



# Timely Hemodynamic Resuscitation and Discharge Outcomes in Severe Traumatic Brain Injury: *Preliminary Findings*

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*for the PEGASUS (Pediatric Guideline Adherence and Outcomes) Study*

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## ***Background***

- 630,000 ED TBI visits, 60,000 hospitalizations, 6000 deaths per year in children <18 years**
- Early hypotension common event associated with increased morbidity and mortality post-TBI.**
- Bratton (2008)**
  - **showed 39% hypotension**
  - **48% had attempt to treat in early period**
  - **Attempt to treat associated with better outcomes**
- Whether or not timely treatment of hypotension during early care improve outcomes is unknown**



## ***Aim***

- To examine the association between timely treatment of hypotension during early care and discharge outcomes

## ***Hypothesis***

- Timely hypotension treatment during early care is associated with better discharge outcomes.

## ***Inclusion Criteria of PEGASUS Study***

1. Age <18 years
2. Admission Glasgow Coma Scale (GCS) score < 9
3. Head Abbreviated Injury Score (AIS)  $\geq 3$
4. Alive with ICU tracheal intubation  $\geq 48$  hours
5. Trauma history
6. Abnormal admission head CT findings



## *Data Abstracted and Main Exposure*

- Resuscitation data during early care from 234 medical records abstracted for parent PEGASUS study
- Five level 1 pediatric trauma centers (2007-2011)
- Exposure: Timely treatment of hypotension during early care
  - Hypotension = systolic blood pressure < 5<sup>th</sup> percentile for age
  - Early Care = Pre-Hospital & Emergency Department
  - Timely = Treatment within 30 minutes of hypotension episode

## *Outcomes*

- In-hospital mortality
- Glasgow Outcome Scale (GOS) score among alive
  - Poor (vegetative & major impairment)
  - Good (minor impairment & return to baseline status)

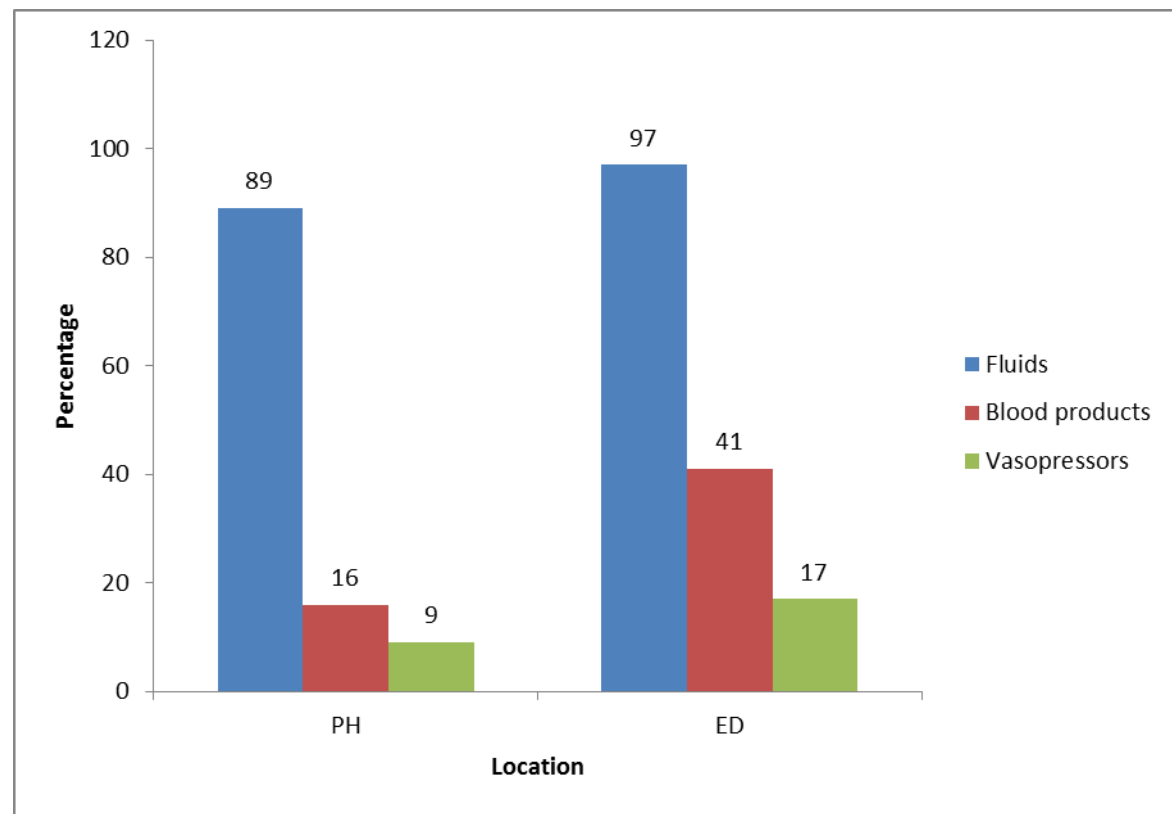


## Clinical Characteristics of 234 Children with Severe TBI by Early Hypotension

	Early Hypotension (N=60; 26%)		No Early Hypotension (N =174; 74%)
	No Timely Treatment N = 5; 8%	Timely Treatment N = 55; 92%	
Age (years) mean[SD]	6 [7]	11[7]	7 [6]
<b>ISS mean[SD]</b>	<b>29 [7]</b>	<b>36 [16]</b>	<b>26 [11]</b>
Other injuries N (%)	5 (100)	46 (84)	118 (68)
<b>High intracranial pressure N (%)</b>	<b>5 (100)</b>	<b>42 (76)</b>	<b>145 (83)</b>
ICU LOS (days) mean[SD]	17 [14]	15 [13]	15 [12]
<b>In-hospital death N (%)</b>	<b>3 (60)</b>	<b>11 (20)</b>	<b>15 (9)</b>
Poor discharge GOS N (%)	2/2 (100)	32/44 (73)	99/159 (62)



## Method of Timely Treatment of Hypotension (N = 60/234) During Early Care by Treatment Location





## Timely Treatment of Hypotension During Early Care and Discharge Outcomes in 234 Children with Severe TBI

Discharge Mortality (N= 29/234)	aRR (95% CI)
No timely treatment	Reference group
Timely treatment	0.46 (0.24, 0.90)
No hypotension	0.23 (0.06, 0.87)

Discharge Glasgow Outcome Scale Score (N= 205/234)	aRR (95% CI)
No timely treatment	Reference group
Timely treatment	0.54 (0.39, 0.76)
No hypotension	0.56 (0.43, 0.73)

\*adjusted for age, gender, head abbreviated injury severity (AIS) score, motor Glasgow coma scale (GCS) score, and maximum non-head AIS score and clustering analysis within institution performed.



## *Limitations*

- **Retrospective data**
- **Few patients in the no timely treatment group**
- **Did not capture correction of hypotension**
- **Residual confounding despite adjustments**





## ***Discussion***

- **High burden of early hypotension**
- **Hypotension during early care associated with in-hospital mortality**
- **Timely treatment of hypotension during early care associated with better discharge survival and GOS**
- **Better hemodynamic stability in first 30 minutes of hypotension may help achieve better cerebral hemodynamic conditions and improve post injury outcomes.**



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