



Delirium Assessment in Pediatric Trauma Patients with Neurotrauma



Lauren Einterz¹, Jodi Raymond², Matthew P. Landman³

¹Indiana University Medical School; ²Riley Hospital for Children Trauma Program ³Indiana University School of Medicine, Riley Hospital for Children, Division of Pediatric Surgery

BACKGROUND

- Few studies have been done regarding the effects of delirium in vulnerable pediatric populations
- Greater than 25% of PICU patients can have delirium and that delirium is shown to cause worsening prognosis and increased length of stay¹
- There are no current studies investigating the impact of neurotrauma on the rates of delirium in Pediatric Intensive Care Patients
- We hypothesized that pediatric trauma patients with neurotrauma would have higher rates of delirium than pediatric trauma patients without neurotrauma.

MATERIALS AND METHODS

- A retrospective review was performed of pediatric trauma patients at Riley Hospital from 2019-2022. Exclusion criteria included death within 24 hours of ICU admission and non-trauma mechanisms such as drownings, suffocations, overdoses, and hangings.
- Neurotrauma was defined as an abbreviated injury score head of 2 or greater. Important clinical covariates were abstracted from the trauma registry and from the medical records. CAPD score of 9 or greater was considered to be positive for delirium.

CAPD Assessment

Please answer the following questions based on your interactions with the patient over the course of your shift:

	Never	Rarely	Sometimes	Often	Always	Score
	4	3	2	1	0	
1. Does the child make eye contact with the caregiver?						
2. Are the child's actions purposeful?						
3. Is the child aware of his/her surroundings?						
4. Does the child communicate needs and wants?						
	0	1	2	3	4	
5. Is the child restless?						
6. Is the child inconsolable?						
7. Is the child underactive—very little movement while awake?						
8. Does it take the child a long time to respond to interactions?						
						TOTAL

Table 1: This table is an example of the Cornell Assessment of Pediatric Delirium (CAPD) questions that nursing staff answer to generate a Pediatric Delirium Score.² These scores are automatically calculated and added to the patient carts in CERNER at IU Riley Children's Hospital

RESULTS

- There were 446 patients who met inclusion criteria.
- Thirty-eight percent of the study cohort had a least one CAPD assessment during their ICU admission.
- Factors associated with at least one delirium assessment on univariate analysis included: ED arrival GCS, ISS, total ventilator days, total ICU days, hospital LOS, and mortality.
- In those patients with at least one CAPD assessment, age, arrival GCS, ISS, ICU LOS and hospital LOS were associated with scores screening positive for delirium

RESULTS

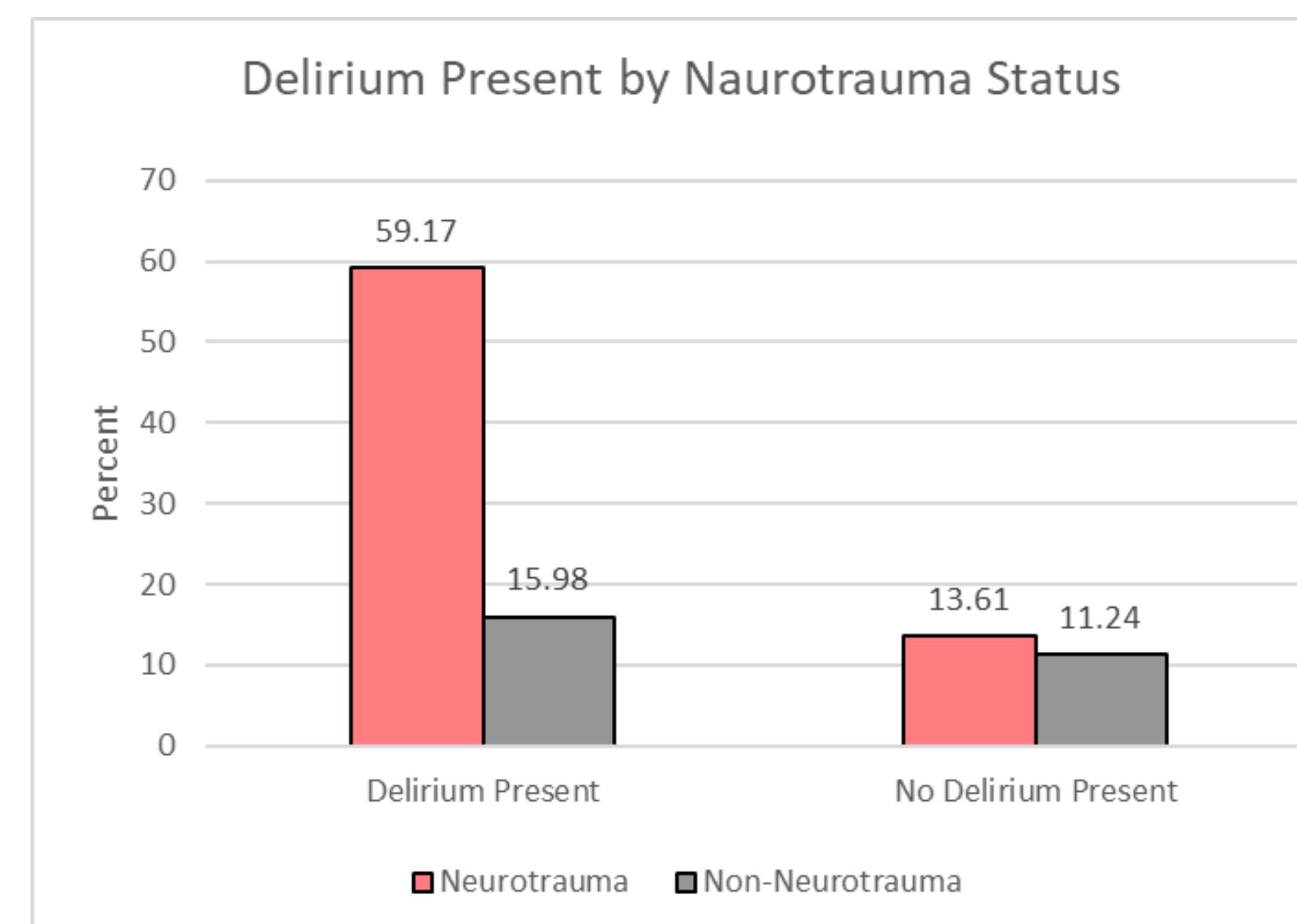


Fig. 1: This figure demonstrated Neurotrauma patients (AIS score of 2 or greater) and those without Neurotrauma. These two groups are then further split between patients with a recorded CAPD score greater than 9 deemed as "Delirium Present" compared to those without a CAPD score greater than 9 deemed as "No Delirium Present." This was deemed statistically significant with a p-value <0.001

RESULTS

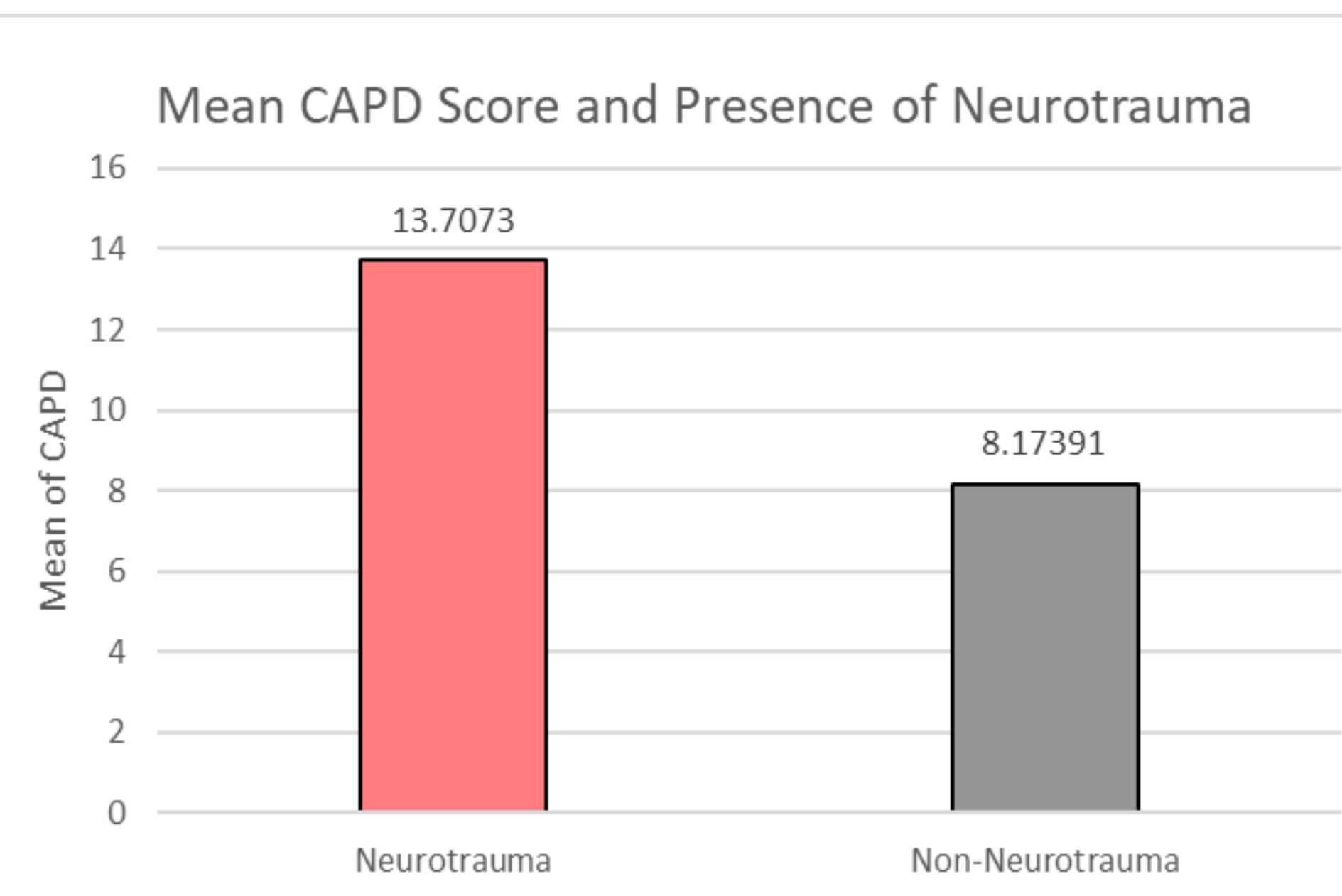


Fig. 2: This figure demonstrates the difference in the mean CAPD scores in the patients with Neurotrauma and those without Neurotrauma. As a CAPD greater than 9 is considered delirium, the neurotrauma group overall had a mean score reflective of delirium while the non-neurotrauma group on average had scores below the delirium cutoff

RESULTS

Variable	Odds Ratio	95% CI	p-value
Age	0.9	0.77-1.03	0.13
Arrival GCS	1.16	0.96-1.41	0.12
ISS	1.04	0.96-1.12	0.35
Total Vent Days	0.65	0.33-1.27	0.21
Total ICU Days	1.81	0.997-3.29	0.05
Neurotrauma	22.05	2.99-162.54	0.002

Table 2: Multivariate logistic regression evaluating odds of delirium based on important clinical variables. When controlling for significant clinical factors associated with delirium, demonstrated associations with both ICU LOS (OR 1.8, 95% CI 1.00-3.29, p=0.05) and neurotrauma (OR 22, 95% CI 2.99-162.54, p=0.002).

CONCLUSIONS

- In this cohort of pediatric trauma patients managed in the ICU, variable assessment of delirium occurred.
- When controlling for risk factors for delirium, the presence of neurotrauma was associated with delirium on CAPD assessment.
- Ongoing research into risk factors as well as prevention strategies should be assessed in this population

LIMITATIONS

Limitations for this study include that there were not CAPD scores recorded for all patients. When Patients did have at least one score, there were often patients that did not have delirium scores recorded every 12 hours for the length of their stay. Other limitations include that due to the nature of pediatric trauma injuries there were more neurotrauma patients than non-neurotrauma patients

REFERENCES

1. Siegel EJ, Traube C. Pediatric delirium: epidemiology and outcomes. *Current Opinion in Pediatrics*. 2020;32(6):743-749. doi:https://doi.org/10.1097/mop.0000000000000960
2. Traube C, Gerber LM, Mauer EA, et al. Delirium in children undergoing hematopoietic cell transplantation: A multi-institutional point prevalence study. *Frontiers in Oncology*. 2021;11. doi:10.3389/fonc.2021.627726
3. Flaigle MC, Ascenzi J, Kudchadkar SR. Identifying barriers to delirium screening and prevention in the pediatric ICU: Evaluation of PICU staff knowledge. *Journal of Pediatric Nursing*. 2016;31(1):81-84. doi:10.1016/j.pedn.2015.07.009
4. Paterson RS, Kenardy JA, De Young AC, Dow BL, Long DA. Delirium in the critically ill child: Assessment and sequelae. *Developmental Neuropsychology*. 2017;42(6):387-403. doi:10.1080/87565641.2017.1374961
5. Prevalence of delirium in the postoperative period of cardiac surgery. *Journal of Cardiology & Current Research*. 2022;15(1):19-19. doi:10.15406/jccr.2022.15.00544
6. Roberson SW, Patel MB, Dabrowski W, Ely EW, Pakulski C, Kottis K. Challenges of delirium management in patients with traumatic brain injury: From pathophysiology to clinical practice. *Current Neuropharmacology*. 2021;19(9):1519-1544. doi:10.2174/1570159x19666210119153839
7. Smith HAB, Brink E, Fuchs DC, Ely EW, Pandharipande PP. Pediatric Delirium Monitoring and Management in the Pediatric Intensive Care Unit. *Pediatric Clinics of North America*. 2013;60(3):741-760. doi:0031-3955/13/\$
8. Traube C, Gerber LM, Mauer EA, et al. Delirium in children undergoing hematopoietic cell transplantation: A multi-institutional point prevalence study. *Frontiers in Oncology*. 2021;11. doi:10.3389/fonc.2021.627726
9. Traube C, Silver G, Gerber LM, et al. Delirium and mortality in critically ill children. *Critical Care Medicine*. 2017;45(5):891-898. doi:10.1097/ccm.0000000000002324