

RADIOLOGY RESIDENCY HANDBOOK FOR EMERGENCY/TRAUMA RADIOLOGY

Including Block Nights and Call

**Section of Emergency/Trauma Radiology
Department of Diagnostic Radiology**

Beaumont Health Farmington Hill, Botsford Campus

Steve Zuckerman DO Section Chief Emergency Radiology

Timothy McKnight DO

Rocky Saenz DO

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INTRODUCTION:

Emergency and Trauma Radiology is critical to the success of every radiology resident and attending. This discipline includes integrating knowledge from all other radiology subspecialties, requires familiarity with all modalities but also is the setting where the radiologist can provide the greatest clinical impact for patients during their most critical episodes of care. The radiologist must make rapid decisions applying logical consistent algorithmic approaches to care and timely clear communication of critical results to the clinical providers.

EMERGENCY RADIOLOGY AT BOTSFORD

Beaumont Farmington Hills Botsford Hospital Emergency complex is a level 2 trauma center providing 24/7 trauma care and radiology services for all varieties of traumatic injuries. The radiology resident will begin their experience during the late fall/early spring of their PGY2 year under the direct supervision of the attending radiologist(s) covering the emergency room during the daytime working for their first two rotations. Following the second rotation the resident will participate in a buddy call experience one weekday evening a week directly with a senior resident on block nights during the early evening for 3-4 hours in preparation for independent call, with the attending indirectly supervising offsite. Prior to independent call all residents must complete the ER radiology preparedness evaluation to the satisfaction of the program director and clinical competency committee. In addition the resident is expected to complete their assigned online computer modules (RadPrimer) relevant to the emergency radiology prior to independent call. Residents at the PGY2 level will NOT provide any preliminary interpretations without reviewing the case directly with the attending radiologist or senior radiology resident.

Beginning in the PGY 3 year the resident will continue their emergency radiology experience with block night coverage usually from the hours of 7pm to 7am providing emergency and critical inpatient radiology services. In addition during the spring of each year the PGY2 residents will rotate through daytime weekend coverage assisting the attending radiologist from approximately 8a-4p in house with emphasis on emergency radiology, critical inpatient exams, and urgent/emergent interventional radiology services.

During the PGY3-5 years weekend coverage will be on a rotating basis depending on availability of residents and compliance with ACGME workhour limitations with the resident providing a single weekend day of coverage. This day usually beginning at 8am will include assisting the in house radiology attending with emergency/inpatient radiology services similar to above until the early evening with attending transitioning to remote supervision until the following morning. The entire experience will not exceed twenty four hours and it is customary that the attending excuse the resident from all patient care services for a block period of time (usually four hours) during the late morning or early afternoon during that time to rest and prepare for the independent evening call experience following morning checkout. In addition for all radiology residents (PGY2-5), all level 1 traumas are to be directly reviewed with the attending radiologist immediately following completion of the exams.

EDUCATIONAL GOALS AND OBJECTIVES

Emergency Radiology Rotation I (PGY 2)

PATIENT CARE AND TECHNICAL SKILLS

- Access the Electronic Health Record to obtain all relevant information regarding the emergency patient. Be able to document preliminary interpretations while under direct supervision of the radiology attending to clinical staff through the EHR.
- If further work-up is necessary to direct the ER physician to the next most appropriate modalities in a logical sequence including consideration to cost effectiveness and patient risk.
- Communicate all critical results of the imaging procedure as soon as possible directly to the requesting physician and document discussion.

MEDICAL KNOWLEDGE

- Recognizes suboptimal imaging and provide basic quality assurance for each case
- Selects appropriate type and route of contrast for each exam independently.
- Makes core observations on all common ER exams and formulates a differential diagnosis and recognizes all critical findings.
 - Lines and Tubes positioning
 - Pneumothorax/Pneumoperitoneum/Pneumomediastinum -Radiographs and CT
 - CT brain intracranial hemorrhage and large territorial CVAs
 - CT spine – fractures (emphasis on cervical spine injury patterns)
 - Ruptured/Dissected Aorta on CT and Abnormal dilated aorta on CXR and Abdomen Xray
 - CT Abdomen- Renal stones/Obstructive uropathy
 - Xray Pelvis and Extremities – common fracture patterns and classifications/descriptors
- Recognizes normal anatomy and common variants

PRACTICE-BASED IMPROVEMENT

- Contrast Agents: Recognizes and manages contrast reactions. All residents are required to maintain BLS and ACLS certification.
- Radiation Safety: Describes the mechanisms of radiation injury and the ALARA (“as low as reasonably achievable”) concept

INTERPERSONAL AND COMMUNICATION SKILLS:

- Communicates information about imaging and examination results in routine, uncomplicated circumstances
- Generates accurate reports with appropriate elements required for coding
- Communicates urgent and unexpected findings according to institutional policy and ACR guidelines

PROFESSIONALISM

Demonstrates the following professional behaviors:

- recognizes the importance and priority of patient care and advocates for patient interests
- fulfills work-related responsibilities
- is truthful
- recognizes personal limitations and seeks help when appropriate
- recognizes personal impairment and seeks help when needed
- responds appropriately to constructive criticism
- places needs of patients before self
- maintains appropriate boundaries with patients, colleagues, and others
- exhibits tolerance and acceptance of diverse individuals and groups
- maintains patient confidentiality
- fulfills institutional and program requirements related to professionalism and ethics
- attends required morning ER radiology conferences and monthly trauma conference

Assessment Rotation I:

- End of Rotation Global Assessment
- Direct Observation and feedback
- Reading out with resident
- ER morning case conferences exclusively for PGY2 twice a week

Emergency Radiology Rotation II (PGY 2)

PATIENT CARE AND TECHNICAL SKILLS

- Understanding of the common imaging modalities (XRAY, CT, US) and protocols used in the emergency/trauma setting and able to assist clinical staff to order most appropriate exam and protocol to render appropriate treatment to the patient. Emphasis on ACR appropriateness criteria and algorithmic approach to imaging workup.

MEDICAL KNOWLEDGE

- Recognizes suboptimal imaging and provide quality assurance for each case
- Selects appropriate type and route of contrast for each exam independently.
- Able to discuss management options with clinical providers
- Recognizes normal anatomy and both uncommon/common variants.
- Makes core and secondary observations on all ER exams and formulates a brief relevant/reasonable differential diagnosis and recognizes all critical findings.
 - CT brain – subtle intracranial hemorrhage, compartments and complications, subtle infarcts, common masses, infection
 - CT Abdomen – Appendicitis, Diverticulitis, IBD, Bowel obstruction, Bowel ischemia, hernias, pancreatitis, abscess
 - CT Chest – Pulmonary embolus, contusions, pulmonary edema, infection
 - Chest Xray-pulmonary edema(typical/atypical), foreign body, fractures, contusions, infection, nodules/masses
 - US – cholecystitis, hydronephrosis, ascites, ovarian torsion, ectopic, testicular torsion/infection
 - Able to utilized AAST grading for all injuries(emphasis on solid organs)

PRACTICE-BASED IMPROVEMENT

- Contrast Agents: Recognizes and manages contrast reactions. All residents are required to maintain BLS and ACLS certification.
- Radiation Safety: Able to identify radiation dosimetry information for each exam. Familiar with relative levels of radiation for each type of exam.
- MR Safety: Describes risks of MRI.

INTERPERSONAL AND COMMUNICATION SKILLS:

- Communicates, under direct supervision, in challenging circumstances
- Communicates, under direct supervision, difficult information such as errors, complications, adverse events
- Efficiently generates clear and concise reports that do not require substantive faculty member correction on routine cases
- Communicates findings and recommendations clearly and concisely

PROFESSIONALISM

- Demonstrates the following professional behaviors listed in first rotation.
- Functions as an effective member of the radiology imaging team while directly supervised by the attending

Assessment Rotation II:

- End of Rotation Global Assessment
- Direct Observation and feedback
- Reading out with resident
- ER morning case conferences exclusively for PGY2 twice a week
- Completion of assigned Online modules in ER/Trauma radiology
- ER Preparedness exam
- ACR In-service review

EMERGENCY BLOCK NIGHTS/CALL (PGY 3 –PGY4)

PATIENT CARE AND TECHNICAL SKILLS

Understanding of the uncommon imaging modalities(Nuc, MRI, Angio) and uncommon protocols (eg CT perfusion, coronary CTA, Liver/Renal Doppler, Breast US) used in the emergency/trauma setting and able to assist clinical staff to order most appropriate exam and protocol to render appropriate treatment to the patient. Emphasis on ACR appropriateness criteria and algorithmic approach to imaging workup.

MEDICAL KNOWLEDGE

- Provides accurate, focused, and efficient interpretations
- Prioritizes differential diagnoses and able to independently recommend/discuss management with clinical providers
 - Pediatric Xray – Foreign body, infection, epiglottitis, small airways disease, nonaccidental trauma, bowel obstruction/intussusception, surfactant deficiency/TTNB/meconium aspiration
 - CT Brain – Perfusion, CTA head and neck, uncommon masses, postoperative
 - MR Brain and Spine – CVA, infection, herniated disc, hemorrhage, demyelinating disease, fractures, common masses/metastatic disease
 - CT Abd/Pelv – CT angiogram incl lower extremity runoff of occlusive disease, aneurysm, dissection, pseudaneurysm. Unexpected masses, uncommon infections, CT cystography
 - CT complex extremity/pelvic fracture evaluations for surgical planning.

PRACTICE-BASED IMPROVEMENT

- Contrast Agents: Recognizes and manages contrast reactions. All residents are required to maintain BLS and ACLS certification.

- Radiation Safety: Communicates the relative risk of exam-specific radiation exposure to patients and practitioners
- MR Safety: Communicates MR safety of common implants and retained foreign bodies to patients and practitioners

INTERPERSONAL AND COMMUNICATION SKILLS:

- Communicates, under indirect supervision, in challenging circumstances (e.g., cognitive impairment, cultural differences, language barriers, low health literacy)
- Efficiently generates clear and concise reports that do not require substantive faculty member correction on common complex cases
- Communicates appropriately under stressful situations

PROFESSIONALISM

- Demonstrates the following professional behaviors listed in first rotation.
- Functions as an effective member of the radiology imaging team and can function as a team leader, when the radiology attending is indirectly supervising offsite. Emphasis on primacy of patient care/welfare, patient autonomy, and social justice.

Assessment following each Nights block:

- End of Rotation Global Assessment
- Direct Observation and feedback
- Reading out with resident
- Completion of additional assigned Online modules in ER/Trauma radiology
- Review of Reports/Rate of major discrepancies
- 360 degree Evaluation/Multipeer
- Portfolio/Case Logs evaluation
- Emergency Case conference interesting cases prepared formal presentation by the resident following each nights block
- Semi annual evaluation with program director
- ACR In-service performance

EMERGENCY BLOCK NIGHTS/CALL (PGY 5)

PATIENT CARE AND TECHNICAL SKILLS

- Demonstrates all previously defined rotation skills.
- Integrates current research and literature with guidelines, taking into consideration cost effectiveness and risk-benefit analysis, to recommend imaging.

- Able to modify established protocols to personalize imaging for each individual patient based on patient specific clinical differential diagnosis and special patient care needs.

MEDICAL KNOWLEDGE

- Demonstrates all skills from prior rotations with improved performance.
- Makes subtle observations
- Suggests a single diagnosis when appropriate
 - Rare infections/masses/syndromes/congenital malformations
 - Complex/Complicated Oncology Cases
 - Complex/Complicated Postsurgical Cases
 - Resident should be comfortable with all modalities/protocols offered at Botsford Hospital as well as familiar with services not offered onsite but are recommended for patient care and available at local tertiary hospital (eg William Beaumont Royal Oak or Children's Hospital of Michigan) and may require transfer of patient.
- Integrates current research and literature with guidelines to recommend management

PRACTICE-BASED IMPROVEMENT

- Contrast Agents: Re-demonstrates recognition and management of contrast reactions
- Radiation Safety: Applies principles of Image Gently® and Image Wisely®
- MR Safety: Applies principles of MR safety including safety zones and pre-MR screening

INTERPERSONAL AND COMMUNICATION SKILLS:

- Communicates complex and difficult information, such as errors, complications, adverse events, and bad news
- Serves as a role model for effective and compassionate communication
- Efficiently generates clear and concise reports that do not require substantive faculty member correction on all cases
- Communicates effectively and professionally in all circumstances
- Serves as a role model for effective communication

PROFESSIONALISM

- Demonstrates the following professional behaviors listed in first rotation.
- Functions autonomously with limited supervision as a team leader and acts as a role model for professional behavior.

Assessment following final Nights block:

- End of Rotation Global Assessment
- Direct Observation and feedback
- Reading out with resident
- Completion of additional assigned Online modules in ER/Trauma radiology
- Review of Reports/Rate of major discrepancies
- 360 degree Evaluation/Multipeer
- Portfolio/Case Logs evaluation
- Emergency Case conference interesting cases prepared formal presentation by the resident following each nights block
- Semi annual evaluation with program director
- ACR In-service performance
- Written Boards
- Mock Oral Boards

CURRICULUM: (Adapated from the ASER established radiology curriculum for residents)

A. Central Nervous System: James M. Provenzale, MD

1. Skull fractures
2. Extra-axial hemorrhages
 - a. subdural hematoma
 - b. epidural hematoma
3. Parenchymal injuries
 - a. cortical contusion
 - b. diffuse axonal injury
 - c. deep gray matter injury
 - d. brainstem injury
4. Subarachnoid hemorrhage
5. Vascular injuries
6. Penetrating injuries
7. Herniation syndromes
8. Cerebral infarction
 - a. arterial infarction
 - b. venous infarction
 - c. diffusion imaging appearance
 - d. perfusion imaging appearance
9. Non-traumatic hemorrhage
 - a. subarachnoid hemorrhage
 - b. parenchymal hemorrhage
10. Central Nervous system infections
 - a. meningitis
 - b. encephalitis
 - c. abscess/cerebritis
 - d. subdural empyema

- e. spinal epidural abscess
- f. osteomyelitis/discitis
- 11. Dural sinus thrombosis
- 12. Reversible posterior leukoencephalopathy syndrome
- 13. Pituitary apoplexy
- 14. Spinal trauma
 - a. spinal cord contusion
 - b. spinal epidural hematoma
 - c. nerve root avulsion

B. Face and Neck: James T. Rhea, MD and Diego Nunez, MD, MPH

- 1. Facial fractures
 - a. Orbital fractures
 - Blow-out fracture
 - Blow-in fracture
 - Orbital apex fracture
 - b. Zygoma fractures
 - Isolated arch fracture
 - Zygomatic complex fracture
 - c. Nasal fractures
 - d. Naso-orbital-ethmoid fractures
 - Posteriorly displaced
 - Telescoped
 - e. Frontal fractures
 - f. Maxillary fractures
 - Dentoalveolar fractures
 - Maxillary sagittal fractures
 - LeFort fractures
 - g. Mandible fractures
- 2. Soft tissue injuries of the orbit
 - a. Post bulbar emphysema and hemorrhage
 - b. Extraocular muscle entrapment
 - c. Ocular injuries
 - Rupture
 - Laceration
 - Lens dislocation
 - Vitreous hemorrhage
 - Subchoroidal hemorrhage
- 3. Trauma to the aerodigestive tract
 - a. Laryngeal trauma
 - b. upper esophageal injuries.
- 4. Infection of the paranasal sinuses
 - a. Acute rhinosinusitis
 - b. Aggressive fungal sinusitis
 - c. Chronic and allergic sinusitis
 - d. Complications
 - 1. cellulitis

- 2. orbital subperiosteal abscess
- 3. osteomyelitis
- 4. epidural abscess
- 5. subdural empyema
- 6. cavernous sinus thrombosis
- 5. Acute Infection of the suprahyoid neck
 - a. retropharyngeal and prevertebral abscess and inflammation (edema)
 - b. tonsillitis and tonsillar/peritonsillar abscess
 - c. Odontogenic infections
 - 1. masticator abscess
 - 2. submandibular abscess
 - 3. sublingual abscess
 - d. Ranula
 - e. Parotitis
 - f. submandibular sialoadenitis
 - g. Ludwig's angina and cervical necrotizing fasciitis.
- 6. Acute infections of the infrahyoid neck
 - a. epiglottitis
 - b. croup
 - c. lymphadenitis and suppurative adenopathy
 - d. jugular thrombophlebitis
- 7. Ear Infections
 - a. External otitis
 - b. Cholesteatoma
 - c. otomastoiditis
 - d. otitis media
 - e. apical petrositis.
- 8. Orbital infection
 - a. orbital cellulitis
 - b. orbital pseudotumor
 - c. optic neuritis

C. Spine: Diego Nunez, Jr., MD

Initial assessment issues = "Clearance" in the Emergency Department.

The evaluation of low-risk patients

The evaluation of high-risk patients (multitrauma)

The evaluation in patients with neurologic deficits

Concept and Assessment of Instability

Concept: Mechanism of injury, radiographic patterns, normal variants, frequently associated injuries.

1. Cranio-cervical / C1-C2

a. Occipital condyle fracture

b. Atlanto-occipital dislocation / subluxation

- c. Jefferson burst fracture
 - d. Atlanto-axial rotary fixation
 - e. C1 - posterior arch
 - f. Dens fracture
 - g. Hangman's fracture
2. C3-T1
- a. Anterior subluxation / whiplash syndromes
 - b. Hyperextension sprain / spinal cord injury without radiographic abnormalities
 - c. Wedge compression, spinous process fractures
 - d. Burst compression
 - e. Flexion tear drop fracture
 - f. Bilateral facet dislocation
 - g. Unilateral facet dislocation
 - h. Articular mass and transverse process fractures
 - i. Traumatic isolation of articular pillar / pedicolumnar separation
 - j. Corner Avulsion Fracture (extension teardrop)
 - k. Laminar fractures
 - l. Facet dislocation with fracture
 - m. Acute ligamentous injuries
3. Thoraco-lumbar spine trauma
- a. Compression fracture
 - b. Burst Fracture
 - c. Chance fracture
 - d. Complex fracture-dislocation
 - e. Pathological fracture
4. Traumatic injuries to intervertebral disks
5. Ostoemyelitis /discitis
6. Epidural abscess
7. Disk herniation

D. Chest: Steven L. Primack, MD

- 1. Chest trauma
 - a. Rib fractures
 - b. Sternal and manubrial fractures
 - c. Hemothorax
 - d. Pneumothorax and pneumomediastinum
 - e. Mediastinal hemorrhage
 - f. Pulmonary contusion, laceration, hematoma
 - g. Tracheobronchial injury
 - h. Esophageal tear
 - i. Diaphragm injury
- 2. Pulmonary embolism
- 3. Acute pulmonary infections
- 4. Aspiration pneumonia
- 5. Airway foreign bodies

6. Obstructive airway disease
7. ARDS: near-drowning, fat embolism syndrome
8. Esophageal rupture

E. Cardiovascular Emergencies: Stuart Mirvis, MD

1. Myocardium and Pericardium
 - a. Myocardial infarction
 - b. Myocardial laceration
 - c. Myocardial contusion
 - d. Pericardial effusion . tamponade
 - e. Pneumopericardium . tamponade
2. Aorta
 - a. Aortic trauma
 - b. Aortic dissection
 - c. Aortic aneurysm
3. Pulmonary Edema . various etiologies
4. Thrombo-embolic disease
 - a. Deep venous thrombosis
 - b. Pulmonary embolism

E. Abdomen: O.Clark West, MD

1. Abdominal Trauma

- a. Hemoperitoneum and intraperitoneal fluid
- b. Hemodynamic status assessment
- c. Retroperitoneal hemorrhage
- d. Gas collections: intraperitoneal and retroperitoneal
- e. Active arterial extravasation on CT
- f. Splenic injuries
- g. Liver injuries
- h. Gallbladder and biliary injuries
- i. Bowel injuries
- j. mesenteric injuries
- k. Pancreatic injuries
- l. Renal injuries
- m. Adrenal injuries
- n. Bladder injuries: intraperitoneal and extraperitoneal
- o. Abdominal wall injuries and diaphragmatic hernias

2. Non-traumatic Abdominal Emergencies

- a. The peritoneal cavity
 - Ascities
 - Peritonitis
 - Abdominal abscess
- b. Liver and biliary tract
 - Jaundice: obstructive and non-obstructive

- Cholecystitis
- c. Pancreatitis
- d. Urinary tract
 - Urinary stones
 - Infection
 - Pyelonephritis
 - Renal abscess
- e. Adrenal hemorrhage
- f. Gastrointestinal tract
 - Gastrointestinal hemorrhage
 - Bowel obstruction
 - Bowel infarction
 - Bowel infection
 - Appendicitis
 - Diverticulitis
 - Infectious enteritis and colitis
- g. Epiploic appendagitis
- h. Inflammatory bowel disease
 - Crohn disease
 - Ulcerative colitis

I. Gynecological /Obstetrical Emergencies: Stephen Ledbetter, MD

1. Uterine trauma
2. Cervico-vaginal trauma
3. Feto-placental trauma
4. Ovarian cystic disease
5. Ovarian torsion
6. Pelvic inflammatory disease
7. Endometritis
8. Spontaneous abortion
9. Fetal demise
10. Subchorionic hemorrhage
11. Ectopic pregnancy
12. Placenta previa
13. Placental abruption and hemorrhage
14. Biophysical Profile

H. Male Genitourinary Emergencies: Stanford M. Goldman, MD

1. Urethral and penile trauma
2. Urethral foreign bodies
3. Urethral stones
4. Scrotal and testicular trauma
5. Acute non-traumatic scrotal conditions
 - a. Testicular torsion
 - b. Epididymitis

- c. Orchitis
- d. Acute fluid collections (Hydrocele, hematocele, pyocele)
- e. Epididymoorchitis
- f. Infarction
- g. Abscess
- h. Fournier's Gangrene

I. Upper Extremity: Fred A. Mann, MD

1. Scapulothoracic dissociation
2. Clavicle fractures and dislocations
 - a. Dislocations
 - Sternoclavicular
 - Acromioclavicular
3. Glenohumeral dislocations
4. Scapular fractures
5. Humerus fractures
 - a. Proximal (head & neck)
 - b. Shaft
 - c. Supracondylar
 - extra articular, including epicondyles
 - intra articular, including unicondylar, bicondylar and capetellar fractures
6. Elbow dislocations
7. Forearm fractures & dislocations
 1. Fractures
 - a. Processes
 1. coronoid process
 2. Radial tubercle
 - b. Distal radius
 1. Colles, Smith, Barton types
 2. Die-punch fracture radiolunate fossa
 - c. Defensive injuries to ulna, including classic nightstick
 2. Single bone fracture with associated dislocation non fractured bone
 - a. Monteggia
 - b. Galeazzi
 - c. Essex-Lopresti
 3. Dislocations
 - a. Elbow
 - b. Distal radioulnar joint
8. Carpal bone fractures
9. Carpal dislocations and malalignments
 - a. Perilunate spectrum
 - b. Carpal instability patterns
10. Metacarpal fractures
 - a. Carpometacarpal fracture dislocations, including Fighters. equivalent fractures
 - b. Extra articular fractures of the base, shaft and neck

11. Phalangeal fractures
 - a. Dislocations
 - Simple
 - Complex
 - Ligament injuries, including those of the extensor mechanism, collateral ligaments
 - b. Fractures
 - Extra articular
 - Intra articular
 - Volar plate
 - Mallet type
 - Amputations

J. Pelvis and Hip: John H. Harris, Jr. MD, DSc

A. Pelvis

1. Fractures of isolated bones of the pelvis that do not involve the pelvic ring
 - a. iliac wing (Duvrney)
 - b. sacrum
 - c. coccyx
 - d. avulsion
 - ant. sup. iliac crest apoph. - sartorius m
 - ant. inf. iliac crest apoph. - rectus femoris m
 - ischial tuberosity - hamstring ms
 - lesser troch. apoph. (femur) - iliopsoas
2. Pelvic ring disruption. Disruption, ie., fracture or diastasis at two or more sites of the anterior and posterior pelvic arcs.
 - a. Mechanism of injury
 - lateral compression
 - anteroposterior compression
 - discrete: straddle injury
 - diffuse: open-book pelvic ring disruption
 - vertical shear
 - b. Types of pelvic ring disruption
 - Malgaigne (ipsilateral)
 - bucket - handle (contralateral)
 - open - book
 - other fracture patterns without eponym
3. Insufficiency fractures
 - anterior pelvic arch
 - sacrum

4. Stress fractures
5. Acetabular fractures (Involve only one side of the pelvic ring. Occur concomitantly with PRD in approximately 12%.)
 - a. posterior column (most common) rim
 - b. anterior column
 - c. both columns - above, or through, acetabulum but spare the lunate surface
 - d. transverse ("T")
 - "T" with ant. column extension
 - "T" with post. column extension

B. Hip

1. Dislocation
 - a. Posterior or posterosuperior
 - pure fracture-dislocation. Fracture involves posterior or posterosuperior acetabular rim
 - b. Anterior (obturator)
 - c. Central
2. Fractures (usually associated with dislocation).
 - a. Posterior or posterosuperior acetabular rim
 - b. Anterior (Involve the acetabular "tear-drop")
 - c. Central

C. Proximal femur

1. Slipped capital femoral epiphysis (SCFE)
2. Salter-Harris physeal injuries
3. Fractures
 - a. Head - usually associated with hip dislocation
 - b. Neck
 - subcapital
 - transcervical
 - basicervical
 - c. Trochanteric
 - intertrochanteric
 - 2 - part (proximal/distal fragments)
 - 3 - part (prox./distal + 1 trochanter)
 - 4 - part (prox./distal + each trochanter)
 - subtrochanteric
 - isolated fracture, greater trochanter
4. Avascular necrosis
 - Stage I - radiograph negative
 - Stage II - inhomogeneity of femoral head
 - Stage III - Progressive inhomogeneity; trabecular disruption; "crescent" sign;
 - subcondral cortical disruption.
 - Stage IV - fragmentation of head

K. Lower Extremity: Eric A. Brandser, MD

1. Femoral shaft fractures
2. Patella fractures
3. Tibial plateau fractures
4. Tibial spine avulsion fractures
5. Cruciate and other ligamentous injuries of the knee
6. Meniscus tears
 - a. Bucket handle tear
 - b. Radial tear
7. Knee dislocations
8. Tibial stress fractures
9. Tibial and fibular shaft fractures
10. Tibial plafond fracture (pilon fractures)
11. Ankle mortise injury
12. Calcaneal fractures
13. Achilles tendon and ligamentous injuries of the ankle
14. Talus fractures
15. Talar and subtalar dislocations
16. Tarsal fractures
17. Tarso-metatarsal fracture dislocations (Lisfranc.s fracture)
18. Metatarsal fractures
19. Toe fractures
20. Septic arthritis
21. Muscle injuries
22. Compartment syndrome
23. Diabetic muscle infarction
24. Diabetic foot infections

L. Pediatric Emergencies: Carols J. Sivit, MD

1. Brain
 - A. Trauma
 1. Cephalohematoma and caput succinadeum
 2. Unintentional blunt and penetrating
 3. Intentional (Battered child)
 - B. Infection
 1. TORCH infections
 2. Meningitis, cerebritis, cerebral abscess
 3. Mastoiditis
 - C. Non-traumatic hemorrhage
 1. Neonatal germinal matrix hemorrhage
 2. AVM, aneurysm, moya-moya, coagulation disorders
 - D. Cerebral ischemia
 1. Perinatal brain injury
 2. Sickle cell disease

- E. Imaging the child with seizures
- 2. Head & Neck
 - a. Trauma
 - 1. Facial (orbit, zygoma, maxilla, mandible, frontal, nasal)
 - b. Infection
 - 1. Croup
 - 2. Epiglottitis
 - 3. Retropharyngeal abscess
 - 4. Parotitis
 - 5. Orbital cellulitis
 - 3. Spine
 - a. Trauma
 - 1. Cervical spine
 - 2. Thoracic spine
 - 3. Lumbar spine
 - b. Infection
 - 1. Osteomyelitis/discitis
 - 2. Epidural abscess
 - c. Miscellaneous
 - 1. Imaging the child with acute back pain
- 4. Chest
 - a. Trauma
 - 1. Pulmonary contusion/laceration
 - 2. Thoracic air leak
 - 3. Mediastinal hemorrhage
 - 4. Esophageal and airways injury
 - 5. Chest wall injury
 - b. Infection
 - 1. Pneumonia
 - a. Neonatal pneumonia
 - b. Bacterial pneumonia
 - c. Viral pneumonia
 - d. Opportunistic infection
 - 2. Empyema & pleural disease
 - c. Foreign body aspiration
 - d. Neonatal respiratory distress
 - 1. Respiratory distress syndrome
 - 2. Meconium aspiration syndrome
 - 3. Transient tachypnea of the newborn
 - e. Congenital heart disease
 - f. Congestive heart failure and pulmonary edema
- 5. Abdomen
 - a. Trauma
 - 1. Solid viscus injury
 - 2. Hollow viscus injury
 - 3. Peritoneal fluid, hemoperitoneum & active

- hemorrhage
 - 4. Hypoperfusion complex\
 - b. Non-traumatic hemorrhage
 - 1. Adrenal hemorrhage
 - c. Infection/Inflammation
 - 1. Appendicitis
 - 2. Pancreatitis
 - 3. Cholecystitis
 - 4. Cholangitis
 - 5. Pyelonephritis
 - d. Bowel obstruction
 - 1. Midgut malrotation
 - 2. Bowel atresias
 - 3. Intestinal intussusception
 - 4. Hirschsprungs disease
 - 5. Meconium ileus, meconium plug syndrome & meconium peritonitis
 - e. GI bleeding
 - f. Immunocompromised disorders
 - 1. Neutropenic typhlitis
 - 2. Pseudomembranous colitis
 - g. Obstructive uropathy
 - h. Urolithiasis
6. Pelvis
- a. Trauma
 - 1. Bladder and urethral injury
 - b. Infection/Inflammatory
 - 1. PID
 - 2. Ovarian cystic disease & torsion
7. Scrotum
- a. Trauma
 - b. Infection/Inflammatory
 - 1. Neonatal testicular torsion
 - 2. Testicular torsion in older children
 - 3. Epididymitis/Orchitis
8. Musculoskeletal
- a. Trauma
 - 1. Battered child
 - 2. Growth plate injury
 - 3. Toddlers fracture
 - 4. Nursemaids elbow
 - 5. Elbow injury & normal developmental variants
 - 6. Biomechanical features of growing long bones
 - b. Infection
 - 1. Osteomyelitis
 - 2. Septic arthritis

3. Pyomyositis
 - c. Miscellaneous
 1. Child with limp
9. Pediatric sedation & monitoring in the emergency setting

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Vascular & Interventional Radiology Handbook Department of Radiology and Radiological Sciences. As the Diagnostic Radiology Residency Program Director, I often hear it is difficult and confusing for residents to understand the intricacies of a subspecialty rotation, especially one as complex as interventional radiology. Emergency Situations: Medical or surgical procedures may be undertaken without Informed Consent when the patient is unable to consent, no surrogate is available immediately, and the delay caused by attempting to locate a surrogate will create a substantial risk of death, serious disfigurement, or loss or impairment of the functions of a bodily member or organ or other serious threat to the health of the patient. Most radiology services, including an emergency radiology service, do not schedule dedicated clinic time, and therefore meeting with patients may not be a set priority in the daily workflow. Additionally, radiologists often do not have enough information from the emergency medicine team to discuss detailed management plans with patients. At Harborview Medical Center in Seattle, Washington, emergency radiologists are embedded in the trauma section of the ED and frequently speak with patients for additional clinical history or may even perform a focused physical exam to correlate with imaging findings. In some situations, a radiologist is best suited for directly correlating imaging findings with symptoms or physical examination findings. The Radiology Residency program at Indiana University School of Medicine is an ACGME-accredited, four-year program that provides crucial training for trainees to develop expertise in all areas of diagnostic and interventional radiology. The IU School of Medicine Radiology Residency also leverages the considerable resources available through the school's partnership with one of the leading hospital systems in the country, IU Health. From Level-1 trauma centers to the state's epicenter of academic tertiary and quaternary referrals, learn about the diverse clinical training the Diagnostic Radiology Residency Program offers trainees. Radiology is a vast subject and there are tons of books available. Here is a list of recommended radiology books for residents! This handbook is quintessential for all radiology residents and is MUST read for practicals. The updated 7th edition has divided the differentials into most common, less common and rare. These are now easier to recollect than the monotonous list in the previous versions. A good book for first-year radiology residents to understand the basic physics of x-rays, image identifiers, and dark-room. MRI made easy Govind Chavhan. A small handbook that covers the essentials of MR physics.