

Critically Appraised Topic in Trauma

Cindal Duley

s5103342

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Paramedic mini-CAT (Critically Appraised Topic)

Title: Does initial GCS in major trauma (multisystem) predict outcome?

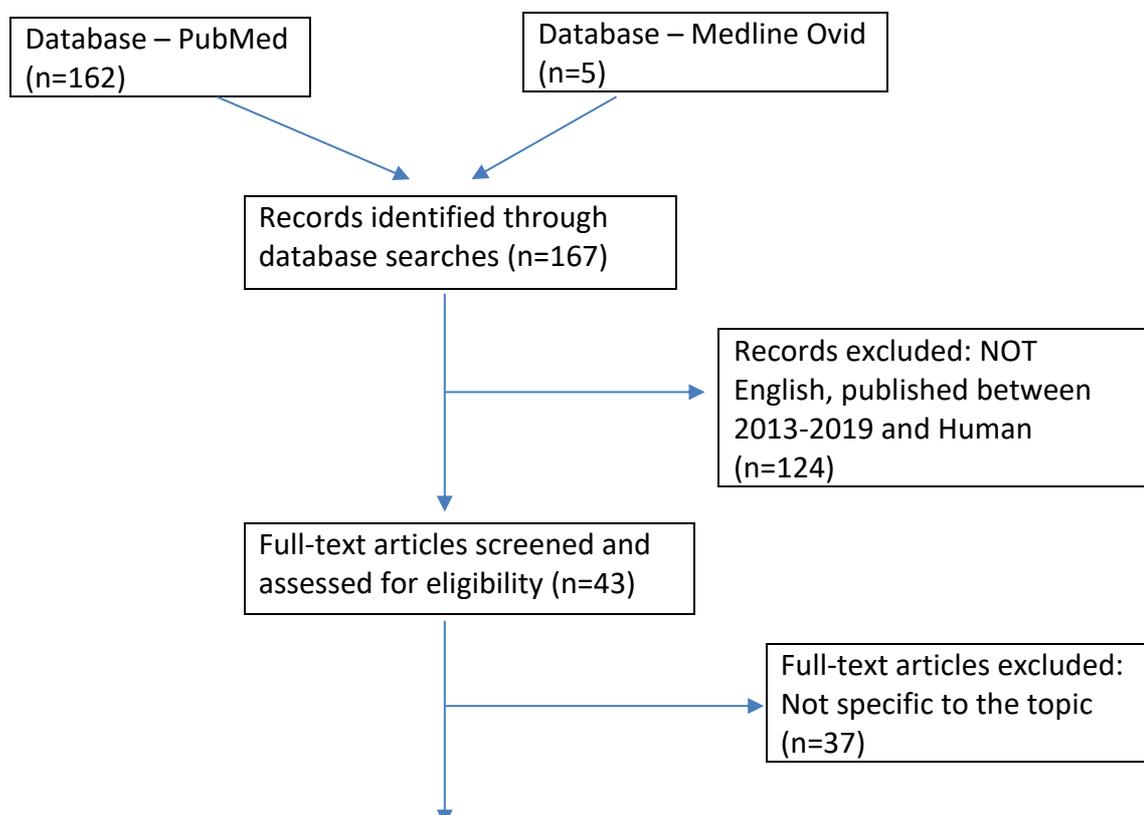
Report by: Cindal Duley

Clinical scenario: you are called code one to an unconscious 27-year-old male patient with significant trauma to the head, chest and legs following a high-speed motor vehicle accident. Patient was ejected from the vehicle. Upon your arrival the patient is GCS 5 (E1,V1,M3), has a respiratory rate of 6 and a weak radial pulse. Does the patients GCS of 5 predict his long-term outcome?

PICO (Population – Intervention – Comparison – Outcome) question: In patients who have received major multisystem trauma, is the patients initial Glasgow Coma Scale (GCS) score an accurate prediction of the patient’s final outcome?

Search Strategy: (GCS OR initial GCS OR Glasgow coma scale OR GCS accuracy) AND (major trauma OR multi-system trauma) AND (predict outcome OR patient outcome OR predictor of mortality OR accuracy). Medline Ovid and PubMed.

Search outcome:



Relevant papers included in CAT (n=6)
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AUTHOR, DATE	STUDY DESIGN	STUDY SIZE & CHARACTERISTICS	OUTCOME	RESULTS	STRENGTHS AND LIMITATIONS
Thompson et al, 2017	Exploratory study	1033 patients that met major trauma classification within one Regional Trauma Network in the UK	Casualty characteristics (physiological factors such as age, GCS, respiratory rate and systolic BP) and Response characteristics (skill matrix of attending crews and time on scene) analysed to predict "status at discharge" (alive or deceased)	Study findings suggest that physiological characteristics are a greater predictor of patient outcome than response characteristics. GCS score alone was found to have a 45.8% prediction of outcome. When GCS was grouped with other physiological factors it was reported to have a predictive outcome of 99.3% for alive and 67.6% for deceased	(-) The study only briefly looked at GCS solely being a predictive factor for patient outcome (-) The study was based on data from a Regional Trauma Network and included a significant amount of physician lead teams that have a greater skill set to perform greater interventions and broader knowledge base (+) Decent study size (-) Did not include patient outcome other than alive or deceased
Cicero & Cross, 2013	Retrospective	Data from 104035 paediatric patients aged 0-18 years over a 3-	Primary outcome was the accuracy of GCS predicting	The study concluded that initial GCS is predictive of injury and	(+) Largest and most comprehensive study of its kind

		year period within the United States	patient mortality. Other outcomes such as death on arrival at ED, ED length of stay, major injury and hospital length of stay were also analysed	mortality outcome and has significant accuracy. For patients with initial GCS of 8 and above, the survival rate was 95% or more.	(-) Data reliance due to possible reporting errors or reporting bias (+) Evaluated a range of outcomes such as death, hospital stay length, ED stay and major injury (+) Included data on a national level
Bledsoe et al, 2015	Prospective observational	217 emergency care providers including; nurses, paramedics, CCP's, EMT's and attending and resident physicians made 2084 GCS observations	The study aimed to determine the overall accuracy of GCS scoring by various emergency care providers	The overall accuracy of GCS scoring within this study was 33.1%. The verbal component has the highest accuracy with 69.2%. The eye-opening component scored 61.2% accuracy and the motor component scored the least accuracy with 59.8%. GCS scores that do not exist were recorded in 9.2% of cases. The study concluded that the initial GCS is not an	(-) The observations were made during training sessions via video vignettes (-) The scoring from participants was compared to the expert scoring of only two board certified neurologists (+) The study outlined the need for further studies to be conducted in the real-world setting

				accurate tool due to its complexity	
Reith et al, 2017	Retrospective observational	54069 patient's data was analysed using three different data bases; Corticosteroid Randomized After Significant Head Injury (CRASH), Victorian State Trauma Registry (VSTR) and Trauma Audit and Research Network (TARN)	Compare the three individual components of the GCS; eye-opening, verbal and motor to that of the sum score and the accuracy of three components in comparison to the total sum score	The study concluded that each component has floor and ceiling effects. The study stated that the three components had higher prognosis value individually than that of just the sum score as the component in which the patient had lost points has significant value	(+) Large study population (-) study focused mainly on traumatic brain injury rather than multisystem trauma (-) Study stated that there may be reporting differences between the three databases used and that should be taken into consideration (+) Provided statistics that outlined the important of the three components of the GCS rather than the importance of the over sum score
Majdan et al, 2015	Prospective observational	445 patient's data from 16 medical facilities	Compare in field and hospital admission GCS motor score and pupillary reactivity and assess prognostic value for patient mortality	The average total GCS score was 6 with the average motor score being 4 and a noticeable shift towards lower motor scores on admission to hospital was	(-) Focused mainly on GCS motor score and pupillary reactivity (+) Outlined the effectiveness of initial GCS in the pre-hospital setting in major trauma

				observed, this was stated as being due to sedation. Pupillary reactivity remained unchanged from in field to hospital admission in 84% of patients.	(+) good study sample size (+) Outlined the importance of reassessment of GCS to observe any changes in patient status
Yousefzadeh-chabok et al, 2016	Retrospective	588 paediatric patients	Compare the Glasgow coma scale (GCS), Injury severity score (ISS) and Paediatric trauma score (PTS) for accuracy in determining patient survival	The study determined the best cut off points for the three scoring systems and compared the accuracy of each, resulting in findings of 92.3% for GCS, 31% for PTS and 62% for ISS. The study concluded that GCS had the highest accuracy and predictive ability	(+) Good study size (-) Little information on exactly how the data was collected (+) Compared three types of trauma scoring systems (+) Outlined the effectiveness of the use of GCS in pre-hospital trauma for determining the criticality of the patient and potential outcome

CCP: critical care paramedic; ED: emergency department; EMT: emergency medical technician; GCS: Glasgow coma scale

Comments and considerations:

While there is clear links between initial GCS scores in major trauma and patient outcomes, the GCS is designed to provide a quick neurological assessment of the patient and must be used in conjunction with other clinical findings to determine the overall condition of the patient. This research outlined that the GCS is a valuable assessment tool to be used in the pre-hospital environment to assist with determining the need for patient intubation and the need for the patient to be taken to a major trauma facility. The use of the GCS can also be

an effective tool in triage assessment. The above articles mention that the medical provider skill scope and application of the GCS can have an impact on the accuracy of its use. The need for adequate training around the application of the GCS is of importance. The literature outlines that the GCS is most accurate when focus is on where in the three components the patient has scored and that there are a number of mortality-predicting factors when it comes to the trauma patient, such as, age, mechanism of injury, perfusion status and resuscitation requirements.

Clinical Bottom Line:

Based on the relevant articles above it is clear that the use of the Glasgow coma scale in major trauma does have significance and validity in predicting patient outcome. The above outlines the importance of the GCS and reiterates its success in major trauma outcome predictions.

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