Adult Firearm-Related Traumatic Brain Injury in the United States Trauma Centers

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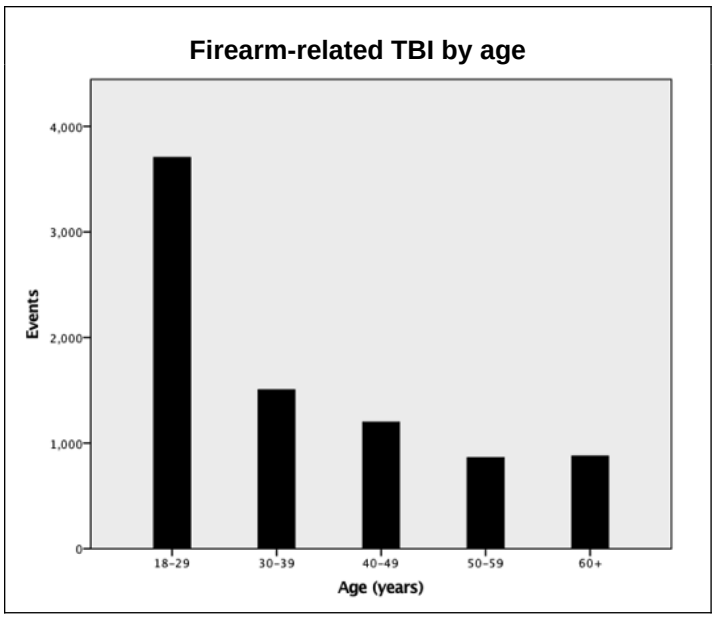
Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the current epidemiology of adult firearm-related traumatic brain injuries, 2) Discuss, in small groups, trends of mortality and injury severity in the civilian population, 3) Identify important prognosticators in injured patients to reduce the burden from firearm-related traumatic brain injuries.

Introduction

Firearm injuries cause an estimated 33,000 deaths annually in the United States. Management algorithms following gunshot wounds to the head (GSWH) have been static for two decades and outcomes remain in need of systematic characterization.



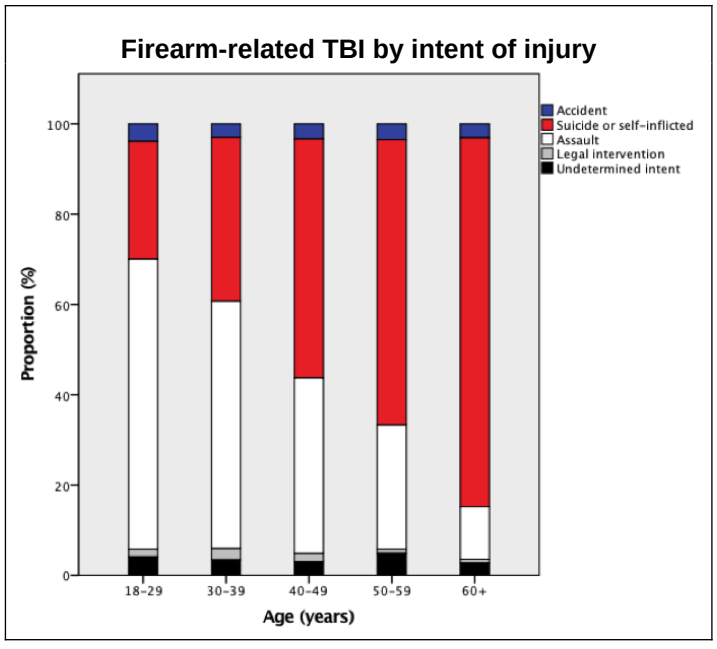
Methods

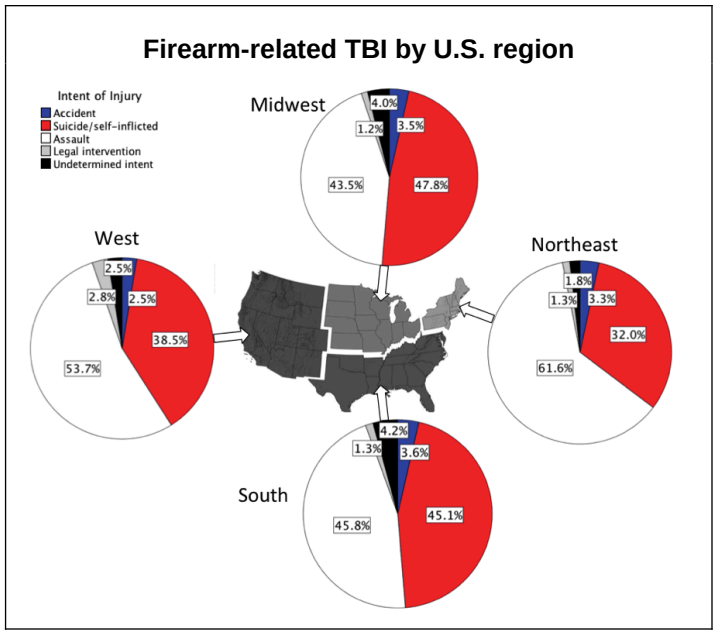
Adult GSWH patients in the National Sample Program (NSP) of the National Trauma Data Bank (NTDB), years 2003-2012, were extracted. Multivariable regression identified predictors for hospital length of stay (HLOS), ICU LOS, medical complications, mortality, and discharge disposition. Odds ratios (OR) and 95% confidence intervals (95% CI) were reported. Statistical significance was assessed at a < 0.001.

Results

In total, 8,148 patients were included extrapolating to 32,439 national incidents. Age was 36.6 ± 16.4 years. Mean HLOS was 13.9 ± 17.9 days and ICU LOS was 8.6 ± 17.4 days. The mortality was 54.6%. Age, injury intent, Glasgow Coma Scale (GCS) score, Injury Severity Score (ISS), and hypotension were significant predictors as previously reported.

Compared to privately insured patients, Medicare/Medicaid patients had longer HLOS (mean increase 4.4 days, 95% CI [2.6 to 6.3 days], p<0.001). Compared to the Midwest, the South had longer HLOS (mean increase 3.7 days [2.0-5.4 days], p<0.001) and more complications (OR 1.7 [1.4-2.0], p<0.001); the West had less complications (OR 0.6 [0.5-0.7], p<0.001). Compared to handgun, injury from shotgun and hunting rifle had lower odds of death (OR 0.3 [0.2-0.4], p<0.001; OR 0.5 [0.4-0.8], p<0.001). Suicide had lower odds of discharge to home compared to accident (OR 0.5 [0.3-0.7], p<0.001). Relative to level I trauma centers, level II trauma centers had lower odds of discharge to home (OR 0.7 [0.5-0.8], p<0.001).





Conclusions

Firearm type, injury intent, insurance type, and geographic region are important prognosticators in addition to older age, hypotension, and injury severity. Compared with the Midwest, those in the South had a higher complication rate whereas the West had a lower complication rate. Similarly, the South also had a prolonged HLOS (mean increase 3.7 days) relative to the Midwest; a higher complication rate would naturally result in longer hospitalization. The explanations previously put forth include differences in trauma center distribution and services expenditure, varied stages of regionalization for trauma-care delivery, and urban-rural prehospital care.

Compared with Level I trauma centers, GSWH patients treated at Level II trauma centers have lower odds of being discharged home. Patients with Medicare/Medicaid insurance show longer hospitalizations, patients of self-pay/unbilled insurance have higher mortality, and patients of government/other insurance are more likely to be discharged home. Improved understanding of civilian GSWH is critical to increasing awareness and reducing injury burden from firearm injuries.