

Prevalence of significant traumatic brain injury among children intubated due to impaired consciousness

Nir Samuel¹, Yoav Hoffaman², Stav Rakedzon³, Ari M. Lipsky⁴, Hany Bahouth⁵, Aeyal Raz⁶, Danny Epstein⁷

Background:

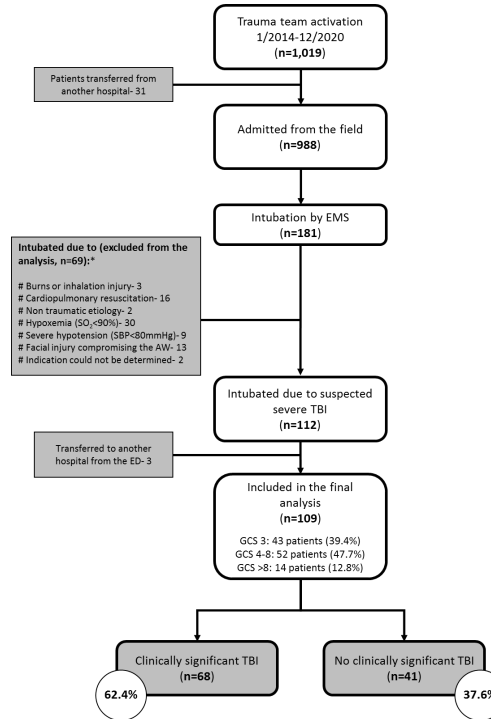
- Severe traumatic brain injury is a leading cause of pediatric morbidity and mortality.
- Emergency endotracheal intubation (EEI) of head injured children with impaired consciousness aims to minimize secondary brain injury.
- Not all intubated children suffer clinically significant TBI (csTBI) and EEI may have significant complications.
- Aim:** to investigate the prevalence of csTBI and factors associated with its accurate prediction in children intubated in the field due to impaired consciousness.

Methods:

- Retrospective cohort study of children <18 years of age who underwent EEI solely due to impaired consciousness
- Two academic trauma centers
- January 2014 to December 2020
- 6 EMS agencies
- Data from EMS and hospital trauma registries.
- Main outcome:** csTBI.

Results:

- 109 children
- 82 (75.2%) male, median age 10 years (IQR 5-15 years).
- 68 children (62.4%) suffered csTBI.
- The prevalence of csTBI among those with field GCS of 3, 4-8 and >8 was 81.4% (n=35), 55.8% (n=29) and 28.6% (n=4), respectively (p<0.001).
- Age>10 years and lower GCS were associated with csTBI (p<0.001).



| | No csTBI (n=41) | Confirmed csTBI (n=68) | p-value |
|---|--------------------|---------------------------|---------|
| Demographics | | | |
| Male gender, n (%) | 31 (75.6%) | 52 (76.5%) | 0.90 |
| Age, years (IQR) | 7 (5-14) | 12 (6-15) | 0.09 |
| 0-10 years, n (%) | 28 (68.3%) | 28 (41.2%) | 0.01 |
| 11-17 years, n (%) | 13 (31.7%) | 40 (58.8%) | |
| Prehospital | | | |
| Weekdays, n (%) | 30 (73.2%) | 45 (66.2%) | 0.58 |
| Weekends, n (%) | 11 (26.8%) | 23 (33.8%) | |
| Arrived daytime (08:00-15:59), n (%) | 7 (17.1%) | 23 (33.8%) | 0.13 |
| Arrived in evening and at night (16:00-07:59), n (%) | 34 (82.9%) | 45 (66.2%) | 0.09 |
| Fail, n (%) | 20 (48.8%) | 24 (35.3%) | 0.28 |
| Motor vehicle accident, n (%) | 16 (39.0%) | 38 (55.9%) | |
| Other blunt trauma, n (%) | 5 (12.2%) | 5 (7.4%) | |
| Penetrating trauma, n (%) | 0 (0.0%) | 1 (1.5%) | |
| Transport time > 30min, n (%) | 29 (70.7%) | 56 (82.4%) | 0.24 |
| Ambulance evacuation, n (%) | 27 (65.9%) | 36 (52.9%) | 0.26 |
| Helicopter evacuation, n (%) | 14 (34.1%) | 32 (47.1%) | |
| Prehospital GCS 3, n (%) | 8 (19.5%) | 35 (51.5%) | <0.001 |
| Prehospital GCS 4-8, n (%) | 23 (56.1%) | 29 (42.6%) | |
| Prehospital GCS >8, n (%) | 10 (24.4%) | 4 (5.9%) | |

Conclusion:

- A substantial proportion of injured children who undergo EEI due to impaired consciousness do not have csTBI and may be exposed to the risks of EEI with limited benefit.
- Older age and a lower pre-intubation GCS were associated with more accurate field classification of csTBI.

¹ Pediatric Emergency Department, Schneider Children's Medical Center, Petah Tikva, Israel;

² Pediatric Intensive Care Unit, Western Galilee Hospital, Nahariya, Israel;

³ Department of Internal Medicine B, Rambam Health Care Campus, Haifa, Israel;

⁴ Emergency Department, Emek Medical Center, Afula, Israel;

⁵ Trauma and Emergency Surgery, Rambam Health Care Campus, Haifa, Israel;

⁶ Anesthesiology, Rambam Health Care Campus, Haifa, Israel;

⁷ Critical Care Division, Rambam Health Care Campus, Haifa, Israel

Samuel, Nir, et al. "Indications for prehospital intubation among severely injured children and the prevalence of significant traumatic brain injury among those intubated due to impaired level of consciousness." *European Journal of Trauma and Emergency Surgery* (2022): 1-9.

samuelnir@gmail.com