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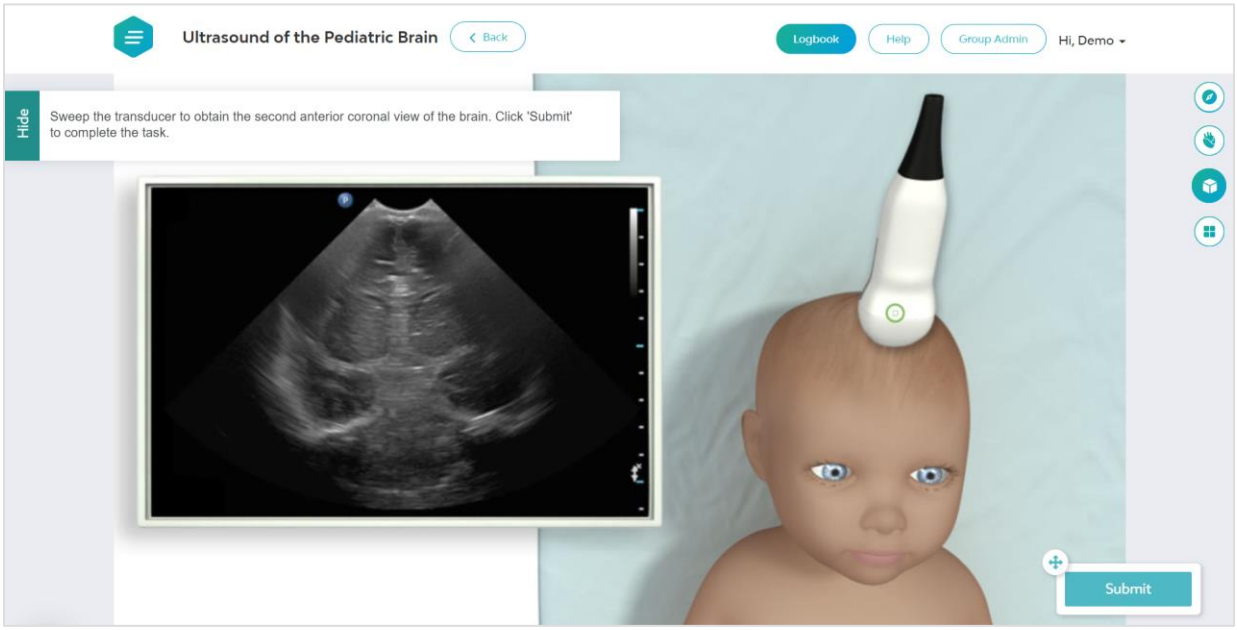

SIMTICS Sonography Module Outlines

General Introductory Modules

Basic Ultrasound Scan Techniques

Learning Objectives

- Define and explain related ultrasound terminology
- Identify orientation on the ultrasound image
- Identify and obtain cross-sectional anatomy on ultrasound images
- Identify vascular landmarks used in abdominal imaging
- Describe and explain the significance of obtaining a relevant patient history
- Describe and explain the reason for patient preparation for ultrasound examinations
- Describe and demonstrate the reason for patient positioning for ultrasound examinations
- Manipulate the transducer in sagittal, transverse, and oblique planes
- Demonstrate different transducer approaches and manipulations used to obtain optimum images on different body types
- Describe and explain the reason for patient breathing techniques in order to obtain optimum images
- Identify and utilize acoustic windows in order to obtain optimum ultrasound images
- Describe and explain the requirements for annotation of ultrasound images
- Describe the technique for measuring structures on ultrasound images
- Using a standard format, write a technical impression
- Demonstrate and describe methods for preventing musculoskeletal injury
- Explain the importance of belonging to a professional association.

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Ultrasound Physics I

Learning Objectives

- Discuss units and conversions
- Discuss metric system
- Discuss scientific notation, exponents and logarithms
- List and describe the properties of sound waves
- Discuss the parameters of sound waves / speed of sound
- Diagram and compare wave motions
- Diagram and explain mechanisms of attenuation and attenuation coefficients
- Explain acoustic impedance
- Discuss power and intensity
- Explain and diagram the laws of reflection and refraction
- Discuss Snell's Law
- Explain pulse echo principle
- Compare pulse wave to continuous wave
- Discuss crystal diameter and thickness
- Define bandwidth and how it affects an image
- Define Q factor and how it affects an image
- Discuss the types of resolution
- Describe how beam configuration affects image
- Discuss Huygens' Principle and how it relates to phase
- Compare focused and unfocused transducers
- Discuss slice thickness and how it affects the image
- Discuss the role of piezoelectricity in the production and processing of ultrasound
- Diagram and explain transducer construction
- Describe the effects of changing transducer frequency
- Compare types of transducer construction and application
- Discuss the types of transducers
- Apply pulse echo to system design
- Discuss the effect of TGC, gain, and power
- List and describe equipment modes
- Diagram and describe scan converters
- List and describe image recorders
- Discuss parts of ultrasound system
- Explain filters, gates, color maps, pre, and post processing

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Ultrasound Physics II

Learning Objectives

- Identify and explain artifacts
- Identify testing results that show artifacts from electrical interference
- Discuss methods used to minimize artifacts
- Compare methods and formulae used to measure power
- Discuss the relationship between power and patient exposure
- List and describe bioeffects
- Discuss methods used to minimize bioeffects
- Discuss contrast and harmonics
- Diagram and describe tests for equipment performance
- List and describe the elements of a comprehensive quality assurance program for an imaging lab
- Discuss the importance of preventive maintenance
- Identify, discuss, and describe the proper use of the following: Doppler, color Doppler, power Doppler, and spectral Doppler ultrasound
- Discuss aliasing and explain how to prevent it
- Discuss fluid and hemodynamics

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Step 2: Bioeffects
- 2.1 Mechanisms
- 2.2 Thermal bioeffects
- 2.3 Mechanical bioeffects
- 2.4 Intensity
- 2.5 Beam uniformity coefficient (BUC)
- 2.6 Duty factor (DF)
- 2.7 Measurement of sound energy
- 2.8 Dosimetry
- 2.9 Epidemiology
- 2.10 American Institute of Ultrasound in Medicine (AIUM) statements
- 2.11 ALARA

Step 3: Contrast and harmonics
- 3.1 Harmonic imaging
- 3.2 Contrast harmonics
- 3.3 Tissue harmonics
- 3.4 Mechanical index
- 3.5 Future applications

Step 4: Quality Assurance
- 4.1 Definition
- 4.2 Test object
- 4.3 Tissue phantom
- 4.4 Doppler phantom
- 4.5 Slice thickness phantom
- 4.6 Performance measurements
- 4.7 Accreditation of ultrasound practices

Step 5: Hemodynamics
- 5.1 Definitions
- 5.2 Laminar flow
- 5.3 Turbulent flow
- 5.4 Energy gradient
- 5.5 Forms of energy
- 5.6 Energy loss
- 5.7 Pressure flow
- 5.8 Poiseuille's law
- 5.9 Bernoulli's equation
- 5.10 Reynolds number

Step 6: Doppler principles
- 6.1 Ohm's law
- 6.2 Doppler frequency
- 6.3 Doppler equation
- 6.4 Positive and negative Doppler shifts
- 6.5 Continuous wave Doppler
- 6.6 Pulse wave Doppler
- 6.7 Color flow Doppler
- 6.8 Spectral analysis
- 6.9 Power Doppler
- 6.10 Resistivity and pulsatility indices

Abdomen

Ultrasound of the Abdominal Vasculature (also in Vascular category)

Learning Objectives

- List indications for ultrasound of the abdominal blood vessels
- Identify abdominal vascular anatomy on diagrams and sonograms
- List signs and symptoms of abdominal vascular disease
- Describe the abdominal vascular protocol
    - Equipment preparation - transducer and preset selection
    - Patient preparation
    - Patient positioning
    - Transducer positions
    - Scan planes
- Identify and obtain sonographic images of the aorta, abdominal aortic branches, and common iliac arteries
- Identify and obtain sonographic images of the inferior vena cava and its tributaries
- Identify and obtain sonographic images of the portal vein, superior mesenteric vein, inferior mesenteric vein, and splenic vein
- Obtain Doppler spectral traces of the aorta and inferior vena cava
- Explain and demonstrate the use of breathing techniques to obtain optimal sonographic images of the blood vessels
- Differentiate normal and abnormal sonographic appearances of the vascular system
- Identify and describe common pathology of the abdominal vasculature
- Explain the important ultrasound characteristics when evaluating an abdominal aortic aneurysm
- Describe the normal and abnormal Doppler patterns of the vascular structures
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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- 4.5 Sonographic features of normal abdominal vessels
  - 4.5.1 Sonographic features of the normal abdominal aorta
  - 4.5.2 Sonographic features of the normal celiac axis
  - 4.5.3 Sonographic features of the normal common hepatic artery
  - 4.5.4 Sonographic features of the normal splenic artery
  - 4.5.5 Sonographic features of the normal superior mesenteric artery (SMA)
  - 4.5.6 Sonographic features of the normal renal arteries
  - 4.5.7 Sonographic features of the normal inferior mesenteric artery (IMA)
  - 4.5.8 Sonographic features of the normal inferior vena cava (IVC)
  - 4.5.9 Sonographic features of the normal renal veins
  - 4.5.10 Sonographic features of the normal superior mesenteric vein (SMV)
  - 4.5.11 Sonographic features of the inferior mesenteric vein (IMV)
  - 4.5.12 Sonographic features of the splenic vein
  - 4.5.13 Sonographic features of the normal portal vein
- 4.6 Variants
- 4.7 Troubleshooting

Step 5: Scan the aorta

- 5.1 Scan the proximal aorta in the longitudinal plane
- 5.2 Scan the mid aorta in the longitudinal plane
- 5.3 Scan the distal aorta in the longitudinal plane
- 5.4 With the patient in the supine position scan the aorta in the transverse plane
- 5.5 Obtain a Doppler spectral trace of the aorta
- 5.6 Scan celiac artery in the longitudinal plane
- 5.7 Scan the celiac artery in the transverse plane
- 5.8 Pathology of the celiac axis
- 5.9 Scan the SMA in the longitudinal plane
- 5.10 Scan the SMA in the transverse plane
- 5.11 Pathology of the SMA

Step 6: Scan the inferior vena cava

- 6.1 Scan the proximal inferior vena cava (IVC) in the longitudinal plane
- 6.2 Scan the distal inferior vena cava (IVC) in the longitudinal plane
- 6.3 Scan the inferior vena cava (IVC) in the transverse plane
- 6.4 Obtain a Doppler spectral trace of the inferior vena cava

Step 7: Scan the portal venous system

- 7.1 Obtain longitudinal images of the main portal vein (MPV)
- 7.2 Obtain a Doppler spectral trace of main portal vein (MPV)
- 7.3 Obtain longitudinal images of the superior mesenteric vein (SMV)
- 7.4 Obtain a Doppler trace of the SMV
- 7.5 Obtain a longitudinal image of the splenic vein
- 7.6 Obtain a Doppler trace of the splenic vein
- 7.7 Obtain a longitudinal image of the inferior mesenteric vein (IMV)
- 7.8 Obtain a Doppler trace of the IMV

Step 8: Complete the procedure

Ultrasound of the Gallbladder

Learning Objectives

- List indications for ultrasound of the gallbladder
- Identify gallbladder anatomy
- Explain gallbladder physiology
- List clinical symptoms of gallbladder disease
- Describe and apply the gallbladder protocol
    - Patient preparation
    - Transducer selection and preset selection
    - Patient positioning
    - Transducer positions and scan planes
- Identify and obtain sonographic images of the gallbladder, bile ducts, and portal triad
- Identify and obtain sonographic images of the extrahepatic biliary system
- Obtain measurements of the gallbladder and related structures
- Explain and demonstrate the use of breathing techniques to obtain optimal sonographic images of the gallbladder
- Differentiate normal and abnormal sonographic appearances of the gallbladder
- List and identify common neoplasms of the gallbladder
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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Ultrasound of the Liver

Learning Objectives

- List indications for ultrasound of the liver
- Identify the liver anatomy
- Explain liver physiology and laboratory findings
- List clinical symptoms of liver disease
- Describe and apply the liver ultrasound scan protocol
    - Patient preparation
    - Transducer selection and preset selection
    - Patient positioning
    - Transducer positions
    - Scan plane
- Identify and obtain sonographic images of liver, vascular structures, ligaments, and fissures of the liver
- Obtain measurements of the liver
- Explain and demonstrate the use of breathing techniques to obtain optimal sonographic images of the liver
- Differentiate normal and abnormal sonographic appearances of the liver
- Differentiate and describe common pathologies of the liver on sonographic images
- Identify and obtain images in hepatic trauma
- Identify and obtain images in hepatic transplantation
- Identify and obtain images of vascular flow abnormalities
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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Ultrasound of the Pancreas

Learning Objectives

- List indications for ultrasound of the pancreas
- Identify pancreas anatomy
- Explain pancreas physiology
- List clinical symptoms of pancreatic disease
- Identify laboratory data relevant to the pancreas
- Describe and apply the pancreas protocol
    - Patient preparation
    - Transducer and preset selection
    - Patient positioning
    - Transducer positions
    - Scan planes
- Identify and obtain sonographic images of the pancreas
- Identify and obtain sonographic images of the vascular and ductal landmarks of the pancreas
- Obtain measurements of the pancreas and related structures
- Explain and demonstrate the use of breathing techniques to obtain optimal sonographic images of the pancreas
- Differentiate normal and abnormal sonographic appearances of the pancreas
- List and identify common neoplasms of the pancreas
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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Ultrasound of the Gastrointestinal Tract

Learning Objectives

- List indications for ultrasound of the gastrointestinal tract
- Identify the gastrointestinal tract anatomy
- Explain gastrointestinal physiology
- List clinical symptoms of gastrointestinal tract disease
- Describe and apply the gastrointestinal tract protocol:
  - Patient preparation
  - Transducer and preset selection
  - Patient positioning
  - Transducer positions
  - Scan planes
- Identify and obtain sonographic images of the gastrointestinal tract
- Explain and demonstrate the use of breathing techniques and graded compression to obtain optimal sonographic images of the gastrointestinal tract
- Differentiate normal and abnormal sonographic appearances of the gastrointestinal tract
- Describe and identify pathologies of the gastrointestinal tract
- Describe and identify abnormalities of the gastrointestinal tract
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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Ultrasound of the Retroperitoneum, Peritoneal Cavity & Abdominal Wall

Learning Objectives

- List indications for ultrasound of the retroperitoneum, peritoneal cavity, and abdominal wall
- Identify the anatomy of the retroperitoneum, peritoneal cavity, and abdominal wall
- Explain the basic physiology of the retroperitoneum, peritoneal cavity, and abdominal wall
- Distinguish potential spaces for fluid collections in the abdominal and pelvic retroperitoneum
- List clinical symptoms of retroperitoneal, peritoneal, and abdominal wall disease
- Describe and apply the retroperitoneum, peritoneal cavity, and abdominal wall protocol
    - Patient preparation
    - Transducer and preset selection
    - Patient positioning
    - Transducer positions
    - Scan planes
- Identify and obtain sonographic images of the retroperitonium, peritoneal cavity, and abdominal wall
- Explain and demonstrate the use of breathing techniques to obtain optimal sonographic images of the retroperitoneum, peritoneal cavity, and abdominal wall
- Identify and obtain images of the retroperitoneum, peritoneal cavity, and abdominal wall
- Describe and identify pathologies of the retroperitoneum
- Describe and identify abnormalities of the peritoneal cavity and abdominal wall
- Explain sonography occupational health and safety issues (see references)
- Explain Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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4.4 Annotations required
4.5 Sonographic features of a normal retroperitoneum
4.6 Sonographic features of a normal peritoneal cavity
4.7 Troubleshooting

Step 5: Scan the retroperitoneum and peritoneal cavity
5.1 Scan the subphrenic space
5.2 Scan the perirenal space (also called the perinephric space) and pararenal spaces
5.3 Scan the lesser sac
5.4 Scan the right and left lower quadrants
5.5 Scan the pelvic cul-de-sac (Pouch of Douglas)

Step 6: Commence the abdominal wall scanning protocol
6.1 Patient position
6.2 Scan Plane
6.3 Abdominal wall image requirements
6.4 Annotations required
6.5 Sonographic features of the normal abdominal wall
6.6 Troubleshooting

Step 7: Scan the abdominal wall
7.1 Scan the anterior abdominal wall in the transverse plane
7.2 Scan the anterior abdominal wall in the longitudinal plane
7.3 Scan the inguinal canal/groin

Step 8: Complete the procedure

Ultrasound of the Spleen

Learning Objectives

- List indications for ultrasound of the spleen
- Identify spleen anatomy
- Explain splenic physiology and laboratory findings
- List clinical symptoms of splenic disease
- Describe and apply the spleen protocol
    - Patient preparation
    - Transducer and preset selection
    - Patient positioning
    - Transducer positions
    - Scan planes
- Identify and obtain sonographic images of the spleen and vascular structures
- Obtain measurements of the spleen
- Explain and demonstrate the use of breathing techniques to obtain optimal sonographic images of the spleen
- Differentiate normal and abnormal sonographic appearances of the spleen
- Differentiate and describe common pathologies of the spleen on sonographic images
- Identify and obtain images of vascular flow of the splenic artery and vein
- Identify and discuss the physiology of congestion of the spleen
- Compare and contrast focal and diffuse disease of the spleen

- Explain Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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Ultrasound of the Urinary Tract & Adrenal Glands

Learning Objectives

- List indications for ultrasound of the urinary tract and adrenal glands
- Identify the anatomy of the urinary tract and adrenal glands
- Explain the basic physiology of the urinary tract and adrenal glands
- Identify laboratory data relevant to the urinary tract
- Identify laboratory data relevant to the adrenal glands
- Describe and apply urinary tract protocol
    - Patient preparation
    - Transducer and preset selection
    - Patient positioning
    - Transducer positions
    - Scan planes
- Identify and obtain sonographic images of the urinary tract
- Identify and obtain sonographic images of the adrenal gland
- Obtain measurements of the kidneys and related structures

- Explain and demonstrate the use of breathing techniques to obtain optimal sonographic images of the urinary tract and adrenal glands
- Differentiate normal and abnormal sonographic appearances of the urinary tract and adrenal glands
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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Abdomen 1 – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Abdominal Vessels
- Gallbladder
- Liver

- Pancreas

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

Abdomen 2 – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Gastrointestinal Tract
- Retroperitoneum, Peritoneal Cavity & Abdominal Wall
- Spleen
- Urinary Tract & Adrenal Glands

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

Obstetrics

Ultrasound Assessment during First Trimester

Learning Objectives

- List and describe the sequence of embryonic development.
- Identify the anatomy of early intrauterine pregnancy on diagrams and sonograms.
- Describe how to obtain a patient history and correlate the information with laboratory results.
- Recognize and differentiate between intrauterine, ectopic, heterotropic, and multiple pregnancies, including signs, symptoms, and locations.
- Describe and demonstrate methods for calculating gestational age during the first trimester of pregnancy.
- Describe and recognize on images the features of various types of failed pregnancy in the first trimester.
- Describe and recognize on images embryonic abnormalities in the first trimester.
- Describe and recognize on images normal and abnormal amniotic fluid in the first trimester.
- Describe and recognize on images normal and abnormal placental anatomy in the first trimester.
- Explain the sonographic features of fetal demise of the first trimester.
- Describe and recognize on images first trimester abnormalities of the uterus and adnexae.
- Describe a nuchal translucency measurement.
- Follow relevant protocols when scanning.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Ultrasound Assessment during Second & Third Trimesters

Learning Objectives

- Identify on diagrams and sonograms normal fetal anatomy of the second and third trimesters.
- Describe and demonstrate gestational age assessment in the second and third trimesters, including multiple pregnancies.
- Describe fetal presentation and position.
- Identify on diagrams and sonograms normal feto-placental anatomy of the second and third trimesters.
- Compare and contrast the advantages of 3D/4D imaging with those of conventional 2D imaging.
- Follow relevant protocols when scanning.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Step 3: Select the transducer
Step 4: Commence the second and third trimester pregnancy scanning protocol
- 4.1 Patient position
- 4.2 Scan plane
- 4.3 Standard second and third trimester protocol image requirements
  - 4.3.1 Fetal lie, life, number, presentation and situs
  - 4.3.2 Maternal uterus and adnexae
  - 4.3.3 Amniotic fluid and placental location
  - 4.3.4 Fetal biometry
  - 4.3.5 Fetal anatomy
- 4.4 Annotations required
- 4.5 Troubleshooting

Step 5: Scan for fetal viability, number, presentation, and situs
- 5.1 Determine fetal lie and presentation
- 5.2 Scan the fetus for fetal viability
- 5.3 Determine fetal number
- 5.4 Determine fetal organ situs

Step 6: Scan the maternal uterus and adnexae
Step 7: Scan for amniotic fluid and placental location
- 7.1 Scan for amniotic fluid
  - 7.1.1 Calculate amniotic fluid volume
- 7.2 Determine pacental location

Step 8: Assess fetal biometry
- 8.1 Calculate the biparietal diameter
- 8.2 Head circumference
- 8.3 Abdominal circumference
- 8.4 Femur length
- 8.5 Transcerebellar diameter
- 8.6 Cephalic index

Step 9: Scan fetal anatomy relevant to gestational age
- 9.1 Scan the fetal head and face
  - 9.1.1 Cranium
  - 9.1.2 Orbits
  - 9.1.3 Lips and nostrils
  - 9.1.4 Fetal profile
- 9.2 Scan the fetal spine
- 9.3 Scan the fetal thorax
  - 9.3.1 Diaphragm
  - 9.3.2 Fetal heart four-chamber view
  - 9.3.3 Fetal heart left ventricular outflow tract, or aortic outflow tract
  - 9.3.4 Fetal heart right ventricular outflow tract or pulmonary outflow tract.
  - 9.3.5 Fetal ductal arch and aortic arch views
- 9.4 Scan the fetal abdomen
  - 9.4.1 Fetal stomach
  - 9.4.2 Fetal liver, spleen, and gallbladder
  - 9.4.3 Fetal kidneys and adrenals
  - 9.4.4 Fetal bowel
  - 9.4.5 Fetal cord insertion and umbilical cord
  - 9.4.6 Fetal bladder

Ultrasound Assessment of Fetal Growth (& High Risk Pregnancies)

Learning Objectives

- Describe and demonstrate how to evaluate normal and abnormal findings relating to the amniotic fluid, placenta, and umbilical cord.
- Describe the use of Doppler in evaluating fetoplacental circulation.
- Give the criteria and demonstrate the testing of fetal well-being, including the biophysical profile.
- Describe techniques for the sonographic evaluation of high-risk pregnancies including multiple gestations.
- List and describe peri- and post-pregnancy maternal diseases and complications and be able to compare immune and non immune hydrops.
- Explain how intrauterine growth restriction is evaluated by ultrasound.
- Describe and recognize on images abnormalities that may occur with multiple pregnancies.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Ultrasound Assessment of Fetal Anomalies

Learning Objectives

- Describe and recognize on images abnormalities of the following: cranium, face, neck, vertebral column, thorax, lungs, anterior abdominal wall, hepatobiliary system, gastrointestinal tract, abdomen, urinary tract, genitalia, extremities, skeleton, umbilical cord, circulatory system.
- Describe congenital heart abnormalities and fetal abnormalities associated with the fetal thorax.
- Discuss the use of genetic testing in pregnancy, including amniocentesis, chorionic villus sampling (CVS), and nuchal translucency.
- Explain procedures related to fetal therapies.
- Describe and recognize on images abnormalities of chromosomes.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act

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- 4.1 Patient position
- 4.2 Scan plane
- 4.3 Targeted fetal anomaly protocol image requirements
  - 4.3.1 Fetal lie, life, number, presentation, and situs
  - 4.3.2 Maternal uterus and adnexae
  - 4.3.3 Amniotic fluid and placental location
  - 4.3.4 Fetal biometry
  - 4.3.5 Fetal anatomy
- 4.4 Annotations required
- 4.5 Troubleshooting

Step 5: Perform targeted fetal anomaly evaluation
- 5.1 Scan the fetal head and face
- 5.2 Scan the fetal spine
- 5.3 Scan the fetal thorax and heart
- 5.4 Scan the abdomen and pelvis
- 5.5 Scan the fetal limbs and extremities

Step 6: Genetic testing techniques and common genetic conditions identified by ultrasound
- 6.1 Maternal serum markers
- 6.2 Nuchal translucency
- 6.3 Chorionic villus sampling
- 6.4 Amniocentesis

Step 7: Fetal therapies under ultrasound guidance
- 7.1 Cordocentesis
- 7.2 Umbilical cord therapies
- 7.3 Fetal shunting procedures
- 7.4 Embryo reduction and selective fetocide

Step 8: Complete the procedure

Obstetrics 1 – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:
- First Trimester
- Second and Third Trimesters

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

Obstetrics 2 – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:
- Fetal Anomalies
- Fetal Growth and High Risk Pregnancies

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

Pediatrics

General Pediatric Ultrasound Protocols and Ultrasound of the Pediatric Abdomen

Learning Objectives

- List, demonstrate, and discuss methods for effectively communicating with children of various ages.
- Describe additional considerations when imaging patients in the neonatal intensive care unit.
- Identify and describe differences between adult and neonatal abdominal anatomy on diagrams and sonograms.
- Identify and describe sonographic images of common pediatric pathologies, including hypertrophic pyloric stenosis, appendicitis, and intussusception.
- Identify the anatomy of the neonatal kidney and adrenal gland on diagrams and sonograms.
- Identify and describe sonographic images of pathologies of the kidney and adrenal gland.
- Describe and demonstrate the protocols for sonographic scanning of the pediatric abdomen.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Ultrasound Assessment of the Pediatric Brain

Learning Objectives

- Identify on diagrams and sonograms the anatomy of the neonatal brain.
- Describe the protocol for ultrasound evaluation of the neonatal brain.
- List and describe developmental defects in the neonatal brain.
- Describe and recognize on images neural tube defects of the neonate.
- Describe and recognize on images neonatal brain lesions.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Ultrasound Assessment of the Pediatric Hip and Spine

Learning Objectives

- Identify on diagrams and sonograms the anatomy of the neonatal hip and spine.
- Describe the protocol for ultrasound evaluation of the neonatal hip and spine.
- List and describe developmental defects in the neonatal hip and spine.
- Describe and recognize on images defects of the neonatal spine.
- Describe and recognize on images neonatal hip anomalies.
- List steps for relevant protocols.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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5.3 Scan the left neonatal hip in the coronal and transverse planes
5.4 Scan the pediatric hip with an anterior approach
5.4.1 Scan the pediatric hip in the longitudinal plane
5.4.2 Scan the pediatric hip in the transverse plane
Step 6: Scan the neonatal spine in sagittal and axial planes
6.1 Scan the neonatal spine in the sagittal plane
6.2 Scan the neonatal spine in the axial plane
Step 7: Complete the procedure

Pediatrics – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the 3 Pediatrics modules above.

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

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Reproductive Systems & Small Parts

Ultrasound Assessment of the Female Breast

Learning Objectives

- Identify the anatomy and explain the physiology of the breast on diagrams and sonograms.
- Describe and demonstrate the protocol for sonographic scanning of the breast, including the clock and quadrant methods, and targeted examinations based on mammographic findings.
- Describe the various diagnostic pathways that may lead to a sonographic breast examination, and explain how the ultrasound findings are correlated with other imaging modalities.
- Identify and describe sonographic images of benign and malignant features and common breast pathologies.
- Explain biopsy techniques for breast tumors.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act (see reference).

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5.3 Targeted examination
5.3.1 Scan the quadrant in the longitudinal plane
5.3.2 Scan the quadrant in the transverse plane
5.4 Sonographic features of a normal breast
5.5 Sonographic features of breast variants
Step 6: Scan the nipple and sub-areolar tissue
6.1 Scan the nipple and areola in the longitudinal and transverse planes
6.2 Sonographic features of the nipple and sub-areolar tissue
Step 7: Scan the axilla
7.1 Scan the axilla in the longitudinal plane
7.2 Scan the axilla in the transverse plane
Step 8: Biopsy techniques
8.1 Preparation
8.1.1 Equipment
8.1.2 Patient
8.1.3 Operator
8.2 Techniques
8.2.1 Aspiration of cysts
8.2.2 Fine-needle aspiration cytology
8.2.3 Drainage procedures
8.2.4 Large-core needle biopsy
8.2.5 Vacuum-assisted needle biopsy
8.2.6 Pre-operative needle (wire) localization
8.2.7 Open (surgical) biopsy
8.2.8 Sentinel node biopsy
Step 9: Complete the procedure

Ultrasound Assessment of the Female Reproductive Organs

Learning Objectives

- Describe and demonstrate the protocol for sonographic scanning of the female pelvis, including transabdominal and endovaginal scanning.
- Identify and explain the anatomy and physiology of the female pelvis on diagrams and sonograms.
- Describe and demonstrate Doppler evaluation of the female pelvis, including uterus and ovaries.
- Identify on images, common abnormalities and pathologies of the uterus and adnexa, including fallopian tubes, ovaries, and the appearance and locations of the various types of intrauterine contraceptive devices.
- Describe the sonographic evaluation and follow-up of the infertile patient.
- Describe the interventional and post-operative uses of ultrasound.
- Differentiate the sonographic appearances of the female reproductive organs in relation to the menstrual cycle, the use of contraceptives and hormone replacement, and following chemotherapy.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act (see reference).

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Ultrasound Assessment of the Male Reproductive System

Learning Objectives

- Identify the anatomy and explain the physiology of the scrotum on diagrams and sonograms.
- Describe and demonstrate the protocol for sonographic scanning of the scrotum.
- Identify and describe sonographic images of congenital abnormalities of the scrotum.
- Identify and describe sonographic images of pathologies of the scrotum.
- Identify and describe sonographic images of extratesticular disease processes.

- Identify the anatomy and explain the physiology of the prostate on diagrams and sonograms.
- Describe and demonstrate the protocol for transabdominal and endorectal sonographic scanning of the prostate.
- Identify and describe sonographic images of benign and malignant pathologies of the prostate, including benign hyperplasia, prostatitis, carcinoma, and calculi.
- Explain the technique for prostate biopsy.
- Define the criteria for an ultrasound appearance of prostate tumor staging.
- Explain the technique for radiation seed implantation.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act (see reference).

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Ultrasound Assessment of the Thyroid & Parathyroid Glands

Learning Objectives

- Define and use related medical terminology.
- Describe and demonstrate techniques for imaging the thyroid gland.
- Discuss functional abnormalities of the thyroid gland.
- Correlate laboratory data relevant to the thyroid and parathyroid glands.
- Describe, and recognize on images, pathologies of the thyroid gland.
- Identify the anatomy of the parathyroid glands on diagrams and sonograms.
- Describe and demonstrate techniques for imaging the parathyroid glands.
- Describe, and recognize on images, pathologies of the parathyroid glands.
- List and describe other neck masses.
- Follow relevant protocols when scanning.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act (see reference).

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Human Reproduction – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Breast
- Female Reproductive Systems
- Male Reproductive Systems

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

Vascular

Ultrasound Assessment of the Carotid, Subclavian, & Vertebral Arteries

Learning Objectives

- Describe the principles of Doppler ultrasound
- Perform ultrasound scans of the carotid, vertebral, and subclavian arteries to include 2D anatomy, color flow, and Doppler analysis
- Scan and identify:
    - Common carotid artery
    - Internal carotid artery
    - External carotid artery
    - Vertebral artery
    - Subclavian artery
- Describe various methods of carotid interpretation
- Differentiate normal and abnormal sonographic appearances of the carotid, vertebral, and subclavian arteries
- Differentiate and describe common pathologies of the carotid, vertebral, and subclavian arteries on sonographic images
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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Ultrasound Assessment of the Lower Limb Arteries

Learning Objectives

- Discuss arterial anatomy, physiology, and hemodynamics
- Describe the effects of atherosclerosis
- Describe physiologic arterial testing of the lower limbs:
  - Ankle-Brachial Index (ABI)
  - Segmental pressures
  - Exercise stress testing
  - Toe pressure
  - Treadmill exercise
- Discuss color duplex imaging of the lower limb arteries:
  - Aorto-iliac segment
  - Femoral-popliteal arterial segment
  - Popliteal artery
  - Tibial artery
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

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Ultrasound Assessment of the Lower Limb Veins

Learning Objectives

- Discuss venous anatomy and hemodynamics
- Perform an ultrasound scan of the lower extremity venous vessels to include 2D anatomy, color flow, and Doppler analysis (valve competency and vessel patency)
- Scan and identify
    - Common femoral vein (CFV)
    - Saphenofemoral junction (SFJ)
    - Superficial femoral vein (SFV)
    - Saphenous vein, popliteal vein
- Compress with probe frequently to determine compressibility
- Evaluate for thrombus
- Evaluate for flow with distal augmentation
- Evaluate valve competence with proximal compression
- Continue the evaluation for posterior tibial and peroneal veins
- Explain Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

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4.1 Patient position
4.2 Scan plane
4.3 Images required
4.4 Annotation
4.5 Sonographic features of normal lower limb veins
4.6 Variants
4.7 Troubleshooting
Step 5: Scan and identify the common femoral vein, femoral vein, and popliteal vein
Step 6: Compress with probe frequently to determine compressibility
Step 7: Evaluate for thrombus
7.1 Pathology of venous thrombosis
Step 8: Valve competence with Valsalva, augmentation, and photoplethysmography (PPG)
8.1 Pathology of venous incompetence
Step 9: Continue evaluation of posterior tibial and peroneal veins

Ultrasound of the Abdominal Vasculature (also in Abdomen category)

Learning Objectives

- List indications for ultrasound of the abdominal blood vessels
- Identify abdominal vascular anatomy on diagrams and sonograms
- List signs and symptoms of abdominal vascular disease
- Describe the abdominal vascular protocol
    - Equipment preparation - transducer and preset selection
    - Patient preparation
    - Patient positioning
    - Transducer positions
    - Scan planes
- Identify and obtain sonographic images of the aorta, abdominal aortic branches, and common iliac arteries
- Identify and obtain sonographic images of the inferior vena cava and its tributaries
- Identify and obtain sonographic images of the portal vein, superior mesenteric vein, inferior mesenteric vein, and splenic vein
- Obtain Doppler spectral traces of the aorta and inferior vena cava
- Explain and demonstrate the use of breathing techniques to obtain optimal sonographic images of the blood vessels
- Differentiate normal and abnormal sonographic appearances of the vascular system
- Identify and describe common pathology of the abdominal vasculature
- Explain the important ultrasound characteristics when evaluating an abdominal aortic aneurysm
- Describe the normal and abnormal Doppler patterns of the vascular structures
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act (see reference)

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- 0.1 Principles of Doppler ultrasound
- 0.2 Basic physiology of the abdominal blood vessels
- 0.2.1 Signs and symptoms of abdominal vascular disease

Step 1: Preparation
- 1.1 Equipment preparation
- 1.2 Patient preparation
- 1.3 Operator preparation

Step 2: Expose the abdomen and apply gel

Step 3: Select the transducer and obtain images of the abdominal blood vessels

Step 4: Commence the scanning protocol for the abdominal blood vessels
- 4.1 Patient position
- 4.2 Scan plane
- 4.3 Images required
- 4.4 Annotations required
- 4.5 Sonographic features of normal abdominal vessels
  - 4.5.1 Sonographic features of the normal abdominal aorta
  - 4.5.2 Sonographic features of the normal celiac axis
  - 4.5.3 Sonographic features of the normal common hepatic artery
  - 4.5.4 Sonographic features of the normal splenic artery
  - 4.5.5 Sonographic features of the normal superior mesenteric artery (SMA)
  - 4.5.6 Sonographic features of the normal renal arteries
  - 4.5.7 Sonographic features of the normal inferior mesenteric artery (IMA)
  - 4.5.8 Sonographic features of the normal inferior vena cava (IVC)
  - 4.5.9 Sonographic features of the normal renal veins
  - 4.5.10 Sonographic features of the normal superior mesenteric vein (SMV)
  - 4.5.11 Sonographic features of the inferior mesenteric vein (IMV)
  - 4.5.12 Sonographic features of the splenic vein
  - 4.5.13 Sonographic features of the normal portal vein
- 4.6 Variants
- 4.7 Troubleshooting

Step 5: Scan the aorta
- 5.1 Scan the proximal aorta in the longitudinal plane
- 5.2 Scan the mid aorta in the longitudinal plane
- 5.3 Scan the distal aorta in the longitudinal plane
- 5.4 With the patient in the supine position scan the aorta in the transverse plane
- 5.5 Obtain a Doppler spectral trace of the aorta
- 5.6 Scan celiac artery in the longitudinal plane
- 5.7 Scan the celiac artery in the transverse plane
- 5.8 Pathology of the celiac axis
- 5.9 Scan the SMA in the longitudinal plane
- 5.10 Scan the SMA in the transverse plane
- 5.11 Pathology of the SMA

Step 6: Scan the inferior vena cava
- 6.1 Scan the proximal inferior vena cava (IVC) in the longitudinal plane
- 6.2 Scan the distal inferior vena cava (IVC) in the longitudinal plane
- 6.3 Scan the inferior vena cava (IVC) in the transverse plane
- 6.4 Obtain a Doppler spectral trace of the inferior vena cava

Step 7: Scan the portal venous system
- 7.1 Obtain longitudinal images of the main portal vein (MPV)

Ultrasound Vessel Mapping

Learning Objectives

- Discuss preoperative vein-artery mapping for the following procedures:
  - Sclerotherapy
  - Perforator veins and varicosities
  - Radial artery harvest
  - Arteriovenous fistula for dialysis
  - Suitability for venous bypass graft and harvest
- Discuss venous imaging of the upper extremity for deep venous thrombosis
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

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Neck & Duplex Imaging – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Thyroid and Parathyroid
- Cerebrovascular System
- Lower Limb Veins

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

Vascular 1 – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Cerebrovascular System
- Lower Limb Veins

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

Vascular 2 – Integrated Clinical (Simulations and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Lower Limb Arteries
- Vessel Mapping

In test mode the scenarios are presented at random from any of these modules, with the goal of helping students prepare for a clinical situation where each patient is different.

Echocardiography

Cardiovascular Pathology for Sonographers

Learning Objectives

- Define and use medical terminology related to cardiovascular pathology
- Describe cell injury and repair
- Explain the mechanisms of inflammation
- Explain the importance of obtaining a full clinical history of the patient
- Describe cellular changes that result in neoplasia
- Differentiate between benign and malignant tumors, and give examples of each
- Describe mechanisms of fluid disorders, and give examples
- Describe mechanisms of hemodynamic disorders, and give examples
- Describe disorders and possible treatments of the venous system
- Describe disorders and possible treatments of the arterial system
- Differentiate between common signs and symptoms of cardiovascular and venous diseases
- Describe diagnostic tests used to diagnose cardiovascular disease, and their application to certain diseases
- Describe cardiac catheterization and interventional procedures for coronary artery disease
- Describe acute cardiac conditions and emergency procedures
- Discuss techniques and benefits of cardiac rehabilitation

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Basic Echocardiography Techniques

Learning Objectives

- Define and explain ultrasound terminology
- Identify orientation on the ultrasound image
- Identify and obtain echocardiographic views
- Identify cardiac landmarks
- Describe the reason for, and demonstrate, patient positioning for cardiac ultrasound examinations
- Manipulate the transducer in various planes
- Describe patient breathing techniques in order to obtain optimum images and explain the reason for the techniques
- Describe the technique for measuring structures on ultrasound images
- Write a technical impression using a standard format
- Demonstrate and describe methods for preventing musculoskeletal injury
- Explain the importance of belonging to a professional organization

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- 1.1.2 Scanning planes
- 1.1.3 On-screen orientation
- 1.2 Cross-sectional anatomy of the heart
- 1.3 Anatomical landmarks
  - 1.3.1 Thoracic landmarks
  - 1.3.2 Cardiac landmarks
- 1.4 Scanning windows

Step 2: Introduction to echocardiography

- 2.1 Basic cardiac physiology
- 2.2 Signs and symptoms of cardiac disease
- 2.3 Types of echocardiography (TTE, TEE, Stress echo)
  - 2.3.1 Transthoracic echocardiography
  - 2.3.2 Transesophageal echocardiography
  - 2.3.3 Stress echocardiography

Step 3: Preprocedure considerations

- 3.1 Patient preparation
- 3.2 History
- 3.3 Patient position
- 3.4 Equipment

Step 4: Basic techniques

- 4.1 Transducer selection
- 4.2 Transducer manipulation
  - 4.2.1 Sweeping
  - 4.2.2 Rotating
  - 4.2.3 Rocking
- 4.3 Transducer pressure
- 4.4 Transmission gel
- 4.5 Breathing

Step 5: Two-dimensional imaging

- 5.1 Image optimization
  - 5.1.1 Sector size
  - 5.1.2 Focal zones
  - 5.1.3 Time gain compensation
  - 5.1.4 Lateral gain compensation
  - 5.1.5 Zoom
  - 5.1.6 Gain
  - 5.1.7 Dynamic range
  - 5.1.8 Harmonics imaging

Step 6: M-mode

- 6.1 Image optimization
  - 6.1.1 Cursor alignment
  - 6.1.2 Sweep speed
  - 6.1.3 Gain

Step 7: Doppler

- 7.1 Principles of Doppler ultrasound
- 7.1.1 Spectral Doppler
- 7.1.2 Color Doppler

Step 8: Standard echocardiography procedure

- 8.1 Protocol

Basic Echocardiography Views

Learning Objectives

- Describe and explain heart anatomy
- Describe and explain heart physiology
- List indications for ultrasound of the heart
- Review and apply the echocardiography protocol
- Describe and explain the reason for patient preparation for echocardiography
- Describe and explain transducer and preset selection
- Describe and demonstrate the reason for patient positioning for echocardiography
- Describe and demonstrate the use of scanning planes and the echocardiography protocol
- Demonstrate different transducer positions to obtain optimal images
- Describe and explain the reason for patient breathing techniques in order to obtain optimum images
- Identify and obtain images of heart, ascending aorta, main pulmonary arteries, and great veins

- Obtain measurements of various structures within the heart
- Differentiate normal and abnormal sonographic appearances of the heart
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

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Perform Electrocardiogram (ECG) - 12 Lead

Learning Objectives

- Describe the anatomy and physiology of the heart
- Identify the basic electrophysiology of the heart
- Describe the sinus mechanisms
- Describe atrial rhythms
- Describe junctional rhythms
- Describe ventricular rhythms
- Describe atrioventricular (AV) blocks
- Describe pacemaker rhythms
- Explain and demonstrate the 12-lead ECG
- Describe stress testing and Holter monitoring

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- 4.5 Evaluate overall appearance

Step 5: Sinus rhythms
- 5.1 Features of sinus rhythms
- 5.2 Sinus bradycardia
- 5.3 Sinus tachycardia
- 5.4 Sinus arrhythmia
- 5.5 Sinoatrial block
- 5.6 Sinus arrest

Step 6: Atrial arrhythmia
- 6.1 Premature atrial complexes (PACs)
- 6.2 Wandering atrial pacemaker
- 6.3 Multifocal atrial tachycardia
- 6.4 Supraventricular tachycardia
  - 6.4.1 Atrial tachycardia
  - 6.4.2 AVNRT
  - 6.4.3 AVRT
- 6.5 Atrial flutter
- 6.6 Atrial fibrillation

Step 7: Junctional arrhythmia
- 7.1 Premature junctional complexes (PJCs)
- 7.2 Junctional escape beats/rhythm
- 7.3 Accelerated junctional rhythm
- 7.4 Junctional tachycardia

Step 8: Ventricular arrhythmia
- 8.1 Premature ventricular complexes
  - 8.1.1 Types of PVC
- 8.2 Ventricular escape beats
- 8.3 Idioventricular rhythm
- 8.4 Accelerated idioventricular rhythm (AIVR)
- 8.5 Ventricular tachycardia (VT)
  - 8.5.1 Types of VT
- 8.6 Ventricular fibrillation (VF)
- 8.7 Asystole
- 8.8 Pulseless electrical activity

Step 9: AV blocks
- 9.1 First-degree AV block
- 9.2 Second-degree AV block
  - 9.2.1 Second-degree AV block type I (Wenckebach, or Mobitz type I)
  - 9.2.2 Second-degree AV block type II (Mobitz type II)
  - 9.2.3 Second-degree AV block, 2:1 conduction (2:1 AV block)
- 9.3 Third-degree/complete AV block

Step 10: Pacemaker rhythms
- 10.1 Pacemaker terminology
- 10.2 Pacemaker systems
  - 10.2.1 Single-chamber pacemakers
  - 10.2.2 Dual-chamber pacemakers
  - 10.2.3 Transcutaneous pacing
- 10.3 Pacemaker malfunction and complications
- 10.4 Analyzing pacemaker function with an ECG

Doppler Techniques and Instrumentation

Learning Objectives

- Review normal cardiac anatomy.
- Describe and demonstrate the use of spectral Doppler and color Doppler instrumentation.
- Identify and describe anatomy represented on spectral Doppler tracings.
- Differentiate between normal and abnormal anatomy represented on color images.
- Describe and demonstrate tissue Doppler.
- Describe and identify tissue Doppler wave forms.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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- 1.2 Patient preparation
  - 1.2.1 Position the patient
  - 1.2.2 Apply ECG electrodes
- 1.3 Operator preparation

Step 2: Select the transducer and apply the gel

Step 3: Obtain the left parasternal long axis view

- 3.1 Scan the mitral valve, using color
- 3.2 Scan the aortic valve, using color

Step 4: Obtain the left parasternal short axis view

- 4.1 Scan the aortic valve, using color
- 4.2 Scan the tricuspid valve, using color
- 4.3 Scan the tricuspid valve, using pulsed wave Doppler
- 4.4 Scan the tricuspid valve, using continuous wave Doppler
- 4.5 Scan the pulmonary valve, using color
- 4.6 Scan the pulmonary valve, using pulsed wave Doppler
- 4.7 Scan the pulmonary artery, using continuous wave Doppler
- 4.8 Scan the right ventricular outflow tract, using pulsed wave Doppler
- 4.9 Scan the right ventricular outflow tract, using continuous wave Doppler

Step 5: Obtain the apical four-chamber view

- 5.1 Scan the mitral valve, using color
- 5.2 Scan the mitral valve orifice, using pulsed wave Doppler
- 5.3 Scan the mitral valve, using continuous wave Doppler
- 5.4 Scan the tricuspid valve, using color
- 5.5 Scan the tricuspid valve orifice, using pulsed wave Doppler
- 5.6 Scan the tricuspid valve, using continuous wave Doppler
- 5.7 Scan the pulmonary vein, using pulsed wave Doppler
- 5.8 Perform tissue Doppler imaging of the septal annulus, using pulsed wave Doppler
- 5.9 Perform tissue Doppler imaging of the lateral annulus, using pulsed wave Doppler

Step 6: Obtain the apical five-chamber view

- 6.1 Scan the left ventricular outflow tract, using color
- 6.2 Scan the left ventricular outflow tract, using pulsed wave Doppler
- 6.3 Scan the aortic valve, using color
- 6.4 Scan the aortic valve, using continuous wave Doppler

Step 7: Obtain the subcostal view

- 7.1 Scan the inferior vena cava and hepatic veins, using color
- 7.2 Scan the abdominal aorta, using pulsed wave Doppler
- 7.3 Obtain a four-chamber view of the interatrial septum, using color

Step 8: Obtain the suprasternal view

- 8.1 Scan the aorta long axis, using color
- 8.2 Scan the aorta long axis, using pulsed wave Doppler
- 8.3 Scan the aorta long axis, using continuous wave Doppler
- 8.4 Scan the main pulmonary artery, using color
- 8.5 Continuous wave Doppler of the ascending aorta, with Pedoff probe

Step 9: Obtain the right parasternal long axis view

- 9.1 Scan the thoracic aorta, using continuous wave Doppler with Pedoff probe

Step 10: Complete the procedure

Embryology & Echocardiography Assessment of Congenital Heart Disease

Learning Objectives

- Define and use related medical terminology.
- Understand and discuss cardiac embryology.
- List and describe common congenital abnormalities.
- Identify and describe the sonographic appearance of common congenital abnormalities.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Echocardiography Assessment of Endocarditis & Pericarditis

Learning Objectives

- Describe and demonstrate the sonographic appearance of subacute bacterial endocarditis, common cardiac tumors, and thrombus.
- Describe and demonstrate the hemodynamics and pathophysiology associated with pericardial diseases.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Transesophageal & Stress Echocardiography

Learning Objectives

- Describe and discuss transesophageal echocardiography (TEE).
- Discuss the indications and protocols for TEE, and identify standard TEE views.
- Describe and discuss stress echocardiography.
- Evaluate normal and abnormal stress echocardiography images.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Echocardiography Assessment of Valvular Disease

Learning Objectives

- Review normal cardiac anatomy.
- Identify and describe the appearance of valve replacements on echocardiograms.
- List and describe pathology that may affect the heart valves.
- Identify and describe the sonographic appearance of mitral, aortic, tricuspid, and pulmonary valve pathology.
- Identify and explain the mechanisms of various types of prosthetic valve replacements.
- Discuss the use of proximal isovelocity surface area (PISA).
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act.

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Echocardiography Assessment of Wall Motion & Diastolic Function

Learning Objectives

- Review cardiac anatomy.
- List and describe pathology that may affect the cardiac chambers.
- Calculate linear and volume measurements of the cardiac chambers.
- Evaluate the wall motion of the left ventricle.
- Describe and demonstrate special measurements used in echocardiography.
- Define and use related medical terminology.
- Explain the Patient Privacy Rule (HIPAA) and Patient Safety Act (see reference).

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5.2 Scan the mitral valve, using pulsed wave Doppler
5.3 Scan the mitral valve, using color M-mode Doppler
5.3.1 Color M-mode flow propagation velocity measurements
5.4 Perform tissue Doppler imaging of the lateral mitral annulus, using pulsed wave Doppler
5.5 Perform tissue Doppler imaging of the septal mitral annulus, using pulsed wave Doppler
5.6 Scan the pulmonary vein, using pulsed wave Doppler
5.7 Scan the left ventricle and obtain the volume
5.7.1 Biplane Simpson's method for left ventricle volume measurement
5.8 Scan the left atrium and obtain the volume
5.8.1 Biplane area-length measurements of the left atrium
5.9 Scan the right ventricle for dimension
5.9.1 Right ventricle basal diameter measurement
5.10 Scan the right atrium and obtain the volume
5.10.1 Biplane area-length of the right atrium
Step 6: Obtain the apical two-chamber view
6.1 Scan the left ventricle to evaluate the myocardium
6.2 Scan the left ventricle to obtain the volume
6.2.1 Biplane Simpson's method for measuring left ventricle volume
Step 7: Obtain the apical long axis view
7.1 Scan the left ventricle in apical long axis to evaluate the myocardium
Step 8: Complete the procedure

Echocardiography 1 – Integrated Clinical (Sims and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Basic Echocardiography Techniques
- Basic Echocardiography Views

Echocardiography 2 – Integrated Clinical (Sims and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Doppler Techniques and Instrumentation
- Valvular Disease
- Wall Motion & Diastolic Function

Echocardiography 3 – Integrated Clinical (Sims and Quizzes only)

Contains all simulation scenarios and quizzes from the following modules:

- Embryology & Congenital Heart Disease
- Endocarditis & Pericarditis
- TEE & Stress Echo

NOTE: In test mode the scenarios in these integrated clinical modules are presented at random, with the goal of helping students prepare for a clinical situation where each patient is different.