



## CLINICAL PATHWAYS – INTRODUCTION

**Clinical Pathways** are guidelines used to assist in the delivery of high-value, effective, efficient, safe, and family-centered care. Pathways have been shown to improve the quality of care for hospitalized children with many conditions and in different settings (1)

### A definition of a clinical 'pathway' needs to satisfy four criteria (2)

- (1) It is a structured multidisciplinary plan of care.
- (2) It is used to translate guidelines or evidence into local practices.
- (3) It details the steps in a course of treatment of care in a plan, pathway, algorithm, guideline, protocol, or other "inventory of actions."
- (4) It is aimed to assist in standardizing care of a specific population.

These Clinical Decision-Support (CDS) tools are aimed to assist clinicians at the bedside to deliver evidence-based care. The algorithm is a visual aid that helps guide clinicians, step-by-step through the timing, indications, and details of recommended tests and treatments for managing specific conditions. In this case, **Abdominal Trauma** is being addressed.

These PATHWAYS and their specific SECTIONS were developed by a consensus of a subject-matter-expert (SME) team, organized by the Clinical Effectiveness and Pathways (CEP) program at Nicklaus Children's Health System (NCHS). The SME team included clinicians from multiple disciplines and pediatric sub-specialties.

These clinical pathways are intended to be used as a compilation of best practice recommendations for practitioners. The practice of evidence-based pediatric medicine involves the use of pathways, the clinicians' experiences and judgment, and finally the patient's perspectives and values. However, these clinical pathways are not intended to constitute specific medical recommendations for treatment. The practitioners must exercise their own independent judgment in applying these tools. These clinical pathways are not a script or 'cookbook' applicable to all patients. NCHS cannot certify that CDS documents are accurate or complete in every aspect. NCHS is not responsible for any errors or omissions in the use of clinical pathways or for any outcomes a patient might experience where a clinician consulted or followed these CDS in providing clinical care.

1-Rising utilization of inpatient pediatric asthma pathways.Kaiser SV, et al. J Asthma. 2017.

2-Lawal AK RT, Kinsman L, Machotta A, Ronellenfitch U, Scott SD, Goodridge D, et al. What is a clinical pathway? Refinement of an operational definition to identify clinical pathway studies for a Cochrane systematic review. BMC Med 2016;14 )

## Abdominal Trauma

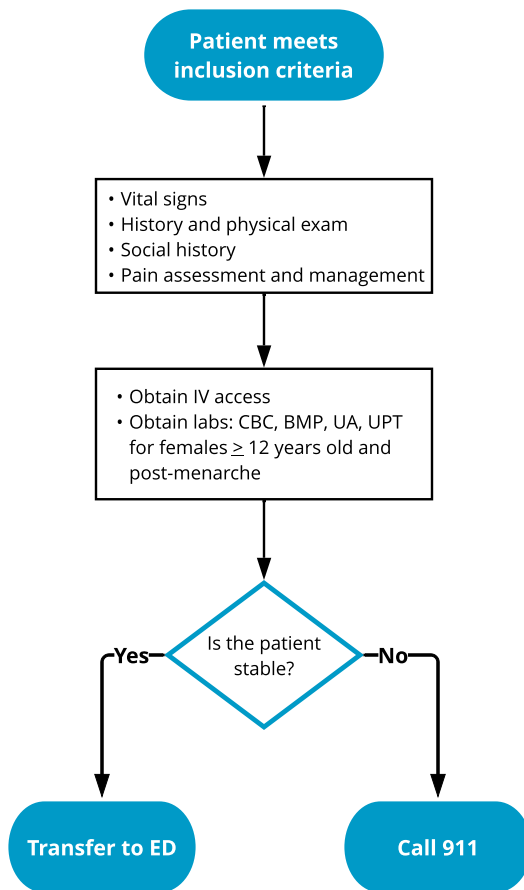
## UCC Phase



Nicklaus Children's  
Health System

If suspected child abuse, follow Non-Accidental Trauma Pathway (linked)

Abdominal ultrasounds are not routinely indicated in abdominal trauma



### Inclusion Criteria

- Patients with blunt abdominal trauma

### CT Recommendation using PECARN Pediatric Intra-Abdominal Injury Algorithm

- Patients are considered at very low risk for intra-abdominal injuries (CT not indicated) if they present with NONE of the following but high risk (CT or further evaluation indicated) if any of the following are present:
  - Abdominal wall trauma/seatbelt sign
  - GCS ≤ 14
  - Abdominal tenderness
  - Thoracic wall trauma
  - Complaints of abdominal pain
  - Vomiting
  - Absent or decreased breath sounds

# Abdominal Trauma

## ED Phase



**Nicklaus Children's Health System**

If suspected child abuse, follow Non-Accidental Trauma Pathway (linked)

Abdominal ultrasounds are not routinely indicated in abdominal trauma

**Patient meets inclusion criteria**

- Triage
- History and physical exam
- Social history
- Pain assessment and management

Consult Pediatric Surgery

Clinical findings suggestive of peritonitis?

**Continue care per Surgery recommendations**

No

- Obtain IV access
- Obtain labs: CBC, BMP, LFT, amylase, lipase, type and screen, PT, PTT, UA
  - UPT for females  $\geq 12$  years old and post-menarche, non-trauma alert patients

Is the patient stable?

- Apply PECARN Pediatric Intra-Abdominal Injury (IAI) Algorithm to determine if CT is indicated (linked)
  - Rule does not apply to patients  $\geq 18$  years, penetrating trauma, pre-existing neurologic disorder impeding a reliable exam, or pregnancy

IAI Algorithm recommends CT? (linked)

**Continue care as clinically indicated**

Obtain CT Abdomen/Pelvis w/ IV contrast

Does the patient have a liver or spleen grade III laceration or higher, abdominal wall bruising or free fluid on CT?

No

Yes

**Admit to floor under surgery**

### Discharge Criteria

1. Tolerating PO
2. Minimal abdominal pain
3. Cleared by pediatric surgery
4. Able to follow up per surgery recommendations

**Discharge**

Does patient meet discharge criteria?

No

### Inclusion Criteria

- Patients with blunt abdominal trauma

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### Signs/Symptoms of Peritonitis

- Severe abdominal tenderness
- Abdominal rigidity
- Abdominal rebound tenderness to palpation

Administer 20 mL/kg LR or NS bolus

Are there clinical signs of shock or bleeding after bolus?

No

Yes

Administer PRBCs 10-20 mL/kg

Recurrent hypotension/persistent shock?

No

Yes

**Admit to PICU**

Obtain CT Abdomen/Pelvis w/ IV contrast

Did CT show significant intra-abdominal blood or contrast extravasation?

No

Yes



If suspected child abuse, follow Non-Accidental Trauma Pathway (linked)

**Patient meets inclusion criteria**

- Vital signs
- History and physical exam
- Social history
- Pain management
- Bed rest x 24 hours
- NPO
- IVF

**Inclusion Criteria**

- Patients with blunt abdominal trauma

- Obtain hemoglobin q6h x 2
  - If hemoglobin stable, no additional levels needed

Hb > 7.0 g/dL x 1 day?

Yes

No

Administer PRBCs 10-20 mL/kg and reassess

Hemoglobin > 7.0 g/dL and VS stable x 1 day?

Yes

No

Already given > 20 mL/kg of any blood product within 1 hour, > 40 mL/kg PRBCs, or > 4 units PRBCs within 24 hours?

No

Yes

**Transfer to medical floor under surgery**

**Follow Surgery recommendations**

Activate Massive Transfusion Protocol (MTP) in patients with ongoing life-threatening hemorrhage and an anticipated need for large volume transfusion (policy linked)

# Abdominal Trauma

## Inpatient Phase



Nicklaus Children's  
Health System

If suspected child  
abuse, follow  
Non-Accidental  
Trauma  
Pathway  
(linked)

Patient meets  
inclusion criteria

- Vital signs
- History and physical exam
- Social history
- Pain management
- Strict intake and output
- Diet as tolerated
- Ambulate 3 times a day
- Out of bed to chair

- Obtain 2<sup>nd</sup> hemoglobin 6 hours  
after initial hemoglobin
  - If hemoglobin stable, no  
additional levels needed

### Inclusion Criteria

- Patients with blunt abdominal trauma  
admitted under surgical service
- Hemodynamically stable
- No concern for active bleeding

### Signs of Clinical Deterioration

- Tachycardia
- Hypotension
- Worsening abdominal pain
- Peritonitis
- Evidence of ongoing hemorrhage
- Need for ongoing blood  
transfusion

Does  
patient show  
signs of clinical  
deterioration?

Yes

- Notify Pediatric Surgery immediately  
and follow recommendations
- Activate RRT as clinically indicated
- Repeat hemoglobin
- Consider additional imaging if  
indicated
- Consider fluid resuscitation and/or  
blood transfusion if indicated

Transfer to PICU  
or OR per Pediatric  
Surgery

No

Does  
patient meet  
discharge  
criteria?

Yes

Discharge

No

Continue care  
as clinically  
indicated

### Discharge Criteria

- Vital signs stable
- Abdominal exam reassuring
- Tolerating PO
- Pain controlled on oral medications
- Family education completed
- Reviewed return precautions with the  
family
- Restrict from physical activity for  
grade of injury plus 2 weeks



1. Holmes JF, Yen K, Ugalde IT, Ishimine P, Chaudhari PP, Atigapramoj N, Badawy M, McCarten-Gibbs KA, Nielsen D, Sage AC, Tatro G, Upperman JS, Adelson PD, Tancredi DJ, Kuppermann N. PECARN prediction rules for CT imaging of children presenting to the emergency department with blunt abdominal or minor head trauma: a multicentre prospective validation study. *Lancet Child Adolesc Health*. 2024 May;8(5):339-347. doi: 10.1016/S2352-4642(24)00029-4. PMID: 38609287.
2. Williams RF, Grewal H, Jamshidi R, Naik-Mathuria B, Price M, Russell RT, Vogel A, Notrica DM, Stylianos S, Petty J. Updated APSA Guidelines for the Management of Blunt Liver and Spleen Injuries. *J Pediatr Surg*. 2023 Aug;58(8):1411-1418. doi: 10.1016/j.jpedsurg.2023.03.012. PMID: 37117078.
3. Notrica DM, Eubanks JW, Tuggle DW, Maxson RT, Letton RW, Garcia NM, Alder AC, Lawson KA, St Peter SD, Megison S, Garcia-Filion P. Nonoperative management of blunt liver and spleen injury in children: Evaluation of the ATOMAC guideline using GRADE. *J Trauma Acute Care Surg*. 2015 Oct;79(4):683-693. doi: 10.1097/TA.0000000000000808. PMID: 26402546.
4. Bašković M, Keretić D, Lacković M, Borić Krakar M, Pogorelić Z. The Diagnosis and Management of Pediatric Blunt Abdominal Trauma-A Comprehensive Review. *Diagnostics (Basel)*. 2024 Oct 10;14(20):2257. doi: 10.3390/diagnostics14202257. PMID: 39451580; PMCID: PMC11506325.



### Trauma

1. Small organ injuries
2. Length of stay
3. Radiology study results
4. Grade of injury
5. Serial H&H
6. Bolus prior to PRBC
7. Solid organ surgeries

### Urgent Care Center

1. Proportion of patients treated according to the pathway (Order set utilization)
2. Length of stay
3. Revisits
4. Cost

### Emergency Department

1. Proportion of patients treated according to the pathway (Order set utilization)
2. Length of stay
3. Revisits
4. Cost

### PICU

1. Proportion of patients treated according to the pathway (Order set utilization)
2. Length of stay
3. Readmissions
4. Cost

### Inpatient

1. Proportion of patients treated according to the pathway (Order set utilization)
2. Length of stay
3. Readmissions
4. Cost



## **CLINICAL EFFECTIVENESS AND PATHWAYS PROGRAM (CEP)**

### **Subject-Matter Expert (SME) Team**

Trauma: Patricio Lau, Shakeva Swain, Samantha Tronosco  
UCC: Richmond Darko, Vanessa Guerra, Sheree Mundy  
ED: David Lowe, Naiomi Cohen, Justina Iglesias  
PICU: Prithvi Raj Sendi, Janessa Martin

### **Clinical Effectiveness and Pathways Program Leadership**

Marcos Mestre: SVP, Chief Physician Executive and Chief Clinical Officer  
Veronica Etinger: Program Director  
Jenna Lang: Program Manager  
Eric Cortes: Director of Professional Nursing

### **Executive Approval**

Marcos Mestre: SVP, Chief Physician Executive and Chief Clinical Officer

**Approval by CE Program: September 2026**  
**Go-live: October 2026**