

## Incidence of Thoracolumbar Spine Injuries Is Increasing in the United States

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**Background/Purpose:** The National Highway Traffic Safety Administration issued a report in 2008 stating that from 1996 to 2005, there was a 23% decline in non-fatal injuries among motor vehicle crash (MVC) occupants. In contrast, a recent paper indicated that the incidence of MVC-related spinal fractures had increased in Wisconsin from 1994 to 2002. The purpose of this study was to investigate national trends in the incidence of non-fatal thoracolumbar spine (TL) injuries. A secondary aim was to evaluate potential “trade-off” injuries (ie, other injuries sustained because of or in relation to a change in TL injuries) should a trend in TL injuries be identified.

**Methods:** IRB approval was obtained. Retrospective review of injury information contained in three national databases was performed: the National Trauma Data Bank (NTDB) from 2002-2006, the National Automotive Sampling System (NASS) from 2000-2011, and the Nationwide Inpatient Sample (NIS) from 1998-2007. Within each database, the total number of MVC-related injuries and the total number of MVC-related TL injuries per year were identified using appropriate Abbreviated Injury Scale (AIS) or ICD-9 codes. Using these codes, sacral and pelvic (S-P) injuries were also identified to evaluate for their potential as “trade-off” injuries, given possible energy transfer from the spine to the pelvis. In NTDB and NASS, which report AIS codes, lower-severity (AIS1) injuries were excluded. A second analysis in NTDB (which also supplies ICD-9 codes) and an analysis in NIS evaluated TL and S-P injuries of all severities utilizing ICD-9 codes. Poisson regression models adjusting for age were used to analyze trends in the data over time.

**Results:** Evaluation of AIS2+ codes in NTDB demonstrated a significant increase in the incidence of TL injuries over time, with an 8.2 relative annual percent increase (95% confidence interval [CI]: 5.8%-10.7%,  $P < 0.0001$ ). When non-fractures were excluded, the age-adjusted Poisson model remained significant with an 8.5 relative annual percent increase (95% CI: 6.0%-11.0%,  $P < 0.0001$ ). Evaluation of ICD-9 codes in NTDB demonstrated similar patterns with significant increases in age-adjusted TL injury rates and a 9.9 relative annual percent increase after age adjustment and exclusion of non-fractures (95% CI: 7.3%-12.6%,  $P < 0.0001$ ). Investigation of AIS2+ TL injuries in NASS produced analogous results with significant increases in TL injuries after age adjustment, and an 8.1 age-adjusted relative annual percent increase (95% CI: 4.9%-11.3%,  $P < 0.0001$ ) after exclusion of non-fractures. Finally, NIS reinforced these trends, revealing an age-adjusted relative annual percent increase of 8.1 (95% CI: 7.2%-9.1%,  $P < 0.0001$ ) among TL injuries, a pattern that held true after excluding non-fractures. When evaluating for compensatory decreases in S-P injuries in these databases, no consistent decreasing trends were discovered.

**Conclusion:** In an era of declining rates of fatal and non-fatal MVC-related injuries, these data demonstrate a significant increase in the incidence of TL injuries throughout the first decade of the 21st century. Although more sensitive screening tools in the emergency department have led to increased early diagnosis of TL injuries, it is not clear that such tools

have affected overall diagnosis. Furthermore, the incidence of TL injuries has continued to rise beyond the time such screening techniques became widely accepted. As seatbelt use has continued to rise, this trend may represent TL injuries emerging as a “trade-off” for other more severe injuries. No matter what the cause, this diagnosis carries significant morbidity and greatly impacts such factors as return to work. Further investigation to evaluate the root of this pattern is warranted.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an “off label” use). For full information, refer to page 600.