

An Evaluation of the Relationship between 6-week Post-Discharge Risk Classification and 6-Month Outcomes Following Orthopaedic Trauma

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Purpose: Numerous studies have demonstrated that long-term outcomes following orthopaedic trauma are related to psychosocial and behavioral health factors evident early in the patient's recovery. The goal of this project is to examine whether clusters (sets of patients who are more similar to each other than to members of other clusters) based on risk and protective factors measured at 6-week postinjury predict outcomes at 6 months following trauma.

Methods: Among 420 participants with AIS (Abbreviated Injury Scale) 3 orthopaedic injuries, 333 (79.3%) with both 6-week assessment and 6-month follow-up data were included in this analysis. At 6 weeks postdischarge, patients completed standardized measures for five risk factors: pain intensity, depression measured using the Patient Health Questionnaire (PHQ)-9, posttraumatic stress disorder measured using the PTSD Check List (PCL), and alcohol and tobacco use. Five protective factors were also measured: resilience (Connor-Davidson Resilience Scale), social support (Behavioral Risk Factor Surveillance System), and self-efficacy for return to usual activity and managing the financial demands of recovery, adapted from the Arthritis Self Efficacy Scale. Latent class analyses were used to classify participants into three clusters (low risk, high protection; medium risk, low protection; and high risk, low protection). Clusters were evaluated against the Short Musculoskeletal Function Assessment (SMFA) bother and dysfunction index, the overall health scale from the Veterans Rand 12 (VR-12), the PCL, and PHQ-9, all measured at 6 months. Regression models (linear for continuous outcomes, proportional odds for ordinal outcomes) were used to adjust for age, gender, race, education, injury severity, and length of stay, as well as additional adjustment for site level effects.

Results: As shown in the table, the three clusters were powerful predictors of 6-month outcomes. The unadjusted trends in outcomes across clusters (columns 3-5 of the table) were statistically confirmed by regression analyses shown in the last two columns of the table. These results show that outcomes worsen as risk increases, with none of the 97.5% confidence intervals for the differences between clusters including 0 for any outcome tested. Sensitivity analyses showed similar results with a 4-cluster solution for the risk and protective factor data.

Results presented as mean (standard deviation), except for the VR-1, which is presented as count (percent).	Cluster 1 - Low Risk, High Protection (n = 164)	Cluster 2 - Medium Risk, Low Protection (n = 115)	Cluster 3 - High Risk, Low Protection (n = 54)	Difference Between Clusters (97.5% C.I.)		
				2 vs 1	3 vs 2	
SMFA Dysfunction	23.8 (15.9)	38.3 (18.2)	53.2 (19.0)	13.8 (9, 19)	15.0 (9, 21)	
SMFA Bother *15 patients had missing data	22.2 (18.5)	39.1 (20.4)	63.8 (23.2)	15.9 (10, 22)	23.5 (16, 31)	
VR-1 (Excellent, Very good, Good, Fair, Poor)	E, VG, G	145 (88%)	86 (75%)	23 (43%)	2.2 (1, 5)	4.0 (2, 9)
	F	17 (10%)	23 (20%)	18 (33%)		
	P	2 (1%)	6 (5%)	13 (24%)		
Depression (PHQ-9)	4.3 (4.9)	8.7 (5.8)	16.2 (6.4)	4.1 (3, 6)	7.3 (5, 9)	
PTSD (PCL)	8.8 (10.6)	19.8 (12.8)	40.4 (15.6)	11.1 (8, 15)	19.7 (15, 24)	

Conclusion: The study demonstrates trauma patients can be classified, early in the recovery process, into risk/protective clusters that result in very strong prediction for a wide range of 6-month functional and health outcomes. Identification of an individual’s risk and protective factors may have important implications for the potential benefits for psychosocial interventions and referral. Individuals falling into cluster 1 (low risk, high protection) are likely to achieve full recovery barring clinical complications. Individuals falling into cluster 2 (medium risk, low protection) may have subclinical conditions that could be contributors to poor outcomes. Collaborative care programs that emphasize peer support and self-management may help patients in this cluster by improving resilience, self-efficacy, and social support. Those in cluster 3 (high risk, low protection) may benefit from early and aggressive referral to an appropriate mental health specialist. Further research is necessary to define the role and efficacy of psychosocial interventions within these individual clusters.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.