Pediatric Trauma Imaging

Key Considerations

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Early identification of patients requiring transfer to Pediatric Trauma Center is a priority.

- Using the principles of ATLS, early identification of patients requiring transfer is paramount.
- Cross-sectional imaging should be utilized for patients that can be potentially discharged from your ED.
- Do not delay transfer to Pediatric Trauma Center (PTC) while awaiting CT to evaluate injuries that your center does not have the capabilities to manage.
- Discuss with PTC if CT scans should be obtained while waiting for transport.
- CT of thorax or abdomen/pelvis must be with IV contrast.
- Utilize pediatric-specific dosing for all imaging studies.
- This key considerations resource accompanies the **Best Practices in Pediatric Trauma Imaging**, a clinical tool to guide decision-making when caring for pediatric trauma patients.

PEDIATRIC WHOLE BODY CT ("PAN-SCAN")

- Routine whole body CT (WBCT) should **NOT** be routinely undertaken for screening in asymptomatic children after high-mechanism trauma.
- WBCT with IV contrast can be considered in children with critical neurotrauma and an impaired physical examination after high-risk mechanism of injury (MVC, Fall > 10 feet), but this examination should not delay transfer if a center does not have the capability to treat diagnosed injuries.

PEDIATRIC HEAD TRAUMA SCREENING

- Obtaining CT, including head CT alone prior to transfer, has been shown to delay transfer to definitive care. Head CT prior to transfer did not improve time to neurosurgical intervention at the PTC.
- The Pediatric Emergency Care Applied Research Network (PECARN) decision guide has been well validated to risk stratify children needing imaging for TBI.
    - The guide is divided by age, younger than 2 years and older than 2 years.
    - The use of PECARN Head Trauma Decision Guide has been supported by professional organizations including American College of Surgeon (ACS) Committee on Trauma (COT).

CERVICAL SPINE

- Incidence of pediatric c-spine injury is low (<1%) in children after blunt trauma.
- Younger children are more likely to suffer ligamentous injury than fracture. Thus, CT alone does not adequately examine ligaments and MRI may be needed in the presence of normal bony imaging with persistent pain or neurologic symptoms.
- The PECARN prediction rule for cervical spine imaging of children after blunt trauma has a 94% sensitivity and 99.9% negative predictive value for clinically significant cervical spine injury in children.
- For children with neurologic deficit and/or altered mental status, decision for transfer should be made early and discussion for obtaining imaging prior to transfer discussed with the PTC.
- In children with pain on Range of Motion (ROM) or persistent midline cervical tenderness and normal x-rays, options include:
    - Discharge home in well-fitting c-collar and follow-up with a pediatric specialist for clearance, or
    - MRI to rule out ligamentous injury (if feasible at your facility), or
    - Discussion with PTC next steps

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THORAX

- Screening chest x-ray (CXR) can be used in children to identify life-threatening injuries. It is recommended in all children in the presence of abnormal physiology, high risk mechanism of injury, or intubation. In asymptomatic stable children with low grade MOI, obtaining routine CXR is an area of debate but is probably unnecessary.
- For children with normal CXR or minor abnormalities on CXR (pneumo/hemothorax, pulmonary contusion, or fractures), chest CT rarely alters management but exposes the child to significant amounts of ionizing radiation.
- Aortic injury is uncommon in children compared to adults. If there is abnormal mediastinal contour on CXR, discussion with PTC prior to obtaining a CT thorax with contrast. Chest CT is not indicated if the mediastinum is normal on CXR.

ABDOMEN

- Hemodynamically stable pediatric patients should be screened by validated tools prior to CT,
- Abdominal tenderness, seatbelt sign (defined by continuous area of erythema, ecchymosis, or abrasion across the abdomen secondary to a seat belt, not just marks over ASIS), and GCS <13 all increase the risk of intra-abdominal injury (IAI).
- Laboratory studies can assist in the decision to obtain CT. AST>200U/L, elevated lipase or pancreatic amylase, and abnormal CXR are risk factors for IAI.
- For children with IAI risk factors being treated at centers without capability to provide surgical care to children, a CT scan should only be utilized if it will facilitate discharge home from the ED. If a child has an indication for transfer to a PTC, an abdominal CT scan should only be done in collaboration with the PTC if it will not delay transfer out.
- Concern for non-accidental trauma should prompt evaluation by a center experienced in its work-up.
- Focused Abdominal Sonography for Trauma (FAST) examination in children with concern for blunt torso trauma has decreased sensitivity and specificity compared to adults, and positive FAST exams in otherwise asymptomatic patients have been shown to lead to unnecessary increase in CT scan use. FAST is not recommended unless a child is in shock and hemorrhage localization is needed.

REFERENCES

PEDIATRIC HEAD TRAUMA SCREENING

- ACS TQIP Best Practice Guidelines in Imaging **https://www.facs.org/media/oxdjw5zj/imaging_guidelines.pdf**
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CERVICAL SPINE

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THORAX

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ABDOMEN

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