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Does Vehicle Intrusion Alone Still Predict Injury: A Retrospective Analysis of Mechanism as Trauma Activation Criteria

Background: Current Centers for Disease Control (CDC) Guidelines for 'Field Triage of Injured' recommend patients involved in automobile collisions with greater than 12 inches of intrusion on the driver side or 18 inches on the passenger compartment should meet criteria for trauma activations. However, previous studies suggest that mechanism-of-injury (MOI) criteria only is a moderate predictor for patients who require trauma center resources given the introduction of "crumple zones" to cars. Crumple zones have been incorporated into modern vehicle design as a safety feature. The objective of this study was to determine if vehicle intrusion alone as MOI criteria necessitates trauma activation. We hypothesized that vehicle intrusion as the MOI results in overtriage.

Methods: A retrospective, single center chart review of all adult patients involved in motor vehicle collisions (MVC) presenting to a Level 1 trauma center from July 2016 to March 2022 was performed. Patients were divided by MOI criteria: vehicle intrusion alone vs. multiple MOI activation criteria. Univariate analyses were conducted to evaluate clinical outcomes with statistical significance set at $p < 0.05$.

Results: A total of 2940 patients met inclusion criteria with 2,098 patients (71.4%) having vehicle intrusion as the sole MOI. Vital signs on presentation to the Trauma center were similar between both groups ($p > 0.05$). The vehicle intrusion only group had a higher reported incidence of seatbelt use ($n=1589/2098$, 75.7% vs $n=525/842$, 62.4%, $p=0.001$), and a lower injury severity score (5.3 ± 6.6 vs 6.3 ± 7.5 , $p=0.004$). The average number of CT scans performed between the two groups was slightly higher in the multiple MOI group but likely not clinically relevant (3.1 ± 1.5 vs 3.3 ± 1.5 , $p=0.001$). The MOI only group had a higher incidence of ED discharge ($n=1335/2098$, 63.6% vs $n=450/842$, 53.4%, $p=0.001$), lower ICU admission ($n=210/2098$, 10.1% vs $n=116/842$, 13.8%, $p=0.004$), and fewer in-hospital procedures ($n=345/2098$, 16.4% vs $n=168/842$, 20.0%, $p=0.03$).

Conclusion: This study expanded upon previous MOI literature to specifically focus on vehicle intrusion criteria by analyzing discharge results, injury profiles, and CT scans in addition to ICU admissions and mortality. With increasing demand to optimize resource utilization, the results from this study suggest that vehicle intrusion MOI criteria alone may not be an accurate predictor for trauma center transport. Future studies are needed to evolve trauma triage guidelines to minimize unnecessary costs without compromising the care provided to trauma patients.