New Mexico Epidemiology

October 30, 2015 Volume 2015, Number 9

Traumatic Brain Injury Hospitalizations among American Indians and Alaskan Natives in New Mexico, 2010 to 2013

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Traumatic brain injury (TBI) is defined as "a bump, blow or jolt to the head or penetrating head injury that disrupts the normal function of the brain".[1] These injuries fall on a spectrum from mild injuries like concussions to severe outcomes like lifelong disability and death.[1]

One of the goals of Healthy People 2020 is to reduce the national mortality rate for TBI. The current national rate is 17.4 deaths per 100,000 persons. The goal is to reduce this rate to 15.7 deaths per 100,000 persons.[2] Using New Mexico Vital Records and Health Statistics data from 2009-2013, the mortality rate due to TBIs among American Indians and Alaskan Natives (AIAN) was 29.1 deaths per 100,000 persons, or 1.9 times the Healthy People 2020 target. Additionally, AIAN populations had the highest TBI mortality rate of any racial/ethnic group within the state during that time period. While data on TBI mortality is available publicly on an annual basis, less is known about TBI hospitalizations. Hospitalization data provides information on individuals who survive a TBI, and thus are living with the long term effects of these injuries.

This analysis describes TBI hospitalization rates to inform prevention efforts around TBI mortality and morbidity, specifically in the AIAN population of New Mexico. The goal of this analysis is to provide an epidemiological overview of TBI hospitalizations among AIAN persons within New Mexico.

Methods

The New Mexico Hospital Inpatient Discharge Dataset (NM-HIDD) is a statewide dataset that includes all discharges from any non-federal New Mexico hospital (excludes data from Veteran Affairs and Indian Health Service hospitals) staying a minimum of 24 hours in that facility. We combined this dataset with hospitalization records from Indian Health Service (IHS) for 2010 - 2013. Data elements in the combined dataset include but are not limited to up to 18 diagnosis codes, up to 6 procedure codes, insurance/payment information, admission and discharge dates, and demographic information. Age-adjusted TBI hospitalization rates were calculated by health region, race/ethnicity, and sex. Additionally, an analysis of e-codes in the NM-HIDD only dataset was completed to look at the leading causes and intention of AIAN TBI hospitalizations during this time period. This portion of the analysis was restricted to the NM-HIDD data only because E-Codes were not available from the IHS data during this time period.

A TBI hospitalization was defined as having any of the following codes in any of 18 diagnosis fields: 800.00-800.99 (Fracture of the vault or base of the skull), 803.00-804.99 (Other and unqualified or multiple fractures of the skull), 850.0-850.9 (Concussion), 851.00-854.19 (Intracranial injury, including contusion laceration or hemorrhage), 950.1-950.3 (Head injury, unspecified), and 995.55 (Shaken infant syndrome). This case definition for TBI surveillance in hospitalization data, and the classifications of intent and causes of injuries, was obtained from recommendations for state injury surveillance produced by the CDC.[3] In order to categorize TBIs into cause and intention categories, the matrix of external cause of injury codes (e-codes) provided by the CDC was used.[4]

Results

There were a total of 6580 cases of TBI identified in the combined dataset within these years, and 1003 were among AIANs. The rate of hospital discharges due to TBI was highest among residents of the Northwest region of the state at 135.7 hospitalizations per 100,000 persons (Figure 1).

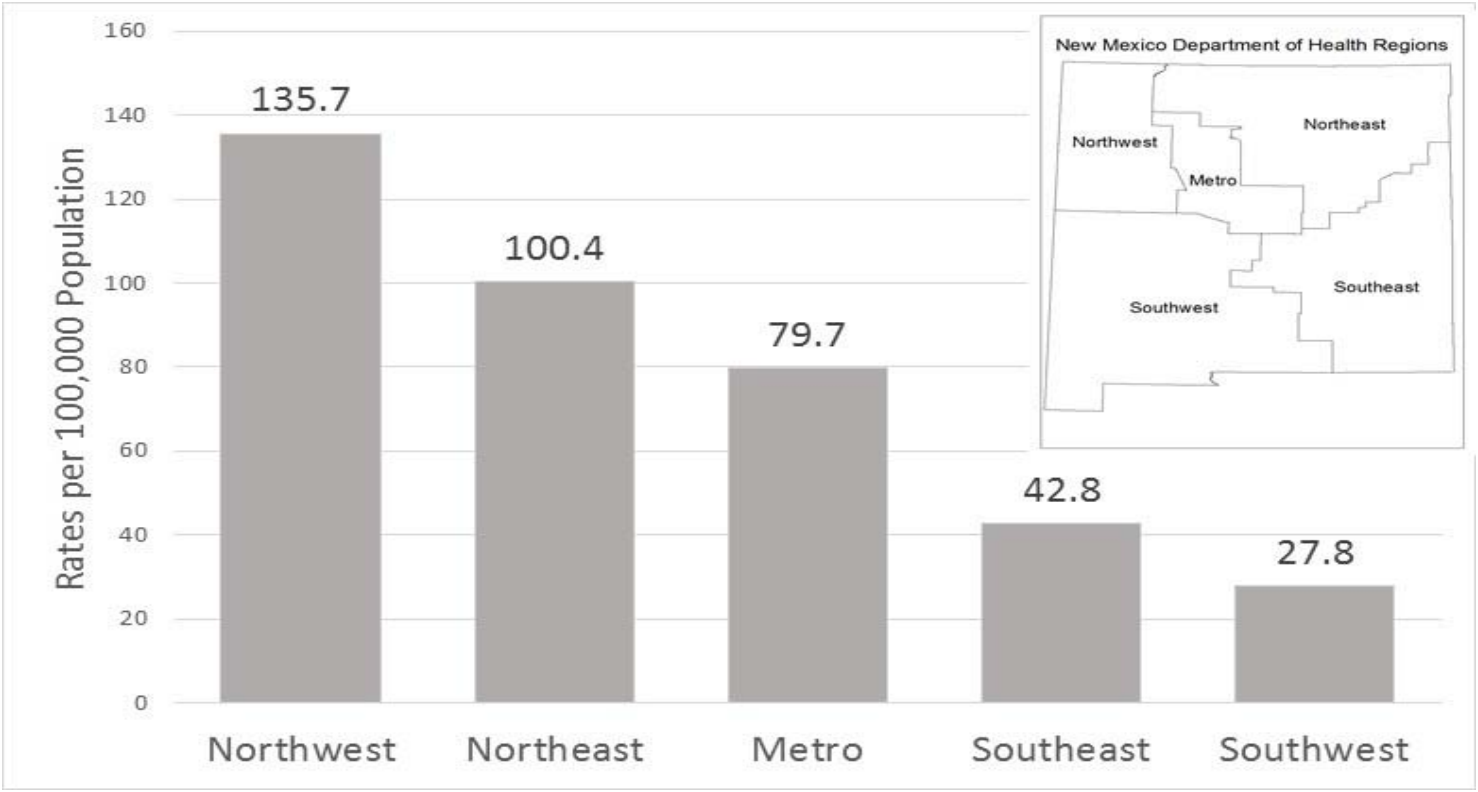
TBI rates were higher among men than women for every single racial/ethnic group in New Mexico (Figure 2). The highest TBI hospitalization rate in the state was among AIAN men at 221.9 hospitalizations per 100,000 population, which was almost three times the rate for the AIAN female population.

Of the 892 AIAN TBI cases identified from 2010 to 2013 in the original HIDD dataset, the cause of injury for 248 (27.8%) cases was classified as missing. Of the remaining 644 TBI cases, the three leading causes of TBI were falls (35%), motor vehicle injuries (27%), and struck by on/against injuries (17%). The remaining 21% of the TBI discharges were split between several other causes, none accounting for more than 10% of the discharges. When categorized by injury intention, 118 (13.2%) of the AIAN TBI cases were missing. Of the remaining 774 AIAN TBI hospitalizations, 559 (72%) were categorized as having an unintentional intent. A smaller number, 208 (26.8%), were categorized as intentional, other or assaults, and 5 (0.01%) of these cases were classified as suicide attempts. The cause of the remaining 2 cases was undetermined. When TBI hospitalization rates by intent among AIAN were compared, unintentional injuries were much more common than intentional injuries (Table).

Discussion

TBI hospitalizations and mortality among AIAN persons within New Mexico warrant urgent attention. Both more data and analysis of this problem and more focus on the prevention of these types of injuries is needed. High rates of TBI hospitalizations suggest other burdens of traumatic brain injury. Currently, there is no dataset that estimates the number of persons in the population living with these injuries, as not all of these persons are hospitalized. While there are numerous causes of these hospitalizations this analysis highlighted three main causes, falls, motor vehicle injuries, and being struck by or against an object. All three causes are preventable and could be targeted for additional prevention efforts to reduce the burden of TBI in New Mexico.

Figure 1. TBI age-adjusted hospitalization rates by health region per 100,000 population, New Mexico, 2010-2013. (N= 6580 cases)



In order to further understand groups within the AIAN population most at risk for TBI, further analysis should be conducted using smaller geographic areas, and other variables such as smaller, specific age groups. The addition of E-codes in IHS data would improve the understanding of the causes of TBI. In order to continue to monitor and assess the epidemiology of TBI among AIAN populations in New Mexico, it is critical that the data used for injury surveillance be improved. Finally, epidemiological analysis of other data sources such as emergency departments, emergency medical transports, and ambulatory care visits should be conducted where possible to further complete the picture of TBI in New Mexico.

Recommendations

The New Mexico Department of Health (NMDOH) has several recommendations for the prevention of falls and motor vehicle injuries, which were two of the leading causes of TBI among AIAN. For fall prevention, the NMDOH recommends that primary care providers be aware of the issue of adult falls and that the providers are appropriately encouraged to discuss the STEADI (Stopping Elderly Accidents, Deaths, and Injuries) recommendations with their patients and patient's families. These recommendations can be found on the CDC website.[5] For the prevention of injuries due to motor vehicle accidents, the NMDOH recommends that policy makers ensure the availability of low-cost child safety seats and free installation assistance.

Additionally, the NMDOH recommends increased enforcement of passenger restraint laws, impaired driving laws, texting laws, and where applicable, laws that prohibit cell phone use while driving. These recommendations will help reduce the burden of TBI in in New Mexico. This report does not provide a complete picture of TBI because this analysis did not investigate individuals currently suffering from long-term health consequences of TBIs.

Finally, the surveillance of all injuries, not just TBI, should be a critical priority for medical and prevention professionals interested in reducing health disparities among AIAN. Since all injury outcomes share many of the same risk factors, the prevention of all injury outcomes may help to reduce the burden of TBI in AIAN in New Mexico.

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Table. Cause and Intention of TBI Hospitalizations among AIAN New Mexico, 2010-2014

Age adjusted rate per 100,000 persons	
Cause of injury	
Falls	38.3
Motor vehicle traffic accidents	23.5
Struck by/ against and object	15.8
Injury intention	
Unintentional, accidents	85.8
Intentional other, (assaults)	29.8
Intentional self (suicide attempts)	0.7

The New Mexico Epidemiology Report

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The New Mexico Epidemiology Report
(ISSN No. 87504642) is published monthly
by the
Epidemiology and Response Division
New Mexico Department of Health
1190 St. Francis Dr.
P.O. Box 26110, Santa Fe, NM 87502

24-Hour Emergency Number:
(505) 827-0006
www.health.state.nm.us

Figure 2. TBI age-adjusted hospitalization rates by race and gender per 100,000 population, New Mexico, 2010-2013. (N= 6580 cases)