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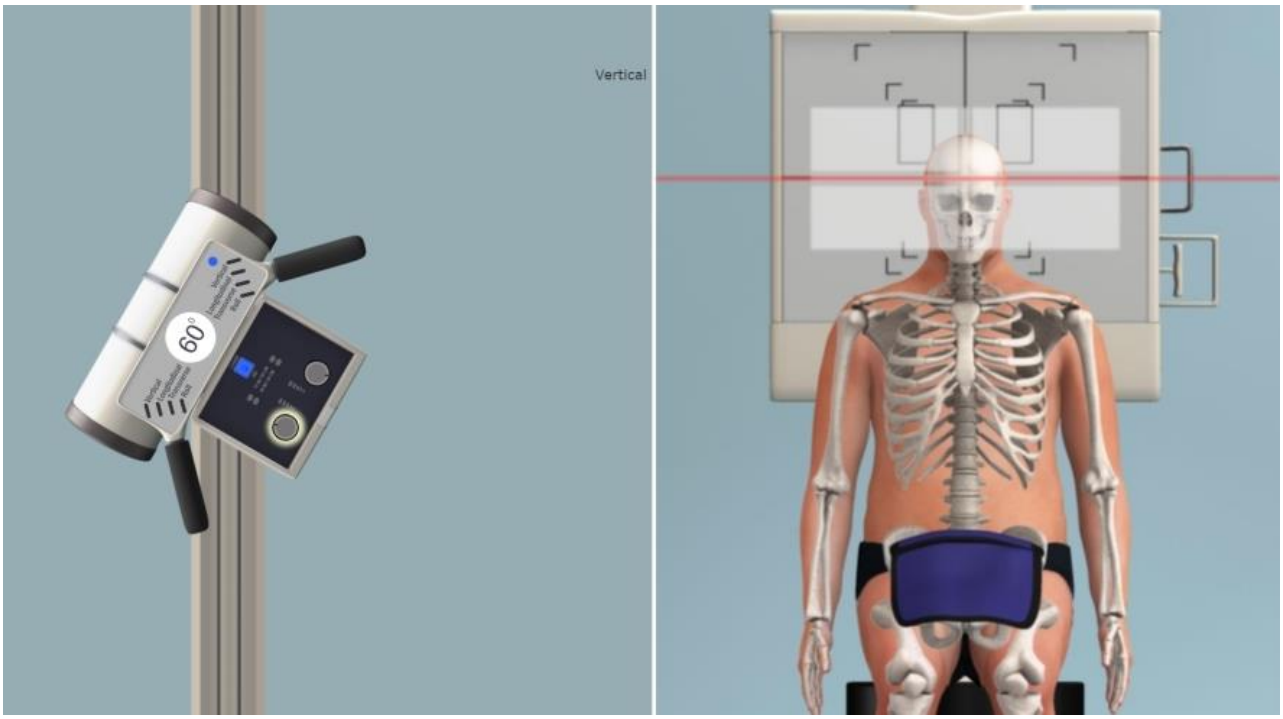

SIMTICS Radiography Module Outlines

List of Modules

Section 1: Theory modules: text, video, anatomy, quiz – no simulation

Radiographic Imaging

Description

This theory module (no simulation) teaches the key concepts that underpin radiographic imaging such as scatter radiation, exposure, and field size, and the tools and techniques available to create high-quality X-ray images.

Learning objectives

- Understand the production and control of scatter radiation and its effect on image contrast
- Describe the construction and performance characteristics of grids and apply this knowledge to the correct clinical situation
- Understand and discuss the relationship of factors that may influence x-ray quantity and quality
- Understand the purpose and construction, and explain the use, of the three types of technique charts
- Apply knowledge of the three major interrelated categories of radiographic quality
- Discuss the tools and techniques available to create high-quality images
- Identify and discuss the three categories of radiographic artifacts and explain their causes.

Content Detail

Introduction
Step 1 - Beam-restricting devices
Step 1.1 - Scatter radiation
Step 1.1.1 - Kilovoltage (kV)
Step 1.1.2 - Field size
Step 1.1.3 - Patient thickness
Step 1.2 - Control of scatter
Step 1.2.1 - Effect of scatter on image contrast
Step 1.2.2 - Beam restrictors
Step 2 - Radiographic grids
Step 2.1 - Grids
Step 2.1.1 - Grid ratio
Step 2.1.2 - Grid frequency
Step 2.1.3 - Grid strip
Step 2.2 - Grid performance
Step 2.2.1 - Contrast improvement factor (k)
Step 2.2.2 - Bucky factor (B)
Step 2.3 - Grid types
Step 2.4 - Grid problems
Step 2.4.1 - Off-center grid (lateral decentering)
Step 2.4.2 - Off-level grid
Step 2.4.3 - Off-focus grid
Step 2.4.4 - Upside-down grid

Radiographic Analog Processing

Description

This theory module (no simulation) provides a thorough introduction to radiographic film and film processing, handling and storage. It also covers special imaging methods such as tomography and magnification radiography.

Learning objectives

- Discuss the construction of radiographic film
- List and define the characteristics of x-ray film
- Understand and describe the chemical components/interaction and process required to convert a latent image to a ready-to-read radiograph
- Explain the systems of the automatic processor
- Describe the component layers, properties, and care of a radiographic intensifying screen
- Describe image noise and image blur
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

Content Details

Introduction
Step 1 - Radiographic film
    Step 1.1 - Remnant radiation
    Step 1.2 - Film construction
      Step 1.2.1 - Base
      Step 1.2.2 - Emulsion
      Step 1.2.3 - Silver halide crystals
    Step 1.3 - Latent image formation
      Step 1.3.1 - Photon interaction with silver halide (Gurney-Mott theory)
      Step 1.3.2 - Latent image
    Step 1.4 - Types of film
      Step 1.4.1 - Screen-film
      Step 1.4.2 - Direct exposure film (non-screen film; special application film)
      Step 1.4.3 - Mammography film
      Step 1.4.4 - Laser film
      Step 1.4.5 - Specialty film
Step 2 - Intensifying screens
    Step 2.1 - Cassette
    Step 2.2 - Screen construction
    Step 2.3 - Luminescence
    Step 2.4 - Screen characteristics
      Step 2.4.1 - Screen speed
      Step 2.4.2 - Image noise
      Step 2.4.3 - Spatial resolution
    Step 2.5 - Screen-film combinations
    Step 2.6 - Screen care

Step 3 - Processing the latent image
    Step 3.1 - Chemical processes
    Step 3.2 - Silver (Ag^+) recovery
Step 4 - Processing
    Step 4.1 - Automatic processing
      Step 4.1.1 - Transport system
      Step 4.1.2 - Temperature control system
      Step 4.1.3 - Circulation system
      Step 4.1.4 - Replenishment system
      Step 4.1.5 - Dryer system
    Step 4.2 - Alternative processing methods
      Step 4.2.1 - Rapid processing
      Step 4.2.2 - Extended processing
      Step 4.2.3 - Daylight processing
      Step 4.2.4 - Dry processing
Step 5 - Handling and storage of film
    Step 5.1 - Heat and humidity
    Step 5.2 - Light
    Step 5.3 - Radiation
    Step 5.4 - Shelf life
    Step 5.5 – Safelights
Step 6 - Health and safety
    Step 6.1 - Glutaraldehyde exposure
    Step 6.2 - Multiple chemical sensitivity
    Step 6.3 - Safety regulations
    Step 6.4 - Material Safety Data Sheets (MSDS)
    Step 6.5 - Safety resources
Step 7 - Special imaging methods
    Step 7.1 - Tomography
    Step 7.2 - Magnification radiography

Computer Science, the Digital Image, and Computed Radiography

Description

This theory module (no simulation) provides an introduction to computer science, the technology used in radiographic imaging, and the difference between digital imaging and computed radiography. It also covers the elements of the digital image and how these affect image quality.

Learning objectives

- Review history and development of the computer.
- Define terminology associated with digital imaging systems.
- Describe the various types of digital receptors.

- Discuss the fundamentals of digital radiography, distinguishing between cassette-based systems and cassette-less systems.
- Describe the advantages and disadvantages of digital imaging versus cassette-based imaging.
- Discuss spatial resolution, contrast resolution, and noise related to digital imaging.
- Describe the features of a contrast-detail curve, and interpret a modulation transfer function curve.
- Discuss how post-processing allows the visualization of a wide dynamic range.
- Explain the relevant features of a storage phosphor imaging plate and operating characteristics of a computed radiography reader.
- Describe how digital imaging can be used to help reduce patient radiation dose.
- Describe HIPAA concerns with electronic information.
- Explain the Patient's Bill of Rights, Patient Privacy Rule (HIPAA) and Patient Safety

Content Detail

Introduction
Step 1 - Background to the computer
    Step 1.1 - Computer types
        Step 1.1.1 - Server
        Step 1.1.2 - Operator console
        Step 1.1.3 - Workstation
    Step 1.2 - Computer systems
        Step 1.2.1 - Hardware
    Step 1.3 - Software
    Step 1.4 - Networking systems
    Step 1.5 - Computer security
Step 2 - Digital imaging compared with film-screen imaging
    Step 2.1 - Equipment
    Step 2.2 - Image acquisition
    Step 2.3 - Image processing
    Step 2.4 - Clinical application
    Step 2.5 - Patient radiation dose
Step 3 - Elements of the digital image and image quality
    Step 3.1 - Spatial resolution
        Step 3.1.1 - Field-of-view
        Step 3.1.2 - Matrix size
        Step 3.1.3 - Pixel size
        Step 3.1.4 - Bit-depth
        Step 3.1.5 - Spatial frequency
    Step 3.2 - Contrast resolution
        Step 3.2.1 - Linear response
        Step 3.2.2 - Exposure latitude
        Step 3.2.3 - Detective quantum efficiency
        Step 3.2.4 - Signal-to-noise ratio
        Step 3.2.5 - Contrast-detail curve
    Step 3.3 - Post-processing
        Step 3.3.1 - Windowing
        Step 3.3.2 - Edge enhancement

Step 3.3.3 - Annotation
Step 3.4 - Grids
Step 3.5 - Image artifacts
Step 3.6 – Collimation
Step 4 - Computed radiography
Step 4.1 - Equipment
Step 4.1.1 - X-Ray imaging system
Step 4.1.2 - Cassette
Step 4.1.3 - Image plate
Step 4.1.4 - Computed radiography reader
Step 4.2 - Image acquisition
Step 4.3 - Image processing
Step 4.3.1 - Cassette insertion
Step 4.3.2 - Laser scanner
Step 4.3.3 - Image process
Step 4.3.4 - Image display
Step 4.3.5 - Image plate erasure
Step 4.3.6 - Cassette ejection
Step 4.4 - Patient radiation dose

Computed Tomography and Magnetic Resonance Imaging

Description

This introductory module (no simulation) covers the basic principles of CT, spiral CT and MRI scanning, the differences between them, and advantages of each.

Learning objectives

- Explain the purpose, principles, and application of computed tomography (CT)
- Discuss the concepts of transverse tomography, translation, and reconstruction of images
- Discuss the design features that make spiral computed tomography possible
- Explain the spiral imaging principles of interpolation, pitch, index, and section sensitivity
- Identify the appearance of contrast media on a CT image
- Identify basic cross-sectional anatomy of the head, thorax, and abdomen on diagrams, magnetic resonance imaging (MRI), and CT images
- Explain the purpose, principles, and application of MRI
- Identify the appearance of T1 and T2 MRI images

Content Details

Introduction
Step 1 - Computed tomography
Step 1.1 - Principles of operation
Step 1.2 - Generations of CT scanners
Step 1.3 - System components

Step 1.4 - Image characteristics and reconstruction
Step 1.5 - Image quality
Step 1.6 - CT cross-section anatomy
Step 2 - Spiral computed tomography
Step 2.1 - Imaging principles
Step 2.2 - System design
Step 2.3 - Imaging techniques
Step 2.4 - Advantages and disadvantages of mulitslice spiral CT
Step 3 - Magnetic resonance imaging
Step 3.1 - Principles
Step 3.2 - Equipment
Step 3.3 - Application and safety
Step 3.4 - Technique
Step 3.5 - Application
Step 3.6 - Comparison of CT and MR images

Mammography, Bone Densitometry and Quality Control

Description

This overview module (no simulation) discusses mammography and bone densitometry.

Learning objectives

- Discuss the differences between soft tissue radiography and conventional radiography
- Identify the recommended intervals for self-examination and x-ray examination of the breast
- Describe the unique features of the mammographic imaging system
- Describe the image receptors used and spatial resolution obtained in mammography
- Explain the differences between diagnostic and screening mammography
- Describe the unique features of a bone density system
- Differentiate between quality improvement/management, quality assurance, and quality control
- List the benefits of a quality management program, to the patient and to the department
- List elements of a quality management program and discuss how each is related to the quality management program
- Discuss the proper test equipment/procedures for evaluating the operation of the x-ray generator
- Evaluate the performance of the x-ray generator

Content Details

Introduction
Step 1 - Mammography
Step 1.1 - Soft-tissue radiography
Step 1.2 - Basis for mammography
Step 1.3 - Mammographic imaging system
Step 1.4 - Film-screen mammography
Step 1.5 - Computed radiography mammography

Radiographic Image Analysis

Description

This information-rich module explains radiographic image analysis, including how to manage the factors that affect image quality. (No simulation)

Learning objectives

- Describe the role of the radiologic technologist in image analysis.
- Describe an effective image analysis method.
- Identify the steps in the decision-making process used in image analysis.
- Discuss the impact of patient preparation on the resulting radiographic image.
- Explain the importance of proper patient positioning and how it contributes to an acceptable radiograph.
- Discuss the elements of a radiographic image.
- Correlate the criteria for producing a diagnostic-quality radiograph to the elements of a radiographic image.

- Apply the process for evaluating images for adequate density/brightness, contrast, recorded detail/spatial resolution, and acceptable limits of distortion.
- Explain how the radiologic technologist determines that an adequate level of penetration has been applied to produce the desired level of contrast.
- Analyze images to determine the appropriate use of beam restriction.
- Identify the radiographic appearance of common equipment malfunctions that affect image quality and take corrective action.
- Differentiate between technical factor problems, procedural factor problems, and equipment malfunctions.
- Critique images for appropriate technical and procedural factors, and recommend corrective actions, if necessary.
- Explain the Patient's Bill of Rights, Patient Privacy Rule (HIPAA), and Patient Safety Act.

Content Detail

Introduction
- Step 1 - Chest, ribs, and abdomen
- Step 1.1 - Chest - Adult
- Step 1.2 - Lower ribs
- Step 1.3 – Abdomen

Step 2 - Upper extremity and shoulder
- Step 2.1 - Finger
- Step 2.2 - Thumb
- Step 2.3 - Hand
- Step 2.4 - Wrist
- Step 2.5 - Forearm
- Step 2.6 - Elbow
- Step 2.7 - Humerus
- Step 2.8 – Shoulder

Step 3 - Lower extremity and pelvis
- Step 3.1 - Foot
- Step 3.2 - Ankle
- Step 3.3 - Lower leg - tibia and fibula
- Step 3.4 - Knee
- Step 3.5 - Femur
- Step 3.6 - Hip
- Step 3.7 – Pelvis

Step 4 - Spinal column
- Step 4.1 - Cervical spine
- Step 4.2 - Thoracic spine
- Step 4.3 - Lumbar spine

Step 5 - Cranium, facial bones, paranasal sinuses, and gastrointestinal system
- Step 5.1 - Cranium (skull)
- Step 5.2 - Facial bones
- Step 5.3 - Paranasal sinuses
- Step 5.4 - Gastrointestinal system

Fluoroscopy and Interventional Radiography

Description

This theory module (no simulation) provides an overview of fluoroscopy, which allows real-time viewing of moving internal structures and fluids in the human body, and interventional radiology, a rapidly growing area of medicine that uses image-guided procedures to diagnose and treat patients using the least invasive techniques

Learning objectives

- Describe the measures used to provide radiation protection for patients and personnel during interventional radiology
- Discuss the advantages that nonionic (water-soluble) contrast media offer over ionic contrast media
- Explain image-intensified fluoroscopy
- Discuss gain and conversion factors as related to image intensification
- Discuss fluoroscopic image formation in terms of image size and brightness
- Indicate the purpose, construction, and application of video camera tubes, TV monitors, and video recorders
- Identify fluoroscopic recording equipment
- Discuss the purpose of and procedure for radiographic magnification
- Discuss electronic imaging equipment used in radiography and fluoroscopy
- Discuss flat panel detectors used in digital electronic x-ray equipment

Content Details

Introduction
Step 1 - Fluoroscopy
    Step 1.1 - Radiation protection
        Step 1.1.1 - Personal protection
        Step 1.1.2 - Patient protection
    Step 1.2 - Special demands
    Step 1.3 - Fluoroscopic technique
    Step 1.4 - Image intensification
    Step 1.5 - Fluoroscopic image monitoring
Step 2 - Interventional radiology
    Step 2.1 - Basic principles
    Step 2.2 - Interventional radiology suite

Digital Radiography and Fluoroscopy, Image Viewing and PACS, and Quality Control

Description

This theory module (no simulation) provides an introduction to digital image acquisition, display and storage.

Learning objectives

- Describe the capture, coupling, and collection stages of each type of digital radiographic imaging system.
- Discuss the use of silicon, selenium, cesium iodide, and gadolinium oxysulphide in digital radiography.
- Describe the parts of a digital fluoroscopy system and explain their functions.
- Outline the procedures for temporal subtraction and energy subtraction.
- Describe the effect of conditions such as luminance and ambient lighting on viewing digital images.
- Compare the advantages and disadvantages of hard and soft copy images.
- Describe the Picture Archival and Communication System (PACS) and its function, including differences between the Hospital Information System (HIS), Radiology Information System (RIS), and Digital Imaging and Communications (DICOM).
- Describe data flow and networking between systems.
- Discuss the systematic management of patient data and errors that may occur in the workflow when utilizing the digital system.
- Discuss the quality control test and preventive maintenance schedule used for digital display devices.
- Explain how digital image artifacts occur and how to avoid them.
- Analyze the use of an image histogram and look-up table (LUT) in digital image artifacts.
- Explain the Patient's Bill of Rights, Patient Privacy Rule (HIPAA) and Patient Safety Act.

Content Detail

- Step 2.2 - Advantages of flat-panel detectors
- Step 2.3 - Digital subtraction angiography
  - Step 2.3.1 - Digital subtraction equipment
  - Step 2.3.2 - Image acquisition
  - Step 2.3.3 - Temporal subtraction
  - Step 2.3.4 - Energy subtraction
  - Step 2.3.5 - Roadmapping
  - Step 2.3.6 - Patient radation dose
- Step 2.4 - Post-processing
  - Step 2.4.1 - Windowing
  - Step 2.4.2 - Edge enhancement

Step 3 - Digital image viewing and picture archiving and communication system (PACS)

- Step 3.1 - Display and viewing of the digital image
- Step 3.2 - Photometry
- Step 3.3 - Digital display monitor
  - Step 3.3.1 - Active matrix liquid crystal display
  - Step 3.3.2 - Advantages of an AMLCD over a CRT
  - Step 3.3.3 - Disadvantage of an AMLCD over a CRT
  - Step 3.3.4 - Advantages of soft copy over hard copy images
- Step 3.4 - Picture archiving and communication system
  - Step 3.4.1 - Components of picture archiving and communication system
  - Step 3.4.2 - Image compression
  - Step 3.4.3 - PACS workflow

Step 4 - Digital display and imaging system quality control, and artifacts

- Step 4.1 - Daily routine checks
- Step 4.2 - Weekly checks
- Step 4.3 - Monthly checks
- Step 4.4 - Digital display quality control
  - Step 4.4.1 - Luminance testing
  - Step 4.4.2 - Distortion testing
  - Step 4.4.3 - Reflection testing
  - Step 4.4.5 - Digital display noise
  - Step 4.4.4 - Luminance response
- Step 4.5 - Image artifacts
  - Step 4.5.1 - Computed radiography image receptor artifacts

Section 2: Positioning modules contain simulations

Basic Radiographic Techniques

Description

This module provides a thorough introduction to basic radiographic techniques, and demonstrates how to set up and perform an X-ray procedure.

Learning objectives

- Discuss and utilize radiographic positioning terminology
- Discuss the care of the radiographic examining room
- Describe common radiographic positions
- Discuss the various approaches to dealing with trauma and pediatric patients
- Discuss basic radiographic positioning methods and steps
- Describe and identify radiographic equipment
- Describe positioning landmarks
- Describe and explain the significance of obtaining a pertinent patient history
- Describe and explain the technologists' role with respect to patient safety and ALARA
- Discuss the importance of radiation protection
- Discuss infection control and prevention
- Describe and explain the reason for patient breathing techniques in order to obtain optimum radiographic images
- Analyze the radiographs for quality and proper positioning criteria
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule (HIPAA), and Patient Safety Act

Content Detail

0. Introduction
    Step 0.1 - Radiographic terminology
        Step 0.1.1 - Body types
        Step 0.1.2 - Terms describing curvature of the spine
        Step 0.1.3 - Radiographic projections
        Step 0.1.4 - Terms relating to image production
    Step 0.2 - Osteology
        Step 0.2.1 - Development of bones
        Step 0.2.2 - Classification of bones
    Step 0.3 – Arthrology
    Step 1 - Overview
    Step 1.1 - Orientation
        Step 1.1.1 - Anatomical directions
        Step 1.1.2 - Planes or body sections
    Step 1.2 - Production of x-rays
    Step 1.3 - Types of radiography
        Step 1.3.1 - Conventional radiography
        Step 1.3.2 - Computed radiography

Step 11 - Skeletal survey
Step 12 - Postprocedure
    Step 12.1 - Viewing radiographic images
    Step 12.2 - Other considerations
    Step 13 - Professional considerations
        Step 13.1 - Continuing professional development

Radiography of the Chest, Bony Thorax, and Soft Tissues of the Neck

Description

This module covers how to prepare for, set up and acquire radiographic projections of the chest, bony thorax and soft tissue of the neck and upper airways

Learning objectives

- Describe indications for radiographic procedures of the chest, bony thorax, and soft tissue neck/upper airway
- Describe and utilize radiographic positioning terminology
- Discuss anatomical details of the chest, bony thorax, and soft tissue neck/upper airway
- Discuss chest, bony thorax, and soft tissue neck/upper airway protocols
- Describe positioning criteria and anatomical landmarks for chest, bony thorax, and soft tissue neck/airway projections
- Discuss the radiographic requirements for chest, bony thorax, and soft tissue neck/upper airway with regards to trauma and pediatric patients
- Analyze radiographs for quality and correct positioning criteria
- Discuss chest, bony thorax, and soft tissue neck/upper airway pathology, and identify what signs and symptoms relate to that pathology
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule (HIPAA), and Patient Safety Act

Content Detail

Introduction
    Step 1 - Preparation
    Step 1.1 - Equipment and room preparation
    Step 1.2 - Patient preparation
    Step 1.3 - Technologist preparation
Step 2 - Chest Projections
    Step 2.1 - Routine projections
    Step 2.2 - Trauma
    Step 2.3 – Pediatrics

Step 3 - Sternum and Sternoclavicular Joints
    Step 3.1 - Sternum
    Step 3.2 - Sternoclavicular joints
    Step 3.3 - Trauma
    Step 3.4 – Pediatrics
Step 4 - Ribs
    Step 4.1 - Routine projections
    Step 4.2 - Trauma
    Step 4.3 – Pediatrics
Step 5 - Upper Airway and Soft Tissues of the Neck
    Step 5.2 - Trauma
    Step 5.3 - Pediatrics
    Step 5.1 - Routine projections

Radiography of the Upper Extremity and Shoulder Girdle

Description

This module covers how to prepare for, set up and obtain radiographic projections of the upper extremity and shoulder girdle.

Learning objectives

- Describe indications for radiographic procedures of the upper extremities
- Describe and utilize radiographic positioning terminology
- Discuss anatomical details of the upper extremities
- Discuss upper extremity protocols
- Describe positioning criteria and anatomical landmarks for each upper extremity projection
- Discuss the radiographic requirements of the upper extremities with regard to trauma and pediatric patients
- Analyze radiographs for quality and for correct positioning criteria
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule (HIPAA), and Patient Safety Act

Content Detail

Introduction
Step 1 - Preparation
    Step 1.1 - Equipment and room preparation
    Step 1.2 - Patient preparation
    Step 1.3 - Technologist preparation
Step 2 - Finger projections
    Step 2.1 - Routine projections
    Step 2.2 - Pediatric considerations
    Step 2.3 - Trauma considerations

Radiography of the Lower Extremity and Hip

Description

This module covers how to prepare for, set up and obtain radiographs of the lower extremity and hip.

Learning objectives

- Describe indications for radiographic procedures of the hip and lower extremities
- Describe and utilize radiographic positioning terminology
- Discuss anatomical details of the hip and lower extremities
- Discuss hip and lower extremity protocols
- Describe positioning criteria and anatomical landmarks for each hip and lower extremity projection
- Discuss the radiographic requirements of the hip and lower extremities with regards to trauma and pediatric patients
- Analyze the radiographs for quality and for correct positioning criteria
- Discuss pathology of the hip and lower extremities
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

Content Detail

Introduction
Step 1 - Preparation
    Step 1.1 - Equipment and room preparation
    Step 1.2 - Patient preparation
    Step 1.3 - Technologist preparation
Step 2 - Toe projections
    Step 2.1 - Routine projections
Step 3 - Foot
    Step 3.1 - Routine projections
Step 4 - Calcaneus
    Step 4.2 - Pediatric considerations
    Step 4.3 - Trauma considerations
    Step 4.1 - Routine projections
Step 5 - Ankle
    Step 5.1 - Routine projections
    Step 5.2 - Pediatric considerations
    Step 5.3 - Trauma considerations
Step 6 - Tibia and fibula
    Step 6.1 - Routine projections
    Step 6.3 - Trauma considerations
    Step 6.2 - Pediatric considerations
Step 7 - Knee and patella
    Step 7.2 - Patella
        Step 7.2.1 - Routine projections
    Step 7.3 - Pediatric considerations
    Step 7.4 - Trauma considerations

Radiography of the Abdomen and Pelvis

Description

This module demonstrates how to set up for and obtain X-rays of the abdomen and pelvis.

Learning objectives

- Describe the indications for radiographic procedures of the abdomen and pelvic girdle
- Describe and utilize radiographic positioning terminology
- Describe anatomical details of the abdomen and pelvic girdle
- Discuss abdomen and pelvic girdle protocols
- Describe positioning criteria and external landmarks for each abdomen and pelvic girdle projection
- Discuss the radiographic requirements for abdomen and pelvic girdle with regards to trauma and pediatric patients
- Analyze the radiographs for quality and correct positioning criteria
- Discuss pathology of the abdomen and pelvic girdle
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

Content Detail

Radiography of the Skull, Cranial and Facial Bones, and Paranasal Sinuses

Description

This SIMTICS module covers how to prepare for, set up, and obtain radiographs of the skull, cranial and facial bones, and paranasal sinuses.

Learning objectives

- Describe indications for radiographic procedures of the skull, cranial and facial bones, and paranasal sinuses
- Describe and utilize radiographic positioning terminology
- Discuss anatomical details of the skull, cranial and facial bones, and paranasal sinuses
- Discuss skull, cranial and facial bones, and paranasal sinuses protocols
- Describe positioning criteria and anatomical landmarks for each skull, cranial and facial bones, and paranasal sinuses projection
- Discuss the radiographic requirements for skull, cranial and facial bones, and paranasal sinuses with regards to trauma and pediatric patients
- Analyze the radiographs for quality and correct positioning criteria
- Discuss skull, cranial and facial bones, and paranasal sinuses pathologies
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

Content Detail

Introduction
Step 1 - Preparation
    Step 1.1 - Equipment and room preparation
    Step 1.2 - Patient preparation
    Step 1.3 - Technologist preparation
Step 2 - Skull projections
    Step 2.1 - Routine projections
    Step 2.2 - Pediatric considerations
    Step 2.3 - Trauma considerations
Step 3 - Facial bones
    Step 3.1 - Routine projections
    Step 3.2 - Pediatric considerations
    Step 3.3 - Trauma considerations
Step 4 - Mandible and temporomandibular joints
    Step 4.1 - Routine projections
    Step 4.2 - Pediatric considerations
    Step 4.3 - Trauma considerations
    Step 4.4 - Routine projections
    Step 4.5 - Pediatric considerations
    Step 4.6 - Trauma considerations
Step 5 - Zygomatic arch

Radiography of the Spinal Column

Description

This module covers how to prepare for, set up and obtain radiographic images of the spinal column

Learning Objectives

- Discuss indications for radiographic procedures of the cervical, thoracic, lumbar, sacrum, and coccyx of the spine
- Describe and utilize radiographic positioning terminology
- Describe the anatomical details of the cervical, thoracic, and lumbar spine, and the sacrum and coccyx
- Discuss cervical, thoracic, lumbar, sacrum, and coccyx protocols
- Describe positioning criteria and anatomical landmarks for each of the cervical, thoracic, lumbar, sacrum, and coccyx spine projections
- Discuss the radiographic requirements for cervical, thoracic, lumbar, sacrum, and coccyx with regards to trauma and pediatric patients
- Analyze the radiographs for quality and correct positioning criteria
- Discuss pathology of the cervical, thoracic, and lumbar spine, and the sacrum and coccyx
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

Content Detail

Step 2 - Cervical spine
    Step 2.1 - Routine projections
    Step 2.2 - Trauma considerations
    Step 2.3 – Pediatrics
Step 3 - Thoracic spine
    Step 3.1 - Routine projections
    Step 3.2 - Trauma
    Step 3.3 – Pediatrics
Step 4 - Lumbar spine
    Step 4.1 - Routine projections
    Step 4.2 - Trauma
    Step 4.3 – Pediatrics
Step 5 - Sacrum
    Step 5.1 - Routine projections
    Step 5.2 - Trauma
    Step 5.3 – Pediatrics
Step 6 - Coccyx
    Step 6.1 - Routine projections
    Step 6.2 - Trauma
    Step 6.3 - Pediatrics

Radiography of the Upper and Lower Gastrointestinal Systems and the Biliary Tract

Description

This module covers how to set up for and perform radiography of the upper and lower gastrointestinal systems and biliary tract.

Learning objectives

- Discuss the basic anatomy and physiology of the gastrointestinal (GI) system
- Discuss the basic anatomy and physiology of the biliary tract system
- Discuss positioning criteria, projections, use of contrast media, and procedures utilized in radiography of the upper GI system, lower GI system, and biliary tract system
- Discuss the various pathological indications and contraindications for each procedure
- Discuss the equipment and supply preparation for each procedure
- Analyze the radiographs for quality and proper positioning criteria for each procedure
- Describe signs and symptoms and management of an anaphylactic reaction
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

Content Detail

0. Introduction
    - Step 0.1 - Basic physiology of the digestive and biliary systems
        - Step 0.1.1 - Digestive system
        - Step 0.1.2 - Liver and biliary system
    - Step 0.2 - Radiography of the digestive system
    - Step 0.3 - Contrast media
    - Step 0.4 – Anaphylaxis
- Step 1 - Barium swallow
    - Step 1.1 - Preparation
        - Step 1.1.1 - Equipment and room preparation
        - Step 1.1.2 - Radiologic technologist's preparation
        - Step 1.1.3 - Patient preparation
    - Step 1.2 - Protocols
        - Step 1.2.1 - Radiologic technologist's role
        - Step 1.2.2 - Radiologist's role
        - Step 1.2.3 - Esophagram protocol
        - Step 1.2.4 - Modified barium swallow protocol
    - Step 1.3 - Projections for barium esophagram
- Step 2 - Upper gastrointestinal series (UGI)
    - Step 2.1 - Preparation
        - Step 2.1.1 - Equipment and room preparation
        - Step 2.1.2 - Radiologic technologist's preparation
        - Step 2.1.3 - Patient preparation
    - Step 2.2 - Protocols
        - Step 2.2.1 - Radiologic technologist's role
        - Step 2.2.2 - Radiologist's role
    - Step 2.3 - Projections for an UGI series
- Step 3 - Small bowel series (SBS)
    - Step 3.1 - Preparation
        - Step 3.1.1 - Equipment and room preparation
        - Step 3.1.2 - Radiologic technologist's preparation
        - Step 3.1.3 - Patient preparation
    - Step 3.2 - Protocols
        - Step 3.2.1 - Radiologic technologist's role
        - Step 3.2.2 - Radiologist's role
    - Step 3.3 - Projections for a small bowel series
    - Step 3.4 - Pediatric upper gastrointestinal tract study
        - Step 3.4.1 - Specific equipment and preparation for pediatric upper GI study
        - Step 3.4.2 - Patient (and guardian) preparation
        - Step 3.4.3 - Procedure for a pediatric UGI study
        - Step 3.4.4 - Procedure for a pediatric small bowel study
- Step 4 - Barium enema (BE) - lower GI series
    - Step 4.1 - Preparation
        - Step 4.1.1 - Equipment and room preparation
        - Step 4.1.2 - Radiologic technologist's preparation

Radiography of the Central Nervous System, Circulatory System, and Arthrography

Description

This module provides an overview of radiography of the central nervous system, circulatory system, as well as arthrography

Learning objectives

- Discuss the basic anatomy and physiology of the central nervous system
- Discuss the basic anatomy and physiology of the circulatory system
- Discuss the basic anatomy and physiology of the synovial joint
- Discuss positioning criteria, projections, use of contrast media, and procedures utilized in radiography of the central nervous system, circulatory system, and joints
- Discuss the various pathological indications and contraindications for each procedure
- Discuss the equipment and supply preparation for each procedure
- Analyze the radiographs for quality and correct positioning criteria for each procedure
- Describe the management of anaphylactic reaction
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

Content Detail

- Step 0.1.1 - Central nervous system
- Step 0.1.2 - Basic anatomy of the circulatory (cardiovascular) system
- Step 0.1.3 - Basic anatomy of a synovial joint
- Step 0.2 - Contrast media

Step 1 - Central nervous system

- Step 1.1 - Preparation
  - Step 1.1.1 - Equipment and room preparation
  - Step 1.1.2 - Radiologic technologist preparation
  - Step 1.1.3 - Patient preparation

Step 2 - Circulatory system

- Step 2.1 - Preparation
  - Step 2.1.1 - Equipment and room preparation
  - Step 2.1.2 - Contrast media preparation
  - Step 2.1.3 - Technologist preparation
  - Step 2.1.4 - Patient preparation

Step 3 - Circulatory System

- Step 3.1 - Preparation
  - Step 3.1.1 - Equipment and room preparation
  - Step 3.1.2 - Contrast media preparation
  - Step 3.1.3 - Technologist preparation
  - Step 3.1.4 - Patient preparation

Step 4 - Circulatory system

- Step 4.1 - Preparation
  - Step 4.1.1 - Equipment and room preparation
  - Step 4.1.2 - Contrast media preparation
  - Step 4.1.3 - Technologist preparation
  - Step 4.1.4 - Patient preparation

Step 5 - Circulatory system

- Step 5.1 - Preparation
  - Step 5.1.1 - Equipment and room preparation
  - Step 5.1.2 - Contrast media preparation
  - Step 5.1.3 - Technologist preparation
  - Step 5.1.4 - Patient preparation

Step 6 - Arthrography

- Step 6.1 - Preparation
  - Step 6.1.1 - Equipment and room preparation
  - Step 6.1.2 - Contrast media preparation
  - Step 6.1.3 - Technologist preparation
  - Step 6.1.4 - Patient preparation

Radiography of the Urinary and Reproductive Systems

Description

This module covers how to prepare for, set up and perform radiography of the urinary and reproductive systems.

Learning objectives

- Discuss the basic anatomy and physiology of the urinary system
- Discuss the basic anatomy and physiology of the male and female reproductive systems
- Discuss positioning criteria, projections, use of contrast media, and procedures utilized in radiography of the urinary system and reproductive systems
- Discuss the various pathological indications and contraindications
- Discuss the equipment and supply preparation
- Describe the management of anaphylactic reaction
- Analyze the radiographs for quality and proper positioning criteria
- Explain the Patient's Bill of Rights, HIPAA Privacy Rule, and Patient Safety Act

Content Detail

Introduction
Step 1 - General preparation for a contrast media study
    Step 1.1 - Equipment and room preparation
    Step 1.2 - Technologist preparation
Step 2 - Intravenous cannulation technique (for contrast administration)
Step 3 - Intravenous urogram
    Step 3.1 - Preparation
      Step 3.1.1 - Equipment and room preparation
      Step 3.1.2 - Patient preparation
    Step 3.2 - Protocols
    Step 3.2.1 - Radiographic technologist's role
    Step 3.2.2 - Radiologist's role
    Step 3.3 – Projections
Step 4 - Retrograde pyelography
    Step 4.1 - Preparation
      Step 4.1.1 - Equipment and room preparation
      Step 4.1.2 - Patient preparation
    Step 4.2 - Protocols
      Step 4.2.1 - Radiographic technologist's role
      Step 4.2.2 - Radiologist or urologist's role
    Step 4.3 – Projections
Step 5 - Cystography
    Step 5.1 - Preparation
      Step 5.1.1 - Equipment and room preparation
      Step 5.1.2 - Patient preparation
    Step 5.2 - Protocols

Non-Routine Projections for Chest, Neck, Upper Extremities & Shoulder Girdle

Description

This module covers how to prepare for, set up, and obtain non-routine radiographic projections of the chest, bony thorax, upper airway/soft tissue of the neck, upper extremities and shoulder girdle.

Learning objectives

- Describe indications for radiographic procedures of the chest, bony thorax, soft tissues of the neck, upper extremity, and shoulder girdle.
- Describe and utilize radiographic positioning terminology.
- Discuss anatomical details of the chest, bony thorax, soft tissues of the neck, upper extremity, and shoulder girdle.
- Discuss chest, bony thorax, soft tissues of the neck, upper extremity, and shoulder girdle protocols.
- Describe positioning criteria and anatomical landmarks for chest, bony thorax, soft tissues of the neck, upper extremity, and shoulder girdle projections.
- Discuss the radiographic requirements for chest, bony thorax, soft tissues of the neck, upper extremity, and shoulder girdle, with regards to trauma and pediatric patients.
- Analyze radiographs for quality and correct positioning criteria.
- Discuss chest, bony thorax, soft tissues of the neck, upper extremity, and shoulder girdle pathology.
- Explain the Patient's Bill of Rights, Patient Privacy Rule (HIPAA), and Patient Safety Act.

Content Detail

Introduction
Step 1 - Preparation
    Step 1.1 - Equipment and room preparation
    Step 1.2 - Patient preparation
    Step 1.3 - Technologist preparation
Step 2 - Chest
    Step 2.1 - Non-routine projections
    Step 2.2 - Pathology of the pediatric soft tissue neck
Step 3 - Ribs
    Step 3.1 - Routine projections
    Step 3.2 - Trauma considerations
    Step 3.3 - Pathology of the ribs
Step 4 - Wrist
    Step 4.1 - Non-routine projections
    Step 4.2 - Trauma
    Step 4.3 - Pathology of the scaphoid
Step 5 - Elbow
    Step 5.1 - Non-routine projections
    Step 5.2 - Trauma considerations
    Step 5.3 - Pathology of the elbow
Step 6 - Humerus
    Step 6.1 - Non-routine projections
    Step 6.2 - Trauma considerations
    Step 6.3 - Pathology of the humerus
Step 7 - Shoulder, scapula, and clavicle
    Step 7.1 - Non-routine projections
    Step 7.2 - Trauma considerations
    Step 7.3 - Pathology of the shoulder

Pharmacology and Drug Administration

Description

This module covers pharmacology and the role of the radiologic technologist in administering drugs for radiologic procedures. *It includes a simulation for placing a venous cannula.*

Learning objectives

- Understand and describe the imaging professional's ethical and legal role in drug administration
- Explain the importance of obtaining a clinical history before administering any drug
- Understand and describe basic pharmacological principles including drug nomenclature, classification, dosing, and charting practices
- Understand and explain the concepts of pharmacodynamics and pharmacokinetics

- Explain various routes by which drugs may be administered, and the advantages and disadvantages of each route
- Discuss intravenous drug therapy and its complications
- Discuss specific drugs, drug categories, and methods of administering drugs used in medical imaging
- Explain the importance of patient preparation prior to a contrast study, and postprocedural considerations following a contrast study
- Describe the imaging technologist's role in venous cannulation
- Explain the importance of obtaining informed consent
- Define the categories of contrast agents and give examples from each category
- Understand the pharmacology of contrast agents
- Distinguish between mild and more severe drug reactions
- Discuss procedural anxiety and the types of medications used to treat it
- Understand and discuss the pharmacology of medications used in emergency situations
- List the contents of a crash cart
- Describe the role of the imaging technologist in a medical emergency
- Explain the HIPAA Privacy Rule, and Patient Safety Act

Content Details

Introduction
Step 1 - Principles of pharmacology and drug administration
    Step 1.1 - Drug names
    Step 1.2 - Prescribing
    Step 1.3 - Controlled drugs
    Step 1.5 - Placebos
    Step 1.4 - Complementary or alternative medications
    Step 1.6 - Documentation
    Step 1.7 - Taking a drug history
Step 2 - Biological effects
    Step 2.1 - Biopharmaceutics
    Step 2.2 - Pharmacokinetics
      Step 2.2.1 - Drug absorption
      Step 2.2.2 - Drug distribution
      Step 2.2.3 - Drug metabolism
      Step 2.2.4 - Drug excretion
    Step 2.3 - Dosing considerations
      Step 2.3.1 - Pregnancy
      Step 2.3.2 - Pediatrics
      Step 2.3.3 - Geriatrics (over 65 years of age)
    Step 2.4 - Pharmacodynamics
      Step 2.4.1 - Site of action
      Step 2.4.2 - Mechanisms of action
      Step 2.4.3 - Therapeutic effects
    Step 2.5 - Factors affecting drug pharmacokinetics and pharmacodynamics
    Step 2.6 - Osmotic effect
Step 3 - Drug classification

- Step 3.1 - Analgesics
  - Step 3.1.1 - Opioids
  - Step 3.1.2 - Nonsteroidal anti-inflammatory drugs (NSAIDS)
  - Step 3.1.3 - Paracetamol/Acetaminophen
- Step 3.2 - Drugs affecting the central nervous system
  - Step 3.2.1 - Antidepressants
  - Step 3.2.2 - Anxiolytics (benzodiazepines)
  - Step 3.2.3 - Anticonvulsants
  - Step 3.2.4 - Antipsychotics
  - Step 3.2.5 - General anesthetics
  - Step 3.2.6 - Barbiturates
- Step 3.3 - Drugs affecting the cardiovascular system
  - Step 3.3.1 - Antihypertensives
  - Step 3.3.2 - Antianginals
  - Step 3.3.3 - Anticoagulants, antiplatelets, and thrombolytics
  - Step 3.3.4 - Statins
  - Step 3.3.5 - Antiarrhythmics
- Step 3.4 - Drugs affecting the endocrine system
  - Step 3.4.1 - Hypoglycemics
- Step 3.5 - Drugs affecting the immune system
  - Step 3.5.1 – Antibiotics

Step 4 - Contrast media

- Step 4.1 - Classification
  - Step 4.1.1 - Intravascular ROCM
  - Step 4.1.2 - Enteral ROCM
  - Step 4.1.4 - Ultrasound microbubble ROCM
  - Step 4.1.3 - Parmagnetic ROCM
- Step 4.2 - Pharmacology
  - Step 4.2.1 - Iodinated radiopaque contrast media
  - Step 4.2.1.1 - Intravascular
  - Step 4.2.1.2 - Enteral
  - Step 4.2.2 - Barium sulfate
- Step 4.3 - Adverse reactions
  - Step 4.3.1 - Iodinated radiopaque contrast media
  - Step 4.3.2 - Barium sulfate
  - Step 4.3.3 - Paramagnetic agents
  - Step 4.3.4 - Ultrasound microbubble agents
- Step 4.4 - Drug interactions
- Step 4.5 - Contraindications to ROCM
- Step 4.6 - Procedural considerations
  - Step 4.6.1 - Patient preparation for different contrast studies
  - Step 4.6.2 - Postprocedure considerations
  - Step 4.6.3 - Scheduling multiple procedures
  - Step 4.6.4 - Informed consent

Step 5 - Routes of administration

- Step 5.1 - Oral
- Step 5.2 - Sublingual

- Step 5.3 - Rectal
- Step 5.4 - Topical
- Step 5.5 - Subcutaneous
- Step 5.6 - Intrathecal
- Step 5.7 - Intra-articular
- Step 5.8 - Intramuscular
- Step 5.9 - Intravenous
  - Step 5.9.1 - Inserting a peripheral IV line (venous cannulation)
  - Step 5.9.2 - Complications of IV lines
  - Step 5.9.3 - Central venous lines
  - Step 5.9.4 - Infection prevention and control

Step 6 - Procedural anxiety

- Step 6.1 - Conscious sedation

Step 7 - Medical emergencies

- Step 7.1 - How to approach an emergency situation
- Step 7.2 - Crash cart items
- Step 7.3 - Emergency medications

Additional “Clinical” Modules for Academic Institutions

The SIMTICS Radiography Suite comes with three additional “Integrated Clinical” modules for academic institutions only. These contain all the simulations and quizzes for a group of modules, plus additional simulation scenarios based on the material in that group of modules. These are designed to give students additional practice with multiple cases, to help them prepare for the clinical environment

Radiography Integrated Clinical 1 - chest & upper extremity

A compilation of **12** simulations and quizzes covering material in these modules:

1) Chest, Bony Thorax and Soft Tissues of Neck; and
2) Upper Extremity & Shoulder Girdle.

Contains the 4 scenarios and the quiz question bank from the above modules, plus 6 *additional* simulation scenarios.

Radiography Integrated Clinical 2 - abdomen, pelvis, lower extremity, hip, spine, head

A compilation of **20** simulations and quizzes covering material in these modules:

1) Abdomen & Pelvis;
2) Lower Extremity & Hip;
3) Spinal Column; and
4) Skull, Cranial and Facial Bones, and Paranasal Sinuses.

Contains the 12 scenarios and the quiz question bank from the above 4 modules, plus 8 *additional* simulation scenarios.

Radiography Integrated Clinical 3 – GI & urinary systems, biliary tract, female reproduction

A compilation of **8** simulations plus quizzes covering material in these modules:

1) Upper & Lower GI Systems & Biliary Tract;
2) Urinary & Reproductive Systems

Contains the 4 simulation scenarios and the quiz question bank from these two modules, plus 4 *additional* simulation scenarios.