Blunt Liver and Spleen Injury

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What is a Clinical Pathway?

An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective, and consistent patient care.
Objectives of Pathway

- Standardize care to decrease variability in the management of patients with blunt spleen and/or liver injury
- Decrease length of stay to conform with current evidence-based guidelines
- Decrease unnecessary laboratory testing
- Avoid unnecessary PICU admissions
Why is Pathway Necessary?

• Blunt abdominal trauma causing liver and/or spleen injury is one of the most common indications for hospital admission for injured children.

• In the late 1990s, the American Pediatric Surgery Association (APSA) Trauma Committee developed non-operative management guidelines for blunt trauma to the abdomen to help standardize care.

• In 2012, a pediatric trauma consortium, ATOMAC, developed a practice management guideline for blunt liver or spleen injury that is evidence-based and used at many pediatric trauma centers.

• More recently in 2019, the American Pediatric Surgery Association (APSA) Trauma Committee expanded this and developed non-operative management guidelines for blunt trauma to the abdomen to help standardize care.
A radiologist will grade the liver and/or spleen injury using these scales.
### Background

A radiologist will grade the liver and/or spleen injury using these scales.

<table>
<thead>
<tr>
<th>GRADE*</th>
<th>INJURY DESCRIPTION</th>
<th>ICD-9</th>
<th>AIS-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Subcapsular hematoma, &lt;10% surface area; capsular tear, &lt;1 cm parenchymal depth</td>
<td></td>
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<tr>
<td>2</td>
<td>Subcapsular hematoma, 10%-50% surface area; intraparenchymal, &lt;5 cm in diameter;</td>
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<tr>
<td></td>
<td>laceration 1-3 cm parenchymal depth, &lt;10 cm in length which does not involve a</td>
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<tr>
<td></td>
<td>trabecular vessel</td>
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<td></td>
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<tr>
<td>3</td>
<td>Subcapsular hematoma, &gt;50% surface area or expanding; ruptured subcapsular or</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>parenchymal hematoma; intraparenchymal hematoma &gt;5 cm or expanding; laceration &gt;3</td>
<td></td>
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<tr>
<td></td>
<td>cm parenchymal depth or involving trabecular vessels</td>
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<tr>
<td>4</td>
<td>Laceration involving segmental or hilar vessels producing major devascularization</td>
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<td></td>
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<tr>
<td></td>
<td>(&gt;25% of spleen)</td>
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<tr>
<td>5</td>
<td>Completely shattered spleen; hilar vascular injury which devascularizes spleen</td>
<td>865.04</td>
<td>855.14</td>
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</tbody>
</table>

This is the Blunt Liver/Spleen Injury Clinical Pathway.

We will be reviewing each component in the following slides.
CLINICAL PATHWAY: Blunt Liver and Spleen Injury

Initial care:

- Work up includes:
  - History and physical
  - Trauma Labs including amylase/lipase
  - CXR
  - Other exams should be considered based on presentation
- IV access should be established early
- Consult Pediatric Surgery if not already present for trauma team activation

Inclusion Criteria: Blunt trauma to abdomen or torso with concern for liver/spleen injury

Exclusion Criteria: Penetrating injury to chest or abdomen, clinically significant CNS or thoracic injury, suspected physical abuse (see Suspected Physical Abuse Pathway)
If the patient is hemodynamically unstable and/or has peritonitis:

- Patient should go immediately to the operating room (OR) for laparotomy
  - Notify OR and anesthesia STAT
  - Consider blood transfusion and activation of the Massive Transfusion Protocol
  - OR should not be delayed for imaging
Stable patients:

- Need CT scan of Abdomen and Pelvis with Contrast
- CT scan is read by a Radiologist who then Grades the injury
  - Grade I-V, higher the grade the more significant the injury
Grade I, II, or III injuries:

- Patients are admitted to Med/Surg unit
- A CBC is repeated 6hrs after admission
  - Then again at the discretion of the surgeon
- Pain control with Acetaminophen and Narcotics IV
- Miralax is started once patient starts clears

There are no longer restrictions on bed rest for Grade I-III injuries
Grade IV or V injuries:

- Patients are admitted to PICU
- Labs, Diet, and Activity orders are all dependent on the patients vital signs
  - Orders are advanced as vital signs normalize for age
- Pain control with Acetaminophen and Narcotics IV
- If patient remains clinically stable for 12 hours they may then transfer to MS Unit when appropriate
Discharge Planning:

- **Medications:**
  - 3 day supply of oral Hydrocodone/Acetaminophen or Oxycodone/Acetaminophen
  - Miralax

- **Activity:**
  - Duration of activity restriction is based on Grade of Injury + 2 weeks

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**Discharge Criteria:**
- Hgb/Hct stable x3; afebrile; normal HR & UOP; tolerating diet; minimal abdominal pain

**Discharge Medications:**
- Miralax 1 g/kg/day to a max of 17 g daily until stooling
- Hydrocodone-acetaminophen 0.2 mg/kg q4hr PRN pain (max 5-10 mg/dose) OR Oxycodone 0.1 mg/kg/dose (max 5-10 mg/dose)
  *Dispense only 3 days worth.

**Discharge Instructions:**
- No strenuous activity or contact sports for grade of injury + 2 weeks. Only activities that keep 2 feet on the ground (no trampolines, no bikes, no dirt bikes, no horseback riding, no ATV, no skiing, etc)
- Follow up with pediatric surgery in 4-6 weeks
Review of Key Points

• Blunt Liver/Spleen injuries are Graded by a Radiologist who reviews the CT scan
• CBCs are not routinely drawn after 6hrs for Grade I-III injuries, and can be stopped once a patients vital signs normalize for age for Grade IV-V injuries
• There is no longer an activity restriction for patients with Grade I-III injuries. Patients with Grade IV-V injuries remain on bed rest until their vital signs and CBC are stable.
• Discharge is based on stable Hematocrit and clinical picture NOT grade of injury
• Duration of activity restriction at discharge is based on Grade of injury + 2 weeks
Quality Metrics

- Percentage eligible patients treated per pathway
- Percentage of eligible patients with order set usage
- Percentage of patients requiring red blood cell transfusion
- Percentage of patients for whom radiologist “graded” the liver/spleen injury
- Percentage of patients admitted to the appropriate location per pathway (PICU v. Med/Surg)
- Percentage of patients with hematocrit drawn at appropriate frequency per pathway
- Average length of stay (days)
Pathway Contacts

- Brendan Campbell, MD, MPH
  - Department of Pediatric Surgery and Trauma
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  - Department of Pediatric Surgery and Trauma
- Jen Tabak, RN, MSN
  - Trauma Program Coordinator


About Connecticut Children’s Clinical Pathways Program

Clinical pathways guide the management of patients to optimize consistent use of evidence-based practice. Clinical pathways have been shown to improve guideline adherence and quality outcomes, while decreasing length of stay and cost. Here at Connecticut Children’s, our Clinical Pathways Program aims to deliver evidence-based, high value care to the greatest number of children in a diversity of patient settings. These pathways serve as a guide for providers and do not replace clinical judgment.