Prevalence and Predictive Characteristics of Agitation in Patients with Traumatic Brain Injury in the Acute Care Setting

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Background/Significance/Purpose

- Traumatic brain injury (TBI) is a leading cause of death and disability.
- Patients recovering from moderate or severe TBI often become agitated.
- Patients with agitation have a greater likelihood of restraint and sitter use, falls, tube and line removal, causing injury to healthcare staff, longer length of stay, and poorer post-discharge functional outcomes.
- Use of the Agitation Behavior Scale (ABS) allows nurses to quantify and communicate agitation severity, determine treatment effectiveness and guide interventions to prevent harm and improve outcomes.

Purpose and Specific Aims

- Purpose was to determine the prevalence and predictive characteristics of agitation in patients recovering from TBI in the acute care setting.
- Aims:
  1) Describe agitation prevalence in patients with TBI in the acute care setting
  2) Investigate early predictors of agitation
  3) Examine the relationship between agitation and patient discharge disposition.

Study Design

A prospective observational study was conducted.

Setting

Neurotrauma Critical Care (NTCC) and Neurotrauma Intermediate Care (NTIMC) units at an urban trauma primary adult resource center and neurotrauma referral center.

Sample

- Convenience sample of English-speaking adults 18-100 years with diagnosis of TBI admitted to NTCC or NTIMC over 12 months.
- Patients with no trauma; a hospital readmit; history of psychosis; or significant hearing or vision loss were excluded.

Methods

- Data were extracted from the electronic medical record
- Prevalence was determined by taking the total number of patients documented to have an ABS score >21 and dividing it by total number of study patients.
- Logistic regression was used to determine likelihood of agitation based on patient demographics, surgeries, injury characteristics, and hospital day.
- Discharge locations were compared between subjects with an ABS score >21 at least once during hospitalization and those maintaining an ABS score ≤21. Multinomial logistic regression was used to determine likelihood of discharge to home, rehabilitation, long-term care, or death related to having an ABS >21 controlling for injury severity and demographics.

Results

- Of the 356 patients with documented ABS scores, 155 (44%) had at least 1 episode of ABS >21. Median time to the first episode of agitation was 55 hours (IQR=89) with a median of 4 agitation episodes (IQR=5). Of 4,252 ABS observations, 953 (22%) were ≥ 22 with a median score of 27 (IQR=9) and range 22-54.
- In a negative binomial generalized linear model of predicting total ABS scores, the admission RASS and GCS scores, CT findings and demographic variables each had significant effects alone; however, in the combined model, none demonstrated a significant independent effect. After removing CT findings, the admission RASS was significant at predicting ABS scores. The admission RASS score of +4 had a 44% greater ABS score than an individual with a RASS score of -5.
- Using logistic regression, those with a GCS verbal score of 4 were 69% more likely and those with a verbal score of 3 were 2.7 times more likely to have a single episode of agitation than those with a verbal score of 5 controlling for the other components of the GCS. Those with a GCS eye score of 1 were also 48% more likely to become agitated compared to those with a score of 4 controlling for the other components of the GCS . Subjects with GCS motor scores of 2 were 95% less likely to have a single episode of agitation than those with a GCS motor score of 6, whereas those with a GCS motor score of 3 were 82% less likely.

Glasgow Coma Scale Score Logistical Regression in Predicting Agitation

		OR	95% CI		
			Lower	Upper	
	(Intercept)	.21	.17	.26	
Eye	None	1.48	1.09	2.01	*
	Pain	1.21	.80	1.83	
	Speech	1.30	.98	1.73	
	Spontaneous	1			
Verbal	None	.89	.63	1.26	
	Incomprehensible Sounds	.85	.55	1.31	
	Inappropriate Words	3.76	2.25	6.28	***
	Confused	1.69	1.34	2.14	***
	Oriented to time, place, person	1			
Motor	None	.85	.58	1.24	
	Abnormal Extension	.05	.01	.20	***
	Abnormal Flexion	.18	.08	.41	***
	Withdrawal from Pain	1.41	.94	2.10	
	Localizes	1.22	.91	1.64	
	Obeys Commands	1			

***p<.05, **p<.01, ***p<.001**

- Of survivors those with ≥1 agitation episode were 90% more likely to be discharged to a rehab or nursing facility than those without agitation.
- IRR for length of stay was 45% greater for agitated patients compared to those without agitation.

Discussion/ Conclusion/ Implications

- Agitation is prevalent among patients with TBI in critical care and IMC settings with onset often as early as 3 days after injury. Prevalence of agitation in this study fell within the range of 25% and 57% reported by the few studies conducted in acute care settings.
- Finding the admission RASS score is a significant predictor of ABS scores, further validates use of the ABS score in acute care given that the RASS is also a measure of agitation.
- When compared to alert and oriented patients, agitation was more likely in patients who are confused or using inappropriate words. These patients were most likely in the period of post-traumatic amnesia characterized by disorientation, memory impairment, inattention and confusion.
- Those with no eye opening also were more likely to become agitated when compared to those with spontaneous eye opening which could be caused by eye closure in response to pain or lack of arousal.
- When compared to patients that followed commands those only demonstrating abnormal flexion or extension were less likely to become agitated probably because they still had not emerged from a comatose state.
- As supported in previous studies, those who had one or more agitation episodes were at risk for a greater length of stay and in this study had a greater likelihood of being discharged to a rehab or nursing facility than those without agitation.
- Using an objective tool like the ABS to quantify agitation may aid development and implementation of treatment algorithms that better manage agitation following acute TBI, thereby improving patient outcomes. This study provides a foundation for research evaluating effectiveness of interventions for management of agitation in patients with acute TBI.

Selected References

- Corrigan, JD. (1989). Development of a scale for assessment of agitation following traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology, 11*(2), 261-277.
- McNett, M., Sarver, W., & Wilczewski, P. (2012). The prevalence, treatment and outcomes of agitation among patients with brain injury admitted to acute care units. *Brain Injury*, *26*(9), 1155-1162.
- Phyland, R.K., Ponsford, J. L., Carrier, S. L., et al. (2021). Agitated behaviors following traumatic brain injury: A systematic review and meta-analysis of prevalence by post-traumatic amnesia status, hospital setting, and agitated behavior type. *Journal of Neurotrauma. 38*, 3047-3067.
- Williamson, D. R., Cherifa, S. I., Frenette, A. J., et al. (2020). Agitation, confusion, and aggression in critically ill traumatic brain injury – A pilot cohort study (ACACIA-PILOT). *Pilot and Feasibility Studies*, *6*(1), 1-10.

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