Mechanisms of Traumatic Brain Injury in a Justice-Involved Population

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Introduction

Epidemiological data indicate that 8.5% of the general population has experienced a traumatic brain injury (TBI; Centers for Disease Control [CDC], 2010). The majority of these TBIs result from falls (35.2%) and motor vehicle accidents (17.3%), while 10% result from assault (CDC, 2010). Researchers have noted a higher prevalence of TBI among justice-involved individuals, such as 60% in one meta-analysis (Shiroma, Ferguson and Pickelsimer, 2010). This study investigates whether justice-involved individuals are injured differently than the general population, in addition to having a higher rate of TBI overall. This is important because some mechanisms of TBI, particularly violence-related TBIs such as assault have been associated with poor outcomes compared to other TBIs, such as greater cognitive impairment, higher rates of alcohol use, poorer vocational outcomes, and poorer community reintegration (Hanlon, Demery, Martinovich, and Kellly, 1999; Harrison-Felix, et. al., 1998; Bushnik, Hanks, Kreutzer, and Rosenthal, 2003). In a population that is already at high risk for TBI generally, it is important to understand the prevalence of violence-related TBI, identify at-risk individuals, and develop community reintegration strategies to support these individuals.

Methods

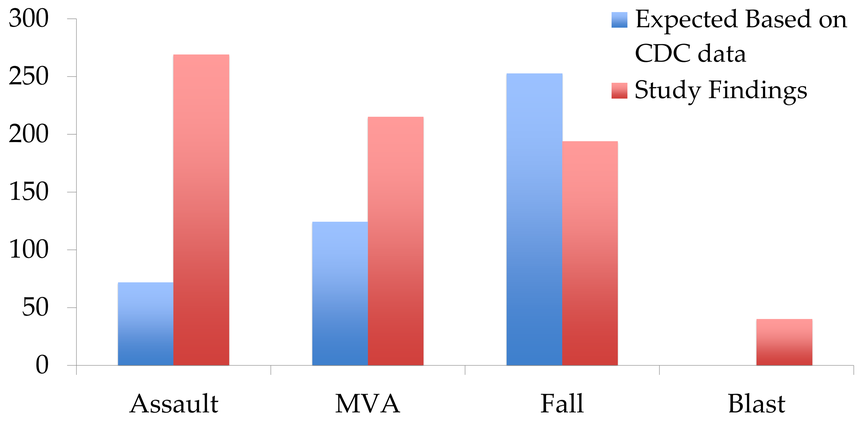
The TBI Implementation Grant database, DU IRB Protocol #674894-2, was used for this study. The database includes data from adult and juvenile probationers and inmates in four county jails. This analysis reviewed the TBI histories of all subjects in the database before November 16th, 2015. Mechanism of injury for each TBI was identified. The OSU-TBI-ID categorizes mechanism of injury as 'motor vehicle accident' (MVA), 'fall' (including sports injury), 'assault' (including gunshot wound), and 'blast'. Prevalence rates were calculated for each mechanism of injury. Expected prevalence rates based on the CDC data were calculated for each available mechanism of injury, and a Pearson Chi-Square test was conducted.

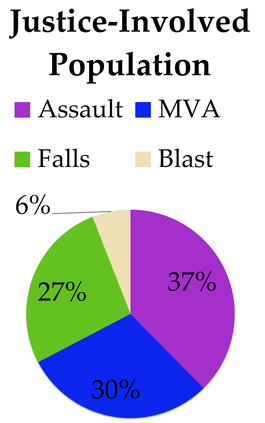
Results

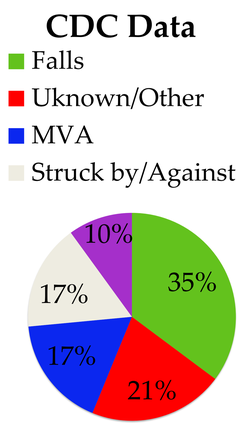
In a sample of 245 participants, 728 TBIs were reported, an average of 2.97 TBIs per participant. Ten descriptions did not contain enough information to determine mechanism of injury. 718 TBIs were counted in this study. See Table 1 for study results. The Pearson Chi-Square test was significant at $p<.005$ (621.63, critical value 10.60) with an effect size of .95. See bar graph for differences between frequencies expected based on CDC data and observed frequencies in this study. See pie charts for comparison between frequencies and categories counted in this study and frequencies and categories reported by the CDC (CDC, 2010).

Results (cont.)

Mechanism	TBIs	Percentage	CDC %	Prediction from CDC %
Assault	269	38%	10%	71.8
MVA	215	30%	17.3%	124.2
Fall	194	27%	35.2%	252.7
Blast	40	6%	N/A	Undetermined







Discussion

Professionals working with justice-involved individuals can take the following steps to address the needs of clients with violence-related TBIs

Be Aware of the prevalence of violence-related TBI among justice-involved individuals, and the poor outcomes with which these injuries are associated.

Improve Screening by using a valid, reliable tool like the OSU-TBI-ID to identify individuals with these injuries (Bogner & Corrigan, 2009).

See the accompanying "Clinician Handout" for more information.

Discussion (cont.)

Identify Cognitive Needs to accommodate clients for effective intervention planning, as cognition can be associated with participation and outcomes (Fishbein et. al. 2009; Desfosses, Meadows, Jackson, & Crowe, 2014).

Develop Reintegration Strategies that connect clients with resources for a range of needs, provide constant follow-up with TBI-informed professionals, and engages family in the re-integration process.

Limitations and Areas of Future Research

The mechanisms of injury reported in this study were somewhat different than the categories reported by the CDC. Some of the TBIs reported in this study may be categorized differently under the CDC model, resulting in different frequencies. The data presented here are preliminary, and further research is needed to confirm these findings. Research is also needed to verify that intervention strategies proposed here, such as consistent follow-up from TBI educated professionals and connection with resource networks improves treatment engagement and outcomes for clients with violence-related TBI. This researcher is also currently studying gender differences in violence-related TBI and the prevalence of domestic violence-related TBI among justice-involved women.

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