Reviewer's report

Title: Incidence of Brain Injury and the Relationship with Substance use: Findings from a Longitudinal Community Survey

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Reviewer: Keith Yeates

Reviewer's report:

This article presents a longitudinal epidemiological study of the incidence of traumatic brain injury (TBI) and its relationship with substance use. The participants took part in a large, Australian community sequential-cohort study using a longitudinal survey methodology with two waves of assessments. Participants were asked at both times if they sustained a “serious brain injury” that interfered with memory, resulted in a loss of consciousness, or was associated with a blood clot in their brain; those who answered yes at wave 2 were divided into those reporting a loss of consciousness of less than 15 minutes (considered mild) versus 15 minutes or longer (considered moderate). The incidence of new brain injury was highest in males and in younger adults. Brain injury was associated with modest declines in physical health scores. Substance use was not a predictor of brain injury, and brain injury was not a predictor of developing substance use problems.

The findings in the study are interesting, although some are essentially replications of previous epidemiological studies showing that males and younger adults are at greater risk for TBI. Perhaps the most interesting result is the lack of association between TBI and substance use; as the authors point out, this may reflect the community vs. hospital-based sample.

Major concerns:

One concern I have about the paper is the non-traditional definition of injury severity. The three criteria for inclusion, namely problems with memory, loss of consciousness (LOC), and intracranial hematoma, are not by any means equivalent as indicators of severity. Moreover, the 15-minute cutoff for distinguishing between mild and moderate injuries is not one that is used conventionally in research on the outcomes of TBI. Traditional definitions of TBI severity have typically treated most intracranial hematomas as at least moderate injuries. An injury with a 10 minute LOC in association with significant intracranial abnormalities on neuroimaging (including any hematoma that required surgical intervention) would typically be considered more severe than one that resulted in a 20-minute LOC but no neuroimaging abnormalities or need for neurosurgical intervention. I would be interested to know if the participants indicated which of the three criteria they met (memory, LOC, hematoma), as well as whether they were hospitalized as a result of their injury. Hospitalization may be a better proxy for severity than the arbitrary division based on duration of LOC. At the very
least, a more compelling rationale for the definition of severity is needed.

A separate concern about the paper is the relatively small number of TBI in the various age/severity cells. Although a total of 101 new TBI were identified, about 70% of those were in the youngest group. The oldest group had only 10 new TBI. The small numbers of cases raises concerns about the robustness of the results, particularly those involving the oldest age group. The estimates of incidence may not be particularly stable among the older groups, particularly for “moderate” injury.

Minor concerns:

1) Some individuals who were unable to report on the duration of LOC were nonetheless classified as mild or moderate. It is not clear how the classification could be determined given that it was based on duration of LOC.

2) To some extent, the first paragraph under the heading “Risk Factors for BI by Wave Two” is redundant with previous results, which already reported on the increased risk among males and the youngest group.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.