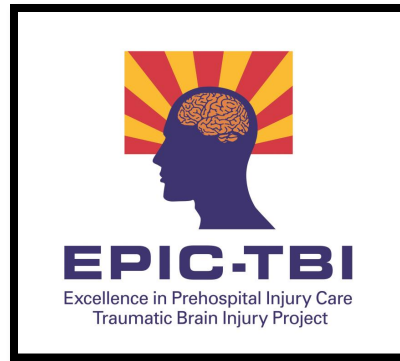


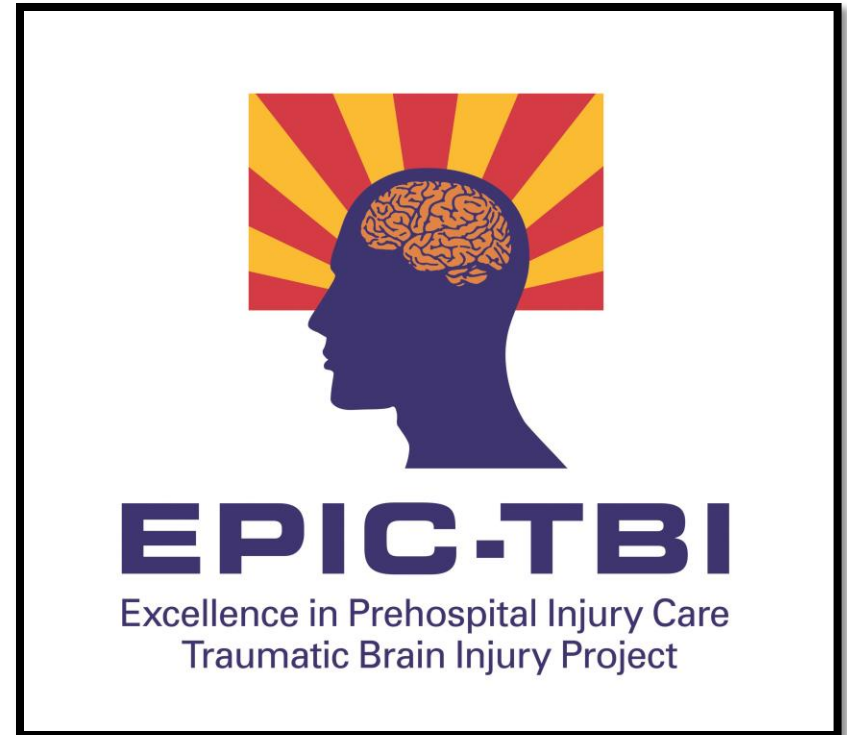
The Influence of Prehospital Hypotension and Hypoxia on Outcomes in Major Traumatic Brain Injury

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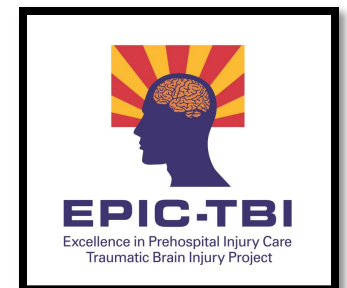
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Disclosure

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 - 3R01NS071049-S1 (EPIC4Kids)



Hypotension *Dramatically* Increases Mortality in TBI

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Hypotension *Dramatically* Increases Mortality (Continued)

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Hypotension is Common: Both Prehospital and In-hospital

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Hypoxia *Dramatically* Increases Mortality

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Even a *Single* Hypoxic Measurement *Dramatically* Increases Mortality

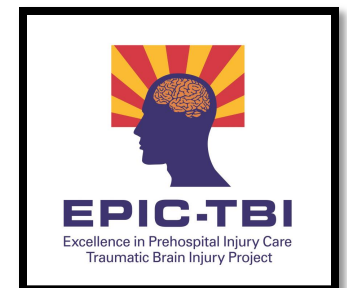
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Hypoxia Occurs *Frequently* During Prehospital TBI Care

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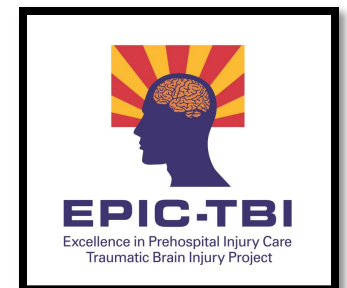
Background

- ▶ Most studies assessing the influence of prehospital hypoxia and hypotension have been:
 - Small
 - Single system/single trauma center
 - Focused solely on mortality
- ▶ Little is known about impact on non-mortality outcomes



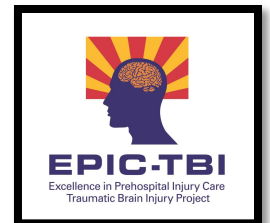
Objective

- ▶ To evaluate the impact of prehospital hypotension and hypoxia on multiple outcomes in victims of major TBI in a statewide trauma system



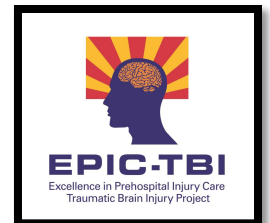
Methods

- ▶ *System* setting:
 - State of Arizona
 - Approximately over 250 Fire Departments and EMS agencies (air and ground)
 - Eight level 1/2 TCs
- ▶ *Study* setting:
 - The pre-implementation cohort of the EPIC Study: →
 - Evaluation of the impact of statewide implementation of the national EMS TBI Guidelines



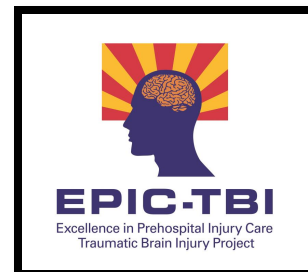
Methods: Data Source

- ▶ The Arizona State Trauma Registry (ASTR):
 - Contains EMS and TC data on all patients taken to a Level 1/2 TC statewide
- ▶ Data are abstracted at each TC and entered into the ASTR



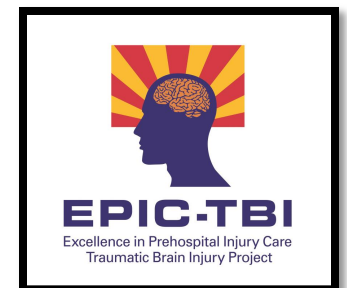
Methods: Analysis

- ▶ Analyzed the associations prehospital hypoxia, hypotension, and hospital outcomes in major TBI cases
- ▶ Inclusion:
 - Five years (2007-2011)
 - CDC Barell Matrix Type 1 TBI cases
 - Age ≥ 10
- ▶ Exclusions:
 - Transfers
 - Missing EMS saturation or BP



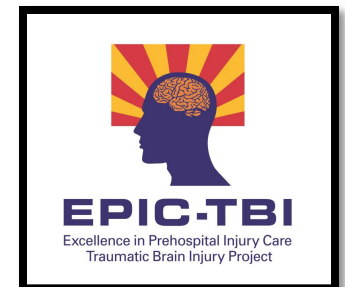
Definitions

- ▶ Hypotension: SBP <90
- ▶ Hypoxia: O₂ saturation <90%



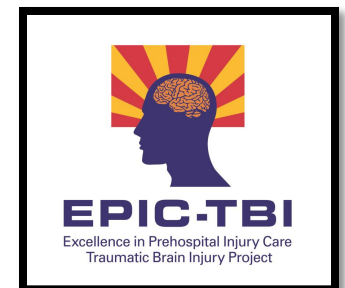
Cohorts

- ▶ Four cohorts:
 - Neither hypotension nor hypoxia
 - Hypotension-only
 - Hypoxia-only
 - Both hypotension and hypoxia



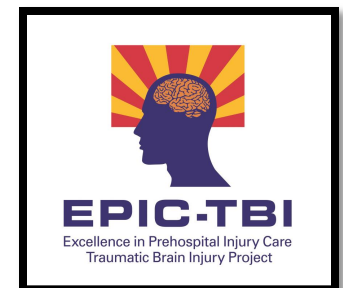
Outcomes

- ▶ Survival
- ▶ Trauma Center length-of-stay
- ▶ ICU LOS
- ▶ Trauma Center charges (USD)
- ▶ Final disposition
 - Home
 - Rehab/Skilled Care Facility

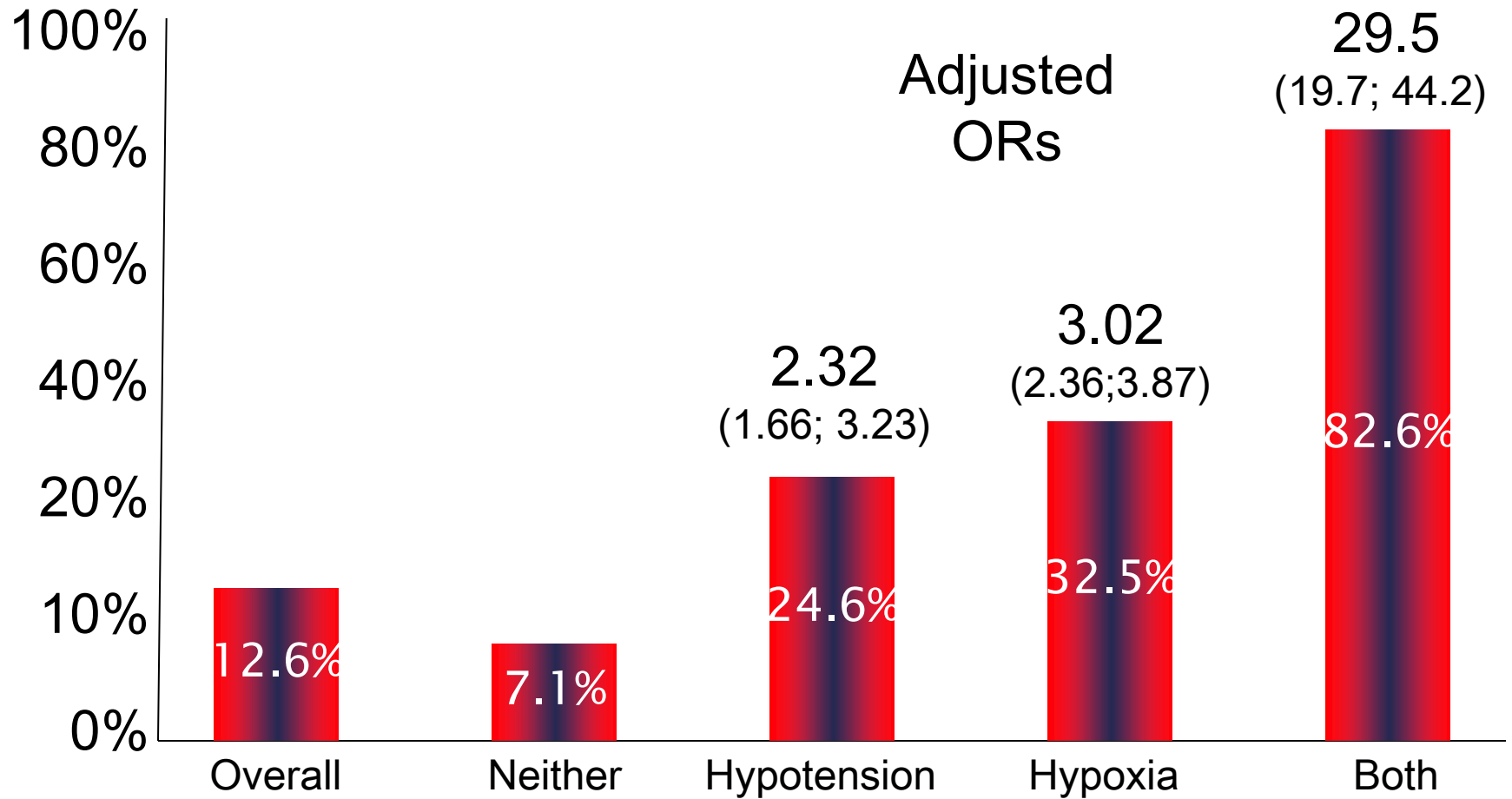


Results

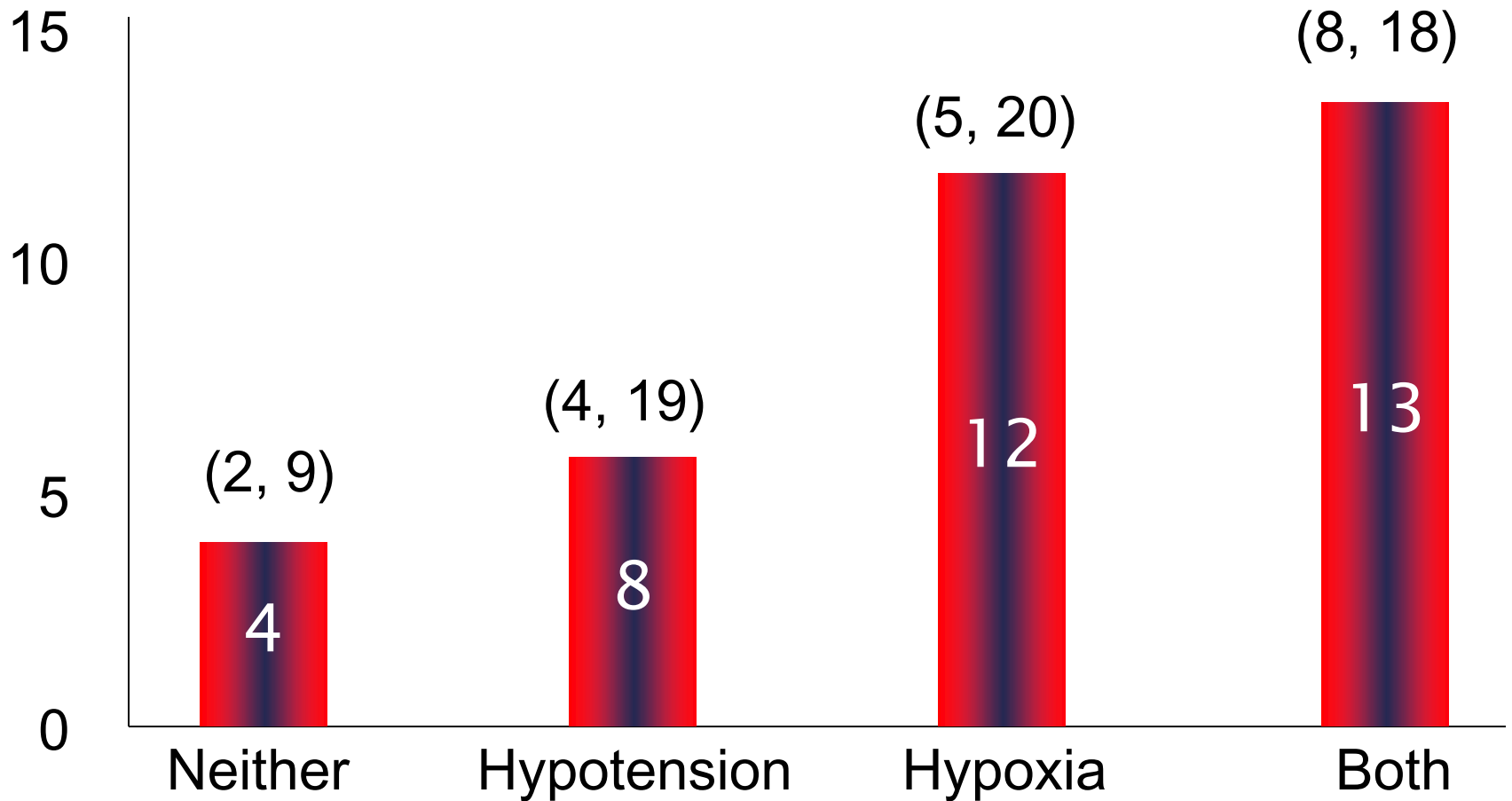
- ▶ 12,475 cases met inclusion
 - 38.1% excluded for missing data
- ▶ 7,718 cases (study group)
- ▶ Median age: 44
- ▶ 70% male
- ▶ Cohorts:
 - Neither: 87.4%
 - Hypotension-only: 3.6%
 - Hypoxia-only: 6.0%
 - Both: 3.0%



Mortality by Cohort

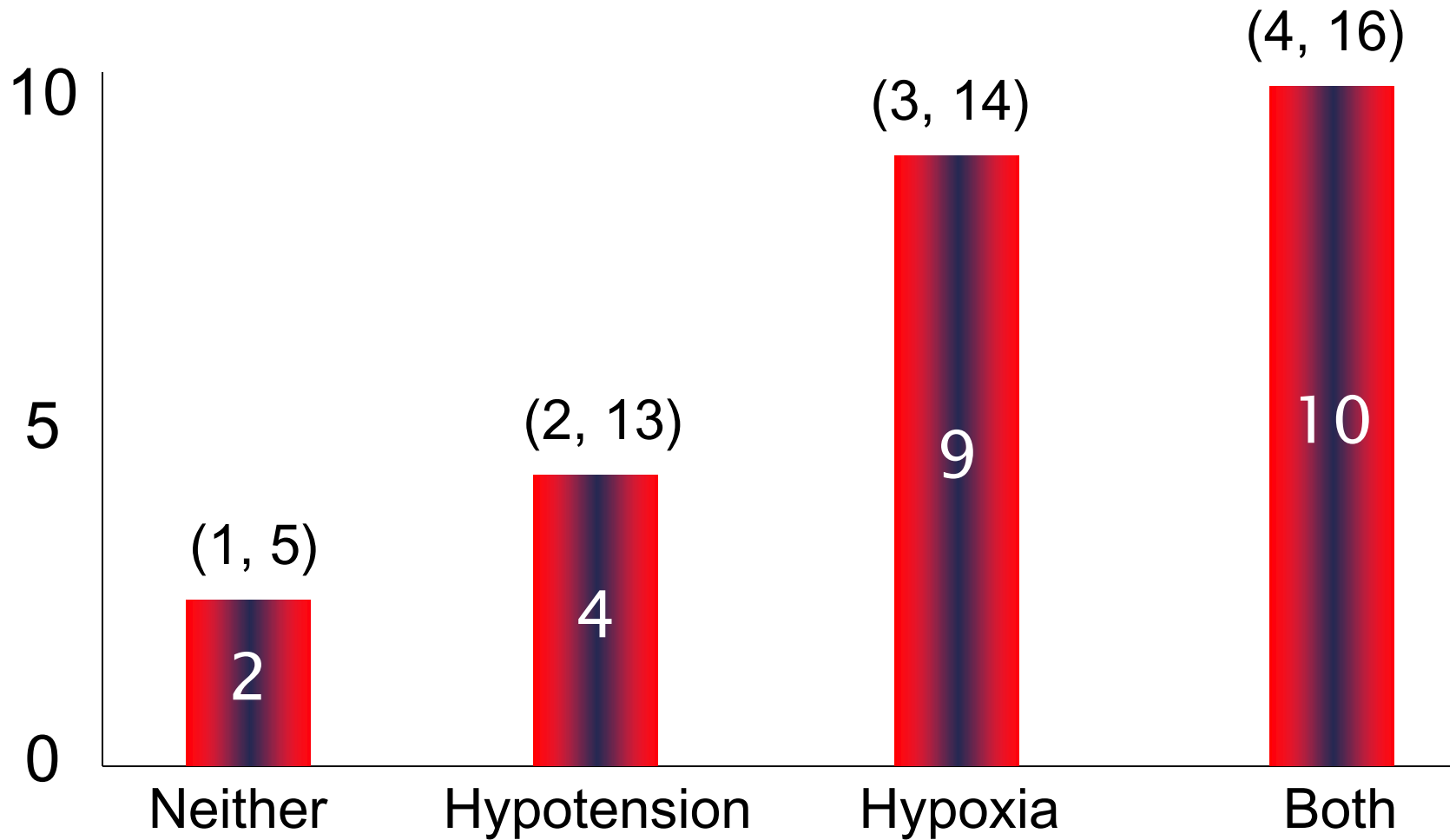


Hospital LOS (Days)



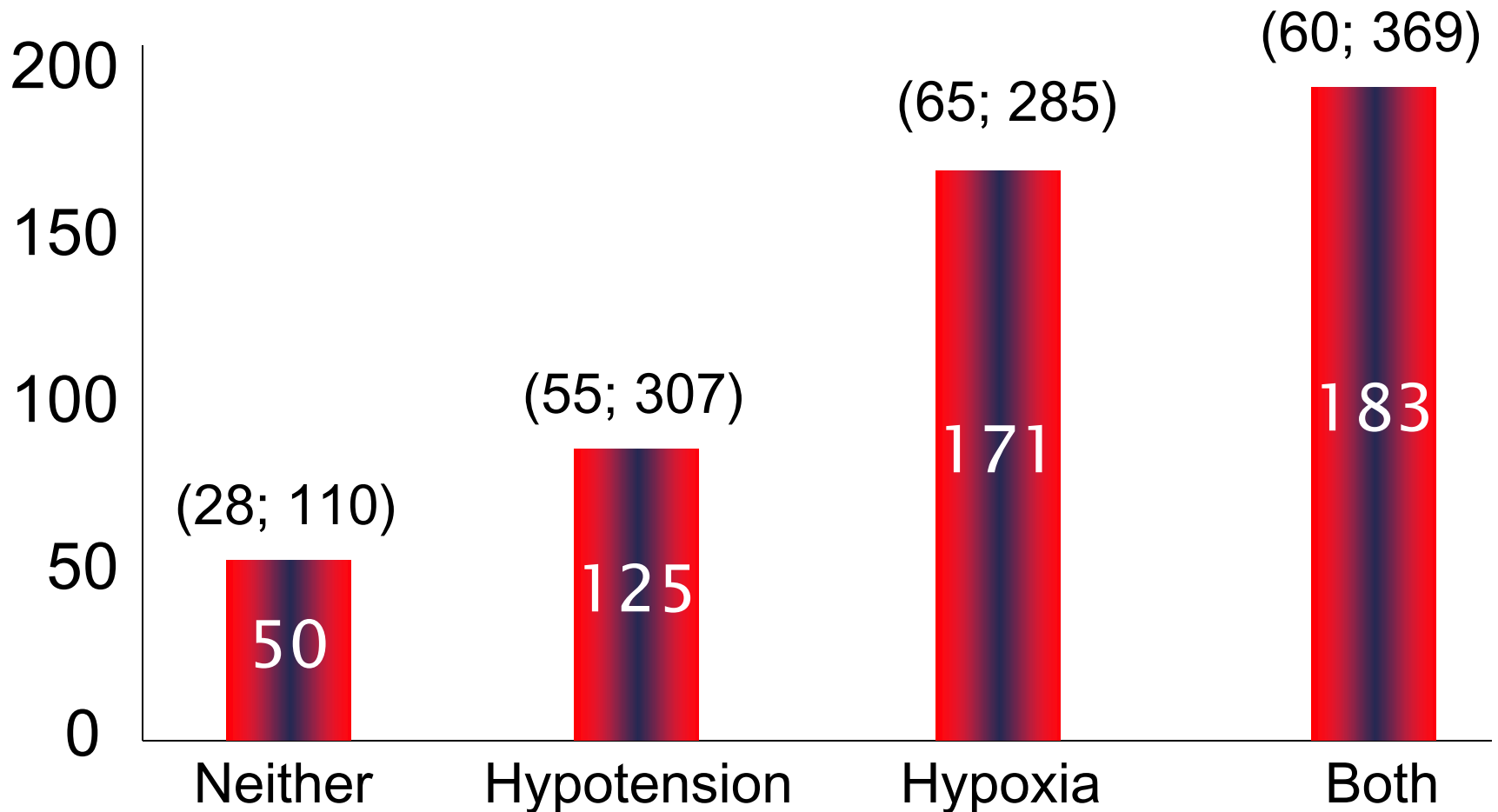
$p < 0.0001$ overall

ICU LOS (Days)



$p < 0.0001$ overall

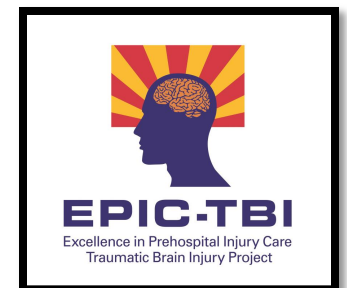
Hospital Charges (\$1,000s)



p < 0.0001 overall

Patient Disposition

- ▶ Patients with either hypotension, hypoxia, or both were much more likely to be discharged to rehab/long-term care than those who had neither
 - Adjusted OR = 1.90 (1.56; 2.32)



Limitations

- ▶ Retrospective
- ▶ Missing prehospital sat/BP in 38% of cases
 - Selection bias
 - Performing Multiple Imputation for the paper
 - As EPIC matures, the EMS data capture will approach 100%
- ▶ “Cost”:
 - Charges are only a surrogate for true cost
 - We don’t have EMS costs



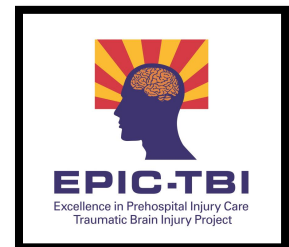
Conclusions

- ▶ In this statewide, multi-system analysis of over 7000 TBI cases:
 - Nearly 13% of cases had either H/H or both
 - Prehospital H/H were strongly and independently associated with mortality even after controlling for injury severity, age, and prehospital intubation.



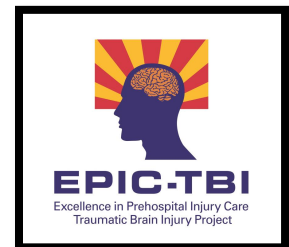
Conclusions

- ▶ Hypotensive/hypoxic patients also had much higher:
 - Trauma Center LOS
 - ICU LOS
 - Inpatient charges
 - Likelihood of being discharged to rehab or long-term care.



Conclusions

- ▶ Since the EMS TBI Guidelines focus on the prevention and aggressive treatment of H/H, implementation of the Guidelines may have the potential to significantly improve both mortality and non-mortality outcomes in victims of major Traumatic Brain Injury.



Special thanks to the EPIC Partners

Arizona Fire Departments and EMS Agencies



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Upcoming Events

- Traumatic Brain Injury (EPIC) Rollout Session
Mon, 01/30/2012

« **December** »

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Excellence in Prehospital Injury Care (EPIC)

Why is the EPIC Project important?

Each year, an estimated 1.7 million people sustain a TBI annually. Of them:

- 52,000 die,
- 275,000 are hospitalized, and
- 1.365 million, nearly 80%, are treated and released from an emergency department.

TBI is a contributing factor to a third (30.5%) of all injury-related deaths in the United States.¹

There is growing evidence that the management of TBI in the early minutes after injury profoundly impacts outcome. EMS operates in the ultra-acute setting, usually providing the first care for TBI victims when treatment matters the most. Reports on implementation of evidence-based TBI treatment guidelines inside the hospital are very promising. However, no studies to date have evaluated their impact in the prehospital setting.

The EMS agencies of Arizona have already proven their ability to dramatically improve cardiac arrest survival and, thus, Arizona was selected by the National Institutes of Health to do the same with TBI.



Results: Mortality

COHORT	%	p-value
Overall	12.6	
Neither	7.1	<0.001
Hypotension	24.6	<0.001
Hypoxia	32.5	<0.001
Both	82.6	<0.001

