

EVALUATING AND REFINING AN ALGORITHMIC APPROACH TO PREHOSPITAL PELVIC BINDER APPLICATION

Authors: *Jacob, M, Lilienfeld, BA;*¹ *Landon, D, Hamilton, PhD;*² *Zoe, Draper;*³ *Cordelie, E, Witt, MD, MPH, FACS;*⁴ *Julie, Dunn, MD, MS, FACS*⁵

Background Pelvic fractures may be missed in the prehospital setting when relying on physical exam alone, leading to an underuse of pelvic binders. Nguyen et. al., 2023 proposed an algorithmic approach in which a prehospital pelvic binder should be placed on any patient with two of the following characteristics: blunt injuries, hemodynamic instability, frontal or side impact in motor vehicle collision (MVC), and non-front seat passenger in MVCs. Our study aims to validate this algorithm and refine it to optimize prehospital pelvic binder use.

Methods This was a retrospective case-control study of trauma patients who were treated at a Level I trauma center from 2017 to 2023. Patients with complex pelvic fractures were compared to those without pelvic fractures. Matching was performed using nearest neighbor matching based on age, height, weight, sex, and Injury Severity Score. The two cohorts were used to evaluate sensitivity and specificity of the Nguyen criteria. Additionally, an elastic-net regression model was used to identify variables predictive of prehospital pelvic fracture.

Results One-hundred and fourteen patients met inclusion criteria for the complex pelvic fracture cohort and 107 matched into the control cohort. The Nguyen et al. criteria had a 50% sensitivity and a 69% specificity for identifying complex pelvic fractures and identified patients with significantly higher injury severity scores. Using the variables identified by the elastic-net regression model to predict pelvic fracture, the Nguyen Criteria was amended to additionally include any passenger in MVC, pedestrian struck by automobile, and a first pre-hospital heart rate >100 beats per minute. The amended Nguyen Criteria had a sensitivity of 74% and a specificity of 48%.

Conclusion The Nguyen Criteria underperformed in terms of sensitivity for recognizing pre-hospital pelvic fractures within our sample. We recommend an amended criteria in which a prehospital pelvic binder should be applied in patients with two or more of the following factors: blunt trauma, front or side impact MVC, passenger in MVC, pedestrian vs. automobile, and a first pre-hospital systolic blood pressure <90mmHg OR a first pre-hospital heart rate >100.