - 1. Open
 - 2. Minimally invasive
 - a)** Endoscopic
 - b)** Robot-assisted
 - B.** Procedures
 - 1. Bronchoscopy
 - 2. Esophagoscopy
 - 3. Laryngectomy

4. Laryngoscopy
5. Parathyroidectomy
6. Parotidectomy
7. Radical neck dissection
8. Temporomandibular joint arthroscopy (TMJ)
9. Thyroidectomy
10. Tonsillectomy and adenoidectomy (T&A)
11. Tracheotomy and tracheostomy
12. Uvulopalatopharyngoplasty (UPPP)

SURGICAL PROCEDURES – DIDACTIC PERIPHERAL VASCULAR

Content:

- I.** Blood vessel
 - A.** Approach
 - a)** Minimally invasive
 - 1)** Endovascular
 - (a)** Endoscopic
 - (b)** Percutaneous
 - b)** Open
 - B.** Procedures
 - a)** Arteriovenous fistula or shunt
 - b)** Embolectomy
 - c)** Thrombectomy
- II.** Artery
 - A.** Approach
 - a)** Minimally invasive
 - 1)** Endovascular
 - (a)** Endoscopic
 - (b)** Percutaneous
 - b)** Open
 - B.** Procedures
 - a)** Abdominal aortic aneurysm repair
 - b)** Angioplasty
 - c)** Angioscopy
 - d)** Angiography
 - e)** Aortofemoral bypass
 - f)** Carotid endarterectomy
- III.** Vein
 - A.** Approach
 - a)** Minimally invasive
 - 1)** Endovascular
 - (a)** Endoscopic
 - (b)** Percutaneous
 - b)** Open
 - B.** Procedures
 - a)** Vein ligation and stripping
 - b)** Vena cava filter placement
 - c)** Venous access placement
 - 1)** Antibiotic
 - 2)** Chemotherapy
 - 3)** Hemodialysis

SURGICAL PROCEDURES – DIDACTIC PLASTICS AND RECONSTRUCTIVE

Content:

- I. Head and face**
 - A. Approach**
 - 1. Open
 - 2. Minimally invasive
 - a) Endoscopic
 - B. Procedures**
 - 1. Blepharoplasty
 - 2. Brow lift
 - 3. Cheiloplasty and palatoplasty
 - 4. Craniosynostosis correction
 - 5. Facial implants
 - 6. Orbital decompression
 - 7. Otoplasty
 - 8. Rhinoplasty
 - 9. Rhytidectomy
- II. Breast**
 - A. Approach**
 - 1. Open
 - B. Procedures**
 - 1. Mammoplasty and mammaplasty
 - a) Augmentation and reconstruction
 - 1) Latissimus dorsi flap (LAT)
 - 2) Tissue expansion
 - 3) Transverse rectus abdominis muscle flap (TRAM)
 - b) Nipple reconstruction
 - c) Reduction
- III. Abdomen**
 - A. Approach**
 - 1. Open
 - B. Procedures**
 - 1. Abdominoplasty
 - 2. Body lift
 - a) Full
 - b) Lower
 - 3. Panniculectomy
 - 4. Suction lipectomy
- IV. Skin**
 - A. Approach**
 - 1. Open
 - B. Procedures**
 - 1. Superficial lesion/neoplasm
 - a) Micrographic (MOHS)

- 2. Scar revision
 - 3. Grafts
 - a) Full-thickness skin graft (FTSG)
 - b) Pedicle graft
 - c) Split thickness skin graft (STSG)
- V. Genitalia
 - A. Approach
 - 1. Open
 - B. Procedures
 - 1. Gender confirmation
 - a) Genitoplasty
 - b) Phalloplasty
 - 2. Labiaplasty
 - 3. Vaginoplasty
- VI. Hand
 - A. Approach
 - 1. Open
 - B. Procedures
 - 1. DeQuervain's release
 - 2. Dupuytren's contracture release
 - 3. Polydactyly release
 - a) Radial thumb and collateral ligament ablation
 - 4. Radial dysplasia repair
 - 5. Replantation
 - 6. Syndactyly release

LAB
LAB SKILL ASSESSMENTS

LAB SKILL ASSESSMENTS
PREOPERATIVE CASE MANAGEMENT

Objectives: The learner will demonstrate:

1. Preparing the OR for a mock surgical procedure.
2. Opening and delivering sterile items utilizing aseptic technique.
3. Performing the medical handwash and surgical hand scrub.
4. Donning the sterile gown and gloves.
5. Assemble and organize the sterile field.
6. Procedure for counting sponges, sharps, instruments, and accessory items.
7. Gowning and gloving another sterile team member.
8. Draping a surgical patient.
9. Finalizing the sterile field and transitioning to the operative field.

Content:

I. First Scrub Role

A. Preparing the OR

1. Proper attire¹
 - a) Eye protection
2. Medical handwash²
3. Damp dusting³
4. Positioning³
 - a) Equipment⁴
 - 1) ESU
 - 2) OR table
 - (a) Attachments
 - (1) Positioning aids
 - (b) Patient transfer device
 - 3) Suction system
 - b) Furniture
 - 1) Back table
 - 2) Kick bucket
 - 3) Mayo stand
 - 4) Prep stand
 - 5) Ring stand
 - c) OR lights

5. Surgeon preference card³

- a) Collect and verify items

B. Opening and delivering sterile items³

1. Integrity verification
2. Sterility assurance
3. Movement around the sterile field
 - a) No reaching, leaning, passing over or under
 - b) 12" distance maintained

*Refer to the following didactic sections of the core for specific information regarding content in this section:

1. *Surgical Attire*
2. *Hand Hygiene and Surgical Scrub*
3. *Establishing the Sterile Field*
4. *Equipment*
5. *Gowning and Gloving*
6. *Asepsis and Sterile Technique*
7. *Surgical Counts*
8. *Draping*
9. *Patient ID and Time-Out*

4. Back table pack
5. Basin on ring stand
6. Instrumentation
 - a) Container system
 - b) Peel-packed
 - c) Wrapped
7. Supplies
 - a) Peel-packed
 - b) Wrapped
- C. Surgical scrub²
 1. Brushless
 2. Stroke
 3. Timed
- D. Donning sterile attire^{5,6}
 1. Self-gowning and gloving
- E. Assembly and organization of the sterile field³
 1. Back table
 - a) Instrumentation
 - 1) Instrument stringer
 - 2) Tissue forceps
 - 3) Retractors
 - 4) Knife blades
 - (a) Loading
 - 5) Suture
 - (a) Loading
 - b) Medication and irrigation
 - 1) Verifying
 - 2) Filling
 - (a) Bulb syringe
 - (b) Hypodermic syringe
 - 3) Loading hypodermic needle
 - (a) Capping and uncapping
 - 4) Labeling
 - c) Sponges
 - 1) Kittner and peanut loading
 - 2) Sponge stick
 - d) Supplies
 2. Initial surgical count ⁷
 - a) Sponges
 - b) Sharps
 - c) Instrumentation
 - d) Accessory items
 3. Mayo stand
 - a) Draping
 - b) Set-up
 4. Correcting contamination^{3,6}

- F.** Gowning and gloving team members⁵
- G.** Draping the patient⁸
 - 1. Extremity
 - 2. Laparotomy
 - 3. Perineal
- H.** Modifications to the sterile field^{3,6}
 - 1. Bowel or isolation technique
 - 2. Conversion to open
- I.** Finalizing the sterile field³
 - 1. Transitioning to the operative field
 - a) Mayo stand
 - b) Back table
 - c) Basin stand
 - d) Pass off and secure cords and tubing
 - e) Place light handle covers
 - f) Establish neutral zone⁸
 - g) Sponge placement
 - 2. Time-out procedure⁹

**LABS SKILLS ASSESSMENT
INTRAOPERATIVE CASE MANAGEMENT**

Objectives: The learner will demonstrate:

1. A mock surgical procedure utilizing the principles of asepsis in the first scrub role.
2. A mock surgical procedure utilizing the principles of asepsis in the second scrub role.

Content:

- I. First scrub role
 - A. Instrumentation²
 1. Selection
 2. Application
 3. Preparation
 4. Passing¹
 5. Anticipation
 6. Point-of-use cleaning^{2,3}
 - B. Sponge handling and tracking²
 - C. Sharps handling and safety²
 1. Scalpel
 - a) Loading and unloading
 - b) Passing
 2. Suture⁴
 - a) Loading and unloading
 - b) Passing right and left-handed
 - c) Suture needles
 - 1) Keith
 - 2) Free (thread, pass, reload)
 - 3) Swaged
 - d) Suture ligatures (ties)
 - 1) Dispensing reel
 - 2) Free hand
 - 3) Stick tie
 - 4) Tie on passer
 - e) Cutting
 - f) Tagging
 3. Hypodermic syringe and needle
 - a) Capping and uncapping
 - b) Passing the syringe
 - D. Supplies⁵
 1. Hemoclips
 - a) Loading and passing
 2. Staplers
 - a) Loading and passing

*Refer to the following didactic sections of the core for specific information regarding content in this section:

1. *Surgical Incisions and Wound Exposure*
2. *Maintenance of the Sterile Field*
3. *Sterile Processing*
4. *Wound Management*
5. *Supplies*
6. *Specimen Care and Handling*
7. *Asepsis and Sterile Technique*
8. *Surgical Counts*
9. *Application of Dressings*

**LABS SKILLS ASSESSMENT
POSTOPERATIVE CASE MANAGEMENT**

Objectives: The learner will demonstrate:

1. Patient transfer.
2. Breakdown of the sterile field.
3. Doffing surgical attire.
4. Disinfecting the surgical environment.

Content:

- I. Securing
 - A. Dressings¹
 - B. Drains and tubing
- II. Drapes^{2,3}
 - A. Containing
 - B. Removing
- III. Patient transfer⁴
- IV. Breaking down the sterile field²
 - A. Disposal
 1. Linen
 2. Sharps
 3. Trash
 - B. Instruments
 1. Point of use (POU) processing
- V. Doffing surgical attire⁵
- VI. Disinfecting the surgical environment⁷

*Refer to the following didactic sections of the core for specific information regarding content in this section:

1. *Application of Dressings*
2. *Breakdown of the Sterile Field*
3. *Draping*
4. *Physical Preparation of the Patient*
5. *Gowning and Gloving*
6. *Disinfection of the Surgical Environment*

**LABS SKILLS ASSESSMENT
ASSISTANT CIRCULATOR ROLE**

Objectives: The learner will demonstrate:

1. Operating room preparation.
2. How to monitor vital signs.
3. Urinary catheterization.
4. Patient transport to the operating room.
5. Patient transfer to the surgical table.
6. How to apply and connect accessory devices.
7. Patient positioning.
8. Surgical skin prep.
9. Patient transfer from the surgical table to the stretcher.

Content:

- I. Preoperative¹
 - A. Room preparation
 1. Positioning furniture
 2. Positioning equipment
 3. Opening sterile supplies
 - B. Physical Preparation of the Patient²
 1. Vital signs
 - a) Blood pressure
 - b) Pulse
 - c) Respirations
 - d) Temperature
 2. Urinary catheterization
 - a) Open gloving
 3. Patient transport
 4. Patient transfer
 - C. Positioning²
 1. Lateral
 2. Prone
 - a) Kraske
 3. Supine
 - a) Lithotomy
 - b) Fowlers
 - c) Trendelenburg
 - 1) Reverse
 - D. Application of accessory devices²
 1. Electrosurgery
 - a) Applying grounding pad
 - b) Connecting active electrode
 2. Pneumatic tourniquet
 - a) Applying tourniquet cuff
 3. Sequential compression devices (SCD)

*Refer to the following didactic sections of the core for specific information regarding content in this section:

1. *Assistant Circulator Duties*
2. *Physical Preparation of the Patient*
3. *Maintenance of the Sterile Field*
4. *Surgical Counts*
5. *Gowning and Gloving*
6. *Specimen Care and Handling*
7. *Application of Dressings*
8. *Disinfection of the Surgical Environment*

- a) Applying SCD's
 - 4. Suction
 - a) Connecting tubing
 - E. Medication and irrigation(s)³
 - 1. Verifying
 - 2. Pouring
 - 3. Delivering to the sterile field
 - F. Initial surgical count⁴
 - G. Skin preparation²
 - 1. Open gloving⁵
 - a) Abdomen
 - b) Extremity
 - c) Perineal and vaginal
 - H. Assisting with gowning and gloving⁵
- II. Intraoperative¹
 - A. Closing surgical count⁴
 - B. Specimen care⁶
 - 1. Verifying
 - 2. Collecting from field
 - 3. Labeling
- III. Postoperative¹
 - A. Securing
 - 1. Dressings⁷
 - 2. Drains
 - B. Patient transfer²
 - C. Patient transport²
 - D. Disinfecting the surgical environment⁸

LABS SKILLS ASSESSMENT STERILE PROCESSING

Objectives: The learner will demonstrate:

1. Point of use (POU) decontamination.
2. Inspection and assembly of an instrument set.
3. Sterile packaging techniques.
4. Operation of a steam sterilizer.
5. Participation in sterile storage and distribution.

Content:

- I. Decontamination¹
 - A. POU
- II. Inspection²
- III. Instrument assembly²
 - A. Count sheet
 1. Instrument set
- IV. Packaging²
 - A. Container system
 - B. Peel pack (pouch)
 - C. Sealing (chemical indicator tape)
 1. Labeling
 - D. Wrapped
 1. Envelope fold
 2. Square fold
- V. Operation of a steam sterilizer²
- VI. Sterile storage management²
- VII. Distribution of sterile items²
 - A. Pick list and surgeon preference card³
 - B. Case cart

*Refer to the following didactic sections of the core for specific information regarding content in this section:

1. *Breaking Down the Sterile Field*
2. *Sterile Processing*
3. *Establishing the Sterile Field*

Some skills listed may need to be performed in a clinical setting.

**CLINICAL
SURGICAL ROTATION AND ROLES**

SURGICAL ROTATION CASE REQUIREMENTS

Objectives: The learner will:

1. Describe the purpose of the observation role.
2. Develop professional competency by performing in the scrub role during an arranged clinical experience.
3. Evaluate the development of professionalism throughout clinical experiences using various methods.
4. Utilize sufficient documentation for verifying cases and roles performed.
5. Demonstrate procedural proficiency by completing a minimum of 120 surgical cases.

Content:

I. Role definitions

A. First Scrub Role (FS)

1. To document a case in the FS role, the student shall perform the following duties during any given surgical procedure with proficiency:
 - a) Verify supplies and equipment
 - b) Set up the sterile field
 - 1) Instruments
 - 2) Medication
 - 3) Supplies
 - c) Perform required operative counts
 - 1) AST guidelines¹
 - 2) Facility policy
 - d) Pass instruments and supplies
 - 1) Anticipate needs
 - e) Maintain sterile technique
 - 1) Recognize sterility breaks
 - 2) Correct sterility breaks
 - 3) Document as needed

¹AST Guidelines for Best Practice can be found on the AST website.

www.ast.org

B. Second Scrub Role (SS)

1. The SS role is defined as a student who has not met all criteria for the FS role but actively participates in the surgical procedure in its entirety by completing any of the following:
 - a) Assistance with diagnostic endoscopy
 - b) Assistance with vaginal delivery
 - c) Cutting suture
 - d) Providing camera assistance
 - e) Retracting
 - f) Sponging
 - g) Suctioning

C. Observation Role (O)

1. The O role is defined as a student who has not met the FS or SS criteria. The student is observing a case in either the sterile or nonsterile role. Observation cases cannot be applied to the required 120 case count but must be documented.

II. Case requirements – A student must complete a minimum of 120 cases as delineated below: (*refer to diagram A*)

A. General surgery

1. A student must complete a minimum of 30 cases in General Surgery.
 - a) 20 of these cases must be performed in the FS role.
 - b) The remaining 10 cases may be performed in either the FS or SS role.

B. Specialty surgery

1. A student must complete a minimum of 90 cases in various surgical specialties, excluding General Surgery.
 - a) A minimum of 60 cases must be performed in the FS role and distributed amongst a minimum of four surgical specialties.
 - 1) A minimum of ten cases in four different specialties must be completed in the FS role (40 cases total).
 - 2) The additional 20 cases in the FS role may be distributed amongst any one surgical specialty or multiple surgical specialties.
 - b) The remaining 30 cases may be performed in any surgical specialty in either the FS or SS role.
2. Surgical specialties (excluding General Surgery)
 - a) Cardiothoracic
 - b) Genitourinary
 - c) Neurologic
 - d) Obstetric and gynecologic
 - e) Orthopedic
 - f) Otorhinolaryngologic
 - g) Ophthalmologic
 - h) Oral Maxillofacial
 - i) Peripheral vascular
 - j) Plastics and reconstructive
 - k) Procurement and transplant

III. Counting cases

- A.** Cases may be counted according to surgical specialty² as defined in the core curriculum.
1. One pathology is counted as one procedure.

²Programs should contact their accrediting agencies for additional clarification.

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Example: *A patient requires a breast biopsy followed by mastectomy. It is one pathology, breast cancer, and the specialty is general surgery; therefore, it is counted and documented as one procedure and one case.*

2. Counting more than one case on the same patient.

Example: *A trauma patient requires a splenectomy and repair of a LeFort I fracture. Two cases can be counted and documented since the splenectomy is general surgery, and the LeFort I repair is an oral-maxillofacial surgical specialty.*

Example: *A procedure that requires different set-ups and includes different specialties may be counted as separate cases. A mastectomy procedure (general surgery) followed with immediate reconstruction or augmentation (plastics and reconstruction) are counted as separate cases.*

3. Diagnostic vs. operative endoscopy cases

- a)** An endoscopy classified as a semi-critical procedure is considered a diagnostic case.
- b)** An endoscopy classified as a critical procedure is considered an operative case.
- c)** Diagnostic and operative cases will be counted according to specialty.
- d)** Diagnostic cases are counted in the SS role up to a total of ten of the required 120 cases.

Example: *A cystoscopy is a diagnostic procedure. If an adjunct procedure is performed, it is considered operative; therefore, a cystoscopy with ureteral stent placement is an operative procedure.*

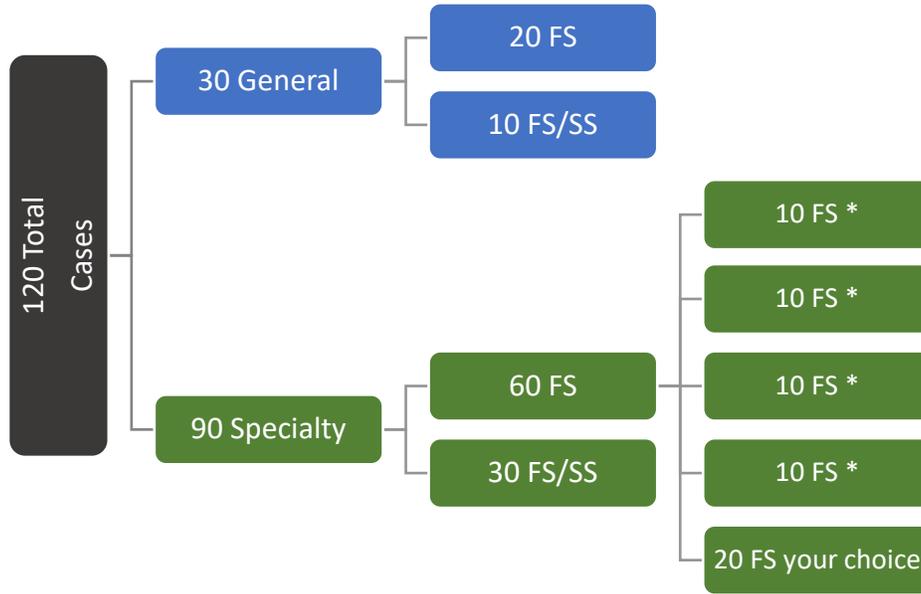
- B.** Vaginal delivery cases are counted in the SS role of the OB/GYN specialty, up to a total of five of the required 120.

IV. Documentation^{2*}

- A.** Case performed
- B.** Role performed
- C.** Performance evaluations
- D.** Verification by program director

**The surgical technology program is required to verify through the surgical rotation documentation the students' progression in the scrub role in surgical procedures of increased complexity as he/she moves towards entry-level graduate competency.*

Diagram A: Surgical Case Requirements
The numbers shown below reflect the minimum case requirements and surgical specialties.



*See Case requirements section II.B.1.

APPENDICES

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APPENDIX A
DIDACTIC PROCEDURE EXEMPLARS

**APPENDIX A
OBSTETRICS AND GYNECOLOGIC
CESAREAN SECTION**

Objectives: The learner will:

1. Describe the pathophysiology of the female reproductive system.
2. Analyze the diagnostic interventions.
3. Evaluate the supplies, equipment, and instrumentation needed for the procedure.
4. Describe the preoperative patient preparations.
6. Discuss the postoperative considerations.
7. State the levels of wound classification that apply to the procedure.

Content:

- I. Pathophysiology (See *Pathophysiology*)
 - A. Fetal
 1. Cephalopelvic disproportion (CPD)
 2. Congenital anomalies
 3. Conjoined twins
 4. Distress
 5. Demise
 6. Intrauterine growth restriction (IUGR)
 7. Malpresentation
 8. Multiple
 9. Prolapsed cord
 - B. Maternal
 1. Death
 2. Failed induction
 3. Failure to progress/prolonged labor
 4. Hemorrhage
 - a) Abruptio placentae
 - b) Placenta previa
 5. Immune thrombocytopenia (ITP)
 6. Comorbidities
 - a) Active genital herpes
 - b) Cardiac disease
 - c) Cervical cancer
 - d) Diabetes
 - e) Hypertension (Eclampsia)
 - f) Pelvic tumor
 - g) Previous pelvic, vaginal, vulvar procedures
 - 1) Fistula repair
 - 2) Repeat cesarean
 - 3) Urinary sling placement
 - 4) Vaginal colporrhaphy

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Positioning*
2. *Skin Prep of the Surgical Patient*
3. *Surgical Drapes*
4. *Patient ID, Correct Surgery Site, and Correct Surgical Procedure*
5. *Electrosurgical (ESU) Unit*
6. *Safe Medication Handling in the OR*
7. *Handling and Care of Specimens in the OR*
8. *Surgical Counts*

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- 5) Vulvar condyloma
 - h) Toxemia (Pre-eclampsia)
 - 7. Trauma
- II. Diagnostic studies
 - A. Fetal monitoring
 - 1. Heart rate (FHR)
 - 2. Scalp pH
 - B. Imaging
 - 1. Ultrasound
 - C. Lab
 - 1. CBC with differential
 - 2. Urinalysis
 - 3. Vaginal cultures
- III. Interventions
 - A. Preoperative
 - 1. Patient
 - a) Anesthesia (See *Anesthesia and Pharmacology*)
 - 1) Epidural
 - 2) General
 - 3) Local
 - 4) Spinal
 - b) Positioning¹
 - 1) Supine, wedge on right side
 - c) Maternal and fetal monitoring
 - 1) Bispectral index (BIS) – *if General anesthesia*
 - 2) Capnography (CO₂) – *if General anesthesia*
 - 3) Hemodynamic
 - (a) Blood pressure
 - (b) Heart rate
 - (c) Oxygen saturation
 - (d) Respiratory rate
 - (e) Temperature
 - (f) Urinary output
 - d) Skin preparation²
 - 1) Abdominal
 - e) Draping³
 - 1) Folded towels to square off
 - 2) Fenestrated drape with fluid-collection pouch
 - 3) Additional drape sheet if second back table needed for care of infant
 - f) Verification⁴ (See *Patient ID and Time Out*)
 - 2. Room
 - a) Equipment (See *Equipment*)
 - 1) ESU generator⁵
 - 2) Fetal monitoring devices
 - (a) Doppler

- (b) Ultrasound
 - 3) Positioning aids
 - (a) Arm boards
 - (b) Safety straps
 - 4) Radiant warmer(s)
 - 5) Suction system(s)
- b) Instrumentation (See *Instrumentation*)
 - 1) Bandage scissors
 - 2) Cesarean section tray
 - 3) Delivery forceps
- c) Supplies (See *Supplies*)
 - 1) Basic
 - (a) Back table or custom pack
 - (b) Basin set
 - (c) Blades
 - (1) #10
 - (d) ESU handpiece, holder, and tips
 - (e) Light handles
 - (f) Suction tubing
 - (g) Additional materials
 - (1) Patient drapes
 - (2) Gowns
 - (3) Gloves
 - (4) Sponges
 - 2) Specialty
 - (a) Bulb syringe(s)
 - (b) Cord pH kit(s)
 - (c) Delee suction catheter
 - (d) Drapes
 - 3) Suture material (See *Wound Management*)
 - (a) Hemostasis
 - (b) Uterus
 - (c) Bladder flap
 - (d) Peritoneum
 - (e) Subcutaneous
 - (f) Skin

B. Intraoperative

1. Incisions

- a) Skin
 - 1) Midline
 - 2) Pfannestiel (low transverse)
- b) Uterus
 - 1) Classical
 - 2) Kerr (low transverse)
 - 3) T-incision (uncommon)

2. Medications⁶
 - a) 0.5% Erythromycin ointment (for infant's eyes)
 - b) Use of oxytocic agents as necessary
3. Procedural steps
 - a) Pfannenstiel or midline incision is made to the level of the rectus muscles.
 - b) Subcutaneous tissue is dissected free from the rectus muscles.
 - c) Rectus muscles are divided.
 - d) The peritoneum is elevated with two Kelly clamps and incised with Metzenbaum scissors and retracted.
 - e) Peritoneal reflection of the bladder (bladder flap) is dissected free from the uterus.
 - f) Delee, Richardson, or Balfour blade is inserted to retract the bladder.
 - g) Classic or Kerr (low transverse) incision is made into the uterus with a #10 blade and expanded with bandage scissors.
 - h) The amniotic sac is grasped with an allis clamp and ruptured if necessary. Amniotic fluid is suctioned from the field.
 - i) The baby's head is delivered from the uterus, and the airway is cleared with a bulb syringe or Delee suction.
 - j) Assistant applies fundal pressure while baby is delivered from the uterus.
 - k) The umbilical cord is doubly clamped and cut with curved Mayo scissors.
 - l) The baby is passed to a member of the neonate team and placed in an infant warmer. APGAR score is assessed.
 - m) A cord blood sample is collected.
 - n) The placenta and umbilical cord are delivered and placed in an emesis pan to be examined by the doctor
 - o) A second sample of cord blood may be taken to assess blood gases and pH levels.
 - p) The uterine cavity is cleaned with dry laps.
 - q) Oxytocic agents may be injected to prevent uterine atony and postpartum hemorrhage (PPH).
 - r) The edges of the uterus are clamped with Foerster sponge forceps, Pennington's, or Duval lung forceps to aid in hemostasis as necessary.
 - s) The first closing count is performed before the closure of the uterus.
 - t) The uterus is closed with two layers of absorbable sutures in an imbricating or locking fashion.
 - u) The bladder flap is reattached with an absorbable suture.
 - v) A second closing count is performed.

- w) The peritoneum, muscle, fascia, and subcutaneous layers are closed with absorbable sutures.
- x) A final closing count is performed.
- y) The subcuticular layer is closed with an absorbable suture.
- 4. Catheters and drains
 - a) Foley catheter
 - b) Subcutaneous drain (as needed)
- 5. Specimen⁷
 - a) Cord blood samples
 - b) Placenta with or without the umbilical cord
- 6. Dressings (See *Application of Dressings*)
 - a) Abdominal pad (ABD)
 - b) 4x4's
 - c) Adhesive, non-adherent
- 7. Counts⁸ (See *Surgical Counts*)
 - a) Initial
 - b) Closing
 - 1) Uterus
 - 2) Peritoneum
 - 3) Skin

IV. Postoperative considerations

- A. Destination
 - 1. PACU
- B. Prognosis
 - 1. Return to normal activity
 - 2. Increased risk of future cesarean section
- C. Complications
 - 1. Amniotic fluid emboli
 - 2. Disseminated intravascular coagulation (DIC)
 - 3. Emergency hysterectomy
 - a) Hemorrhage
 - b) Uterine rupture
 - 4. Maternal and fetal injury
 - 5. Maternal and fetal demise
 - 6. Surgical site infection (SSI)

V. Wound management and classification

- A. Class I – clean
- B. Class II – clean-contaminated (amniotic fluid breach)
- C. Class III – contaminated (presence of meconium)

**APPENDIX A
VASCULAR
ENDOVASCULAR ABDOMINAL AORTIC ANEURYSM REPAIR (EVAR)**

Objectives: The learner will:

1. Assess the anatomy, physiology, and pathophysiology of the circulatory system and arteries.
2. Analyze the diagnostic and surgical interventions for a patient undergoing an EVAR procedure.
3. Evaluate the supplies, equipment, and instrumentation needed for the procedure.
4. Explain the steps for an EVAR procedure.
5. Discuss the postoperative consideration for a patient undergoing an EVAR procedure.
6. State the level of wound classification that applies to the procedure.

Content:

- I. Pathophysiology (See *Pathophysiology*)
 - A. Aneurysm
 1. Etiology
 - a) Arteriosclerosis
 - b) Atherosclerosis
 - c) Congenital
 - d) Infection
 - e) Inflammation
 - f) Trauma
 2. Location
 - a) Between renal arteries and aortic bifurcation
 3. Shape
 - a) Fusiform
 - b) Saccular
 4. Types
 - a) Dissecting
 - b) True
 - B. Atherosclerosis
 1. Atheroma and plaque
 2. Thrombi
 - C. Turbulent blood flow
 - D. Comorbidities
 1. Coronary artery disease
 2. High cholesterol
 3. Hypertension
 4. Smoking
- II. Diagnostic studies
 - A. Doppler

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Positioning*
2. *Skin Prep of the Surgical Patient*
3. *Surgical Drapes*
4. *Patient ID, Correct Surgery Site, and Correct Surgical Procedure*
5. *Intraoperative Cell Salvage*
6. *Electrosurgical (ESU) Unit*
7. *Ionizing radiation Exposure in the Perioperative Setting*
8. *Safe Medication Practices in the Perioperative Area*
9. *Surgical Counts*
10. *Massive Transfusion of the Surgical Patient*

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- B. Imaging
 - 1. Angiography
 - 2. Aortogram
 - 3. Arteriography
 - 4. CT scan/CT angiography
 - 5. Fluoroscopy
 - 6. MRI
 - 7. Ultrasound
- III. Interventions
 - A. Preoperative
 - 1. Patient
 - a) Anesthesia (See *Anesthesia and Pharmacology*)
 - 1) Epidural
 - 2) General
 - 3) Spinal
 - b) Positioning¹
 - 1) Supine
 - c) Monitoring
 - 1) Bispectral index (BIS) – *if General anesthesia*
 - 2) Capnography (CO₂) – *if General anesthesia*
 - 3) Doppler probe
 - 4) DVT prophylaxis
 - 5) Hemodynamic
 - (a) Blood pressure
 - (b) Heart rate
 - (c) Oxygen saturation
 - (d) Respiratory rate
 - (e) Temperature
 - (f) Urinary output
 - d) Skin preparation²
 - 1) Abdominal
 - 2) Extremities, circumferentially
 - e) Draping³
 - 1) Sheet below extremities
 - 2) Isolation of genitalia
 - 3) Folded towels to square off
 - 4) Incise drapes
 - 5) Fenestrated/non-fenestrated drapes
 - f) Verification⁴ (See *Patient ID and Time Out*)
 - 2. Room
 - a) Equipment (See *Equipment*)
 - 1) Additional tables as necessary
 - (a) Back
 - (b) Mayo
 - (c) Ring stand
 - 2) Cell salvage system⁵

- 3) Doppler
- 4) ESU generator⁶
- 5) Fluoroscopy
 - (a) Control room
 - (b) Imaging monitors
- 6) Headlight
- 7) Lead apron or shield⁷
- 8) Positioning aids
 - (a) Arm boards
 - (b) Safety straps
- 9) Suction system(s)
- b) Instrumentation (See *Instrumentation*)
 - 1) Assorted vascular clamps
 - 2) Minor vascular tray
 - 3) Hold items:
 - (a) Major vascular tray
 - (b) Self-retaining abdominal retractor
- c) Supplies (See *Supplies*)
 - 1) Basic
 - (a) Back table or custom pack
 - (b) Basin set
 - (c) Blades
 - (1) #10
 - (d) ESU handpiece, holder, and tips
 - (e) Light handle covers
 - (f) Suction tubing
 - (g) Additional materials
 - (1) Patient drapes
 - (2) Gowns
 - (3) Gloves
 - (4) Sponges
 - 2) Specialty
 - (a) Arteriogram supplies
 - (1) Angi catheter
 - (2) Arterial (butterfly) needle
 - (3) IV catheter extension tubing
 - (4) Syringes
 - (5) Three-way stopcocks
 - (b) Balloons
 - (1) Angioplasty
 - i. Insufflation device
 - (2) Stent expansion
 - (c) Catheters
 - (1) Balloon
 - (2) Directional
 - (3) Exchange

- (4) Pigtail
 - (5) Sizing
 - (d) Cell salvage suction tubing
 - (e) Guidewires
 - (1) Diameters
 - i. Exchange
 - ii. Introducing
 - iii. Steerable
 - iv. Non-steerable
 - (2) Tips
 - i. Flexible
 - ii. J-curved
 - iii. Rigid
 - iv. Stiff
 - (f) Hemoclips
 - (g) Needles
 - (1) Seldinger
 - (2) Spinal 18 g
 - (h) Pressure bags with high-pressure tubing
 - (i) Rummel tourniquet
 - (j) Sheaths
 - (1) Introducer (dilator)
 - (2) Port
 - (3) Stopcock
 - (k) Snare
 - (l) Stent-grafts
 - (1) Balloon
 - (2) Bifurcated vs. tubular
 - (3) Self-expanding mesh
 - (m) Suction tips
 - (1) Frazier
 - (2) Yankauer
 - (n) Suture boots
 - (o) Syringes
 - (1) 30 mL
 - (2) 60 mL
 - (p) Vascular closure devices or plugs
 - (q) Vessel loops
- 3) Suture material (See *Wound Management*)
 - (a) Hemostasis
 - (b) Femoral arteries
 - (c) Fascia
 - (d) Subcutaneous
 - (e) Subcuticular

- B. Intraoperative**
- 1. Incisions**
 - a) Skin**
 - 1) Oblique in groin bilaterally**
 - 2) Inguinal ligament to below femoral bifurcation**
 - b) Femoral artery**
 - c) Vascular**
 - 1) Antegrade**
 - 2) Retrograde**
 - d) Percutaneous arterial puncture**
 - 2. Medications⁸**
 - a) Contrast media**
 - b) Heparin**
 - c) Injectable saline**
 - d) Irrigation fluid**
 - e) Papaverine**
 - f) Topical hemostatic agents**
 - 3. Procedural steps**
 - a) Bilateral groin incisions are made at the inguinal ligament below the femoral bifurcation using a knife blade and toothed tissue forceps.**
 - b) Halsted mosquito or Kelly/Crile clamp used for blunt dissection to reach femoral arteries. Weitlaner retractors are placed.**
 - c) Common, superficial, and deep femoral arteries are dissected free and mobilized using vessel loops, a Rummel tourniquet, and mosquito clamps.**
 - d) Heparin is administered by anesthesia.**
 - e) The right femoral artery is clamped with a Debakey or another vascular clamp.**
 - f) An arteriotomy is made into the right femoral artery with a #11 blade and incision extended with a Potts-Smith scissor.**
 - g) The sheath is flushed with heparinized saline, inserted into the right femoral artery, and advanced to the right external iliac artery.**
 - h) The left femoral artery is punctured with an introducer, and a sheath advanced to the left external iliac artery.**
 - i) An angiocatheter is inserted, and an arteriogram is performed.**
 - j) A sizing catheter is introduced to determine an appropriately sized graft.**
 - k) A graft is inserted utilizing a stiff guidewire into the right femoral artery and positioned below the renal arteries using fluoroscopy.**
 - l) A measuring catheter is used to verify the placement of the graft segment.**

- m) Balloon stent expansion catheter inserted and advanced to graft and inflated using an insufflation device to secure grafts attachment.
 - n) Limbs of the graft are positioned into the iliac arteries.
 - o) The graft is deployed attaches to the walls of the aorta and iliac arteries with hooks.
 - p) Balloon stent expansion catheter inserted and advanced to graft and inflated using an insufflation device to secure grafts attachment.
 - q) An arteriogram is performed to confirm placement, and IV saline is injected to flush contrast media.
 - r) Guidewires, catheters, and sheaths are removed. Irrigation with heparinized saline is performed.
 - s) The femoral arteries are closed with double-armed, non-absorbable sutures on a Castroviejo needle holder or collagen or vascular closure device.
 - t) The fascia layer is closed with absorbable continuous sutures of the surgeon's preference.
 - u) The subcutaneous layer may be closed with an absorbable continuous suture of the surgeon's preference.
 - v) A subcuticular absorbable stitch of the surgeon's preference may be placed, or the skin may be closed with staples.
- 4. Dressings (See *Application of Dressings*)
 - a) Non-adherent
 - b) 4x4's
 - c) Transparent
 - 5. Counts⁹ (See *Surgical Counts*)
 - a) Initial
 - b) Fascia
 - c) Skin

IV. Postoperative considerations

- A. Destination
 - 1. PACU
 - 2. ICU
- B. Prognosis
 - 1. Guarded, if complications
 - 2. Medication therapy
 - 3. Reduced morbidity and mortality
 - 4. Return to normal activities
- C. Contraindications
 - 1. Size and location of aneurysm
 - 2. Lifelong radiation monitoring
- D. Complications
 - 1. Death
 - 2. Endoleak

3. Enlargement of aneurysm sac
 4. Graft
 - a) Migration
 - b) Occlusion
 5. Hemorrhage
 6. Infection of graft
 7. Limb or graft thrombosis
 8. Pelvic ischemia
 9. Pseudoaneurysm
 10. Rupture
 11. Surgical site infection (SSI)
 12. Thrombus formation
- E. Special considerations
1. Preparation for open procedure if EVAR is not successful.
 2. Hybrid OR is used for fixed and rotational angiography and fluoroscopy.
 3. All items are kept sterile until patient has left the operating room.
 4. Confirmation of blood ordered from the blood bank before the procedure¹⁰.
 5. Guidewires, catheters, and sheaths should be wiped down before and after each insertion.
- V. Wound management and classification
- A. Class I – clean

**APPENDIX A
GENERAL - MIS
LAPAROSCOPIC CHOLECYSTECTOMY**

Objectives: The learner will:

1. Assess the pathophysiology.
2. Analyze the diagnostic interventions.
3. Evaluate the supplies, equipment, and instrumentation.
4. Explain the procedural steps.
5. Evaluate the necessity of a cholangiogram and common bile duct exploration.
6. Discuss the postoperative considerations.
7. State the levels of wound classification that apply to the procedure.

Content:

- I. Pathophysiology (See *Pathophysiology*)
 - A. Biliary peritonitis
 - B. Calcified gallbladder
 - C. Cholecystitis
 - D. Cholelithiasis
 1. Blockage
 - a) Increased bile concentration
 - b) Increased serum bilirubin
 - c) Jaundice
 - E. Rupture
 - F. Comorbidities
 1. Hypercholesterolemia
 2. Unhealthy BMI
- II. Diagnostic studies
 - A. Imaging
 1. Abdominal X-ray
 2. Endoscopic retrograde cholangiopancreatography (ERCP)
 3. CT scan
 4. Ultrasound
 - B. Lab
 1. CBC with differential
 2. Electrolytes
- III. Interventions
 - A. Preoperative
 1. Patient
 - a) Anesthesia (See *Anesthesia and Pharmacology*)
 - 1) General
 - b) Positioning¹
 - 1) Supine

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Positioning*
2. *Skin Prep of the Surgical Patient*
3. *Surgical Drapes*
4. *Patient ID, Correct Surgery Site, and Correct Surgical Procedure*
5. *Electrosurgical (ESU) Unit*
6. *Ionizing Radiation Exposure in the Perioperative Setting*
7. *Safe Medication Handling in the OR*
8. *Handling and Care of Specimen*
9. *Surgical Counts*

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- 2) Reverse Trendelenberg
- 3) OR table tilt left
- c) Monitoring
 - 1) Bispectral index (BIS)
 - 2) Capnography (CO₂)
 - 3) DVT prophylaxis
 - 4) Hemodynamic
 - (a) Blood pressure
 - (b) Heart rate
 - (c) Oxygen saturation
 - (d) Respiratory rate
 - (e) Temperature
 - (f) Urinary output
 - 5) Nasogastric (NG) tube
- d) Skin preparation²
 - 1) Abdominal
- e) Draping³ (See *Draping*)
 - 1) Folded towels to square off
 - 2) Fenestrated laparotomy drape
- f) Verification⁴ (See *Patient ID and Time Out*)
- 2. Room
 - a) Equipment (See *Equipment*)
 - 1) Additional tables as necessary
 - (a) Mayo
 - (b) Ring stand
 - 2) Camera box
 - 3) ESU⁵ generator
 - 4) Insufflation unit and CO₂ source
 - 5) Light source
 - 6) Pressure bag
 - 7) Positioning aids
 - (a) Arm boards
 - (b) Footboard
 - (c) Head support/pillow
 - (d) Radiolucent OR table
 - (e) Safety strap
 - 8) Suction system(s)
 - 9) Video monitor(s)
 - 10) Hold items
 - (a) C-arm
 - (b) Lead apron or shield⁶
 - (c) Smoke evacuator system
 - b) Instrumentation (See *Instrumentation*)
 - 1) Camera
 - 2) Laparoscope
 - (a) 5 mm/10 mm

- (b) 0°/30°
 - 3) Laparoscopic
 - (a) Cautery
 - (1) Cord
 - (2) Hook
 - (3) Spatula
 - (b) Graspers
 - (c) Maryland dissector
 - (d) Needle aspirator
 - (e) Scissors
 - (f) Ultrasonic shears
 - 4) Light cord
 - 5) Hold items
 - (a) Choledochoscope
 - (b) Common bile duct instrumentation
 - (c) Gallbladder instrumentation
 - (d) Hemoclip appliers
 - (e) Long instrumentation
 - (f) Major laparotomy instrumentation
 - (g) Self-retaining abdominal retractor
- c) Supplies (See *Supplies*)
 - 1) Basic
 - (a) Back table/custom pack
 - (b) Basin set
 - (c) Blades
 - (1) #11
 - (d) ESU handpiece, holder, and tips
 - (e) Light handle covers
 - (f) Skin prep
 - (g) Suction tubing
 - (h) Additional materials
 - (1) Patient drapes
 - (2) Gowns
 - (3) Gloves
 - (4) Sponges
 - 2) Specialty
 - (a) Antifog solution/pad
 - (b) Endoscopic clip applier
 - (c) Endoscopic closure device
 - (d) Insufflation tubing
 - (e) Scope warmer
 - (f) Specimen retrieval bag
 - (g) Syringe
 - (1) 10 mL
 - (h) Trocar/cannula assembly
 - (1) 5 mm x 2

- 7) A grasper is introduced through the 5 mm port, and the gallbladder is grasped and retracted towards the head.
 - 8) Another grasper is inserted, and the infundibulum of the gallbladder is grasped.
 - 9) The gallbladder is punctured with the needle aspirator, and bile is withdrawn.
 - 10) The cystic duct and cystic artery are identified and dissected free with scissors, an electrocautery hook, and a grasper.
 - 11) Three laparoscopic hemoclips are placed on both the cystic duct and artery and each is divided.
 - 12) The gallbladder is dissected free from the liver bed using a laparoscopic spatula or hook cautery and then freed.
 - 13) The gallbladder is placed in a specimen retrieval bag and removed from the abdomen.
 - 14) The liver bed and peritoneal cavity is irrigated, and hemostasis is achieved.
 - 15) Gas is removed from the abdomen, and facia is closed at 10 mm trocar sites with absorbable sutures.
 - 16) Trocar skin sites are closed with a subcuticular stitch using an absorbable suture.
- b) Common additional procedures**
- 1) Cholangiogram
 - (a) After the hemoclips are placed on the cystic duct, laparoscopic scissors are used to open the duct.
 - (b) A cholangiocatheter is inserted through a stab incision in the abdomen and inserted into the duct.
 - (c) Saline is injected to verify catheter placement, followed by the injection of contrast media.
 - (d) Fluoroscopy or X-ray is performed, and if stones are present, a common bile duct exploration is performed; if stones are not present, the cystic artery is clipped and divided.
 - 2) Common bile duct exploration (CBDE)
 - (a) The cystic duct is dilated, and a choledochoscope is inserted through the abdomen and into the common bile duct.
 - (b) A stone basket is inserted through the choledochoscope and into the common bile duct to retrieve the stone.
 - (c) The stone basket and choledochoscope is removed, and the procedure continues by placing hemoclips on the cystic artery.

5. Catheters/drains
 - a) Common bile duct exploration
 - 1) Fogarty catheter
 - 2) T-tube (available)
 - 3) Drainage bag (available)
 - b) Foley catheter
 - c) Intraoperative cholangiogram
 - 1) 20 mL syringes x 2
 - 2) Cholangiogram catheter
 - 3) IV tubing
 - 4) Stopcock
6. Specimen⁸
 - a) Gallbladder
 - b) Gallstones
7. Dressings (See *Application of Dressings*)
 - a) Non-adherent
 - b) 2x2's
 - c) Transparent
8. Counts⁹ (See *Surgical Counts*)
 - a) Initial
 - b) Fascia
 - c) Skin

IV. Postoperative considerations

- A. Destination
 1. PACU
- B. Prognosis
 1. Outpatient (no complications)
- C. Contraindications
 1. Advanced age
 2. Liver cirrhosis
 3. Presence of asymptomatic gallstone
- D. Complications
 1. Adjacent structural injury
 2. Bile duct injury
 3. Hemorrhage
 4. Persistent bile drainage
 5. Spillage into peritoneal cavity
 6. Surgical site infection (SSI)
- E. Special considerations
 1. Conversion to an open procedure
 2. Ensure the OR table can accommodate the C-arm
 3. Lead aprons/shields are available
 4. Remove air bubbles from cholangiometer and syringes
 5. ST may be responsible for operating the camera

- V.** Wound management and classification
 - A.** Class I - clean
 - B.** Class II– clean-contaminated (if cholangiogram)
 - C.** Class III – contaminated (if bile spillage)
 - D.** Class IV – dirty (presence of infection)

**APPENDIX A
GENERAL
OPEN RIGHT HEMICOLECTOMY**

Objectives: The learner will:

1. Assess the pathophysiology of the colon.
2. Analyze the diagnostic interventions.
3. Discuss the preoperative considerations.
4. Discuss the surgical steps of the procedure.
5. Discuss the postoperative considerations.
6. State the levels of wound classification that apply to the procedure.

Content:

- I. Pathophysiology (See *Pathophysiology*)
 - A. Inflammatory
 1. Crohn's disease
 2. Diverticulitis
 3. Ulcerative colitis
 - B. Mechanical lesions
 1. Fecal impaction
 2. Intussusception
 3. Large bowel obstruction
 - a) Adhesion (band)
 - b) Malignancy
 4. Volvulus
 - C. Polyps
 1. Morphology
 - a) Malignant
 - b) Non-malignant
 2. Shapes
 - a) Adenomatous pedunculated
 - b) Sessile mucosal
 3. Types
 - a) Familial polyposis
 - b) Mucous polyp
 - c) Polypoid adenoma
 - d) Pseudopolypsis of the colon
 - e) Villous adenoma
 - D. Pseudomembranous enterocolitis
 - E. Trauma
 1. Blunt
 2. Penetrating
 - F. Vascular
 1. A-V malformation

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Positioning*
2. *Skin Prep of the Surgical Patient*
3. *Surgical Drapes*
4. *Patient ID, Correct Surgery Site, and Correct Surgical Procedure*
5. *Electrosurgical (ESU) Unit*
6. *Bowel Technique*
7. *Handling and Care of Specimen*
8. *Surgical Counts*

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- 2. Ischemic colitis
 - 3. Vascular occlusion/infarction
 - G. Comorbidities
 - 1. Coronary artery disease
 - 2. Hypercholesterolemia
 - 3. Hypertension
 - 4. Smoking
- II. Diagnostic studies
 - A. Colonoscopy
 - B. Imaging
 - 1. Barium enema
 - 2. Chest X-ray
 - 3. CT scan
 - 4. Intravenous pyelogram (IVP)
 - C. Lab
 - 1. Carcinoembryonic antigen (CEA)
 - 2. Electrolytes
 - 3. Hemocult or guaiac
 - 4. Prothrombin or partial thromboplastin time (PT/PTT)
- III. Interventions
 - A. Preoperative
 - 1. Patient
 - a) Anesthesia (See *Anesthesia and Pharmacology*)
 - 1) Epidural (pain control)
 - 2) General
 - b) Positioning¹
 - 1) Dorsal recumbent
 - c) Monitoring
 - 1) Bispectral index (BIS)
 - 2) Capnography (CO₂)
 - 3) DVT prophylaxis
 - 4) Hemodynamic
 - (a) Blood pressure
 - (b) Heart rate
 - (c) Oxygen saturation
 - (d) Respiratory rate
 - (e) Temperature
 - (f) Urinary output
 - d) Skin preparation²
 - 1) Abdominal
 - 2) Stoma marking
 - e) Draping³
 - 1) Folded towels to square off
 - 2) Fenestrated laparotomy sheet/universal drapes
 - f) Verification⁴ (See *Patient ID and Time Out*)

2. Room
 - a) Equipment (See *Equipment*)
 - 1) Additional tables as necessary
 - (a) Back
 - (b) Mayo
 - (c) Ring stand
 - 2) Positioning aids
 - (a) Arm boards
 - (b) Safety strap
 - 3) Tissue/vessel sealing generator
 - (a) ESU⁵
 - (b) Harmonic® scalpel
 - (c) Ligasure™
 - 4) Suction system(s)
 - b) Instrumentation (See *Instrumentation*)
 - 1) Gastrointestinal instrument tray
 - 2) Major laparotomy tray
 - 3) Minor laparotomy tray (for clean closure)
 - 4) Self-retaining retractor
 - c) Supplies (See *Supplies*)
 - 1) Basic
 - (a) Back table or custom pack
 - (b) Basin set
 - (c) Blades
 - ① #10
 - ② #15
 - (d) ESU handpiece, holder, and tips
 - (e) Light handle covers
 - (f) Skin prep
 - (g) Skin stapler (as indicated)
 - (h) Suction tubing
 - (i) Additional materials
 - ① Patient drapes
 - ② Gowns
 - ③ Gloves
 - ④ Sponges
 - 2) Specialty
 - (a) Clips
 - ① Ligating
 - (b) Intraabdominal staplers
 - ① GIA linear
 - ② TA linear
 - ③ Reloads
 - (c) Suction tips
 - ① Poole
 - ② Yankauer

- (d) Tissue/vessel sealing devices
 - (1) Harmonic® scalpel
 - (2) Ligasure™
- 3) Suture material (See *Wound Management*)
 - (a) Hemostasis
 - (b) Mesenteric
 - (c) Bowel
 - (d) Peritoneum
 - (e) Fascia
 - (f) Subcutaneous
 - (g) Skin (if not stapled)
 - (h) Stoma

B. Intraoperative

1. Incisions
 - a) Median
 - b) Paramedian
 - c) Stoma site
2. Procedural steps – Bowel resection
 - a) The abdominal wall is incised using a skin knife.
 - b) An incision is extended down to the level of the anterior fascia using the deep knife or ESU pencil. Hemostasis is achieved with hemostatic forceps or ESU coagulation.
 - c) The incision is extended through the fascia layer with Mayo scissors or ESU. Richardson retractor is used for exposure.
 - d) The muscle layer is separated bluntly along its fibers.
 - e) The parietal peritoneum is opened. Atraumatic forceps or hemostats are used to lift the tissue off the viscera. The incision is accomplished with a deep knife or Metzenbaum scissors. A Richardson retractor is used for exposure.
 - f) The retractors are removed, the abdominal cavity is explored, and the pathology is identified.
 - g) Exposure is achieved using a self-retaining retractor with moist lap sponges for padding.
 - h) The colon is freed from mesenteric, colic ligaments and posterior peritoneal attachments using ESU pencil or Metzenbaum scissors.
 - i) The colon is manually “run,” and areas for resection/anastomosis are identified.
 - j) A window is created in the mesentery, and division begins using two Kelly or Pean hemostatic forceps, the tissue is cut with Metzenbaum scissors, and the mesentery is ligating with silk ties. This action continues until the mesentery is dissected free from the colon. This step may be completed using a stapler of the surgeon’s preference.
 - k) Bowel segments are transected using either atraumatic bowel clamps on the non-specimen side of the bowel and occluding

- clamps on the specimen side with incision accomplished with the knife or use of a Linear stapling device with a cutting bar.
- l)** The resected colon segment is removed from the field.
 - m)** Bowel technique⁶ is used to isolate any instruments and supply which contact bowel mucosa or luminal contents.
 - n)** The bowel segments are anastomosed:
 - 1)** By hand, end-to-end
 - (a)** Traction sutures are placed to align the mesenteric borders; non-absorbable, interrupted mattress stitches are used and tagged with hemostats.
 - (b)** The serosa layer of the posterior wall of the bowel is closed; non-absorbable, interrupted mattress stitches are used.
 - (c)** Starting on the middle posterior wall of the mucosa layer, the mucosa layer is closed using an absorbable, running stitch – double armed or two, single-armed stitches.
 - (d)** The serosa layer of the anterior wall of the bowel is closed in the same fashion as the posterior wall.
 - 2)** Mechanically, side-to-side
 - (a)** A small opening is made in the staple line across the lumen of each bowel loop.
 - (b)** One arm of the internal anastomosis staplers is placed into each bowel loop; the device is closed and fired.
 - (c)** Allis forceps are used to gasp the sides of the opening created by the stapler.
 - (d)** A terminal end stapler is applied, and the excess bowel is trimmed with a skin knife or scissors.
 - o)** The mesenteric defect is closed with an absorbable running suture.
 - p)** The abdominal cavity is irrigated with saline.
 - q)** The abdominal incision is closed.
 - 1)** Stay/retention sutures may be placed in the event of distended bowel.
 - 2)** The peritoneal layer is closed with an absorbable suture of the surgeon's preference (optional closure).
 - 3)** The fascia layer is closed with two absorbable running or sutures of the surgeon's preference.
 - 4)** If the incision involves the umbilicus, the fascia of the umbilicus is closed with long-term absorbable or non-absorbable sutures.
 - 5)** The subcutaneous layer may be closed with an absorbable suture of the surgeon's preference (optional closure).
 - 6)** The skin is closed with staples or sutures of the surgeon's preference.

3. Procedural steps – Creation of ileostomy
 - a) If possible, the stoma site is marked preoperatively with the patient standing.
 - b) An incision is made at the stoma site following the protocol for entering the abdominal cavity previously detailed.
 - c) A loop of the bowel is brought out through the incision.
 - 1) The fascia may be partially closed with an absorbable, interrupted suture.
 - 2) A bowel loop is secured to the skin.
 - (a) Closed bowel loop
 - 1) A bridge is sutured to the skin with a non-absorbable suture on a cutting needle.
 - 2) The stoma is matured within 24 hours
 - (b) Open bowel loop
 - 1) The bowel edge may be clamped for 12-24 hours or immediately sutured to the skin using an absorbable suture with a taper needle.
 - (c) Mucous fistula: matured at the time of surgery (see open bowel loop).
4. Catheters and drains
 - a) Foley catheter
 - b) Closed wound
 - 1) Drain
 - 2) Reservoir
 - 3) Anchor stitch
5. Specimen⁷
 - a) Bowel segment
 - 1) Frozen section
 - 2) Permanent section
6. Dressings (See *Application of Dressings*)
 - a) ABD or Island dressing
 - b) 4x4's
 - c) Stoma appliance
7. Counts⁸ (See *Surgical Counts*)
 - a) Initial
 - b) Peritoneum closure
 - c) Subcutaneous/skin closure

IV. Postoperative considerations

- A. Destination
 1. PACU
 2. ICU
- B. Prognosis
 1. Primary vs. localized
 2. Metastasis to mesentery
 3. Metastasis to distant tissues
- C. Complications

1. Anastomosis rupture
 2. Death
 3. DVT
 4. Hemorrhage
 5. Ischemic bowel or mesenteric infarct
 6. Short-gut syndrome
 7. Wound infection
 - D. Special considerations
 1. Concepts of bowel technique⁶
 2. Stoma management
- V. Wound management and classification
 - A. Class II– clean-contaminated (controlled spillage)
 - B. Class III – contaminated (non-controlled spillage)
 - C. Class IV – dirty (presence of infection)

**APPENDIX A
ORTHOPEDIC
OPEN REDUCTION INTERNAL FIXATION (ORIF) OF THE DISTAL RADIUS**

Objectives: The learner will:

1. Discuss the steps of normal bone healing.
2. Discuss the pathophysiology of the wrist and forearm.
3. Analyze diagnostic interventions for a patient undergoing an open reduction internal fixation (ORIF) of the distal radius fracture.
4. Describe the preoperative patient preparations.
5. Summarize the equipment needed for the surgical procedure.
6. Describe the instrumentation needed for the surgical procedure.
7. Describe the supplies needed for the surgical procedure.
8. Explain the procedural steps.
9. Discuss the postoperative considerations.
10. Describe the wound classification of the procedure.

Content:

- I. Pathophysiology (See *Pathophysiology*)
 - A. Bone healing
 1. Callus formation
 2. Cellular proliferation
 3. Inflammation
 4. Ossification
 5. Remolding
 - B. Fractures
 1. Colles'
 - C. Comorbidities
 1. Osteoporosis
- II. Diagnostic studies
 - A. Imaging
 1. X-ray
- III. Interventions
 - A. Preoperative
 1. Patient
 - a) Anesthesia (See *Anesthesia and Pharmacology*)
 - 1) Axillary block
 - 2) General
 - 3) Monitored anesthesia care (MAC)
 - b) Positioning¹
 - 1) Supine
 - c) Monitoring
 - 1) Bispectral index (BIS)
 - 2) Capnography (CO₂)

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Positioning*
2. *Skin Prep of the Surgical Patient*
3. *Surgical Drapes*
4. *Patient ID, Correct Surgery Site, and Correct Surgical Procedure*
5. *Electrosurgical (ESU) Unit*
6. *Ionizing Radiation Exposure in the Perioperative Setting*
7. *Safe Use of Pneumatic Tourniquets*
8. *Safe Medication Practices in the Perioperative Area*
9. *Surgical Counts*

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- 3) Hemodynamic
 - (a) Blood pressure
 - (b) Heart rate
 - (c) Oxygen saturation
 - (d) Respiratory rate
 - (e) Temperature
 - (f) Urinary output
- 4) Tourniquet
- d) Skin preparation²
 - 1) Extremity
- e) Draping³ (See *Draping*)
 - 1) Isolation of tourniquet
 - 2) Stockinette
 - 3) Sterile sheet
 - 4) Impervious U-drape
 - 5) Extremity drape
- f) Verification⁴ (See *Patient ID and Timeout*)
- 2. Room
 - a) Equipment (See *Equipment*)
 - 1) ESU generator⁵
 - 2) Lead apron or shield⁶
 - 3) Positioning aids¹
 - (a) Arm board
 - (b) Safety strap
 - (c) Pillows
 - (d) Padding
 - 4) Radiolucent table
 - (a) Hand table
 - 5) Suction system
 - 6) Tourniquet system⁷
 - b) Instrumentation (See *Instrumentation*)
 - 1) Fracture management
 - (a) Drill with battery or pneumatic drill
 - (b) Fixation tray
 - 2) Ortho minor or basic tray
 - c) Supplies (See *Supplies*)
 - 1) Basic
 - (a) Back table extremity pack
 - (b) Basin set
 - (c) Blades
 - (d) ESU handpiece, holder, and tip
 - (e) Light handle covers
 - (f) Skin prep
 - (g) Sponges
 - (h) Suction
 - (i) Tubing

- h) The fracture is reduced using self-retaining bone clamps to hold the reduction in place. Large bone fragments may require fixation with a screw or K-wires.
 - i) A malleable plate template is placed against the bone and matched to the implant, which is contoured to the radius using plate benders as needed.
 - j) Once the fracture reduction is attained, the correct position is verified under image intensification.
 - k) Using a drill and drill guide, a hole is drilled through the radius in the glide hole position of the plate, measured using a depth gauge, tapped (if self-tapping screws are not being used) and a screw placed. The same sequence of 'Drill, Measure, (Tap), Screw' continues with each additional screw placement.
 - l) Temporary K-wires are placed into the distal fragment or volar plate and manipulated under image intensification to verify optimal fixation.
 - m) Additional distal fixation holes on the plate are drilled for subchondral locking screw fixation, and temporary K-wires are removed.
 - n) The fracture reduction and screw placement are verified under image intensification.
 - o) The wound is irrigated, and the muscles are allowed to return to normal anatomical position.
 - p) The tourniquet is released to identify bleeders, and hemostasis is achieved
 - q) All tissue layers are closed.
 - r) Dressing materials are placed over the wound.
 - s) A semi-rigid splint is placed from the hand to the middle of the forearm, leaving the fingers free.
5. Dressings (See *Application of Dressings*)
- a) Nonadherent
 - 1) Telfa
 - 2) Xeroform
 - b) 4x4's
 - c) Kerlix or kling
 - d) Cast or splint materials
 - e) Ace wrap
6. Counts⁹ (See *Surgical Counts*)
- a) Initial
 - b) Fascia
 - c) Skin

IV. Postoperative considerations

- A. Destination
 - 1. ICU (trauma)
 - 2. PACU (See *PACU*)

- B.** Complications
 - a)** Bleeding
 - b)** Compartment syndrome
 - c)** Malunion
 - d)** Nonunion
 - e)** Surgical site infection (SSI)
- V.** Wound management and classification
 - A.** Class I – clean
 - B.** Class III – contaminated (if open, fresh wound)
 - C.** Class IV – dirty (if trauma greater than 4 hours)

**APPENDIX A
GENITOURINARY
ROBOTIC PROSTATECTOMY WITH LYMPH NODE DISSECTION**

Objectives: The learner will:

1. Assess the pathophysiology of the prostate.
2. Analyze the diagnostic interventions.
3. Plan the intraoperative course for a patient undergoing a prostate resection.
4. Evaluate the supplies, equipment, and instrumentation.
5. Explain the procedural steps.
6. Discuss the postoperative considerations for a patient undergoing a prostate resection.
7. State the levels of wound classification that apply to the procedure.

Content:

- I. Pathophysiology (See *Pathophysiology*)
 - A. Tumors
 1. Gland surface
 - a) Adenocarcinoma
 - b) Malignant
 - B. Metastasis
 1. Lymph tissue
 - a) Adrenal glands
 - b) Liver
 - c) Lungs
 - d) Pelvis
 2. Bone
 - a) Femur
 - b) Pelvis
 - c) Ribs
 - d) Spine
 - C. Staging cancer
 1. Gleason scores (2-10)
 - a) Low-grade (6)
 - b) Medium grade (7)
 - c) High grade (8-10)
 2. A – small/nonpalpable, encapsulated
 3. B – palpable, confined to prostate
 4. C – extended beyond prostate
 5. D – presence of distant metastasis
 - D. Etiology
 1. Age
 2. Environmental factors
 3. Genetic factors
 4. Hormone levels

*Refer to the following AST Guidelines for specific information regarding content in this section:

1. *Surgical Positioning*
2. *Skin Prep of the Surgical Patient*
3. *Surgical Drapes*
4. *Patient ID, Correct Surgery Site, and Correct Surgical Procedure*
5. *Electrosurgical (ESU) Unit*
6. *Handling and Care of Specimens in the OR*
7. *Surgical Counts*

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- II. Diagnostic interventions
 - A. Biopsy
 - B. Imaging
 - 1. MRI
 - 2. Transrectal ultrasound
 - C. Lab
 - 1. Blood serum markers
 - a) Prostate-specific antigen (PSA)
 - b) Prostatic acid phosphatase
 - D. Rectal examination
- III. Interventions
 - A. Preoperative
 - 1. Patient
 - a) Procedural preparation
 - 1) 6-8 weeks prior
 - 1) Male Kegel exercises
 - 2) Final diagnostic exams
 - 2) 1 week prior
 - 1) Medication cessation as directed
 - 3) 2 days prior
 - 1) Alcohol cessation
 - 4) Day before
 - 1) Bowel prep
 - 2) NPO as directed
 - b) Anesthesia (See *Anesthesia and Pharmacology*)
 - 1) General
 - c) Positioning¹
 - 1) Low lithotomy
 - d) Monitoring (See *Anesthesia and Pharmacology*)
 - 1) Bispectral index (BIS)
 - 2) Capnography (CO₂)
 - 3) DVT prophylaxis
 - 4) Hemodynamic
 - 1) Blood pressure
 - 2) Heart rate
 - 3) Oxygen saturation
 - 4) Respiratory rate
 - 5) Temperature
 - 6) Urinary output
 - e) Skin preparation²
 - 1) Abdominal
 - 1) Mid-chest to mid-thigh
 - 2) Perineal
 - f) Draping³ (See *Draping*)
 - 1) Folded towels to square off
 - 2) Under-buttocks sheet

- 3) Leggings
- 4) Laparoscopic drape
- g) Verification⁴ (See *Patient ID and Time Out*)
- 2. Room
 - a) Equipment (See *Equipment*)
 - 1) Additional tables as necessary
 - 1) Mayo
 - 2) Ring stand
 - 2) Dedicated electrical circuits
 - 3) ESU generator⁵
 - 4) Insufflation unit and CO₂ source
 - 5) Patient cart
 - 1) 4 instrument arms
 - 2) Patient safety locks
 - 6) Positioning aides
 - 1) Arm boards
 - 2) Safety strap
 - 3) Stirrups
 - 7) Suction system
 - 8) Surgeon console
 - 1) 3DHD vision
 - 2) Tremor filtration
 - 3) Wristed instrument control
 - 9) Vision cart
 - 1) Communication components
 - 2) Integration hub for power generation
 - 3) HD monitor display
 - 4) Integrated camera/box
 - 5) Light source
 - b) Instrumentation (See *Instrumentation*)
 - 1) Laparoscopy instruments
 - 2) Robotic instruments
 - 3) Scopes
 - (a) 0° and 30°
 - (b) Warmer
 - 4) Light cord
 - 5) Hold items
 - 1) Genitourinary set
 - c) Supplies (See *Supplies*)
 - 1) Basic
 - 1) Back table/custom pack
 - 2) Blades
 - (1) #11
 - (2) #15
 - 3) Light handle covers
 - 4) Skin prep

- 5) Suction tubing
- 6) Syringes
 - (1) 10 mL
 - (2) 30 mL
- 7) Additional materials
 - (1) Patient drapes
 - (2) Gowns
 - (3) Gloves
 - (4) Sponges
- 2) Specialty
 - 1) Equipment drapes
 - (1) Camera
 - (2) Robotic arm(s)
 - 2) Endodissectors
 - 3) Foley catheter
 - 4) Specimen retrieval pouch
 - 5) Verres needle
 - 6) Vessel sealer(s)
- 3) Suture material
 - 1) Ureterovesical anastomosis
 - 2) Abdominal closure

B. Intraoperative

- 1. Incisions (See *Surgical Incisions and Exposure*)
 - a) 4-5 port incisions
- 2. Procedural steps
 - a) The surgical technologist drapes the robotic arms of the patient cart.
 - b) A 24fr. Foley catheter is placed to keep the bladder decompressed. The catheter may require a separate mayo or prep stand throughout the surgical procedure for later manipulation.
 - c) The abdominal wall is incised near the umbilicus with a #11 or #15 blade skin knife. The abdominal wall is manually grasped and pulled outward for Verres needle insertion, and a pneumoperitoneum is created.
 - d) The first trocar (12mm) is inserted, and visualization with a 30° scope is completed.
 - e) Two additional port sites are created on each side of the rectus sheath (8mm) under camera visualization.
 - f) A fourth port site incision is made laterally below the right anterior iliac spine (10mm) for retraction, and a final fifth port site is created medial inferior to the umbilicus for suction/irrigation (5mm). The patient is then placed into Trendelenburg.

- g)** A non-sterile team member assists the sterile team with driving the patient cart to the patient to dock (and lock) in position.
- h)** The surgeon directs the cart arms/wrists to secure onto the robotic instrument ports and the camera port already established in the patient. The placement of robotic instruments depends on surgeon preference and primarily includes a bi-polar cautery, grasping forceps, and dissection instrumentation.
- i)** The surgeon breaks scrub to manipulate the wristed instrument control at the surgeon's console.
- j)** A 0° scope replaces the 30° scope, and the bowel is grasped and pulled superiorly to identify the rectum.
- k)** The peritoneum is incised medially, and blunt dissection is used to identify the vas deferens and seminal vesicles.
- l)** The vas deferens are divided bilaterally, and the ureters are identified. The seminal vesicles are dissected free and superiorly retracted with the vas deferens.
- m)** The bladder is then released by dissection of the peritoneum and down to the vas deferens into deep perirectal space.
- n)** Blunt dissection of the anterior prostatic capsule to the apex of the bladder neck is performed. The patient may have additional lymph node dissection if positive surgical margins are found anteriorly in the prostatic fat.
 - 1)** Lymph nodes are grasped medial to the right external iliac vein and, with a combination of blunt dissection and cautery, are dissected away from the iliac vein and pelvic side wall.
 - 2)** The lymph is dissected distally and clipped to avoid lymph leakage.
 - 3)** The dissection is continued, and care is used to avoid damage to the obturator nerve. The obturator nerve is exposed while the lymph node is dissected away and clipped at the proximal end.
 - 4)** The lymph specimen will be passed off to sterile team member.
- o)** The umbilical ligaments are then divided, allowing the bladder to fall away. The prostate is retracted medially, and the endopelvic fascia is incised with cautery and dissected distally until the urethra is exposed.
- p)** A suture is loaded and passed by the surgical technologist to the surgeon through a port site, and the surgeon places a figure-eight stitch around the dorsal venous complex.
- q)** Vertical traction is placed on the prostate suture. The surgeon creates an anterior incision into the bladder neck

until the Foley is exposed. The surgical technologist gently provides traction on the catheter while the surgeon creates a posterior incision into the bladder neck to assist with circumferential dissection away from the prostate.

- r) The lateral pedicles at the prostate are clipped, and the vesical junction is closed and divided as close to the prostate as possible. The dissection continues into puboprostatic ligaments.
- s) The dorsal vein complex is divided, and a space is created between the dorsal complex and the urethra to expose the anterior urethral wall. The anterior wall is transected just distal to the apex of the prostate. The posterior wall of the urethra and rectourethralis muscle is transected next, freeing up the entire prostate.
- t) A surgical specimen retrieval pouch is inserted into a port to capture the prostate specimen. Once the specimen is captured, the retrieval string is secured by the sterile team through a port and placed on a hemostat.
- u) Absorbable suture is used (2/3-0) to create a ureterovesical anastomosis with a continuous stitch.
- v) The bladder is filled by a sterile team member with 200mL saline irrigation solution to check the anastomosis for leaks.
- w) The Foley catheter is replaced with a new one.
- x) The surgeon scrubs back in, and the specimen pouch is retrieved through an extended port site incision.
- y) The pneumoperitoneum is deflated while trocars are removed. The incisions are closed.

3. Catheters and drains

- a) Foley catheter
- b) Closed wound drainage

4. Specimen⁶

- a) Lymph node(s)
- b) Prostate

5. Dressings (See *Application of Dressings*)

- a) Steri-strips/band-aids

6. Counts⁷

- a) Initial
- b) Cavity closure
- c) Subcutaneous and skin closure

IV. Postoperative considerations

A. Destination

- 1. PACU

B. Prognosis

- 1. Metastasis

- a) Primary/localized
- b) Metastasis to lymph

APPENDIX B
TEACHING METHODOLOGIES

APPENDIX B TEACHING METHODOLOGIES

Introduction

The following section covers a broad range of theoretical educational concepts essential to the surgical technologist in the educator role. In consideration of the fact that many new surgical technology educators transition from practitioner to educator, it is even more important that these concepts be presented. This appendix introduces instructors to learning styles, teaching methods, classroom management, domains of learning, and curriculum development.

Understanding the Learner and Learning Styles

Learning style is a person's, or student's, internal methods for processing information, feeling, and behaving in learning situations. Learning styles theory of education focuses on the fact that individuals learn in different ways, process information in different ways, and prefer different learning styles. The learning styles theory implies that all students are capable of learning and that educational success can be achieved when educational experience is geared toward their particular style of learning.

The learning styles theory is based on research that assesses the way that learning is affected by heredity, upbringing, current environmental demands, and instructional methods that the individual has been most frequently exposed to in the classroom. Three main learning styles are explored in the following table:

<u>Learning Style</u>	<u>Example</u>
Visual	The learner needs to 'see' the information to learn it; utilization of graphs, charts, flashcards is helpful for this student. This learner may prefer the front of the classroom to sit and may have the tendency to interrupt.
Auditory	The learner prefers to hear the information or directions rather than read them. They may have trouble taking notes and may lose interest quickly if not fully engaged. Helpful tools may be a repetition of concepts and reading aloud.
Kinesthetic	The learner is hands-on and connects with role-playing activities and note-taking. They may not be the strongest speaker but can learn through trial and error.

Additional learning styles of theory that may fall into the visual, auditory, or kinesthetic categories can also be explored while considering the delivery of information.

- Problem-solving (open-ended situations)
- Reading
- Group (social interactions amongst learners)
- Individual (active participation engaging oneself)
- Outline or numbered steps
- Intuitive (using big picture to find patterns or relationships)

Incorporating Teaching Styles

Teaching styles are intricately related to learning styles. Educators should utilize teaching methods that address multiple learning styles. Many individuals prefer a combination of several learning approaches, while others prefer only one or two approaches because that is the only way in which they have experienced learning. These previous students may have experienced teachers that primarily lectured or incorporated visual aids only; consequently, that is their learning preference. The utilization of effective pedagogy/andragogy (teaching approach) should inspire the instructor to embrace a variety of techniques to engage the whole audience to reach a higher level of thinking. Metacognitive performance yields students who become aware of themselves as learners and the process of their own thinking, thus allowing them to reach higher-order learning.

The utilization of differing learning styles adds a dynamic aspect to the classroom while addressing the needs of differing learners. Research has shown two important aspects of learning styles related to teaching strategies:

1. Learning a new teaching strategy that incorporates different learning styles requires the learners to possess the necessary skills to relate to the new approach to teaching.
2. If the environment and the student are too much in harmony, the student is permitted to operate at a level of comfort that does not challenge the student in the classroom. For students to grow in the classroom, the instructor should create a certain level of discomfort. The instructor accomplishes this with a variety of instructional methods, including the use of visual, auditory, and kinesthetic activities. The instructor’s task is not only to address the various learning styles but also to expose the students to new teaching modalities that will, for a short time, create some discomfort for the student. Instructors can employ a variety of assessment techniques, focusing on the development of “whole brain” capacity and each of the different learning styles.

Many different teaching styles and methods exist today, so the graph below will discuss some of the more popular styles and accompanying delivery methods.

Teaching Styles	Example
Authority (Lectures)	Uses more lecture-based classroom delivery and is a teacher-based style. Information typically flows in 1 direction to the student. It

	is content based and requires the learner to absorb while listening and/or taking notes.
Delegator (Assigns)	Allows the instructor to be the observer while assigning groups to work through learning goals. It can be most useful to encourage peer feedback.
Facilitator (Guides)	Instructors guide the learner(s) through critical scenarios or case studies to develop concepts and meaning to solve situations and understand professional processes.
Demonstrator (Coach Style)	Still, a teacher-based method that utilizes video or physical demonstration to deliver the concept.
Hybrid (Blended Learning)	Utilizes a variety of both traditional methods (lecture/notes/group work) and combines them with some computer (or electronic) forms of learning activity.

Classroom Management

Successful classroom management involves the establishment of both a physical and cohesive space for the learner to learn and the instructor to teach. To create a safe and open learning environment, a set of behavioral standards should be considered and developed to promote and increase student engagement. Consider these tips to employ success:

- Model good/ideal behavior
- Develop/post a set of classroom/lab rules
- Follow established college guidelines or handbooks
- Offer praise and positive feedback
- Do not use punishment tactics on whole groups
- Use positive non-verbal communication
- Encourage initiative
- Interview your students to find their likes/dislikes
- Do not wait to address concerns
- Allow students an opportunity to give insight to creating policy
- Incorporate team-building activities
- Use a reward system
- Utilize transparency with assignments (explain why it is important)
- Have flexible study times or open lab hours
- Be mindful of timeliness for class start/end
- Allow time for reflection and improvement

Domains of Learning

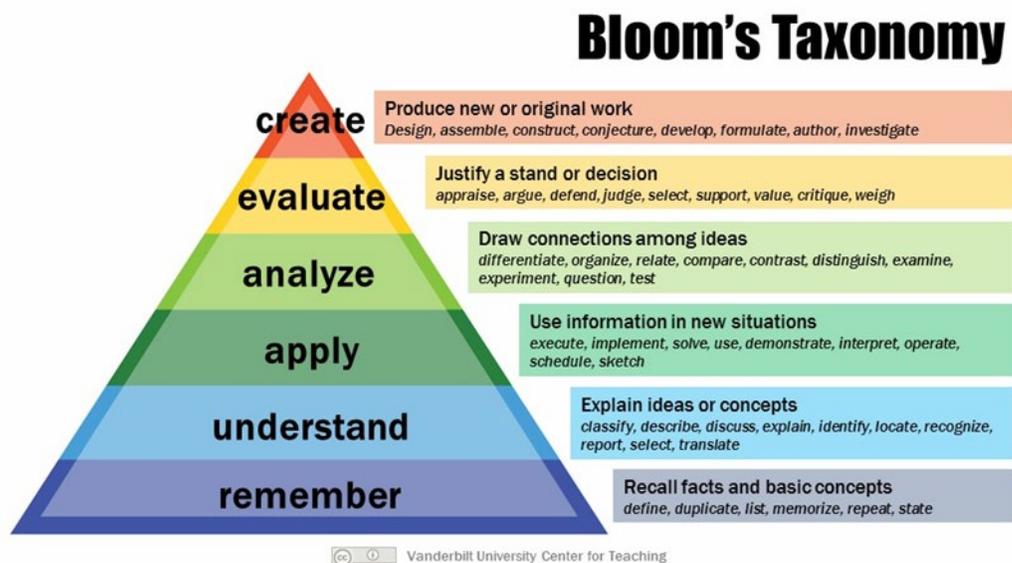
Surgical technology educators must familiarize themselves with the fundamentals of educational delivery. The most common terms associated with educational delivery include outcomes, goals, learning objectives, instructional activities, and assessment. Outcomes are what instructors ultimately want to accomplish. Outcomes include the nuts and bolts of the entire educational and learning process: who is going to do it, how they are going to do it, where they are going to do it when they are going to do it. Goals allow us to focus our efforts on achieving our outcomes: they are building blocks of an outcome. Objectives are observable actions that describe the intended goal or outcome. Objectives must be measurable. Objectives can be derived using a framework called Bloom's Taxonomy. An instructional activity, such as an assignment, should support the mastery of the objectives. Assessment is how educators evaluate the student's performance and determine competency.

Let's use the following example as a common program outcome. The students will apply knowledge of the fundamental elements of patient care and surgical technology concepts during perioperative (preoperative, intraoperative, and postoperative) patient care in both the sterile and non-sterile roles for defined surgical interventions. For students to accomplish that outcome, a series of learning objectives may be to pass a clinical proficiency practicum prior to beginning formal clinical rotations. Objectives tell the instructor and the student what must be done step by step to pass a clinical practicum. In this example, the learning activity is the clinical practicum. The assessment for this example is likely be an evaluation with a rubric with an associated passing score. *Refer to evaluation and assessment.*

In 1956, Benjamin Bloom, a noted educational psychologist, and theorist, collaborated with a group of educators to define and publish a framework of learning for educators. The framework, called "Blooms Taxonomy," is world-renowned and continues to be in use today as the gold standard for writing learning objectives. Bloom's group identified three overarching taxonomies for learning, deemed domains. The taxonomies include the cognitive (knowledge), affective (behavior), and psychomotor (skills) domains. Each of the three domains identifies general learning objectives arranged in a hierarchy from simple to complex. Bloom's original cognitive areas of learning include knowledge, comprehension, application, analysis, synthesis, and evaluation. The affective domain included receiving, responding, valuing, organization, and characterization by value set. The psychomotor domain included reflex movements, basic fundamental movement, perceptual, physical activities, skilled movements, and non-discursive communication.

Bloom's system was revised in 2001 by a more diverse group of collaborators consisting of educators, researchers, psychologists, and assessment experts. The focus of the revision was to support the fact that learning is not a fixed state of events (a one and you're done) for the learner, but rather an ongoing process for the learner. In short, objectives of the cognitive domain originally defined as nouns became verbs. The revisions were to the areas of learning. The cognitive domain changes include remembering (replaced knowledge), understanding (replaced

comprehension), applying (replaced application), analyzing (replaced analysis), evaluating (replaced synthesis), and creating (replaced evaluation). The following diagram of the cognitive domain of Bloom's taxonomy is reproduced with the permission of Vanderbilt University Center for Teaching.



Minimal changes to the affective domain were proposed in 1973 by David Krathwohl, an educational psychologist that was subsequently accepted by the education community. The revision language included only changes to the top two tiers of the hierarchy. They are as follows: receiving, responding, valuing, organizing, compartmentalizing (replaced organization), and internalizing (replaced characterization by value set).

Psychomotor proposed and accepted language revision occurred in 1972 by independent researchers Anita Harrow and Elizabeth Simpson. These changes were a bit more pronounced. This revision language included perception (replaced reflex movements), set (replaced basic fundamental movement), guided response (replaced perceptual), mechanizing (replaced physical activities), complex overt response (replaced physical activities), adaptation (replaced skilled movements), and origination (replaced non-discursive communication). It is important to note that an effective educational exchange (pedagogy/andragogy) that includes clear objectives allows for a mutual understanding and clarification of purpose between the instructor and the student. Furthermore, organized objectives provide a road map for the instructor in planning content delivery and assessing whether educational goals have been achieved.

The Cognitive Domain

The cognitive domain deals with the intellectual development of the learner. This domain of learning is noted as being the easiest to assess.

To **remember** is the most basic level of the cognitive domain, as noted in the pyramid above. Verbs associated with learning at this level include arrange, cite, define, describe, duplicate, label, list, match, name, order, outline, recall, recite, recognize, relate, repeat, select, and state.

To **understand** is the ability to grasp the meaning of presented material and explain it. Verbs associated with learning at this level include classify, compare, convert, defend, depict, describe, discuss, distinguish, estimate, explain, identify, illustrate, indicate, interpret, paraphrase, relate, reorganize, rephrase, report, restate, review, rewrite, summarize, and translate.

To **apply** is to be able to use learned material in a new and concrete situation. Verbs associated with learning at this level include calculating, categorizing, classifying, computing, demonstrating, directing, employing, estimating, identifying, illustrating, interpreting, operating, relating, scheduling, sketching, and writing.

To **analyze** is to be able to break material into its elements or parts and make connections. Verbs associated with learning at this level include combine, compare, change, contrast, diagram, dissect, distinguish, examine, find, illustrate, modify, separating, solve, and test.

To **evaluate** is to be able to justify your decisions. Verbs associated with learning at this level include appraise, argue, assess, conclude, critique, defend, estimate, evaluate, interpret, judge, justify, predict, rate, recommend, and support.

The top and most advanced level of the cognitive domain is the ability to **create** as in creating one's own work. Verbs associated with this level of learning include composing, construct, create, design, develop, devise, formulate, invent, manage, organize, plan, prepare, produce, and set-up.

The Affective Domain

The affective domain encompasses less tangible concepts such as student behaviors, feelings, attitudes, and values as they pertain to presented goals. In short, objective development might solicit behaviors that a student ultimately comes to value.

Receiving is the most basic level of the affective domain. It is awareness and a willingness to pay attention to presented phenomena. Verbs associated with learning at this level include accepting, differentiate, listen, reply, and respond.

Responding is the willingness to react to phenomena voluntarily. Verbs associated with learning at this level include acclaim, comply, conform, commend, follows, replies, and uses.

Valuing is the recognition of worth and use of values. Verbs associated with learning at this level include completes, debates, demonstrates, justifies, performs, practices, promotes, reads, recites, reports, selects, subsidizes, supports, and works.

Organizing involves the placement of values into a system. Verbs associated with learning at this level include balances, completes, demonstrates, formulates, orders, organizes, prioritizes, prepares, and theorizes.

Internalizing is the most advanced level of the affective domain. At this level, the student's value system guides their behaviors and practice. The distinctive characteristics of consistent behaviors and values epitomize the consummate health care professional. Verbs associated with learning at this level include displays, influences, models, personifies, qualifies, rates, requires and revises.

The Psychomotor Domain

The psychomotor domain deals with the physical or hands-on aspects of learning. We are most familiar with this in the performance skills and practicums.

Perception is the most basic level of the psychomotor domain. It is the ability to use sensory prompts to direct movement and motor skills. Verbs associated with learning at this level include choose, describe, detect, differentiate, distinguish, identify, isolate, relate, and select.

Set is the next level of the psychomotor domain. It refers to readiness for action. Verbs associated with learning at this level include begin, display, explain, moves, proceed, react, show, state, and volunteer.

Guided response includes the act of imitating by repetition. Adequacy of performance is achieved by practicing. Verbs associated with learning at this level include copy, trace, follow, react, reproduce, and respond.

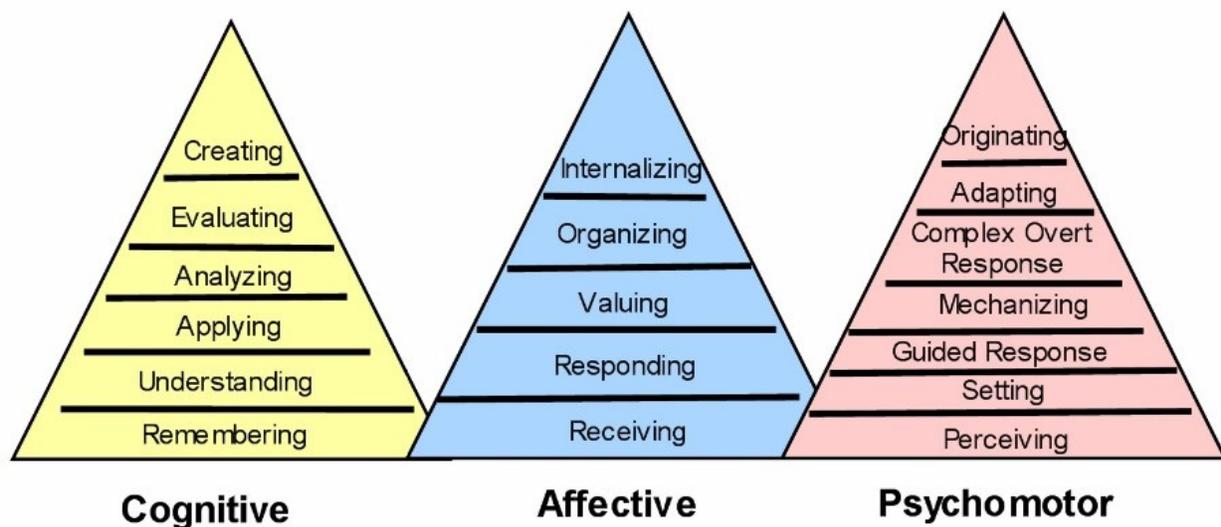
Mechanizing is an intermediate stage of learning a complex skill. Learned responses have become a habit and movements are performed with self-confidence and competence. Verbs associated with learning at this level include assembly, calibrate, construct, dismantle, display, fasten, fix, grind, heat, manipulate, measure, mend, mix, organize, and sketch.

Complex overt response is the skillful performance of motor skills that involve complex movements. Proficiency is indicated by a coordinated performance that requires minimal effort. This category included performing without hesitation or an automatic performance. Verbs

associated with learning at this level include assembly, build, calibrate, construct, dismantle, display, fasten, fix, grind, heat, manipulate, measure, mend, mix, organize, and sketch.

Adaptation includes that skills are well developed and that the individual can modify movements to adapt effectively to unanticipated situations. Verbs associated with learning at this level include adapt, alter, change, rearrange, reorganize, revise, and vary.

Origination is the most advanced level of the psychomotor domain. Origination is the creation of new movements to fit a specific situation. Skills are highly developed to the point that creativity is employed. Verbs associated with learning at this level include arrange, build, combine, compose, construct, create, design, initiate, make, and originate.



Overview of Curriculum Development

The master curriculum – the documentation of your organization’s educational process – is indeed the backbone of your surgical technology program. It is the strength of any educational process. Many individuals tend to think that master curriculum development is the creation of the course syllabus. However, it is much more than that, encompassing the whole teaching process from developing a working philosophy of education based on belief statements to the basics, such as the physical arrangement of the classroom. Master curriculum development is a comprehensive process that facilitates the establishment and analysis of the program’s purpose, designs a program, coordinates a series of related activities, and aids in the evaluation of the process. This clearly establishes basic tasks, one of which is the development of the syllabus. In turn, the syllabus distinguishes a quality master curriculum from a haphazard, accidental curriculum. The following information focuses briefly on the overall aspects of master curriculum development and, more specifically, on the course syllabus in which the terms, scope, sequence, and balance are given more meaning.

Every surgical technology program should have an independently developed master curriculum, reflecting the methods and practices of that particular institution. To become accredited or to maintain accreditation, your school must provide faculty and students with a clear description of the program and its content, including learning goals, course objectives, supervised clinical practice assignments, and competencies required for graduation. This includes the course syllabus that describes learning objectives. In addition, your school must show documented student evaluation and periodic program evaluation as part of the accreditation process.

The master curriculum is a guiding tool for planning the details of the education process, so students can learn in an organized, orderly, and sequenced manner. A master curriculum guides the program in several ways. First, the curriculum organizes program objectives into groups of like information or informational focuses. The faculty can develop courses that assist and support the program's overall educational objectives from these focuses.

A master curriculum also guides in the area of informational sequencing. Basic or introductory information can be assigned as prerequisites or entry-level courses, so the instructional method advances from simple to complex.

A master curriculum guides and focuses the instructor or instructional team, enabling them to support and accomplish the overall educational goals of the program. Standardization of topic presentations assures that each instructor is aware of the required information and objectives of a given course. It also encourages consistency in the information presented during the learning process. Without this consistency in the educational process, a school cannot ensure a comprehensive knowledge base and presentation because positive overall program assessment and outcomes would be difficult to measure and interpret.

Once the master curriculum is developed, it should be validated by representatives of industry and business, advisory boards, a consultant, or an accreditation process. Validation provides one source of feedback to ensure that the materials are both current and comprehensive. Curriculum review should be performed periodically to ensure the timeliness of the concepts and comprehensiveness of the material. This is particularly true in the field of surgical technology, where the technology information base evolves at a rapid pace. Through evolution and revision of the curriculum, faculty can incorporate successful teaching methodologies, leading to more professional and skilled students. Continued evaluation and revision provide a tool that accurately reflects the practices of today's allied health arena and teaches that information using the most successful means available.

Developing Program Courses & Sequence

Program course listings are used to divide and sequence program objectives into specific, clearly defined areas of focus. Each course covers a percentage of all the information and skills defined in the program overview (e.g., Surgical Tech I, II, III, and IV). Programs may group topics, such as pharmacology, operating room techniques, and perioperative issues together. Programs should also consider course progression (simple to complex) to demonstrate the sequence of advancing courses (e.g., Principles of OR Practice and Advanced Principles of OR Practice).

Each segment of the program should be defined by objectives that cover the cognitive, psychomotor, and affective skills presented. The information must be presented in a simple-to-complex manner, and the methods of the competency measurement must be clearly defined.

When developing the number and nature of the courses, consider the following concepts. Using more courses to present the information gives the educator a means to easily identify areas for student remediation. Separate grades for the courses help students recognize areas of strength and weakness. Fewer course offerings help students easily organize their workloads, instead of the ‘all the eggs in one basket’ philosophy, which may stress the student. Including a clinical component in a theory class will require equity when developing outcome measurement rationales, as clinical grades may carry more weight than didactic/theory grades.

Creating Course Syllabi

The next step in creating a master curriculum is creating a syllabus for each course. The format for syllabus development is similar to that of the program overview but will involve greater detail. A syllabus contains the following areas: course title, course overview, course-specific learning outcomes (student learning outcomes- SLOs), teaching and learning methodologies, a list of required and optional texts and informational resources, and methods to measure or evaluate outcomes.

The course title section should include a short but descriptive course name. Institutions may also assign a course number. This section lists the hours assigned for the course and the credits awarded for successful completion. If known, the instructor’s name and credentials are included. The course overview is a brief summary of the learning focus and activity during the course. The overview gives the student information about course offerings. It is written in narrative form and is commonly used both in the syllabus and as the course description in the program overview section.

Example Syllabus Header

	University of Surgical Technology	
	Introduction to Surgical Technology	
Course Section: 1234	Term: Fall 20XX	Course Credits: 3
Course Pre-Requisites: ENG 1567, BIO 4789		
Course Description: Explores the field of the surgical technology profession and affiliated agencies while discussing the role and expectations of the career. A total of 45 hours of lecture and a B- or better are required for course completion.		

The course outcomes present a summary of the skills and information learned during the course. Like the program outcomes, the outcomes must address the cognitive, psychomotor and affective skills related to the selected course and must include the condition, the performance, and the standard. The objectives are written using action verbs and must be measurable. *Please refer to domains of learning and writing learning objectives*

Teaching methodologies are listed and may include the following: lecture, demonstration/return demonstration, written or reading assignments, journal article review or research, oral presentations, audiovisual aids, computer-assisted instruction, activity packages, and externships or internships. Teaching methodologies should address the needs of the auditory, visual, and kinesthetic learners. Participation expectations should also be defined to help provide clarity for the course.

Example Course Expectations and Participation

Students are expected to be on time and ready for class and have any and all materials needed to facilitate their learning experience. Students will conduct themselves in a professional manner and in accordance with program and college policy. Students will be asked at times to engage with technology for research. The utilization of an online learning management system (LMS) and completion of the suggested reading is essential for the success of this course. All papers are to be completed in APA format and submitted as an attachment to appropriate designated online links.

Course participation is an essential part of learning. This requires preparation and includes weekly verbal contributions either in person or online. Students may be asked to engage in multiple activities related to the surgical technology profession, including: standing for long periods, wearing designated PPE common to the OR, and role play in situational case studies.

The syllabus should provide a comprehensive list of reading materials and equipment required for the course. The list should include the author, title, edition, publisher, and ISBN number for required texts. The manufacturer's name and the style number of specific equipment and supplies should also be listed.

A list of course/student learning outcomes should then be included. This list will later be more formally developed into lesson plans with more specific objectives. The instructor may choose to include the following information: the dates or number of classes, reading assignments, laboratory assignments, or other outside assignments. The course outcomes help the student understand the course content focus and assists them in the learning process. The course assignments and assessments can then be created to expand upon the learning outcomes. This process will help with future assignment and objective alignment, ensuring the instructor includes appropriate tasks for students within each course.

The last component of the syllabus is grading criteria/evaluation. This describes the types of activities that contribute to the formulation of the student's grade. This section gives the student

knowledge of how his/her grade will be determined and the weight of each grade or activity. With this information, students can monitor their progress throughout the course.

Grading Scale/Evaluation

Common grade scales typically utilize a letter grade award for a course. When considering the student course outcomes, the instructor must thoroughly examine the importance of each of the assignments to ensure students are appropriately challenged as well as mentally stimulated. Each assignment or assessment may be given a numerical value (e.g., 100 points) or a percentage value (e.g., 20%). Once all assignments and course assessments are created, the values should then be assigned. These values should be made clear to the student on the course syllabus. The values of each of the assignments should then be further examined to include a grading rubric to offer transparency and explanation for the assignment expectations. This provides a more precise understanding to the student of how they can achieve success.

The grading scale should also be included in the course documentation, with the minimum award for course success clearly defined. There may also be a notation to refer to the student program/college handbook, including the grading scale and required course outcomes. Suggested policies should already be in place for students that may need to repeat a course. These policies may be set by the educational facility or developed by the program representative. Successful completion of a course will ultimately be determined by the facility or program based on a minimum grade award earned by each student. Common passing rates can range from 70-80% of the calculated assignment totals. Below are examples of common grade awards.

Examples of Grading Scales and Letter Definitions

A	93-100
A-	90-92
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D+	67-69
D	64-66
D-	60-63
F	0-59

A	93-100
B	85-92
C	77-84
D	69-76
F	68 and below

A	90-100
B	80-89
C	70-79
D	60-69
F	59 and below

Note: *The examples on the left are 7-point scales (some institutions may include a plus (+) or minus (-) which indicates performance at the higher or lower end of the grade range), and the example on the right is a 10-point scale.*

A Outstanding Achievement: The student demonstrates an exceptional mastery of the content. The student demonstrates unusually sharp insight regarding the content, and every aspect of performance is exemplary. An "A" is an exceptional grade indicating distinctly superior performance.

B Commendable Achievement: The student demonstrates above-average mastery of the content. A "B" is an above-average grade indicating achievement of a high order. The student has exceeded the stated requirements. The student demonstrates commendable insight regarding the content, and overall performance is above average.

C Acceptable Achievement: The student demonstrates average mastery of the content. A "C" is an average grade indicating that a student has performed satisfactorily in all aspects of their work. The student has adequately met the stated requirements. The student demonstrates acceptable insight regarding the content, and overall performance is average.

D Marginal Achievement: The student demonstrates below-average mastery of the content. A "D" is a below-average grade indicating that a student has marginally met the stated requirements. The student demonstrates minimal insight regarding content, and the overall performance is marginal.

F Nonperformance: The student demonstrates little or no mastery of the content. An "F" is a non-passing grade indicating that a student has not met the stated requirements. The student demonstrates insufficient insight regarding content, and overall performance is not eligible for credit.

While considering the assignment values, it is also important to utilize proper rigor and relevance when determining the weight of the actual work for the assignment. Larger papers or big presentations may be awarded a larger portion of the overall course grade. Final tests or assessments may also be more heavily weighted. Finding a balance between assignments and assessment values can offer both the student and instructor a way to determine if the student is successful in meeting both course and program outcomes.

Writing Learning Objectives

Learning objectives, behavioral objectives, instructional objectives, and performance objectives are synonymous terms that describe a student's knowledge, performance, or behavior. Learning objectives are statements that describe what the learners are doing while they are learning. An educational learning objective is a clear and unambiguous description of a planned educational expectation(s) for the learner that specifies what knowledge a student must obtain or what behavior a student must perform or demonstrate in order for the instructor to infer that learning took place. Instructors need to describe the desired behaviors to avoid misinterpretation by students and colleagues and should focus on outcomes rather than on processes. A properly worded objective lets students know what is expected of them. Equally important, it allows the instructor to measure the effectiveness of their work. Without learning objectives, it is difficult

to determine exactly what the outcomes of a particular learning experience are supposed to achieve.

Instructors typically write learning objectives to support what is being taught in the classroom, lab, or in a clinical practicum. These objectives become part of a lesson or lesson plan and should be clear and specific. Lesson objectives are not broad statements that the learner would have to interpret what is meant by the objective. Lesson learning objectives must align with the program outcomes, course outcomes, and institutional goals. Curriculum mapping is a process that occurs in courses, within programs, and at an institutional level to certify that alignment. Mapping the curriculum on a course level allows an instructor to align teaching with the learning objectives. On a program level, mapping demonstrates how the courses in the curriculum align to the program outcomes. On an institution level, mapping demonstrates how program outcomes align with the goals of the institution. Mapping is a useful tool to examine if there are gaps in a curriculum related to learning objectives and outcomes. The following table summarizes that alignment.

Goals, Outcomes, and Learning Objective Alignment

Institutional Goals	Program Goals/Outcomes	Course Outcomes	Lesson Plan Objectives
Overarching goals	Broad Statements	Still general statements, but more detailed	Specific learning objectives
Formed at the institutional level	Formed at the department or program level	Formed at the department or program level	Formed by teams in the same department or by a single instructor
Rarely revised	Rarely revised	Revised only during changes to curricular content of a course	Describe expected student outcome, methods of assessing outcome and level of performance are often revised

Cognitive domain objectives are related to information or knowledge, naming, solving, predicting, and other intellectual activities. Objectives written in the cognitive domain have a minimum of two parts and include broad terms, using Bloom’s list, that encompass a domain of learning and the specific types of performance that would indicate mastery of the objective. Once the cognitive domain objectives are written, related activities are designed that direct the student to accomplish that objective on a higher intellectual level.

The following table can help broaden the list of objectives being prepared for a lesson. It includes lower cognitive processes and a more complex learning process, which contributes to learning and reinforces remembering facts, concepts, procedures, and strategies. Where the cells

on the table intersect indicates the category of learning involved. The table is advantageous because it goes beyond just writing objectives. It serves several purposes, including:

1. Useful in developing learning objectives that go beyond remembering
2. Planning for instructional activities that contain a variety of types of learning that are relevant to the learning objectives
3. Planning for assessment methods that are appropriate for the objectives and instructional activities
4. Checking for alignment between the objectives, instructional activities, and assessment methods

Cognitive Process Categories (Increasing in complexity)

Knowledge Categories (Concrete to abstract)	Remember	Understanding	Apply	Analyze	Evaluate	Create
Factual						
Conceptual						
Procedural						
Metacognitive						

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Affective domain objectives are related to attitudes, values, and emotions. Affective domain objectives focus on what the learner says or does and can be observed. Objectives written in this domain of learning have a minimum of two parts. A cognitive component (a thought) that describes the attitude and behavior that, when observed, would represent the attitude.

Psychomotor objectives are related to performing, manipulating, and constructing skills and contain explicitly stated conditions that are required with specific criteria. Time is often used with psychomotor objectives. If time is used to measure the performance, it is a criterion of the objective. If time is used to set a maximum time limit and there is another criterion, it is a condition.

A single major objective can involve learning in one, two, or all three learning domains. There are usually three essential elements to the objective and a fourth optional element when writing learning objectives. A learning objective containing all of these components will be a complete objective that can be well written.

1. An action verb (Bloom’s list in the correct domain) that describes the learning required (required element)
2. The subject matter that describes the content of the objective (required element)
3. The specific or minimum requirements for proficiency or level of achievement. Also referred to as criterion. (Optional element)

4. The conditions of performance specify the conditions under which the evaluation takes place. When no conditions are indicated, the assumption is 100% correct response or performance is acceptable (required element)

The following is an example of a complete objective in the psychomotor domain:

Demonstrate (action verb) the surgical hand scrub timed method (subject matter) with no contaminations (criterion) in five minutes (condition).

The instruction that leads to the behavior is not included in the actual objective. The condition of performance should concentrate only on describing the conditions under which the desired learned skill is to be performed. Objectives also must be appropriate for the achievement level of the learner. If the objectives are to be achieved, the learner must have the necessary background information or knowledge.

Instructors just beginning the process of writing learning objectives tend to write objectives focused on the lower levels of cognitive behavior. However, the curriculum is not all cognitive and includes psychomotor and affective domains of learning as well. Instructors should master the skill of writing learning objectives in all three domains. Lesson plan objectives that blend lower-level and higher-level learning and different learning domains are effective in demonstrating a comprehensive lesson. Individual instructors are expected to build upon and further define the objectives that are included in this publication to facilitate a comprehensive learning experience for the student.

It should also be noted that experts in the field of educational psychology, education, and assessment call upon all educators across curricula to consider the integration of the three learning domains for future discussions and development. For example, a student cannot be expected to perform a skill set correctly if they do not first have the requisite content knowledge. Likewise, they cannot be expected to consistently perform said skill if they are not taught to value the principles of asepsis as they relate to the safety of one's patient. The current accepted educational practice is to separate each domain within its own framework construct. As such, all three domains of learning are reflected in the objectives throughout the Core Curriculum.

Developing Lesson Plans

A lesson plan details the activities that will be undertaken by the student and instructor to assist the learner in knowledge and skills attainment. These areas of information are included in the lesson plan:

1. Unit of Study (Topic)
2. Learning (instructional) objectives
3. Content outline
4. Instructional activities
5. Evaluation (assessment) tools
6. Resources

A lesson plan is created for every unit of study or topic within the curriculum. The plan should be documented in such detail that any person with knowledge of the educational process and the field of study should be able to follow the plan and present the material.

This plan becomes invaluable for team teaching, substitute instructors, and documentation, especially for programmatic and institutional accreditation and validation. Lesson plans also assist in scheduling outside resources, such as audiovisual equipment, guest lecturers, and laboratory time.

The unit of study is a section or sections of a course, typically listed on a syllabus, which the lesson will address. For example, topics in surgical technology would include instrumentation, equipment, robotics.

Learning objectives state the purpose of the lesson and the specific knowledge, skills, or behaviors that the learner will be able to demonstrate at the conclusion of the unit of study.

The content outline identifies the information to be learned. The content will be specific, detailed, and contain all the components related to the unit of study.

Instructional activities are the planned activities that will facilitate learning. The instructional activities should support the mastery of the instructional objectives.

Evaluation (assessment) tools are the method(s) used to assess knowledge or skills attainment. The tools provide evidence of the extent to which learning has been achieved.

Resources are a list of materials and teaching aids that will be utilized to either prepare for or present the unit of study. These resources may include textbooks, audio-visual aids, laboratory supplies, computer-assisted instructional material, and other supplemental materials.

When preparing a lesson, it is important to note that the objectives, instructional activities, and assessment tools must be aligned so the learner can establish a clear connection between what knowledge must be obtained, how that knowledge will be obtained, and what must be completed to demonstrate learning.

Assessment

Assessment is an important component of the instructional process. If assessment procedures and tools are properly designed, these tools will contribute to more effective instruction and greater student learning. There is a close relationship between instruction and assessment, and both involve the specific learning objectives developed within a lesson. Both are equally important if learning is to be achieved.

Instruction and assessment are effective when both are directed toward the learning objectives and are aligned with those objectives. Instruction is designed to meet the needs of the learner and must be meaningful and relevant. Properly designed assessment tools are fair to all learners, and each learner is held to the same evaluation. The method used to deliver the instruction is as important as the content. Learners should see the alignment during instruction, and the assessment tool supports that alignment. Learners must be kept informed of their learning progress, and if the required level of learning is not being achieved, remediation should be provided. The results of the assessment will reveal that deficiency in learning. Instruction should also be reviewed periodically for its effectiveness and revised as needed. Assessment results provide information that is helpful in evaluating whether the instructional objectives and methods of instruction are appropriate.

To illustrate the alignment between a learning objective and assessment, look at the following objective: List the six parts of a ringed instrument.

Proper alignment of this objective with assessment would require the learner to complete a short answer question where the learner lists the parts of a ringed instrument. Incorrect alignment of the objective would be a multiple-choice question because you are really asking the learner to identify the six parts of a ringed instrument. Generally, the action verb dictates and guides the method of assessment of a learning objective. Below are some examples illustrating the type of assessment that is utilized with certain action verbs.

To identify or recognize – Choosing an answer in an objective type test question such as multiple-choice, true/false, or matching. This assesses the lower-level learning of recognition or remember.

To list or label – Writing a word or brief statement such as in short answer, completion, or fill in the blank questions. This assesses the lower-level cognitive learning of understanding and recall.

To state or describe – Writing or speaking a short or lengthy answer such as a short answer or essay question. This assesses the mid-level cognitive learning apply.

To diagram or compare – Writing about a relationship or choosing an answer that shows a relationship, such as essay questions or objective exam questions. This assesses the higher-level cognitive learning analysis.

To interpret or predict – Writing a description of what is expected to happen or choosing from alternative decisions such as an essay question or objective exam question. This assesses the higher-level learning evaluation.

Assessment methods can include observation, achievement exams, or performance assessment with the use of a checklist, rubric, or rating scale. The most appropriate method is chosen based on the domain of learning the assessment tool will be measuring.

Assessment Tools

Achievement exams can be designed to measure all types of learning objectives from simple to complex, but the performance measured by the test should match the performance described in the learning objectives. Each test question should match the student performance described in the specific objective, and the difficulty of the test question must match the difficulty of the learning to be measured. For example, if an objective begins with the action verb compare, this is asking to analyze in the cognitive domain. The difficulty of the test question must match that analysis rather than a question that pertains to remembering. A test is considered valid when it specifically measures what was learned as specified by the learning objectives. For an assessment to be valid, it must be reliable, meaning the test has the ability to produce consistent results whenever it is used.

Performance assessments assess psychomotor objectives and are concerned with observable skills. The completion of the skill is the final product, but the steps to achieve that product are many times just as important. The skills and/or steps may be assessed with the use of a rating scale, checklist, or rubric. A checklist will measure the steps the learner has completed but not necessarily the quality of the skill. A rubric can be utilized to measure to the quality of the completed skill. The standards of performance are assessed according to the requirements of the objectives and should be identical to what was covered during the skills instruction. Prior to performance assessment, the learner should have had ample time to practice the skills to be able to demonstrate the learning. Generally, the process that occurs prior to the assessment of psychomotor objectives involving skills is the learner observes the instructor demonstrate the skill; the learner imitates the skill with verbal or written instructions, the learner practices the skill, and finally performs the skill without assistance.

Assessing the affective domain of learning also is concerned with observation. A rating scale, checklist, or rubric is typically used to assess behaviors and attitudes. The assessment tool is developed to reflect the affective learning objective with specific example behaviors that the instructor can observe or infer from the learner's attitude.

Formative and Summative Assessment

There are two main types of assessment tools, formative and summative. Formative assessment assists the instructor in determining how well the instruction is meeting the objectives. This type of assessment is conducted throughout the instruction of a course and includes tools such as weekly/unit exams, assignments, lab skill checkoffs, quizzes, and daily or weekly clinical evaluations.

Summative assessment occurs at the end of instruction or at the end of a course. This type of assessment measures the degree to which the major course outcomes were achieved at the end of a course or program. Summative assessment tools include final exams, practical lab exams, clinical evaluations, and capstone projects.

Conclusion

The theoretical educational concepts described are the foundation of any educational program. While this document provides a lot of detailed information and introduces several topics, instructors are encouraged to explore additional resources. Just as surgical technologists become proficient in the operating room in all surgical specialties, surgical technology educators need to become proficient in all aspects of teaching and learning.

Refer to *Appendix C* for a list of new educator resources.

APPENDIX C
SUPPORTING RESOURCES

APPENDIX C
References and Educator Resources

Core Sections:

Asepsis and Sterile Technique:

[Association of Surgical Technologists \(AST\)](#)

Anesthesia and Pharmacology

[American Society of Anesthesiologists \(ASA\) \(asahq.org\)](#)

<https://www.jointcommission.org/standards/national-patient-safety-goals/hospital-national-patient-safety-goals/>

All-Hazards

Emergency Preparedness for Health Professions: Introduction to Disaster Response

Author: Linda Young Landesman, DrPH, MSW

Publisher: Paradigm Publishing, Inc.

Copyright: 2009

ISBN: 978-0-76383-397-8

[Hospital Emergency Preparedness: An Online Guide for Healthcare Professionals \(edumed.org\)](#)

[National Incident Management System | FEMA.gov](#)

[National Response Framework | FEMA.gov](#)

[STARTriage.pdf \(csutest.com\)](#)

Cardiothoracic (didactic):

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[https://columbiasurgery.org/heart/approaches-heart-surgery.](https://columbiasurgery.org/heart/approaches-heart-surgery)

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Instrumentation

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https://doi.org/10.4103/ijri.IJRI_96_19

Lasers

[Home | The Laser Institute \(lia.org\)](http://www.lia.org)

Management

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<https://www.forbes.com/sites/vickyvalet/2019/03/27/americas-best-recruiting-firms-2019/#14eb05132bea>

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Popular Management Theories decoded. Business.com Editorial Staff.

<https://www.business.com/articles/popular-management-theories-decoded/>

Medical Terminology

[do-not-use-list-8-3-20.pdf \(jointcommission.org\)](#)

Needs of the Patient

[Maslow's Hierarchy of Needs | Simply Psychology](#)

Perioperative Case Management

Association of Surgical Technologists (AST) Guidelines for Best Practice

www.ast.org

Council on Surgical & Perioperative Safety

<http://www.cspsteam.org/csps-safe-surgery-resources>

Physical Environment/Safety

[Conditioning for the Environment of Critical Care Hospital Operating Rooms \(ashrae.org\)](#)

[Humidity Levels in ORs - Anesthesia Patient Safety Foundation \(apsf.org\)](#)

[Hazard Communication Standard: Safety Data Sheets \(osha.gov\)](#)

[CDC - Bloodborne Infectious Diseases - Management and Treatment Guidelines - NIOSH Workplace Safety and Health Topic](#)

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<https://www.aaopt.org/eye-health/diseases/detached-torn-retina>

Teamwork

[Using the Stages of Team Development | MIT Human Resources](#)

[The Patient Care Partnership | AHA](#)

[Health Insurance Portability and Accountability Act of 1996 \(HIPAA\) | CDC](#)

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New Educator Resources

Organizations:

Association of Surgical Technologists (AST)

www.ast.org

AST's primary purpose is to ensure that surgical technologists have the knowledge and skills to administer the highest quality patient care. AST, the only national organization representing more than 80,000 surgical technologists, is governed by an 11-member Board of Directors. On the local level, 50 formed state assemblies address member concerns and issues.

How AST Promotes the Profession:

- AST collaborates with the Accreditation Review Council on Education in Surgical Technology and Surgical Assisting (ARC/STSA) to set standards for education, such as the associate degree as the preferred level of entry into the profession.
- AST partners with the National Board of Surgical Technology and Surgical Assisting (NBSTSA) on behalf of the CST and CSFA credentials.
- AST provides lobbying support at the state and national levels to advocate for legislative recognition of graduation from an accredited program in surgical technology and holding/maintaining the Certified Surgical Technologist credential as a condition of employment and for similar regulation of and reimbursement of nonphysician surgical assistants.
- AST provides continuing education opportunities to advance the knowledge and skills base of practicing surgical technologists and surgical assistants through a national Journal and an annual conference.
- AST offers national recognition through National Surgical Technologist Week, a week that has been specifically designated to celebrate and honor the professions. It began by a resolution adopted by the AST Board of Directors in 1984.
- AST provides a brochure entitled [*Creating the Surgical Environment*](#). It describes the surgical technologist in sterile and nonsterile roles and how they participate in case management. In addition, this brochure discusses the role of AST and the importance of accreditation and certification. For hard copies, contact [Member Services](#).

Resources:

- AST Annual Educators Conference
- AST Annual National Conference
- AST Scrub Bowl Championship
- Constellation awards
- Foundation for Surgical Technology
- Galaxy program

- Gold bundle package
- National Honor Society
- Student Association (ASTSA)
- Student membership
- Student scholarships

[AST Guidelines for Best Practice](#)

The Association of Surgical Technologists recognized the need for CSTs and CSFAs to have a comprehensive publication focused on evidence-based Guidelines for Best Practices. The Guidelines were researched and developed to aid in legislative efforts for state assemblies and to provide readily available answers to questions asked by operating room supervisors.

Accreditation Review Council on Education in Surgical Technology and Surgical Assisting (ARC/STSA)

<https://arcstsa.org/>

The ARC/STSA is the only CAAHEP Committee on Accreditation (CoA) and national recognition of surgical technology and surgical assisting educational programs sponsored by the American College of Surgeons (ACS) and Association of Surgical Technologists (AST). Achieving CAAHEP-accreditation, in collaboration with the ARC/STSA, is a mark of distinction for surgical technology and surgical assisting programs, providing eligibility for their graduates to sit for national credentialing examinations.

Resources:

- CAAHEP Standards
- Educational Resources
- Forms
- Newsletters with articles focusing on the professions
- Policies
- Volunteer Opportunities
- Workshops/Webinars

[Education & Accreditation Resource, LLC \(EdAccred\)](#)

EdAccred is the ARC/STSA's education initiative to support educators by providing accreditation-focused services to simplify the accreditation process and educational opportunities for advanced professional development.

Resources:

- Digital Resources and program templates
- Program Support Services
- Volunteer Opportunities
- Workshops/Webinars

**National Board of Surgical Technology
and Surgical Assisting (NBSTSA)**

www.nbstsa.org

The mission of the NBSTSA is to be the gold standard provider of professional certification of surgical technologists (CST®) and surgical first assistants (CSFA®), supporting continuing education, thus promoting superior patient care in the surgical setting.

The National Board of Surgical Technology and Surgical Assisting determines, through examination, if an individual has acquired both theoretical and practical knowledge of surgical technology or surgical first assisting.

Resources:

- Certification exam eligibility and requirements
 - Exam content outline
 - Applications
 - Testing options
 - Examination development
 - Examination Performance Statistics

Teaching Methodologies: (*See Appendix B*)

Anderson, L., & Krathwohl, D. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives—Complete edition*. New York, NY: Addison Wesley Longman.

Waugh, K., & Gronlund, N. (2013). *Assessment of student achievement*. Upper Saddle River, NJ: Pearson.

Morrison, G., Ross, S., Kalman, H., & Morrison, J. (2019). *Designing effective instruction*. Hoboken, NJ: Wiley Publishing.

Smith RM. *Learning How to Learn: Applied Learning Theory for Adults*. New York, NY: Cambridge Books; 1982.

<http://www.learning-styles-online.com/>

http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Learning_Styles.html

<http://www.mindtools.com/mnemlsty.html>

<https://www.astate.edu/dotAsset/7a3b152c-b73a-45d6-b8a3-7ecf7f786f6a.pdf>

<https://www.cmu.edu/teaching/designteach/design/learningobjectives.html>

<https://www.cmu.edu/teaching/resources/Teaching/CourseDesign/Objectives/BloomsTaxonomyVerbs.pdf>

<http://www.edpsycinteractive.org/topics/cognition/bloom.html>

<http://www.nwlink.com/~donclark/hrd/bloom.html>

<https://tips.uark.edu/using-blooms-taxonomy/>

<https://tips.uark.edu/blooms-taxonomy-verb-chart/>

<https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/>



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