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Clinical Scenario:
A 25 y/o female suffers a traumatic brain injury (TBI) as a result of a pickup truck colliding with her snow mobile. A bystander calls 911 and the nearest paramedic crew is dispatched CODE 4 (highest priority) to the scene. The primary care paramedics (PCP's) arrive on scene and begin their primary assessment. They find the patient is unconscious with a Glasgow Coma Scale (GCS) of 3, there is a pulse present but respirations are not sufficient. PCP's insert an oropharyngeal airway (OPA) and begin to facilitate respirations with a BVM. Advanced care paramedics (ACP's) arrive on scene and decide to intubate. The intubation process increases the scene time but maintain a stable open airway. The patient is the transported to the nearest trauma centre for treatment. Does this on scene intubation increase the likelihood of a positive patient outcome? Or does the increase in scene time lead to a more negative patient outcome?

Background
Intubation occurs when a plastic tube is placed down a patient's throat into their trachea. This helps to stabilize the patient's airway when it is compromised. Patients who have experienced a traumatic brain injury and are unconscious are often considered for intubation to protect their airway and prevent a secondary brain injury when can be caused by hypoxia.

Review question
In patients with a traumatic brain injury (TBI) what is the effect of prehospital intubation compared with no prehospital intubation on patient outcome?

Search strategy (Basic): (traumatic brain injury) OR (TBI) AND (prehospital intubation) OR (PHI) OR (ETI)
Limits: Publication with the last 5 years, English
Databases searched: PubMed, Science Direct

Search results: (Pub Med: 41, Science Direct: 2983)
Included for review: 3 were chosen as relevant for this CAT

Title, author, year	Study design & LOE	Population	Intervention	Outcomes	Results	Weaknesses & Strengths

Prehospital intubation for isolated severe blunt traumatic brain injury: worse outcomes and higher mortality, Haltmeier et al. (2017)	Retrospective cohort-matched study where matched cohorts are compared with univariable and multivariable regression analysis. LOE: 2	-27 714 patients with isolated severe blunt TBI and a field GCS of ≤8 were pulled from the US National Trauma Data Bank -8139 patients treated with prehospital endotracheal intubation (ETI) -8319 patients treated without prehospital ETI	-Patients undergoing ETI prior to emergency department (ED) admission n=8139 -Patients not undergoing ETI prior to ED admission n=8139	-To assess the effect on patients with isolated severe blunt TBI and a GCS score of ≤8 when prehospital treatment includes ETI vs. when it does not.	-Prehospital ETI intubation was correlated with longer scene times (median 9 vs. 8 min, p<0.001) and transport times (median 26 vs. 19 min, p<0.001), lower ED GCS scores (in patients without sedation; mean 3.7 vs. 3.9 p=0.026), more ventilator days (mean 7.3 vs. 6.9 p=0.006), longer ICU (median 6.0 vs. 5.0 days p<0.001) and total hospital length of stay (median 10.0 vs. 9.0 days p<0.001), and higher in-hospital mortality (31.4 vs. 27.5% p<0.00) -In regression analysis, prehospital ETI when independently associated with lower ED GCS scores (RC -4.213, CI -4.562/-	(+) Strong sample size (+) matched up patients were same age, sex, injury severity based on injury severity score Abbreviated injury scale (AIS) head score, brain injury type, prehospital variables (field systolic blood pressure (SBP), Glasgow coma scale (GCS)), transport and scene times, ED vital signs (SpO2, SBP, heart rate), operative procedures, and outcome variables (total hospital and intensive care unit (ICU) length of stay, ventilator days, in-hospital mortality (-) Retrospective design

Title, author, year	Study design & LOE	Population	Intervention	Outcomes	Results	Weaknesses & Strengths
					3.864, p<.001) and higher in-hospital mortality (OR 1.399, CI 1.205/1.624, p<0.001)	
The effect of prehospital intubation on treatment times in patients with suspected traumatic brain injury, Lansom et al. (2016)	Retrospective cohort study LOE: 2	-258 patients with a suspected TBI and a Glasgow coma scale (GCS) of ≤13 who underwent prehospital intubation (PHI) or emergency department intubation (EDI) -93 patients treated with PHI -165 patients treated with EDI	-Patients undergoing PHI n=93 -Patients undergoing EDI n=165	To assess whether patients that receive PHI have a reduction in treatment times and a higher survival advantage in comparison to EDI.	-Median scene time (interquartile range (IQR)): PHI 43min vs. EDI 17min (p<0.001) -Transport time (IQR): PHI 34min vs. EDI 14min (p<0.001) -Survival to discharge: PHI 73% vs. EDI 70% (p=0.686) -Total treatment times: PHI 86min vs. EDI 71min (p=0.232) -PHI was not found to show any significant survival advantage for patients when compared with EDI	(+) Adjusted patient variables surrounding inclusion into study in order to avoid a skew (-) Small study size (-) Limitations caused by the retrospective nature of study (-) Single-centre study

Tracheal intubation in traumatic brain injury: a multicentre prospective observational study, Gravesteijn et al. (2020)	Multicentre prospective observational study LOE: 2	-4509 all-severity traumatic brain injury (TBI) patients from 59 centres was narrowed down using filters to 890 who underwent prehospital intubation (PHI) and 460 who received in hospital intubation (IHI)	-Patients receiving PHI n=890 -Patients who receiving IHI n=460	To assess the associations between PHI and IHI on patient outcome and whether the association differed according to injury severity.	-No adjusted overall effect on functional outcome of PHI (odds ratio=1.01; 95% confidence interval, 0.79-1.28; p=0.96) -Adjusted overall effect of IHI was not significant (odds ratio=0.86; 95% confidence interval, 0.65-1.13; p=.28) -PHI correlated with better functional outcome in patients with higher thorax and abdominal Abbreviated Injury Scale scores (p=0.009 and p=0.02, respectively) -IHI correlated with better outcomes in patients with lower Glasgow Coma Scale (GCS) scores (p=0.01) -IHI was associated with better functional outcome in patients with GCS	(+) Data pulled from 59 different centres (-) Observational study (-) TBI's of any severity were included (-) Did not define TBI using GCS or Injury severity score (ISS)

Title, author, year	Study design & LOE	Population	Intervention	Outcomes	Results	Weaknesses & Strengths
					scores of 10 or lower -Overall benefits and risks of tracheal intubation should be evaluated in TBI patients in order to maximize the benefit, extracranial injury should also be used to influence decision in the prehospital setting and level of consciousness should be used to influence decision in the in-hospital setting	

Comments:
Much of the research on this topic was outdated, this was a challenge as there were few current articles on the topic that were relevant for this CAT. Additionally, most of the studies reviewed were based on retrospective data which can be prone to bias.

Considerations:
Based on the types of studies reviewed above it is important to note that they can be prone to differing types of bias (as mentioned above). Furthermore, the three studies reviewed used differing populations which can cause inconsistencies within the data.

Clinical bottom line:
There is not enough evidence to support a definitive bottom line therefore more research on the topic would be beneficial in the future to gather a better understanding on the subject. Currently it is acceptable to utilize prehospital intubation or

refrain from doing so. As long as intubation is within the working paramedic's scope of practise it is up to their discretion whether or not to use it.

References

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Haltmeier, T., Benjamin, E., Siboni, S., Dilektasli, E., Inaba, K., & Demetriades, D. (2017). Prehospital intubation for isolated severe blunt traumatic brain injury: worse outcomes and higher mortality. European journal of trauma and emergency surgery: official publication of the European Trauma Society, 43(6), 731–739. doi.org/10.1007/s00068-016-0718-x

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