Blunt-trauma tracheal laceration: a case-report and management overview

Bouncing into the ER: A Study of Inflatable Amusement Device Injuries in Children

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Introduction

The incidence of pediatric injuries involving inflatable amusement devices has increased.[1-4] This study aimed to evaluate the incidence and epidemiology of bounce house-related injuries treated at a Level 1 trauma center. We hypothesized that a yearly increase in relevant injuries across the study period would be observed.

Methods

A retrospective chart review was conducted of pediatric patients treated at the Loma Linda University Children's Hospital for bounce house-related injury between January 1, 2014, and June 30, 2024. Statistical analysis included descriptive statistics and linear regression. IRB #5240530

Results

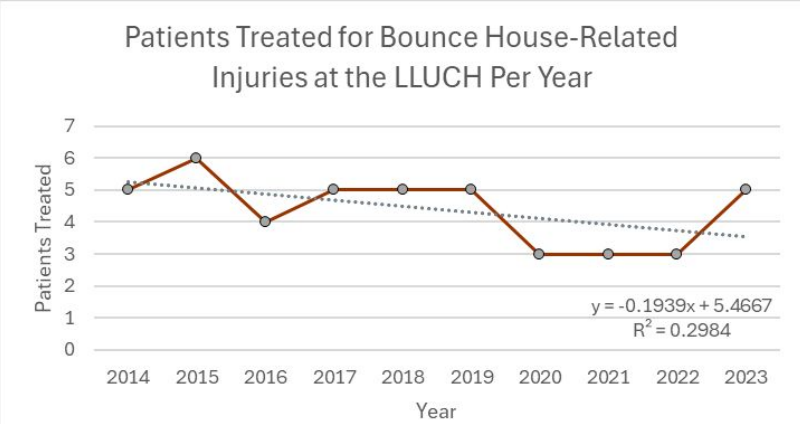

Figure 1: Line graph of patients treated for bounce house-related injury at LLUCH per year.

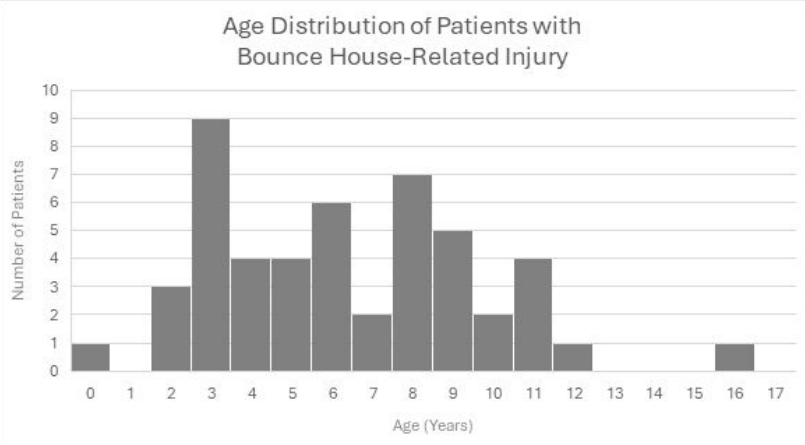

Figure 2: Histogram of age distribution of injured patients.

- An average of 4.4 patients were treated for bounce house-related injuries each year. Linear regression analysis did not produce a statistically significant slope (m = -0.194; p = 0.102) and yielded an R^2 value of 0.298.
- Most injuries occurred in patients six years old and younger (55%).
- Most patients suffered one or more bone fractures (88%) and required surgical intervention (71%).
- The humerus was most frequently fractured bone (28 counts), followed next by the femur bone (5 counts).
- Most patients needed a hospital stay of one day or less (77%), required surgical intervention (71%), and were discharged

Discussion

The data did not feature an increasing temporal trend. This is consistent with a recent publication noting an increasing trend in injury between 2000-2015, but not between 2015-2019.[5]

Patient attributes were comparable to those in the published literature. However, the percentage of patients presenting with bone fractures (88%) was much higher than in similar reports.[1,6-9]

Safety Guidelines for Bounce House Use

1. Always ensure adult supervision with bounce house use.
2. Always anchor the inflatable bouncer per device guidelines, regardless of fair-weather conditions.
3. Never use inflatable bouncers in adverse weather conditions.
4. Avoid use of bouncers by children younger than six-years-old.
5. Avoid mixing bounce house user ages and weights.
6. Keep the number of bounce house co-users to a minimum.
7. Avoid guidelines enforced from the current study and relevant literature use of slide, failing to close bounce house

Table 2: Safety guidelines enforced from the current study and relevant literature.[1,6-9]

Conclusion

1. The cohort did not show a significant increase in the incidence of pediatric bounce house-related injuries over time.
2. The data features similar patient characteristics to comparable studies.
3. The injury severity in our study was substantially higher than that of similar studies, with 71% of patients treated surgically.

Acknowledgements

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Identification of Non-accidental Trauma in Critically Ill Infants at a Pediatric Trauma 1 Center from 2018 to 2022

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INTRODUCTION

Nonaccidental trauma has been documented in up to 2.5% of patients presenting with BRUEs and in up to 2.9% of infants presenting with cardiac arrest. Determining the percentage of non-accidental trauma (NAT) that occurs in critically ill infants in the Emergency Department (ED) is crucial in patient outcomes. While there are several studies looking at NAT in pediatric trauma populations and NAT in cardiac arrest, there is a paucity of information looking at the incidence of NAT in infants presenting more broadly as critically ill to the ED.

METHODS

The retrospective chart review identified patients with suspected NAT within the population of critically ill infants less than 12 months of age presenting to a regional level one trauma center, between January 2018 and December 2022, including transferred patients.

Patients were identified initially if they were triaged as "resuscitation", which is our highest acuity level. These charts were then manually reviewed, and patients requiring immediate stabilizations efforts, such as intubation, fluids resuscitation, antibiotics, or other medication interventions were included in data analysis.

RESULTS

Of the 395 critically ill patients identified, six patients presented directly from home and 12 patients were transferred from outside hospitals an ultimate diagnosis of NAT. There were 15 additional patients that were evaluated for NAT by the child abuse team but were thought to be accidental in nature. Most critically ill patients were eventually diagnosed with sepsis, severe respiratory viral or gastrointestinal illness, seizures or sudden infant death syndrome (SIDS).

Etiology of Critical Presentation	
NAT	18 (4.6%)
Viral (respiratory failure, sepsis)	176 (44.5%)
Bacterial (bacteremia, urosepsis, meningitis)	55 (14.1%)
Status Epilepticus	23 (5.8%)
Cardiac	15 (3.8%)
Trauma (not NAT)	4 (1)
Gastrointestinal (volvulus, obstruction)	5 (1.2%)
Metabolic	2 (0.5%)
Other (anaphylaxis, cardiac arrest, botulism, etc)	97 (24.5%)

Demographics	
Male	221 (56%)
Female	173 (44%)
Average Age (mo)	3.9
Length of Stay (days)	8.4 (1-121)
Mortality	57 (13.9%)
Race	
Non-Hispanic White	224 (56.7%)
Hispanic or Latino	90 (22.7%)
American Indian, Alaska Native, Native Hawaiian and Pacific Islander	31 (7.8%)
Black or African American	13 (3.3%)
Asian	4 (1%)
Other	33 (8.5%)

DISCUSSION

There is a broad spectrum of causes for infants to presenting to the ED in a critical state requiring immediate interventions. It is important to consider the diagnosis of NAT, as the workup and treatment are different from many of the other causes of critical illness in young children. While the majority of patients have viral and bacterial infections resulting in respiratory distress and altered level of consciousness, this can also be a similar presentation for a traumatically injured infant as well. The mortality in this cohort of patients is quite high at 13.9%, making early diagnosis important.

CONCLUSION

While assessing critically ill infants in the Pediatric Emergency Department, it is important to consider the diagnosis of NAT as it requires a different workup and treatment plan than most of the other etiologies identified.

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Facility Matters: Unpacking the Role in Pediatric Open Fracture Management

“Late Complications of Nonoperative Pediatric Hepatic Trauma: Case series and Multidisciplinary Approach at a Tertiary Trauma Center“

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Introduction

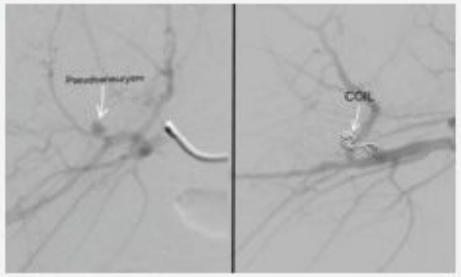
Trauma remains a leading cause of morbidity and mortality in the pediatric population, with blunt mechanisms accounting for 80–90% of cases compared to 10% for penetrating injuries. Nonoperative management (NOM) is the standard approach for blunt abdominal trauma in children, with success rates of 85–95%. However, delayed complications defined as >7 days post-injury occur in 8–20% of cases, influenced by injury severity, affected organs, and associated injuries. The liver is the most frequently injured organ (44%), with delayed hepatic complications reported in 7% of cases.

Methods

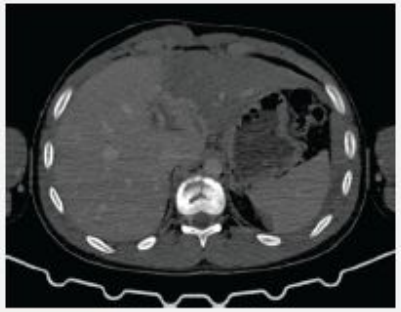
A retrospective observational study conducted from 2023 to 2024 included three pediatric patients with blunt hepatic trauma managed non operatively who developed delayed complications. Demographics, presenting characteristics, and in-hospital management were reviewed.

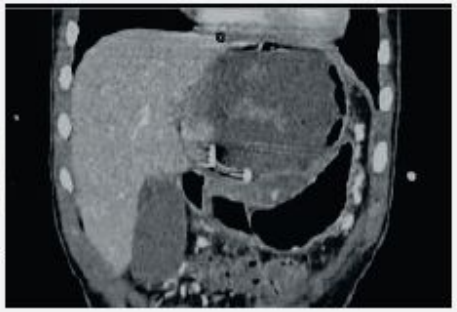
Results

Delayed complications included biloma, delayed hematoma with pancreatic fistula and a hepatic pseudoaneurysm, with a mean presentation time of 19 days post-injury. All patients had grade III hepatic injuries (AAST). Main symptom was abdominal distension. Management included multipurpose catheter drainage and angiographic embolization.

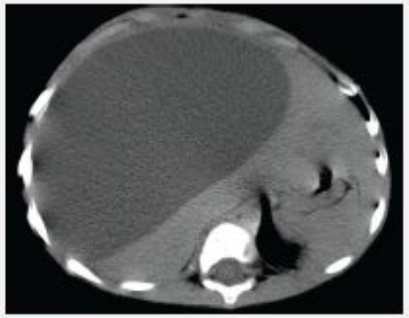


Case 1 14y, male, bicycle accident, hepatic injury grade III, present with signs of shock at 15 days post trauma, the CT angiography revealed a hepatic pseudoaneurysm. Coil embolization of the pseudoaneurysm was performed.





Case 2 14y, male, with equestrian fall-related trauma, hepatic injury grade III, present with abdominal distension and moderate anemia at 14 days post trauma, a well-defined cystic lesion adjacent to the liver was observed, consistent with a delayed hematoma associated with a pancreatic fistula. The fluid analysis revealed an amylase level of 66,000 U/L and blood. It was resolved using a multipurpose catheter.



Case 3 4y, male, pedestrian struck by moving vehicle, hepatic injury grade III, present with abdominal distension at 30 days post trauma, the CT revealed a biloma. The biloma resolved with a multipurpose catheter.

Conclusions

This case series highlights that grade III hepatic injuries, significantly increase the risk of delayed complications. Although timing varies, persistent clinical vigilance and targeted imaging are essential for timely diagnosis. A multidisciplinary approach, particularly interventional radiology techniques proved pivotal in minimally invasive management, avoiding surgery. These findings reinforce that nonoperative management, even in the setting of delayed complications, remains a safe and effective strategy in pediatric hepatic trauma.

References:

Substance Use Screening and Naloxone Prescribing at Discharge among Injured Adolescents

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BACKGROUND

- Drug overdose is now the third leading cause of death in the US children
- Adolescent substance use is commonly associated with risky behavior and injury
- No standardized consensus on drug screening from American College of Surgeons and the Pediatric Trauma Society
- Naloxone distribution remains limited

OBJECTIVE

- Investigate substance use screening and naloxone prescribing patterns among adolescent trauma patients
- Characterize the relationship between biochemical and interview-based drug screening and subsequent naloxone prescription
- Identify sociodemographic and clinical factors associated with naloxone prescription at discharge to address gaps in naloxone distribution

METHODS

- Single center retrospective cohort study – January 2021 to June 2024
- Adolescents aged 12-17 who presented as a trauma activation or trauma transfer
- Receipt of substance use screening was determined from clinical documentation of biochemical screening and/or interview-based screening
- Outcome measure was receipt of a naloxone prescription at discharge

		Naloxone Prescription		
	Total	No	Yes	p-value
	N=813	N=785	N=28	
Age (years)				0.044
12-13	261 (32.1%)	257 (32.7%)	4 (14.3%)	
14-15	298 (36.7%)	282 (35.9%)	16 (57.1%)	
16-17	254 (31.2%)	246 (31.3%)	8 (28.6%)	
Gender				0.952
Female	279 (34.3%)	270 (34.4%)	9 (32.1%)	
Male	533 (65.6%)	514 (65.5%)	19 (67.9%)	
Neutral	1 (0.1%)	1 (0.1%)	0 (0.0%)	
Race/Ethnicity				0.578
Asian	20 (2.5%)	20 (2.5%)	0 (0.0%)	
Black	51 (6.3%)	49 (6.2%)	2 (7.1%)	
Hispanic	521 (64.1%)	505 (64.3%)	16 (57.1%)	
Other	121 (14.9%)	117 (14.9%)	4 (14.3)	
White	100 (12.3%)	94 (12.0%)	6 (21.4%)	

Table 1. Demographic characteristics of injured adolescents who received naloxone prescription

		Naloxone Prescription		
	Total	No	Yes	p-value
	N=813	N=785	N=28	
Blunt Trauma	770 (94.7%)	744 (94.8%)	26 (9.29%)	0.655
Trauma Activation Level				0.104
1	73 (9.0%)	68 (8.7%)	5 (17.9%)	
2	479 (58.9%)	461 (58.7%)	18 (64.3%)	
3	261 (32.1%)	256 (32.6%)	5 (17.9%)	
Year				0.001
2021	230 (28.3%)	220 (28.0%)	10 (35.7%)	
2022	212 (26.1%)	210 (26.8%)	2 (7.1%)	
2023	246 (30.3%)	241 (30.7%)	5 (17.9%)	
2024	125 (15.4%)	114 (14.5%)	11 (39.3%)	
Length of Stay				<0.001
<24 h	529 (65.1%)	527 (67.1%)	2 (7.1%)	
>24 h	284 (34.9%)	258 (32.9%)	26 (92.9%)	
Urine Drug Screen Performed	86 (10.6%)	81 (10.3%)	5 (17.9%)	0.202
Interview-Based Drug Screen Performed	530 (65.2%)	505 (64.3%)	25 (89.3%)	0.006

Table 2. Clinical characteristics of injured adolescents who received naloxone prescription

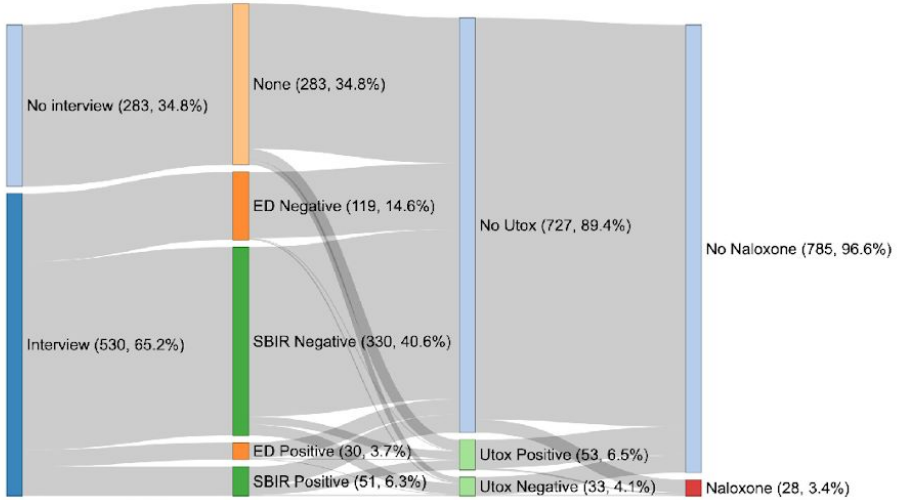

Figure 1. Sankey diagram illustrating patient flow of substance use screening, interview outcomes, and naloxone prescription among injured adolescents

RESULTS

- 86 urine toxicology screenings performed (10.6%), 530 interview-based screenings completed (65.2%), and 28 naloxone prescribed (3.4%)
- Only 3 (5.7%) adolescents with positive biochemical screening and 4 (4.9%) adolescents with positive interview-based screening were prescribed naloxone
- Naloxone prescribing significantly associated with patient's age, trauma activation year, interview-based screening, and hospital stay
- No significant differences in naloxone prescribing by gender, race/ethnicity, trauma activation level, or mechanism of injury
- Majority of naloxone prescriptions were co-prescribed with opioids or muscle relaxants per existing discharge medication policies, than solely from substance use screening alone

CONCLUSIONS

- Few injured adolescents were prescribed naloxone, regardless of biochemical or interview-based drug screening result.
- These findings highlight a critical gap in substance use screening and naloxone prescribing among adolescents
- Future steps needed for enhancing substance use screening strategies and expanding harm reduction efforts such as routine naloxone prescribing into trauma care

The Validity of PECARN 7 Point Decision Rule Within The Patient Populations at Transferring and Children's Hospitals

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UVA Children's

Background

- Trauma is a leading cause of death in children in the US
- PECARN 7-Point Decision Rule was created in 2013 to determine the need for CT abdomen/pelvis (CTAP) in children <18 yo following blunt abdominal trauma (BAT)
- The rule was 97% sensitive with a 99.9% NPV
- The goal was to decrease radiation exposure when not indicated

Aim: To evaluate the predictive value of the PECARN Decision Rule in patients evaluated at regional community hospitals within a referral network of a tertiary children's hospital.

Methods

Retrospective Study

730 patients aged <16 yo from 2016-2022 who experienced BAT were studied. The primary children's hospital was the University of Virginia

Mechanisms of injury included

- Motor vehicle collision
- Vehicle vs. patient incident
- Agricultural vehicle/ATV
- Playground/fall
- Bike
- Sport/recreational injuries

Results

- The sensitivity, specificity, PPV, and NPV of the PECARN Decision Rule in our patient population were .57, .83, .51, and .87, respectively.
- Age was positively associated with a high likelihood of injury in non-clinically indicated scans.

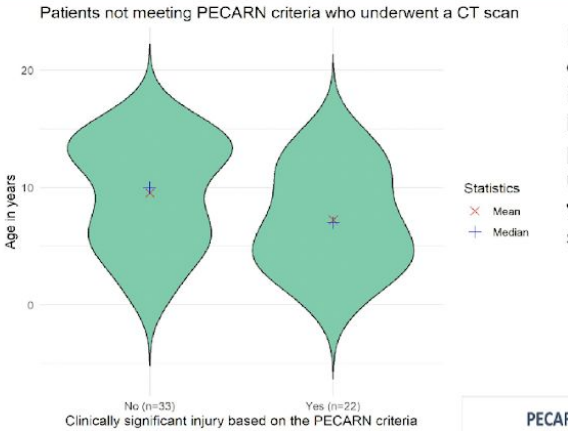


Figure 1: Overall age distribution of significant injury. There was a higher density of younger patients that received an unindicated CTAP and were found to have a significant injury.

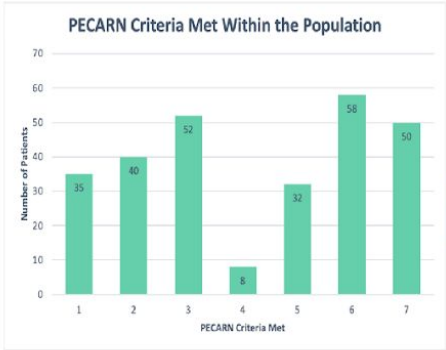
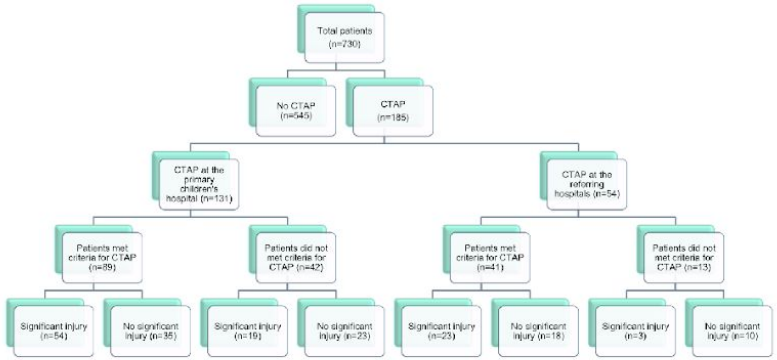


Figure 2: Distribution of the PECARN criteria met within the total population evaluated. 1=GCS<14, 2= Abdominal Pain, 3= Emesis, 4= Change in Breath Sounds, 5= Thoracic Wall Trauma, 6=Abdominal Wall Trauma, and 7= Abdominal Tenderness.

Table 1: Showcases the distribution of patients who meet criteria and have a significant injury.

		PECARN Significant Injury		
		No	Yes	Total
Meets 7 point Rule	No	469	71	540
	Yes	94	96	190
	Total	563	167	730

Results



Conclusions

- Findings support the negative predictive value of the PECARN Decision Rule in children with abdominal trauma.
- 18% of CTs were avoidable.
- For younger children, there needs to be a higher index of suspicion for significant injury.
- There was no significant difference between the amount of non-clinically indicated CTAPs ordered at the tertiary children's hospital vs. the referral hospitals.

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Time and Place: How Trauma Center Type Affects Management and Outcomes for Adolescents with Pelvic Fractures

Affiliated with University of Colorado Anschutz Medical Campus

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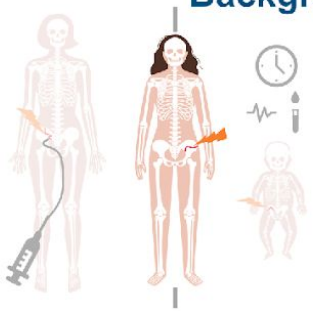
Background



- Traumatic pelvic fractures are physiologically different between children and adult patients
- Treatment for adults focuses on hemorrhage control including angioembolization & pelvic fixation
- Less-invasive management strategies are common in children
- Adolescents straddle the divide between children and adults both in their physiology as well as where they receive trauma care

Aims

- Investigate the patterns of intervention and outcomes for adolescents with pelvic fractures stratified by trauma center type (adult, mixed or pediatric)
- Describe patterns for adolescents to inform care algorithms for these rare injuries

Methods

- Retrospective review of the TQIP database from 2016-2022 for all blunt injured adolescents (12 – <18 years) with traumatic pelvic fracture
  - Subgroup analysis of adolescents treated at level 1 trauma centers
- Primary outcome = rate of angioembolization
- Secondary outcomes = blood transfusion, exploratory laparotomy, pelvic fixation, length of hospital stay (LOS), length of ICU stay, mortality
- Statistics: ANOVA, Chi-squared tests, logistic regression to evaluate mortality

Results

Outcomes of Adolescent Pelvic Fractures by Center Type

Intervention or Outcome	Adult Trauma Center		Mixed Trauma Center		Pediatric Trauma Center		p**
	12 – 14Y n = 553	15 – 17Y n = 2258	12 – 14Y n = 444	15 – 17Y n = 1002	12 – 14Y n = 360	15 – 17Y n = 333	
Angioembolization, n (%)	17 (3.4)	78 (3.8)	10 (2.3)	42 (4.2)	8 (2.2)	10 (3.0)	0.34
Exploratory laparotomy, n (%)	29 (5.9)	172 (8.5)	**17 (3.8)***	**80 (8.0)**	6 (1.7)	8 (2.4)	**<0.001**
Pelvic Fixation, n (%)	847 (33.6%)		574 (39.7)		183 (26.4)		**<0.001**
Blood transfusion, n (%)	96 (19.5)	444 (21.9)	78 (17.6)	190 (19.0)	64 (17.8)	64 (19.2)	**0.045**
Length of stay in days, median [IQR]	3 [2,10]	5 [3,11]	7 [3.75,12.3]	8 [4,13]	5 [3,11]	5 [3,9]	**<0.001**
ICU length of stay in days, median [IQR]	**4 [2,7]***	**4 [2,9]**	**4 [3,8]***	**5 [3,9.3]**	5 [2,10]	4 [2,10]	0.41
Mortality, n(%)	34 (6.9)	168 (8.3)	27 (6.1)	80 (8.0)	13 (3.6)	12 (3.6)	**<0.001**

*$p<0.05$ between age groups
**p values reflect comparisons between all patients treated at adult versus mixed versus pediatric trauma centers

Logistic Regression Models – *Mortality*

Adjusted Logistic Regression Models	Adult / Mixed Trauma Center					
Mortality	ALL ADOLESCENTS		ADOLESCENTS AT LEVEL 1 TRAUMA CENTERS		12 – 14Y ADULT/MIXED Center with No IFT PEDS Level 1 Center with IFT	
	OR* (95% CI)	p	OR* (95% CI)	p	OR* (95% CI)	p
AIS	1.51 (1.42, 1.62)	**<0.001**	1.53 (1.41, 1.66)	**<0.001**	0.47 (0.18, 0.70)	**<0.001**
AIS, Pelvic Fixation	0.13 (0.09, 0.19)	**<0.001**	0.13 (0.08, 0.21)	**<0.001**	1.71 (1.37, 1.88)	**0.004**
AIS, Pelvic Fixation, Inter-Facility Transfer	0.48 (0.35, 0.65)	**<0.001**	0.45 (0.31, 0.64)	**<0.001**	–	–

*reference group = pediatric trauma center

Limitations

1. TQIP does not specify cause of mortality, indication for intervention, distance of inter-facility transfer (IFT)
2. Specialty of treating provider is unknown

Conclusions

- Rates of angioembolization are consistent across adult, mixed and pediatric centers
- Surgical intervention is more common at mixed trauma centers
- Mortality differences exist between adolescents treated at adult or mixed centers compared to those see at pediatric centers
  - IFT and pelvic fixation likely contribute to this effect
  - The drivers of this finding are not fully understood in the present analysis

Significance

Optimal outcomes for adolescents with pelvic fracture likely stem from multidisciplinary discussions between adult and pediatric providers regardless of the trauma center where patients are seen and managed

Traumatic Abdominal Wall Hernias in Pediatric Patients: Early versus Late Repairs

Chris Matsko MPH, Zoe Flyer DO, Andreina Giron MD, John Schomberg PhD, Jeffry Nahmias MD MHPE, Laura F. Goodman MD MPH, Hira Ahmad MD

PURPOSE

- Traumatic abdominal wall hernias (TAWH), though rare in pediatric patients, may indicate underlying intra-abdominal injury
- This study aims to understand the trends in surgical management of TAWH

METHODS

- A retrospective study of the National Trauma Data Bank (NTDB) was conducted from years 2018-2022
- Patients ages ≤18 diagnosed with TAWH were identified and included
- Early TAWH was defined as the TAWH repaired during index hospitalization
- Descriptive statistics and logistic regression were conducted

RESULTS

- 414 patients with TAWH were identified with median age of 17 years
- Race and sex distribution was similar across the two groups
- The injury severity scale (ISS) was lower in the early TAWH repair group (median 5 vs. 17, $p<0.0001$)
- Median length of stay was longer in the early TAWH compared to late TAWH group (13 days vs. 11 days, $p<0.0001$)
- Logistic regression model showed that presence of an underlying intestinal injury (OR 1.33, $p<0.0001$) was associated with increased odds of early TAWH
- Logistic regression model showed that high ISS (OR 1.01, $p<0.0001$) was associated with increased odds of early TAWH

RESULTS

Table 1: Logistic Regression Predicting Early TAWH in Abdominal Trauma Patients

Characteristic	Odds Ratio	95% CI*	p-value
Solid Organ Injury	1.11	0.96, 1.28	0.2
Intestinal Injury	1.33	1.14, 1.55	<0.001
Age in years	1	0.99, 1.01	>0.9
White Race	1.04	0.93, 1.16	0.5
Male Sex	1.13	1.02, 1.25	0.024
Public Insurance	1	0.90, 1.11	>0.9
Hispanic Ethnicity	1	0.89, 1.13	>0.9
Injury Severity Score	1.01	1.01, 1.01	<0.001
Systolic Blood Pressure	1	1.00, 1.00	0.2

* CI = Confidence Interval

CONCLUSIONS

- An underlying intestinal injury and lower injury severity scores are associated with early repairs of TAWH in pediatric patients
- Patients who underwent early TAHW had longer length of stay
- These findings may serve as a foundation in guiding future research to develop standardized practices for evaluating and ultimately treating TAWH in this population

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Children's Hospital of Orange County, CA
Western Pediatric Trauma Conference (WPTC) 2025

Environmental Surveys Reveal Modifiable Risk Factors for Pediatric Auto-Pedestrian Injury in High Disparity Neighborhoods

Emily K. Myers, MD[1,2], Ana Ibarra Meraz[1,2], Kaci Pickett-Nairne, MS[1], Clare Decker, MPH[2], Jose Diaz-Miron, MD[2], Maria Mandt, MD[2], Shannon N. Acker, MD[2]

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Introduction

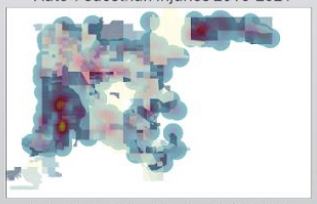
- Leading cause of death in children aged 1-14 is unintentional injury[1]
- Socioeconomic disparities are associated with poor health outcomes[2]
- We demonstrated variation in injury mechanism and severity with disparity, as quantified by the Area Deprivation Index[3,4]
- Higher frequency of auto-pedestrian injuries is associated with higher neighborhood disparity[3]
- Understanding the environmental risk factors that drive this disparity → development of targeted injury prevention programs

Objective

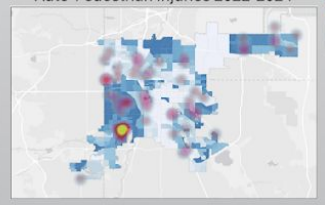
- **Identify environmental risk factors for auto-pedestrian injury in high disparity neighborhoods with a high frequency of auto-pedestrian injury**

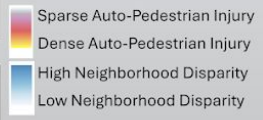
Materials and Methods[5,6]

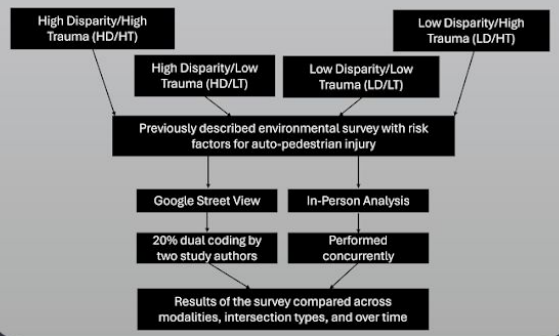
Auto-Pedestrian Injuries 2016-2021



Auto-Pedestrian Injuries 2022-2024







Results

	HD/HT (n = 2)	HD/LT (n = 2)	LD/LT (n = 2)
Long-Block (n/total)	2/2	0/2	1/2
Crosswalks Present (n/total)	2/2	0/2	2/2
Mean Number of Crosswalks Present	4	0	4
Location of Crosswalk at Protected Intersection (n/total)	2/2	0/2	2/2
Multifamily Housing (n/total)	2/2	2/2	2/2
Mixed Use Neighborhood (n/total)	2/2	0/2	1/2
Bus Stop Present (n/total)	2/2	0/2	0/2
Curb Parking Present (n/total)	1/2	2/2	2/2
Location of Curb Parking	Both sides of the street	Both sides of the street	Both sides of the street
Volume of Pedestrian Signage (Low/Medium/High)	Low/High	Low/Medium	Low
Traffic Calming Measures Present (n/total)	2/2	0/2	1/2
Exclusive Turn Lane Present (n/total)	2/2	0/2	1/2
Turn Ban Present (n/total)	0/2	0/2	0/2
Sidewalk Present (n/total)	2/2	1/2	2/2
Mean Number of Traffic Lanes	4.5	2	2
Mean Speed Limit	40	30	22.5
Location Children Gather Present at Intersection (n/total)	1/2 (school and playground)	1/2 (church)	0/2

Table 1) Environmental survey results comparing infrastructure amongst groups of intersections. HD = high disparity, LD = low disparity, HT = high trauma, LT = low trauma.

- **No intersections identified in the low disparity/high trauma group**
- **Google Street View and In-Person analysis were consistent for 87.0% of responses**
- **The intersection that increased in injury frequency from 2016-2021 to 2022-2024 is located near a school and playground**
- **Google Street View revealed that the intersection that decreased in frequency had introduction of a median in ~2020-2022**

Conclusions

- Combining geocoding and geospatial analysis and environmental surveys allows identification of environmental risk factors for auto-pedestrian injury in high disparity neighborhoods with a high frequency of trauma
- Google Street View analysis is consistent with In-Person Analysis and offers a high throughput method of performing environmental surveys in this context
- Google Street View analysis identifies temporal changes in infrastructure that could contribute to changes in frequency of auto-pedestrian injury

Future Research

- Develop injury prevention programs to target these environmental risk factors and study the impact of these interventions over time
- Explore the use of AI to identify the risk factors noted in the environmental survey within Google Street View

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Thoracic endovascular aortic repair in pediatric patients: a national analysis, 2018-2022

Evaluation of Isolated Skull Fractures in Children

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Background

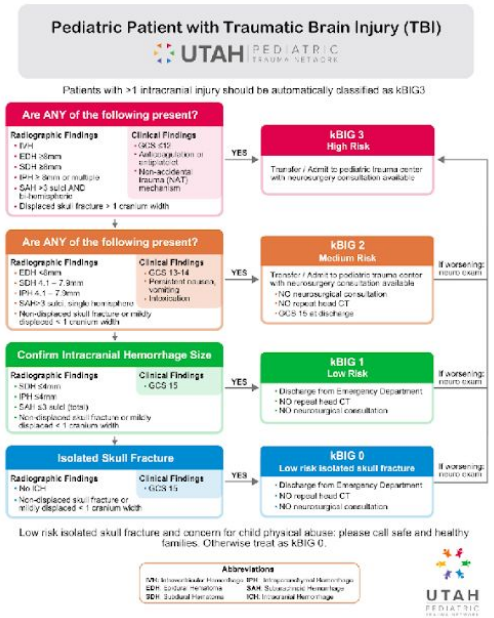
- Isolated skull fractures in children are often managed with repeat imaging and neurosurgical consultation
- The adult Brain Injury Guidelines (BIG) do not categorize isolated skull fractures
- The Brain Injury Guidelines for Kids (kBIG) introduced a new kBIG 0 category for low-risk, neurologically normal patients
- Objective: Characterize fracture patterns and assess outcomes in children with isolated skull fractures without intracranial hemorrhage

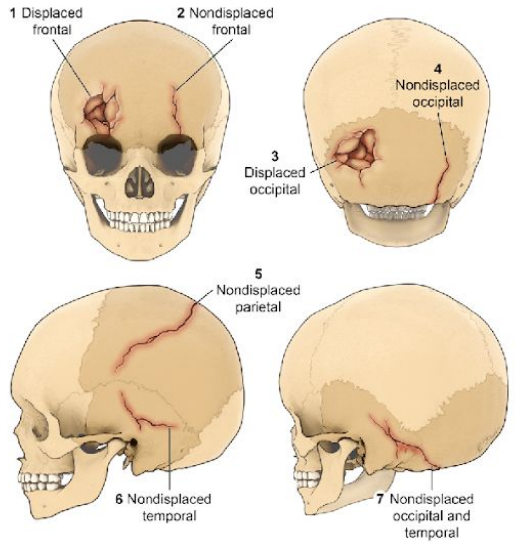
Methods

- Retrospective cohort study of pediatric trauma patients (<18 years) from 2018-2024 at a Level 1 Pediatric Trauma Center
- Inclusion: Isolated skull fractures with no intracranial hemorrhage on initial CT.
- Fractures classified as:
  - Nondisplaced
  - Minimally displaced (<1 cranium width)
  - Displaced (>= 1 cranium width)
- Looked at fracture location
- Primary outcomes: repeat head CT, progression of intracranial hemorrhage, neurosurgical intervention, ICU admission

Results

- Total of 431 patients
  - 63% nondisplaced
  - 27% minimally displaced
  - 10% displaced
- Neurosurgical intervention required in 4.4% (19 patients), all with either GCS <15 or displaced fractures
- **No neurologically normal patient with a nondisplaced or minimally displaced fracture required surgery**
- Intracranial hemorrhage progression occurred in only 6 patients (1.4%), all with abnormal GCS or concerning imaging
- Fracture **displacement**, not location, was key predictor of surgical need





Conclusions

- Children with isolated, nondisplaced or minimally displaced skull fractures and normal neurologic exams had excellent outcomes
- No surgical interventions were needed in kBIG 0 patients with a GCS of 15
- These findings validate the kBIG 0 pathway as a safe, efficient strategy for managing low-risk pediatric skull fractures

Implications

- Supports safety of discharging low-risk patients (kBIG 0) without repeat CT or neurosurgical consult
- Reinforced the importance of neurologic exam over location in decision making.
- Enabled reduction of unnecessary hospital admissions, radiation exposure, and resource use.

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Balancing Diagnostic Accuracy and Risk: Opportunities to Reduce Pediatric Cervical Spine CT Utilization

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Adult centers scanned pediatric patients at nearly 3X the rate of a Pediatric Trauma Center (68% vs 26%)
And
performed nearly 5X as many CT scans to identify a Clinically Significant Injury (CSI) (195 scans/CSI vs 41 scans/CSI)

Background

Computed tomography (CT) is a key diagnostic tool in pediatric trauma, but overuse can lead to unnecessary radiation exposure and excess financial cost.

Methods

A retrospective cohort study (N=25,996) was conducted across a 23-hospital system to compare CT scanning rates in children at adult centers versus a pediatric trauma center.

Results

Figure 1. CT Scan Rate by Hospital Type

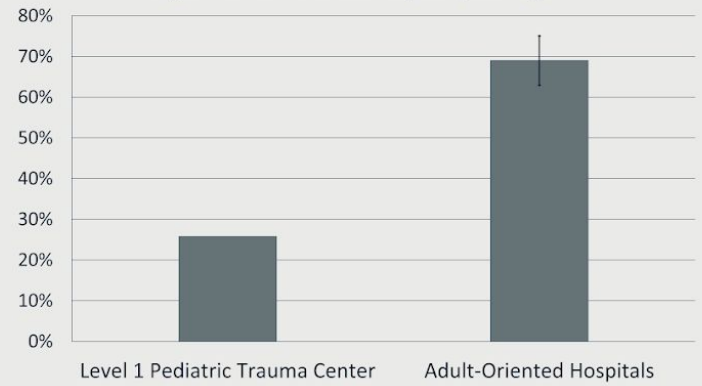
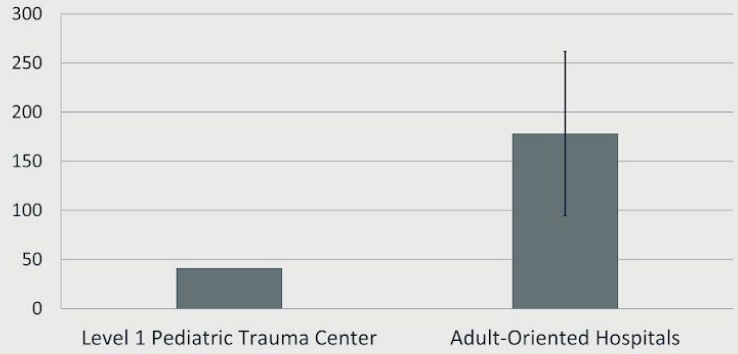


Figure 2. CT Scans Per Clinically Significant Injury by Hospital Type



Conclusions

- **7,770 potentially avoidable CT scans were identified**, which could lead to:
  1) **Up to 4 fatal malignancies** resulting from radiation exposure
  2) **Over $15 million** in additional healthcare charges
- Promoting consistent practice standards may reduce radiation exposure and optimize resource use.

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Pediatric Vascular Trauma – A National Trauma Data Standard Review

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Background

- Vascular injuries in pediatric patients are rare. In 2010, Barmparas *et al.* published the first study to comprehensively examine the epidemiology of traumatic vascular injuries.
- At the time, pediatric traumatic vascular injury accounted for 0.6% of all pediatric traumatic injuries. Since that time, shifts in mechanisms of injury have been noted, but it is unclear what impact this has had on pediatric vascular injury prevalence.

Specific Aims

- To update the epidemiology of pediatric and adult vascular trauma including incidence, mechanism and clinical outcomes.

Methods

***Design, setting, and subjects*:**

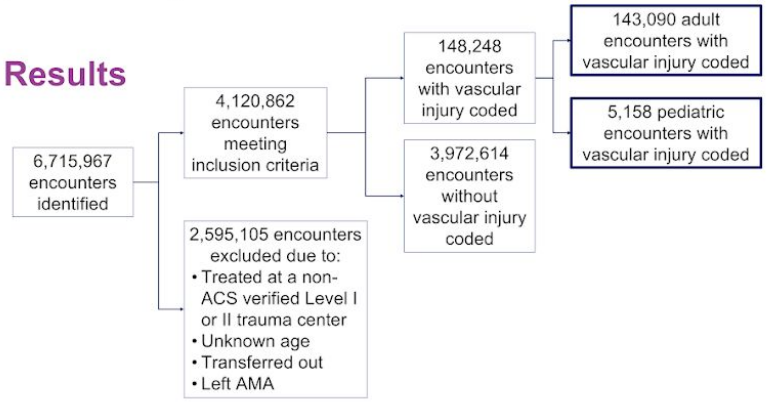
- Retrospective, cross-sectional study of pediatric (ages 1-15 years) and adult (ages 16-89 years) encounters identified within the National Trauma Data Standard (NTDS) who were evaluated at American College of Surgeons (ACS) verified Level I and II pediatric and adult trauma centers.

- Included: Encounters from 2017 through 2022 with at least 1 diagnosis of a vascular injury utilizing *ICD-10* codes.
- Excluded: Patients with unknown age, those transferred out to another facility or those who left against medical advice. Injuries to digital vessels were also excluded to align with original 2010 report.

***Statistical analysis*:**

- Difference between pediatric and adult vascular injuries and outcomes were compared using t-tests and Wilcoxon rank sum tests for continuous variables and Pearson's Chi-square tests for categorical variables.

Results



Results

- 148,248 encounters for vascular injury met inclusion criteria, representing 3.6% of all traumatic injury encounters within the NTDS.
- 5,158 of those vascular injury encounters (3.5%) were children ages 1-15 years, representing 1.3% of all pediatric traumatic injury encounters within the NTDS.

Demographics:

- Both pediatric and adult patients were predominantly male, White and non-Hispanic Latino.
- Pediatric patients predominantly covered by Medicaid whereas adults covered primarily by private or commercial insurance.

Mechanism of Injury:

- Motor vehicle trauma was the leading cause of both pediatric and adult vascular injury followed by firearm injury.
- Within the study period, incidence of pediatric firearm-related vascular injuries increased by 38%, while adult firearm-related vascular injuries remained relatively constant.

Location of injury:

- Pediatric patients were more likely to sustain injuries to upper and lower extremities compared to adults, who sustained more vascular injuries to the neck and upper extremities.

Outcomes:

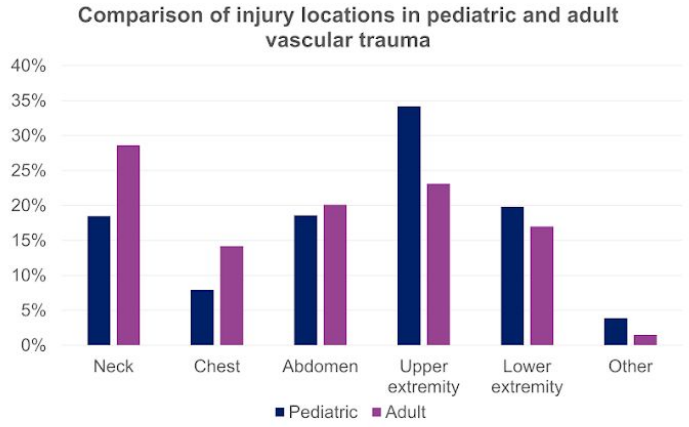
- Pediatric patients had shorter hospital length of stays, fewer ICU admissions, fewer hemorrhage control surgeries and lower mortality rates compared to adults.

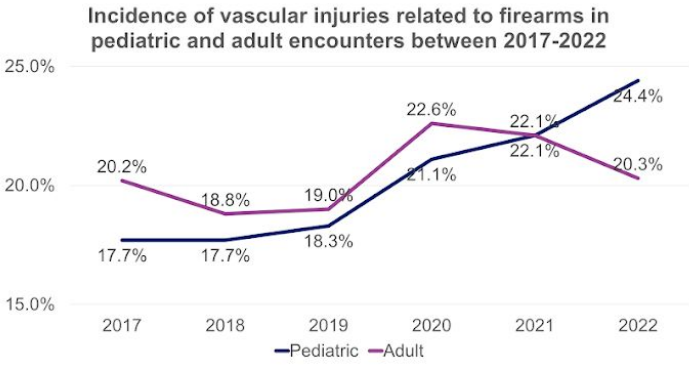
Table 1: Comparison of pediatric and adult vascular trauma

	Pediatric	Adult	*P*
n	5,158	143,090	
Age (y), mean ± SD	10.5 ± 4.4	42.1 ± 18.4	
Male	3,591 (69.6%)	108,522 (75.8%)	<0.001
GCS ≤ 8 on admission	1,067 (20.7%)	30,673 (21.4%)	0.41
ISS, mean	16.8	19.4	<0.001
ISS > 15	2,128 (41.3%)	73,670 (51.5%)	<0.001
Blunt trauma	3,077 (59.7%)	85,540 (59.8%)	0.86
Mechanism of injury			
Motor vehicle trauma	1,267 (24.6%)	53,027 (37.1%)	<0.001
Firearm	1,058 (20.5%)	29,430 (20.6%)	0.92
Cut/pierce	904 (17.5%)	26,713 (18.7%)	0.04
Fall	575 (11.1%)	16,890 (11.8%)	0.15
Location of injury*			
Neck	954 (18.5%)	40,927 (28.6%)	<0.001
Chest	407 (7.9%)	20,303 (14.2%)	<0.001
Abdomen	960 (18.6%)	28,711 (20.1%)	0.01
Upper extremity	1,763 (34.2%)	33,117 (23.1%)	<0.001
Lower extremity	1,020 (19.8%)	24,376 (17.0%)	<0.001
Other	200 (3.9%)	2,158 (1.5%)	
Outcome			
Mean H-LOS ± SD (days)	9.6 ± 14.4	11 ± 15	<0.001
Admitted to ICU	2,900 (56.2%)	83,560 (58.4%)	0.002
Mean ICU-LOS ± SD (days)	7.3 ± 10.8	7.7 ± 9.7	0.02
Hemorrhage control surgery	842 (16.3%)	32,552 (22.7%)	<0.001
Death in hospital	595 (11.5%)	22,580 (15.8%)	<0.001

*Patients may have injuries in multiple locations (e.g., neck and chest)

Results





Conclusions

- Incidence of pediatric vascular trauma remains rare, but has more than doubled from 0.6% to 1.3% since prior review of NTDS data.
- Motor vehicle trauma remains leading cause of vascular injury, but firearm injuries on the rise in pediatric patients.
- Compared to adults, pediatric patients have differing injury patterns but improved mortality outcomes, shorter hospital lengths of stay, and fewer hemorrhage control surgeries.

Elevated Shock Index Pediatric-Adjusted Predicts Blood Product Transfusion

Dog Bite Management: More than Meets the Surface

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Texas Children's Hospital, Baylor College of Medicine

Background

- Most common animal bite in pediatric ER
- Range from minor to severe injuries
- Severe injuries may require complex and/or multiple operative interventions
- Causes of dog bites are multifactorial, including family resources and cultural attitudes towards dogs
- Aim to evaluate our large volume multi-hospital trauma system experience with dog bite management and the social determinants within our urban catchment area

Methods

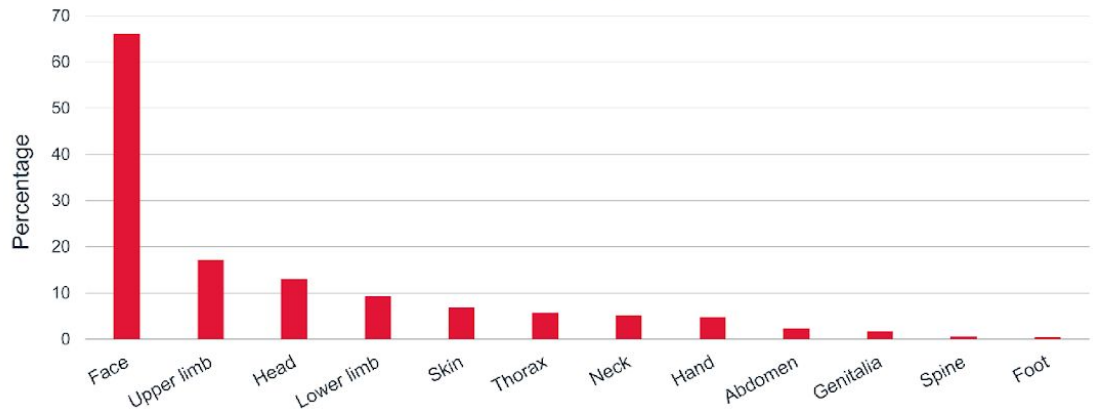
- Retrospective chart review across 3 hospital
  - 1 level 1 and 2 level 4 hospitals in system
- January 2020-March 2024
- Evaluate:
  - Demographics
  - Injury location
  - CDC/ATSDR social vulnerability index
  - Management strategy
  - Operative requirements

Results

Demographics (n=463)	
Male % (n)	57 (264)
Age (years)	(SD)
	6.5 (4.3)
ISS Score	(SD)
	2.6 (3.2)
Length of stay (LOS)	(SD)
	2.3 (5.0)
Management location	Percentage (n)
OR	41.3 (191)
ED	41.5 (192)
Both	1.7 (8)

Social Vulnerability Index Marker	% population under 150% of poverty line
Harris County high level of vulnerability	25.7
Montgomery County low medium level of vulnerability	15.9
Liberty County high level of vulnerability	30.1
Fort Bend County low medium level of vulnerability	12.7
All Dog Bites, Median [IQR]	22.8 [15.7-31.0]
High ISS (n=30), Median [IQR]	19.8 [13.0-30.6]

Bite Location



Conclusions

- Dog bite wounds range from simple to complex
- Repair may be possible in the ER depend on injury, age, and ER resources
- In Harris County and surrounding catchment basin, social vulnerability index (SVI) was not a predictor of ISS score

Implications

- Dog bite management needs to include both wound and trauma care
- Coordinated discharge planning is essential for face and limb injuries
- Dog bite prevention in the community is essential for improving the incidence of dog bites

Disclosures

None

Use of a Biosynthetic Wound Matrix for Complex Road Rash Injuries in a Pediatric Patient

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Background

- A temporary **biosynthetic wound matrix (BWM)** composed of a bilayer silicone and micro-nylon structure integrated with porcine gelatin and aloe vera has shown clinical success in treating partial-thickness burns.
- BWM offers **variable porosity** for moisture management, **transparency** for fast wound assessment, and **quick adherence** to wound bed.

Outer Silicone:
Epidermal Analogue

- Protects wound from trauma and maintains ideal moisture environment
- Provides bacterial protection

Inner Matrix:
3D Micro-support System

- Comprised of a tri-filament nylon matrix
- Bio-coating helps to facilitate adherence to the wound bed and supports the healing process

Case Report

A 6-year-old male presented with road rash injuries, affecting 6% total body surface area and involving the face and bilateral extremities. Facial injuries included a full-thickness stellate avulsion that underwent complex multi-layer plastic closure. Other injuries were mixed partial- and deep-thickness. BWM was applied to all injured areas on hospital day (HD) 3, and the patient was discharged home the following day.

Figure 1. Facial injuries at A) initial presentation, B) HD 0, C) 9 days post-BWM application, D) 3-month follow-up

Figure 2. Right lower extremity injuries at A) initial presentation, B) 4 days post-BWM application, C) 9 days post-BWM application, D) 3-month follow-up

Results

- Facial wounds showed evidence of early healing and improved peri-wound erythema and edema at 3 days post-BWM application.
- BWM had mostly lifted by 9 days post-application, indicating epithelial maturation.
- Extremity wounds followed a similar course of healing, with BWM completely lifted by 23 days post-application.
- Notably, BWM allowed for full knee and ankle range of motion during the healing process.
- At the 3-month follow-up, all wounds were fully healed and showed minimal to no scarring.

Conclusions

- BWM supported early mobilization while maintaining adherence**, allowing for showering once adhered, minimal pain medication after application,** and **good outcomes**.
- The ease of maintenance allowed for patient was **discharged home earlier than expected** and facilitated at-home care.
- These benefits make BWM **optimal for acute pediatric wound care**.

Increasing Granularity of Pancreatic Injury Grading: A Retrospective Look At Outcomes Based on Re-Grading With The 2024 Revised AAST Organ Injury Grading System

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Background

- Blunt pancreatic injury (BPI) infrequently occurs in pediatric trauma but can have serious complications
- Injury grade can help guide management decisions and predict outcomes
- The 1990 AAST pancreatic injury grading scale was revised in 2024 due to critics citing poor correlation between injury grade and clinical course

AAST Pancreatic Injury Grading Scale

1990 Grading Scale		2024 Grading Scale	
I	Minor contusion without duct injury	I_A	Pancreatic edema without hematoma – any location
	Superficial laceration without duct injury	I_B	Pancreatic contusion without hematoma – any location
II	Major contusion without duct injury or tissue loss	II_A	Parenchymal laceration/hematoma <50% depth (without definitive ductal evaluation) or ≥ 50% with an intact MPD – neck, body or tail
	Major laceration without duct injury or tissue loss	II_B	Parenchymal laceration/hematoma <50% depth (without definitive ductal evaluation) or ≥ 50% with an intact MPD – head or uncinate process
III	Laceration with distal transection or parenchymal injury with duct injury	III_N	Main pancreatic duct injury or laceration/hematoma with ≥ 50% depth in neck, body or tail – no ductal evaluation
		III_A	MPD injury or laceration/hematoma with ≥ 50% depth in neck, body or tail – confirmed MPD injury with ductal alignment
		III_B	MPD injury or laceration/hematoma with ≥ 50% depth in neck, body or tail – confirmed MPD injury with complete transection and/or distraction
IV	Laceration with proximal transection or parenchymal injury involving the ampulla	IV_N	MPD injury or laceration/hematoma with ≥50% depth in head or uncinate process of pancreas – no ductal evaluation
		IV_A	MPD injury or laceration/hematoma with ≥50% depth in head or uncinate process of pancreas – confirmed MPD injury with ductal alignment
		IV_B	MPD injury or laceration/hematoma with ≥50% depth in head or uncinate process of pancreas – confirmed MPD injury with complete transection and/or distraction
V	Laceration with massive disruption of the pancreatic head	V_A	Destructive injury of pancreatic head with non-viable pancreatic head – without MPD injury
		V_B	Destructive injury of pancreatic head with non-viable pancreatic head – with MPD injury
		V_C	Destructive injury of pancreatic head with non-viable pancreatic head – with injury to intrapancreatic common bile duct
		V_D	Destructive injury of pancreatic head with non-viable pancreatic head – avulsion of ducts off duodenum or sphincter disruption

Methods

- Retrospective review of patients <18 years of age with BPI at a level 1 pediatric trauma center between January 1, 2009 – December 31st, 2023
- Demographics, clinical course and outcomes were collected
- CT imaging was used to assign injury grades based on 1990 scale
- All available imaging was used to assign injury grades based on 2024 scale

Study Aim

To compare outcomes in pediatric patients with BPI based on the 1990 and 2024 AAST pancreatic injury grading scales

Results

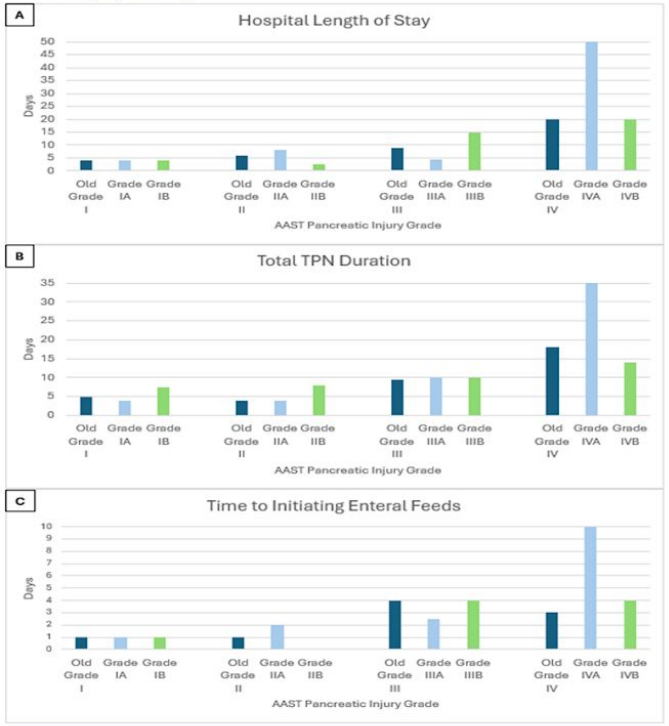
- 59 patients identified with BPI on CT imaging

Age (years); median [IQR]	**9.0 [3.0, 12.0]**
Gender	
Male	36 (61%)
Female	23 (39%)
Race	
White	29 (49.2%)
African American	2 (3.4%)
Indian	7 (11.9%)
Asian	1 (1.7%)
Other	19 (32.2%)
Unknown	1 (1.7%)
Ethnicity	
Hispanic/Latino	21 (35.6%)
Non-Hispanic/Latino	35 (59.3%)
Unknown	3 (5.1%)
Mechanism of Injury	
Bicycle Accident	14 (23.7%)
SNAT	12 (20.3%)
MVC	10 (16.9%)
Multisystem Trauma	25 (42.4%)

- Operative management occurred in 60% of 1990 scale Grade III/IV injuries vs. 94.4% of 2024 Grade IIIB/IVB injuries (main pancreatic duct transection [MPDT])
- Nonoperative management was utilized more frequently in 2024 Grade IIIA/IVA partial duct injuries vs. IIIB/IVB MPDT injuries (85.7% vs. 5.6% p= 0.003)
- Grade IIIA injuries had similar hospital courses to lower grade (I, II) 2024 scale injuries while Grade IIIB injuries did not

Results

Figure 1: Comparison of Median Hospital Length of Stay (LOS) (**A**), Median Total Days of Total Parenteral Nutrition (TPN) (**B**) and Days to Starting Enteral Feeds (**C**) Between the 1990 and 2024 AAST Pancreatic Injury Grading Scales



Limitations

- Retrospective study
- Relatively small sample size

Conclusion

- Clinical outcomes for BPI are highly variable
- Revised 2024 pancreatic injury grading scale may provide more granular understanding of the impact of ductal injury on clinical outcomes
- The revised scale better predicts need for operation and success of nonoperative management in select cases

Management of pediatric high-grade blunt hepatic trauma at adult and pediatric trauma centers: an analysis of the TQIP database

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Background

- **Invasive interventions (i.e. angioembolization, laparotomy, etc) may be more common at adult trauma centers (ATC)** for pediatric **blunt solid organ injury**, than at pediatric trauma centers (PTC)
- Single-center + state-level studies suggest **increased rates of angioembolization, surgery and mortality at adult centers for children** with high grade blunt hepatic injury (BHI)
- Aim: evaluated the utilization of angioembolization and hemorrhage control laparotomy in children with high-grade BHI across **PTC, ATC, and hybrid trauma centers (HTC – adult + pediatric centers).**
- Hypothesis: **ATC would have higher rates of angioembolization and hemorrhage control** laparotomy compared with HTC and PTC

Methods

- **Retrospective** review, ACS **Trauma Quality Improvement Program (TQIP)** database
- Children ≤17 years old with high grade BHI (**AAST grades III-V**, defined by AIS codes) from 2017–2022
- Univariate analyses compare demographics, injury characteristics, management strategies and outcomes across ATC, HTC, and PTC
- **Backward stepwise logistic regression to identify independent predictors** of angioembolization, hemorrhage control laparotomy, and mortality

Results

Table 1: Demographics by AAST Injury Grade

	Grade III (n= 4331)	Grade IV (n=2675)	Grade V (n= 904)	p-value:
Sex (M)	2,465 (57%)	1,474 (55%)	490 (54%)	0.19
Age, yr	12 (7, 15)	12 (7, 15)	12 (6, 15)	0.06
Positive Shock-Index, pediatric age-adjusted*	1,193 (28%)	910 (34%)	384 (42%)	**<0.01**
Injury Severity Score	17 (10, 22)	24 (17, 33)	35 (29, 43)	**<0.01**
Isolated Injury (%)	1,172 (27%)	633 (24%)	127 (14%)	**<0.01**
Any blood product transfusion within 4 hrs	486 (11%)	529 (20%)	336 (37%)	**<0.01**
Procedures				
Angioembolization only	9 (0.2%)	44 (1.6%)	29 (3.2%)	**<0.01**
Hem. Ctrl. Laparotomy	41 (0.9%)	61 (2.3%)	48 (5.3%)	**<0.01**
Any Laparotomy	160 (3.7%)	194 (7.3%)	136 (15%)	**<0.01**
Angio + Lap	8 (0.1%)	17 (6.4%)	26 (2.8%)	**<0.01**
Hospital Verification Status				0.70
Adult Trauma Center	1151(27%)	706 (26%)	242 (27%)	
Peds Trauma Center	1035 (24%)	661 (25%)	241 (27%)	
Hybrid Adult + Peds	1096 (25%)	666 (25%)	215 (24%)	

Table 2: Independent Predictors of Hemorrhage Control Laparotomy

	Adjusted Odds Ratio (95% confidence interval)	p-value:
Injury Severity Score	1.01 (0.99-1.03)	0.07
Presence of Shock (by SIPA)	1.75 (1.16-2.70)	<0.01
Any blood product transfusion within 4 hrs	441.43 (97.21-780.94)	<0.01

Table 3: Independent Predictors of Angioembolization

	Adjusted Odds Ratio (95% confidence interval)	p-value:
Age	1.05 (0.99-1.11)	0.08
AAST Grade:		
Grade III	[reference]	-
Grade IV	3.84 (1.87-8.69)	<0.01
Grade V	4.67 (2.18-11.25)	<0.01
Injury Severity Score	9.59 (0.93-0.98)	<0.01
Any blood product transfusion within 4 hrs	261. 33 (56.79-464.00)	<0.01

Full results/figures available at:

Conclusions

- In pediatric high grade (AAST III-V) blunt hepatic injury, **hospital trauma verification status (ATC, PTC, HTC) does not independently predict** rates of **hemorrhage control laparotomy or angioembolization**
- In management of high-grade BHI, invasive procedures are predicted by **injury severity and deranged physiology**
- These findings suggest that despite **differential management between ATC and PTC in other forms of pediatric blunt solid organ injury**, these findings are **not seen in blunt hepatic injury**

Disclosures

- None

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