

# **Transfer of Children with TBI for Definitive Care, Particularly Without Airway Control, is a Risk Factor for Mortality**

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# Pediatric Head Injury

- Head injury
  - leading cause of death and disability in children and adolescents in the United States and worldwide
  - can have long-lasting and significant implications for cognitive and motor function abilities

Pediatric TBI patients have demonstrated better outcomes when treated at pediatric trauma centers (PTC). Outcomes for pediatric head injury patients treated at non-trauma centers (NTC) are not well documented.

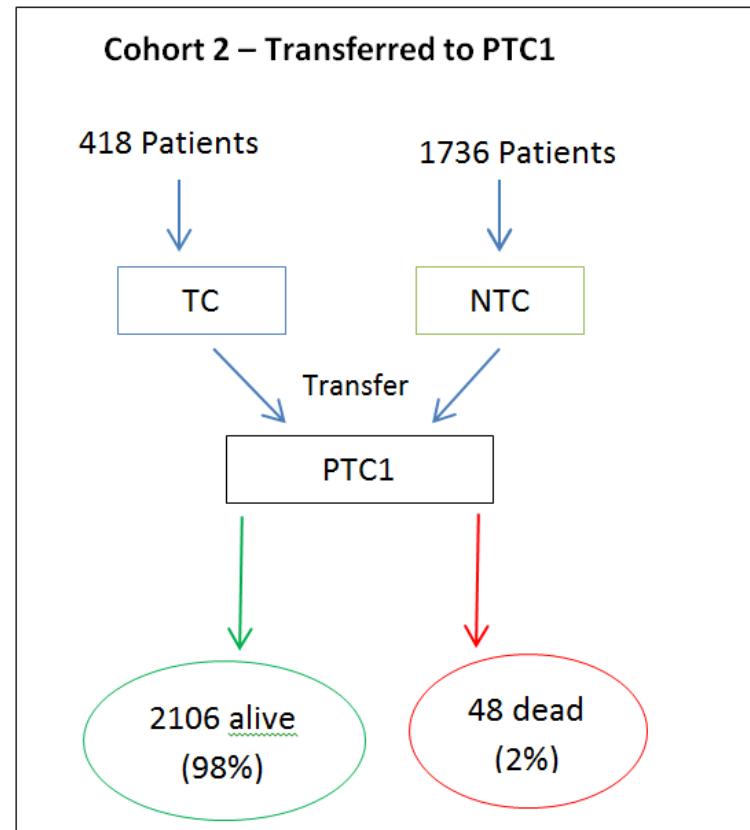
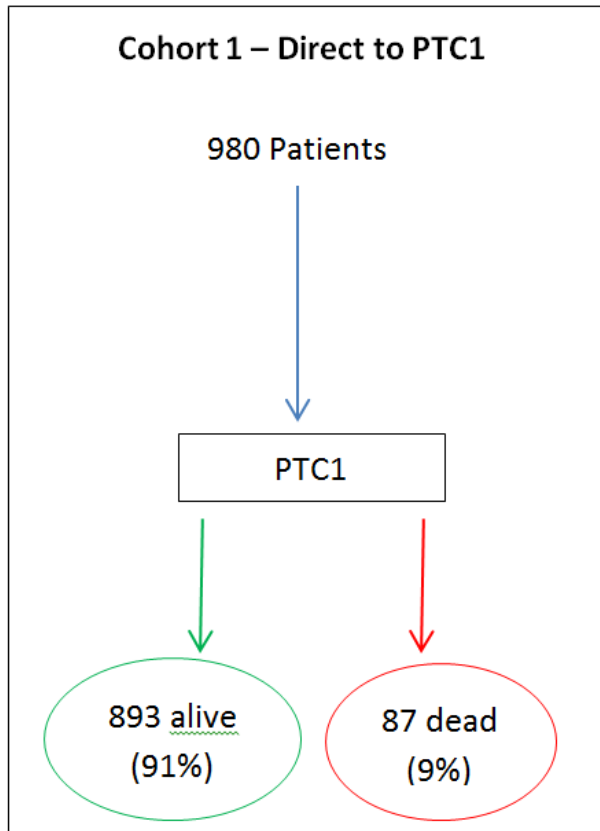
Primary aim: Identify variables predictive of survival to hospital discharge among two populations of pediatric head injury patients:

Cohort 1: Patients admitted directly to a level 1 pediatric trauma center (PTC)

Cohort 2: Patients transferred to a PTC from a trauma center (TC) or a non-trauma center (NTC).

- Is intubation in the PTC Emergency Department (ED) for patients admitted directly to a PTC and those transferred into a PTC associated with decreased survival?

# Study Population



- Ohio Trauma Registry: Captures data from 89% of Ohio hospitals, including 138 NTC
- Data from the years 2007-2012, head injury defined by ICD9 codes 800 – 801.99, 850.0 – 854, 803-804.99, 995.55

# Analysis

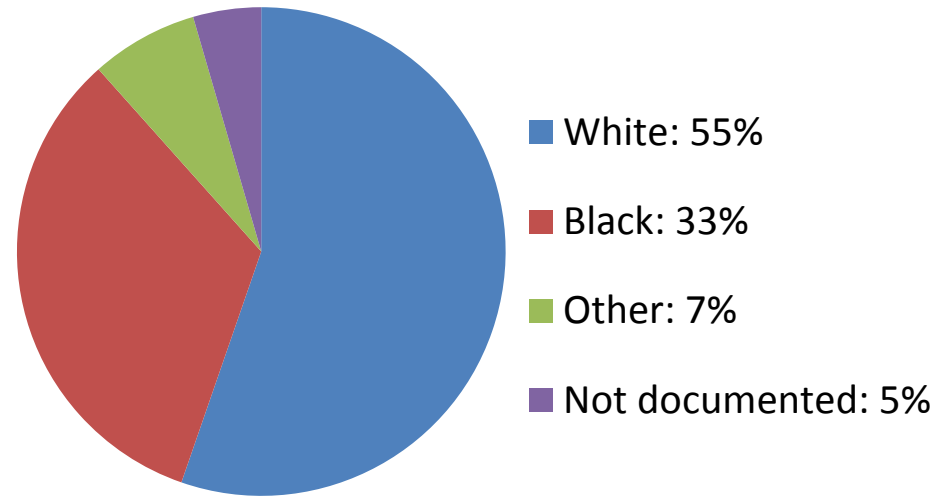
- Patient characteristics and differences between the two patient populations were assessed using chi-squared test.
- Logistic regression analyses were used to model the probability of in-hospital death based on potential covariates including:
  - age
  - sex
  - race
  - payment source
  - Injury Severity Score
  - whether the patient underwent a neurosurgical procedure
  - mechanism of injury
  - Glasgow Coma Scale (GCS)
  - whether or not the patient was intubated in ED upon arriving at PTC
- Two separate regression models created – one for each cohort

# Population characteristics

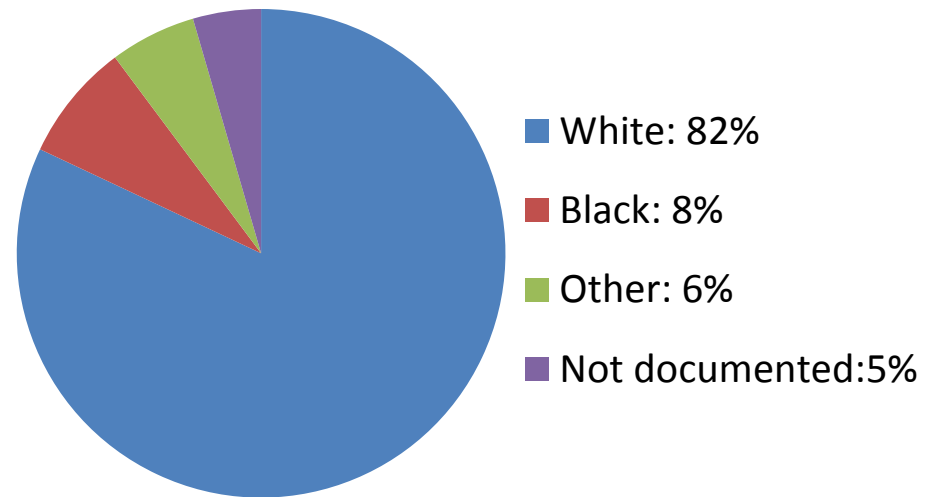
Characteristic	Direct admit to Level 1 Pediatric TC n = 980	Transferred in to Level 1 Pediatric TC n = 2154	p-value
Neurosurgical procedure			<.0001
No	869 (88.7)	2020 (93.8)	
Yes	111 (11.3)	134 (6.2)	
Glasgow Coma Scale			<.0001
3 – 8	108 (11.0)	32 (1.5)	
9 – 12	55 (5.6)	35 (1.6)	
13 – 15	573 (58.5)	1525 (70.8)	
Not documented	244 (24.9)	562 (26.1)	
Injury severity score			<.0001
1 – 8	349 (35.6)	1119 (52.0)	
9 – 14	227 (23.2)	541 (25.1)	
16 – 25	274 (28.0)	372 (17.3)	
>25	130 (13.3)	122 (5.7)	
Injury Type			<.0001
Blunt	961 (98.1)	2146 (99.6)	
Penetrating	20 (1.9)	8 (0.4)	
Head max AIS			<.0001
No	114 (11.6)	90 (4.1)	
Yes	866 (88.4)	2064 (95.8)	
ED Intubation			0.0001
Intubated at ED	96 (9.8)	157 (7.2)	
No airway placed	569 (58.1)	1417 (65.8)	
Not doc/NA	315 (32.1)	580 (26.9)	

# Population characteristics: Race

Cohort 1: Direct to PTC



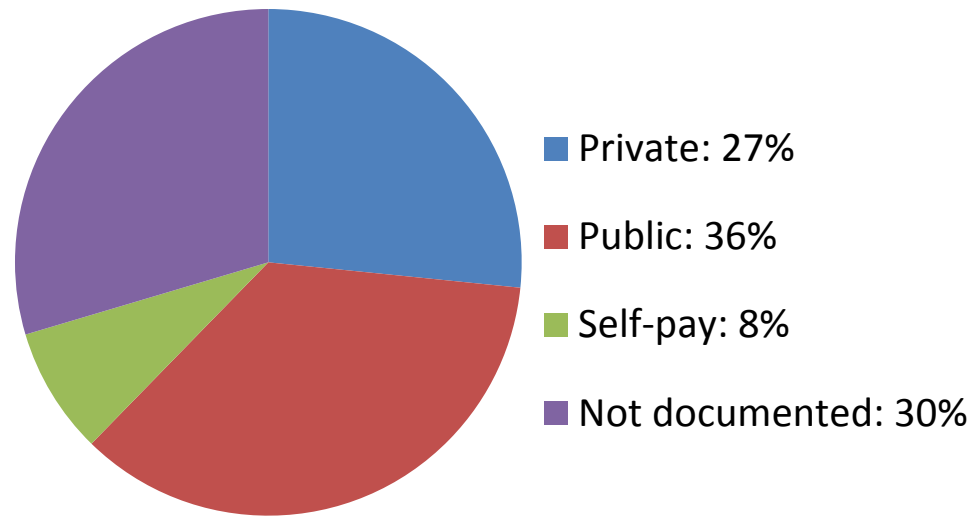
Cohort 2: Transferred in to PTC



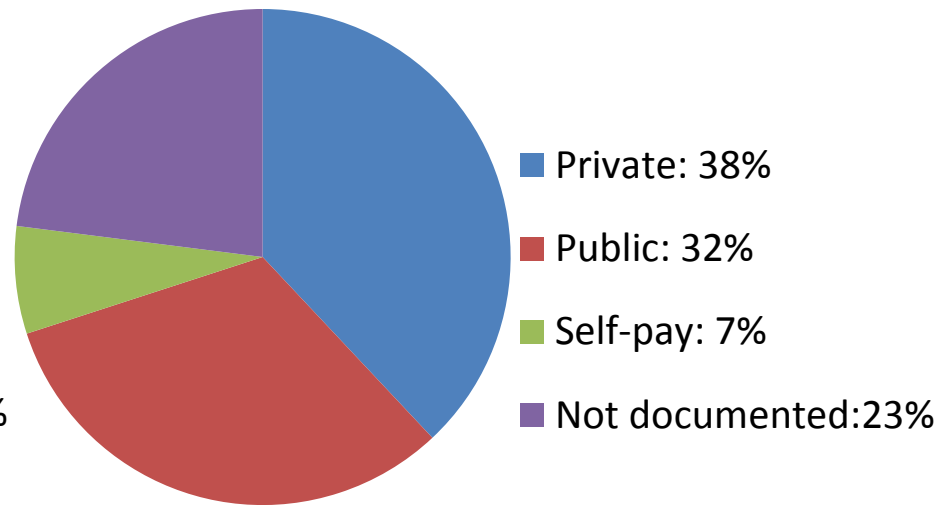


# Population characteristics: Payment source

Cohort 1: Direct to PTC

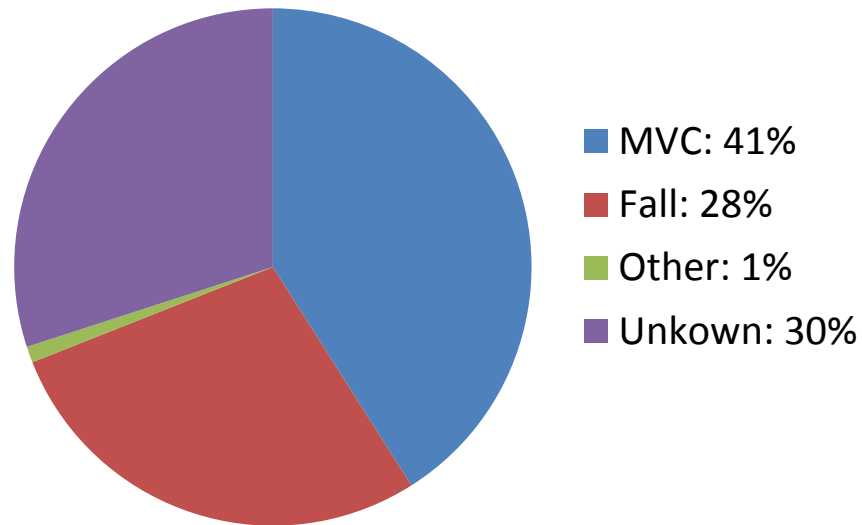


Cohort 2: Transferred in to PTC

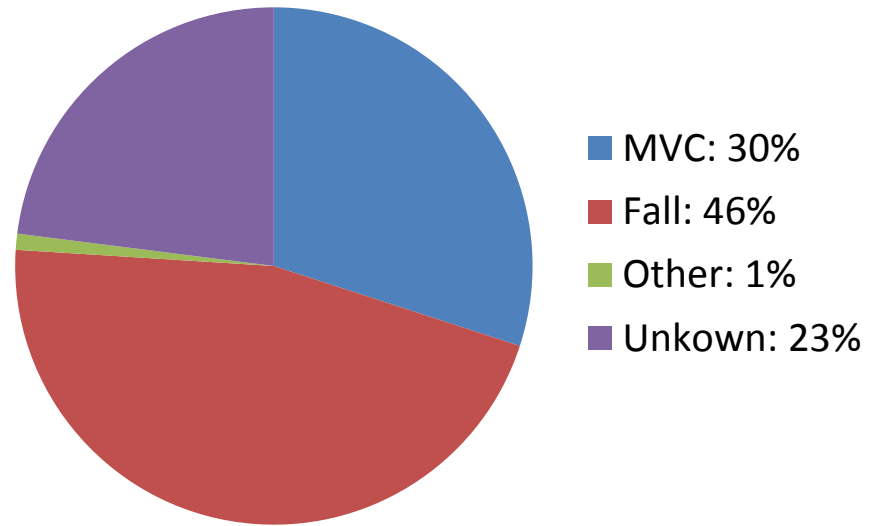


# Population characteristics: Injury Mechanism

Cohort 1: Direct to PTC



Cohort 2: Transferred in to PTC



# Adjusted Risk of Mortality

## Age groups

### Direct to PTC

Age	Odds ratio (95% CI) for in-hospital death	p-value
<1	2.91 (0.90 – 9.44)	0.0751 *
1 - 4	3.59 (1.31 – 9.85)	0.0132 **
5 - 9	1.36 (0.45 – 4.12)	0.5871
10 - 13	0.68 (0.21 – 2.17)	0.5098
14 - 15	Referent	

### Transfer

Age	Odds ratio (95% CI) for in-hospital death	p-value
<1	11.52 (2.36 – 53.30)	0.0025 **
1 - 4	3.67 (0.79 – 16.95)	0.0963 *
5 - 9	2.56 (0.49 – 13.38)	0.2639
10 - 13	0.76 (0.13 – 4.62)	0.7670
14 - 15	Referent	

# Adjusted Risk of Mortality

## Payment source

### Direct to PTC

Payment source	Odds ratio (95% CI) for in-hospital death	p-value
Private	Referent	
Public	2.49 (0.98 – 6.31)	0.0551 *
Self-pay	6.19 (2.31 – 16.62)	0.0003 **
Not documented	4.47 (1.41 – 14.14)	0.0108

### Transfer

- Payment source was not a significant factor and ended up being removed during backwards selection.

# Adjusted Risk of Mortality

## PTC ED Intubation

### Direct to PTC

Intubated in ED	Odds ratio (95% CI) for in-hospital death	p-value
No airway placed	Referent	
Intubated at ED	10.36 (4.10 – 26.20)	<.0001 **
Not doc/NA	1.09 (0.35 – 3.43)	0.8846
No airway placed	Referent	

### Transfer

Intubated in ED	Odds ratio (95% CI) for in-hospital death	p-value
No airway placed	Referent	
Intubated at ED	93.57 (25.81 – 339.20)	<.0001 **
Not doc/NA	3.07 (0.69 – 13.73)	0.1412
No airway placed	Referent	

# Conclusions

- Patients admitted directly to a PTC had a high percentage of patients who were non-white, on public insurance, and severely injured, with motor vehicle accident as the most common mechanism
- There are some factors that predict risk of in-hospital mortality in both cohorts; however, the two cohorts have distinct risk profiles
- After controlling for injury severity, patients admitted directly to a PTC who required intubation in the ED were 10 times more likely to die. Transferred patients who required intubation upon arrival at the PTC ED were 94 times more likely to die
- Transfer with appropriate airway control is a potential focus for quality improvement

*Thank you*

