Objectives

Objective:
1. Identify the key components of trauma assessment
2. Discuss diagnostic evaluation for Limb, organ and musculoskeletal injuries
3. Discuss initial therapy strategies for limb, organ and musculoskeletal injuries
Trauma

- Non-accidental Trauma
- Splenic, Pancreatic, Liver and Renal lacerations
- Thoracic/Chest
- Burns
- Musculoskeletal Injuries
Trauma

• Leading cause of death and disability in children > 1 year of age
  • *Often preventable*
Trauma Evaluation

Primary Survey

• Airway
• Breathing
• Circulation
• Disability/Neurological Evaluation
• Exposure

Secondary Survey: vital signs, history, thorough head to toe examination and diagnostic testing.
Estimating Blood Volume

**A Simple Method To Estimate Circulating Blood Volume**

<table>
<thead>
<tr>
<th>AGE</th>
<th>ESTIMATED BLOOD VOLUME (ml/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm Neonate</td>
<td>100</td>
</tr>
<tr>
<td>Full-Term Infant</td>
<td>90</td>
</tr>
<tr>
<td>Infant</td>
<td>80</td>
</tr>
<tr>
<td>Child</td>
<td>75</td>
</tr>
<tr>
<td>Teenagers &amp; Adults</td>
<td>70</td>
</tr>
</tbody>
</table>

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Circulating Blood Volume

- Small amounts of blood loss in children
  - Results in reduction in circulating blood volume and reduction in systemic perfusion
- Tachycardia is an early sign of shock
- Hypotension; late sign of shock
- Bradycardia; ominous
Non-Accidental Trauma (NAT)

*Non-accidental Trauma*: Consider in any unusual presentation of trauma or age based injury that *doesn’t make sense*.

- Always evaluate whether injury matches story/history
  - Important in verbal and preverbal children
Non-Accidental Trauma

• Evaluation: history not consistent with findings
  • Cutaneous – bruising, lacerations, abrasions, burns
    • Location, shape
  • Skeletal – skull, rib and femur fractures
    • Age of child, likelihood of injury
  • Abdominal – rare, but possible
  • *Funduscopic evaluation for retinal hemorrhage of any child with suspected shaking or traumatic brain injury of questionable mechanism.
Non-Accidental Trauma

Diagnostics:

Radiographic Imaging: CXR/abdominal XR, skeletal survey
Eye Exam: Retinal hemorrhages
Brain imaging: CT scan
Retinal Hemorrhages

normal

retinal hemorrhages
Head CT

Normal CT: 2 month-old infant

Subacute subdural effusion; right tempoparietal acute subdural Hemorrhage: 4 month-old infant
Abdominal Trauma

- Abdominal Injuries: Any age group, typically via blunt force trauma, as motor vehicle accident (MVA)
- Splenic, Pancreatic, Liver and Renal Lacerations
Splenic Laceration

• Most common abdominal injury in childhood; blunt trauma to upper abdomen or lower thorax. Spleen is not adequately protected by rib cage.
• S/S: Pain in left shoulder, LUQ or left part of chest; bruising, abrasions, N/V. A mass may be palpable in LUQ
• Laboratory: Decreased hemoglobin/hematocrit
• Diagnosis by CT, but CXR may show fractures to left lower ribs or pleural effusion

95% are managed non-operatively
Splenic Laceration

Figure 1: AAST Spleen Injury Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Type</th>
<th>Injury Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade I</td>
<td>Hematoma</td>
<td>Subcapsular, &lt;10% surface area</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>Capsular tear, &lt;1 cm parenchymal depth</td>
</tr>
<tr>
<td>Grade II</td>
<td>Hematoma</td>
<td>Subcapsular, 10-50% surface area; intraparenchymal, &lt;5 cm in diameter</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>Capsular tear, 1-3 cm parenchymal depth that does not involve a trabecular vessel</td>
</tr>
<tr>
<td>Grade III</td>
<td>Hematoma</td>
<td>Subcapsular, &gt;50% surface area or expanding; ruptured subcapsular or parenchymal hematoa &gt;5 cm or expanding</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>&gt;5 cm parenchymal depth or involving trabecular vessels</td>
</tr>
<tr>
<td>Grade IV</td>
<td>Laceration</td>
<td>Laceration involving segmental or hilar vessels producing major devascularization (&gt;25% of spleen)</td>
</tr>
<tr>
<td>Grade V</td>
<td>Laceration</td>
<td>Completely shattered spleen</td>
</tr>
<tr>
<td></td>
<td>Vascular</td>
<td>Hilar vascular injury that devascularizes spleen</td>
</tr>
</tbody>
</table>

* Advance one grade for multiple injuries, up to grade III.

http://www.jlgh.org
Splenic Laceration

• If splenectomy; prophylactic antibiotics indicated in children < 4 years old and in some cases, children > 4 years of age
• Post-op splenectomy: monitor for bleeding, thrombosis, infection, fistula formation
• Vaccination importance
  • https://www.cdc.gov/vaccines/schedules/hcp/imz/child-indications-compliant.html
Liver Laceration

- Major cause of death in children with blunt trauma, highest risk for injury.
- Associated with significant blood loss, exsanguination. Right lobe more prevalent than left lobe
- Presentation: Acute abdominal tenderness due to hemoperitoneum, pain in right shoulder or RUQ tenderness. Bruising, seatbelt markings and abrasions, hypotension and tachycardia, if bleeding and fractured ribs, associated pelvic or rib fractures.
Liver Laceration

• Diagnostic evaluation: CBC, liver function tests, ultrasound, CT
• Non-operative management - Same as spleen: NPO status, hemoglobin/hematocrit every 4 – 6 hours
• Can ambulate after AST and ALT are within normal limits; blood products if indicated
• Operative management if hemodynamically unstable – often to control bleeding
Liver Laceration

- Injury Grading Scale
  - Grade I – Grade VI
  - Grade VI – avulsion of liver
Pancreatic Laceration

Pancreatic Injury/laceration:

- Associated with high morbidity and mortality. Findings – soft tissue contusion in upper quadrant, handlebar marking, tenderness to lower ribs and costal margin, epigastric tenderness, lower thoracic spine fracture, signs of peritonitis, vomiting.

- Diagnostic: CT with grading of injury, amylase and lipase labs
Kidney Laceration

- Presentation: Contusion, hematoma, or bruising of flank or back, abdominal or flank tenderness, palpable mass, stab wounds posterior to anterior axillary line.

- Diagnostic: CT, urinalysis for hematuria, Intravenous pyelogram *American Assn for Surgery Trauma renal injury scale.
Trauma - Miscellaneous

• **Abdominal Compartment syndrome**: Life threatening complication of abdominal trauma, results in coagulopathies, acidosis, hypothermia, bowel edema – monitor bladder pressures.

• **Pneumothorax, hemothorax and tension pneumothorax**: Chest injury via fall, blunt trauma
  • Symptoms: Tachypnea, hypoxia, unequal breath sounds, muffled or displaced cardiac sounds
Abdominal Compartment Syndrome

Onset of Multiple Organ Dysfunction Syndrome (MODS)
IAP > 20 mmHg

- Brain swelling and ischemia
- Increased peak pressure, difficult ventilation and oxygenation; VILI/ARDS
- Increased gut ischemia, Impending necrosis
- Cardiovascular instability
- Vena caval flattening
- Anuria/Acute Renal Failure (ARF)
- Further worsening of acidosis
Chest/Thoracic Trauma

• Generally accounts for ~ 5-12% of pediatric trauma
• 2nd leading cause of pediatric trauma associated death
• Can have relatively little cutaneous evidence of injury due to cartilaginous thoracic cavity in children and still have significant injury
  • Chest wall of infants & children very compliant
• Rarely occur as singular insult (e.g. often associated with other injuries)
Chest/Thoracic Trauma

- Most common
  - Pneumothorax
  - Hemothorax
  - Pulmonary contusion
  - Rib fractures
  - Tracheobronchial tree disruptions
  - Cardiac trauma
**Pneumothorax**

- Collection of air in the pleural space between the lung and chest wall
- Signs/symptoms: Tachypnea, dyspnea, unequal breath sounds, hypoxia, chest pain
  - Altered pitch may be difficult to appreciate in small child due to small chest size and referred breath sounds over the pneumothorax
- Can vary in size; not all require intervention
- Emergent = tension pneumothorax.
  - Generally builds up **acutely**, results in positive pressure in the chest cavity, resulting in shifting of mediastinum, and ultimately impacts cardiorespiratory functioning
  - Decompression can be life saving
- Treatment: Evaluation of air; depending on size and symptoms; 100% oxygen pneumothorax ‘washout’ = controversial
Pathology

- Pneumothorax
  - Closed pneumothorax
  - Open pneumothorax
  - Tension pneumothorax

Air in pleural space

Air in pleural space increasing and unable to escape
Hemothorax

- Accumulation of blood in the pleural space between lung and chest wall. Fluid build up can limit lung expansion
- Most common cause: Chest wall trauma resulting in pleural laceration, vascular damage (e.g. intercostal vessel, internal mammary artery)
- Signs and symptoms: Tachypnea, dyspnea, unequal breath sounds, anemia
- Vary in size and acuity
- Treatment: Evacuation of blood; depending on size/symptoms
Hemothorax

![Diagram of the thorax with blood accumulation in the right pleural cavity.](image_url)
Hemodynamic Monitoring

• Arterial Line Placement
  • Indications: Blood pressure monitoring, frequent laboratory sampling
  • Placement:
    • Commonly: Radial artery, dorsalis pedis, posterior tibial, femoral
    • Considerations: Skin integrity/infection near placement site, trauma, collateral flow, platelet count, coagulation state
    • Procedure: Sterile conditions, Seldinger technique
      • Increased number of attempts, increased number of operators needed to place line – increases risk for complications
  • Complications: Infection, bleeding, hematoma, hemodynamic compromise, nerve injury
Hemodynamic Monitoring

- Arterial Line
  - Evaluation of tracing
Hemodynamic Monitoring

- Arterial Line
  - Evaluation of tracing
Hemodynamic Monitoring

• Arterial Waveform
  • Evaluation of tracing; affected by
    • Position of extremity
    • Zeroing at phlebostatic axis
    • Arterial vessel spasm
    • Tubing length
    • Others
Central Venous Access

• Central line placement
  • Considerations
  • Indications
    • Inability to obtain peripheral access
    • Anticipated intermediate-term/long term vascular access requirements
    • Administration of caustic medications
    • Hemodynamic monitoring
  • Placement
    • Evaluation of most appropriate site
    • Sterile conditions
    • Seldinger technique
    • Flush set-up
    • Aspiration as needle is advanced
    • Confirmation of venous vessel
Central Venous Access

- Central line complications
  - Pneumothorax
  - Bleeding
  - Hematoma
  - Air embolism
  - Arrhythmias
  - Venous thrombus, pulmonary embolism
Central Venous Access
Central Venous Access

• Pearls
  • If unable to access vessel; move to another site
  • Do not force guidewire; should advance easily
  • Always have a hand/fingers on the guidewire
  • Always confirm placement using blood gas and waveform tracing
  • Confirm placement with radiograph
  • Do no ‘cure’ patients
  • Always take longer than anticipated to place
  • Remove when no longer needed
Pulmonary Contusion

• A ‘bruise’ of the lung/lung parenchyma, associated with alveolar lung injury without frank pulmonary laceration; results from chest trauma
• Signs/symptoms: tachypnea, respiratory distress, hypoxia
• Initial chest radiograph may be normal
• Within ~ 24 hours after injury, chest radiograph demonstrates ill defined geographic consolidation that is not specific to contusion (e.g. can appear as other pulmonary processes such as aspiration, atelectasis, infection..)
• Often, improvement over several days, as blood is absorbed; may improved within 24-48 hours; most resolved in 7-10 days
• Treatment: Supportive
Rib Fractures

• Children have more pliable chests than adults; rib fractures are less common in children
• ALWAYS raises suspicion of maltreatment
• Risk of mortality increases with each linear rib that is fractured
• Often associated with trauma/injury in other parts of the body: head, thoracic, solid organ
• Treatment: Evaluate for other injuries, evaluate for signs of abuse, consider diseases of bone (uncommon!), pain management
Rib Fracture

www.diseasepictures.com
Cardiac Tamponade

- Accumulation of blood/fluid in the pericardial sac
- Compresses the heart
- Compromises venous return to the heart and cardiac output
- Signs/Symptoms
  - ‘Obstructive shock’
  - Hypotension
  - Tachycardia
  - Distention of neck veins
  - Muffled heart sounds
  - Pulsus paradoxus
Cardiac Tamponade

• Diagnosis
  • CXR - enlarged cardiac silhouette
  • *ECHO/Ultrasound – appears black against gray muscle

• Treatment
  • Pedicardiocentesis
  • Transfusion, may be required
Cardiac Tamponade

Figure-2: Echocardiograph, signs of tamponade (swinging heart and diastolic right ventricular collapse) and pericardial fluid 3.9 cm in size were found.
Radiograph Practice....
Burn Injury

- Burns occur as a result of chemicals or thermal injury. The outcome is often based on layer of skin involved with burns to the subcutaneous layer or third layer posing most problem with wound healing.
- Three layers of the skin involved are:
  - Epidermis, Dermis and Subcutaneous layers
- FIRST line management for burn injuries: includes: Airway, Breathing, Circulation, then Primary and Secondary Trauma Surveys.
Burn Injury

- Skin is the largest organ of the body
  - Has multiple functions — protective barrier, maintenance of fluid and electrolytes, and thermoregulation
  - Also, an excretory and sensory organ
Burn Injury

• Airway Assessment: Potential for injury - facial burns, singed eyebrows, stridor, wheezing, hypoxia, carbon sputum, hoarseness, mucous membrane and tongue swelling
• Breathing and Circulation: Particle aspiration and CO inhalation causes hypoxia and difficulty breathing
• Laboratory and radiological evaluation: carboxyhemoglobin, CBC, complete metabolic panel with albumin, blood gas. Urine pH and myoglobin is indicated for children with electrical burns along with an EKG
• Primary and Secondary Survey: Burn surgeon
Degree of Damage

* Depends on temperature and exposure time

• **Superficial**: epidermis, minor in severity

• **Partial Thickness**: through the epidermis into the dermis, blister formation distinguishes a partial thickness burn from a superficial burn.

• **Full Thickness**: extends through the dermis, skin is white, yellow, brown or black in appearance, no blisters, skin is hard, minimal or no pain.

• **Deep Full Thickness**: all layers of the skin, may involve fascia, tendons, muscle and bone
<table>
<thead>
<tr>
<th>Degree</th>
<th>Anatomic correlate</th>
<th>Schematic aspect</th>
<th>Clinical aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Reddening, swelling, pain (epidermis)</td>
<td>![Schematic I]</td>
<td>![Clinical I]</td>
</tr>
<tr>
<td>IIA</td>
<td>Reddening, blistering, pain (superficial dermis)</td>
<td>![Schematic IIA]</td>
<td>![Clinical IIA]</td>
</tr>
<tr>
<td>IIB</td>
<td>Pallor, blister, pain (partial dermis)</td>
<td>![Schematic IIB]</td>
<td>![Clinical IIB]</td>
</tr>
<tr>
<td>III</td>
<td>Greyish white or black necrosis, analgesia (complete dermis)</td>
<td>![Schematic III]</td>
<td>![Clinical III]</td>
</tr>
<tr>
<td>IV</td>
<td>Carbonization (may extend to the bones and joints)</td>
<td>![Schematic IV]</td>
<td>![Clinical IV]</td>
</tr>
</tbody>
</table>
Burns: Fluid and Systemic Response

- TBSA (total body surface area) of the burn, calculated by the rule of nines. Burns can affect all body systems.
- Capillary Leak. Fluid shifts occur 12 – 48 hours after injury resulting in metabolic compromise and electrolyte instability. Proteins can also escape into the interstitial space. Potassium may be released from injured cells.
- Compartment syndrome can occur as diffuse edema in an extremity, orbital or abdominal region.
- Fluid resuscitation assists in preventing rhabdomyolysis and subsequent renal failure.
- Hyperglycemia management is important with management of protein loss.
- Compromised immune function.
Fluid Management

- Fluids – Parkland Formula. Controversy crystalloid vs colloid. Lactated Ringers, most common
Parkland Formula

**Parkland Formula**
Apply only in 2nd and 3rd degree burns

Volume of Lactated Ringers solution
4 mL x Total body surface area of burn (%) x Body Weight (kg)

- First half of the solution over the **first 8 hrs**
- Second half of the solution over the **next 16 hrs**

**Rule of Nines**

- **Pediatric**
  - 18%
  - Front 18%
  - Back 18%
  - 14% 14%

- Patient's PALM approximates 1%
  - total body surface area
Antimicrobials

*Infection is most common post-burn cause of morbidity and mortality

Group A Strep - most common in fresh burn/graft. Characterized by erythema, pain, induration, edema

Staph aureus/epi – more insidious course – 3-5 days. Fever, ileus.

Gram negatives – green/foul smelling discharge over 2-3 days, leukopenia, hypothermia, ileus

Fungal infections

**Presence of central line and 3rd degree burns are highest risk for serious bacterial infection after burn injury**

Antimicrobial Therapy: prevent bacterial overgrowth and systemic infection

Topical therapy: Silvadene ointment or cream: water soluble, bacteriocidal activity against gram positive and negative bacteria and yeast. Should not be used for young infants or sulfa-sensitive children.

*Silver containing dressings: silver containing hydrocolloid dressings and provide antimicrobial therapy.
Burn Injury Therapy

• Autograft
  • Excision of non-viable tissue
  • Donor site -> area of healthy skin
  • Reduces visible scarring from burn injury site
  • Donor site often painful; risk for infection
  • Not ideal and new therapies are needed

• Collagen animal-derived dermal substitutes, cultured epithelial sheets, bi-layered skin substitutes, others
Pain Management

• Pain Management is Imperative to healing!
  • Difficult to manage
  • Inadequate pain control is associated with long term psychological consequences
  • Acute on chronic pain

• Acetaminophen, NSAIDs, opioid analgesics, ketamine, alpha 2 antagonists all commonly used
  • Other options include antidepressants, anticonvulsants

• Regional blocks and virtual reality may be adjuncts to traditional pharmacologic approaches
Musculoskeletal Problems

• Children experience fractures with trauma!
• **Compartment Syndrome:** major concern following any trauma or musculoskeletal emergency
• Compartment pressure related medical emergency requires immediate treatment if pressures exceed normal limits > 30-35mmHg; castings or bandages are removed with any question of status, keep extremity level.
• If signs/symptoms are excessive, emergent fasciotomy may be performed
Compartment Syndrome

Definition: Emergency that compromises tissue within a closed, inflamed space limiting perfusion with inadequate blood flow to capillaries leading to tissue ischemia.

• Immediate treatment needed if pressures exceeds normal limits > 30-35mmHg; Remove castings or bandages are removed.

• Can result from many medical problems including fractures, burns, venomous bites, IV or IO infiltrates, thromboembolic events, athletes involved in heavy training.

• Symptoms: Three P’s
  • Paralysis
  • Pallor
  • Pulselessness

• Preceding the 3 P’s are 3 A’s – Anxiety, Agitation and Analgesic Requirement
Fractures

• Fractures are common injuries with pediatric trauma.

• Physeal and growth plate fractures need immediate and specialized care. Use Salter-Harris fracture classification to determine growth plate involvement.
Classification of Epiphyseal Plate Fractures

• I – Complete separation without fracture  Mgmt: closed reduction and cast

• II – Most common; separation of plate with fx  Mgmt: closed reduction and cast

• III – Fracture through part of plate extending to joint.  Mgmt: open reduction and internal fixation

• IV – Fracture completely through plate.  Mgmt: open reduction and internal fixation

• V – Crush injury to area of plate that is nondisplaced with no fx line visible on xray.  Mgmt: immobilization and non-weight bearing for a min of 3 weeks
Osteomyelitis

- Infection of the bone - most common infective organism is staph aureus
- Presentation is variable.
- Diagnostics: CBC, diff, ESR, CRP, blood culture, plain xray, MRI
- IV Antibiotics, but unknown documented time frame. Average length of treatment is 5 to 23 days. Surgical drainage is sometimes necessary.
Slipped Capital Femoral Epiphyses (SCFE)

• Separation of the growth plate in the proximal femoral head.

• Acute disease includes sudden exacerbation with hip, thigh or knee pain, limited internal rotation and obligated external rotation.

• Diagnostics: plain radiographs of pelvis, may need CT or MRI

• Surgical pinning or fixation.
Toxic (Transient) Synovitis

- Transient monoarticular synovitis as inflammatory condition that affects large joint spaces, usually hip.
- Pain in the area of the affected joint, limping (antalgic) gait, and refusal to bear weight.
- Diagnostic: CBC, diff, ESR, CRP, MRI or bone scan.
- Symptom based treatment, NSAIDS for pain, rest and limited activity of the joint.
Septic Arthritis

• Infection of the synovial space of the joint.
• Pain to the affected area, fever, nonuse of extremity, limp or refusal to bear weight.
• Diagnostic: CBC, diff, ESR, blood culture, bone scan
• IV antibiotics – may require surgical intervention for drainage of joint.
Septic Arthritis
Spinal Fusion/Scoliosis Repair

Spinal deformity repair

• Intraoperative concerns include blood loss, hypotension, respiratory instability and kidney function, SIADH can occur intra or post operatively as a result of volume replacement and spinal manipulation

• Pain management, fluid and electrolyte monitoring and replacement, intake and output, neurologic assessment for first 24 hours
Spinal Fusion
Le Fort/Mandibular Procedures

- Commonly used procedures to treat midface deformities
- Allows for 3 dimensional correction (advancement, retraction, elongate, shorten)
- May be performed with other mandibular surgery simultaneously (for malocclusion, obstructive sleep apnea, ..)
- Often last stage in surgical treatment for cleft lip/palate (LeFort)
- Procedure completed with nasotracheal intubation
  - Usually secured with 2.0 silk to membranous septum
LeFort/Mandibular Procedures

• Post-op
  • Maxillomandibular fixation device may be in place
  • Nasogastric tube; risk of nausea
  • Hand-held suction device

• Complications
  • Nasolacrimal duct obstruction
  • Abscess
  • Sinusitis
  • Brain abscess
  • Severe hemorrhage
  • Pseudoaneurysm
  • Epistaxis

If distraction device in place; meticulous respiratory evaluation is needed
LeFort III
Esophageal Trauma

- Laundry detergent pods (contain ethanol, hydrogen peroxide, polymers)
  - Most common in children < 3 years of age
  - Adolescent “Tide pod challenge”
  - Signs and symptoms: Vomiting, drooling, depressed sensorium, lactic acidosis
  - Most do NOT demonstrate oral/lip cutaneous findings
  - Damage can be done to the esophagus; in some cases, erosion of esophagus (e.g. erythema, superficial erosion, perforation)
  - Evaluation: Upper endoscopy may be indicated
Ocular Trauma

- Can be open or closed globe injuries; closed globe more common
- More common in males than females
- Most common site of injury
  - Home: preschool children
  - Outdoor activities: > 13 years of age
- Most common cause of monocular blindness in children
- Children are more susceptible to ocular injury d/t immature motor skills, lack of common sense, natural curiosity
- Assessment – can be challenging in children, especially if uncooperative
Ocular Trauma

• Open globe injury presentations:
  • Hypotony
  • Traumatic cataract
  • Iris laceration
  • Vitreous prolapse
  • Uveitis

• Closed globe injury presentations
  • Hyphema
  • Secondary glaucoma
  • Retinal edema
Ocular Trauma

Treatment
• Varies; surgical intervention often needed in open globe injuries

Outcomes
• Less favorable in open globe injuries; increased risk for long term visual impairment/blindness
**Aggressive evaluation for amblyopia in post-trauma phase to avoid additional visual impairment. Visual development in children continues until 9-10 years of age
Question

The most important management of a stabilized child who experienced a liver laceration from a bicycle accident includes:

a. Serial hemoglobin and hematocrit monitoring
b. Serial abdominal CT
c. Coagulation therapy
d. Emergent surgical intervention
Answer

The most important management of a stabilized child who experienced a liver laceration from a bicycle accident includes:

A. Serial hemoglobin and hematocrit monitoring
Question

An obese 14 year old male presents with acute hip pain and inability to walk even with support of crutches. He has recently complained of knee pain and does not remember an injury. The MOST likely diagnosis is:

a. Legg Calve Perthes Disease
b. Femur fracture
c. Slipped Capital Femoral Epiphysis
d. Osteomyelitis
Answer

An obese 14 year old male presents with acute hip pain and inability to walk even with support of crutches. He has recently complained of knee pain and does not remember an injury. The MOST likely diagnosis is:

C. Slipped Capital Femoral Epiphysis
A 6 year old who suffered a radial fracture yesterday, had the repair today and was discharged from the orthopedic center with a prescription for Roxicet. The parents call the surgical NP late that night stating that the child is in severe pain which is not relieved by pain medication. What discussion by the PNP should occur on the phone call to determine disposition of this child?

a. If pain, pallor, decreased perfusion and sensation, return immediately to ED

b. Elevate extremity, assess for continued pain and pallor, call back after 9am

c. Administer another dose of pain medication and return call 2 hours later

d. If cast appears too tight, tactile pain is present and swelling is noted, ice the limb
Answer

A 6 year old who suffered a radial fracture yesterday, had the repair today and was discharged from the orthopedic center with a prescription for Roxicet. The parents call the surgical NP late that night stating that the child is in severe pain which is not relieved by pain medication. What discussion by the PNP should occur on the phone call to determine disposition of this child?

A. If pain, pallor, decreased perfusion and sensation, return immediately to ED
Question

A 15 year-old has suffered a pulmonary contusion after being involved in a motor vehicle accident. Which CXR finding would you expect on presentation?

A. Normal CXR
B. Kerly B lines
C. Diffuse opacities on the affected side
D. Pleural effusion on affected side
Answer

A 15 year-old has suffered a pulmonary contusion after being involved in a motor vehicle accident. Which CXR finding would you expect on presentation?

A. Normal CXR
Question

An 8 year old is admitted with a suspected abdominal injury after a fall from an ATV (all terrain vehicle). The BEST mode of diagnosis for a suspected splenic laceration is:

a. Bedside ultrasound
b. Abdominal CT with IV contrast
c. Abdominal CT with oral contrast
d. Abdominal x-ray
Answer

An 8 year old is admitted with a suspected abdominal injury after a fall from an ATV (all terrain vehicle). The BEST mode of diagnosis for a suspected splenic laceration is:

B. Abdominal CT with IV contrast
Question

When devising a management plan for a child with suspected osteomyelitis, which agent should be included as part of the first line therapy?

A. Azithromycin
B. Gentamicin
C. Cefepime
D. Vancomycin
Answer

When devising a management plan for a child with suspected osteomyelitis, which agent should be included as part of the first line therapy?

D. Vancomycin