

Traumatic Brain Injury In Rhode Island

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Traumatic Brain Injury (TBI) is a blow or jolt to the head or a penetrating head injury that disrupts the function of the brain.¹ In the United States, 1.4 million individuals sustain a TBI per year. Of those, 235,000 are hospitalized, 1.1 million are treated and released from an emergency department and 50,000 die.² The Centers for Disease Control and Prevention (CDC) estimate that 5.3 million people who sustained a TBI need assistance with daily living activities and incur direct and indirect medical costs totaling an estimated \$60 billion.³

On July 1, 2007, the Rules and Regulations Pertaining to the Rhode Island Traumatic Brain Injury Registry of the General Laws of Rhode Island became effective. The Regulations mandate hospitals within the State to report to the Department of Health within fourteen days of diagnosis all cases of TBI diagnosed through inpatient and emergency departments. As part of this notification, hospitals were required to send the following data: principal diagnosis, cause of injury, place of incident, type of discharge, dates of admission/discharge and patient demographics including name, address, social security number, date of birth, gender, ethnicity and race.

This report describes the incidence, principal diagnosis and the leading cause of TBI in Rhode Island using the first full year of the TBI registry data.

METHODS

All cases of TBI occurred in RI and reported to the RI Department of Health during July 1, 2007-June 30, 2008 were analyzed for this report (N=5,301 cases).

The principal diagnosis of TBI (ICD-9-CM External Cause of Injuries Codes) reported was categorized according to the Barel Injury Diagnosis Matrix, Classification by Body Region and Nature of the Injury as Type 1 TBI, Type 2 TBI, Type 3

TBI, Other Head and Late Effects TBI.⁴ (Definitions of Type 1, 2 and 3 TBI are described in the Matrix.⁴) The causes of TBI, categorized using the ICD-9 CM External Cause Codes (E800.0-E999.9), included unintentional falls (E880-E886.9, E888), motor vehicle traffic accidents (E810-E819.9), striking against / struck accidentally (E916-E917.9), assaults (E960-E969), other (all other E codes), and unknown (no E codes).⁵ Incidence rates were calculated per 100,000 population using the 2007 RI population estimates from the US Bureau of the Census. Although data were analyzed by age and gender, race/ethnicity data were not included due to the high incompleteness of those data.

RESULTS

During July 1, 2007-June 30, 2008, 5,301 TBI cases were reported to the Rhode Island Department of Health. Of those cases, 12% (654 cases) were classified as the most severe Type 1 TBI; 46% (2,434 cases) were classified as severe Type 2 TBI; 40% (2,133 cases) were classified as Other Head Injury; and 2% (80 cases) were classified as Late Effects TBI. The overall incidence rate for TBI in Rhode Island was lower than the national rate (501.1 per 100,000 for RI in 2007 vs. 538.2 per 100,000 for US in 2003).⁶

Incidence of TBI

The incidence rate varied substantially by age and gender. (Figure 1) Overall, infants had the highest rate of TBI (1,672 per 100,000), followed by adults aged 80 and older (1,174 per 100,000). Adults aged 46-59 years had the lowest rate (299 per 100,000). Among those aged 6-79 years, teens (13-18) and young adults (19-25) had higher rates of TBI compared to the rest of the age groups.

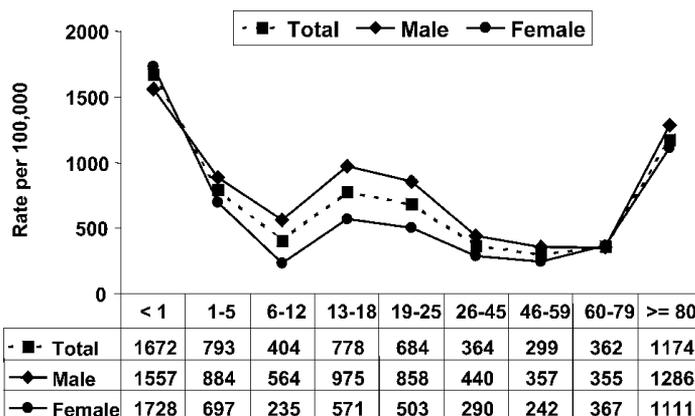


Figure 1. Incidence Rate of Traumatic Brain Injury by Age and Gender, Rhode Island, July 1, 2007-June 30, 2008

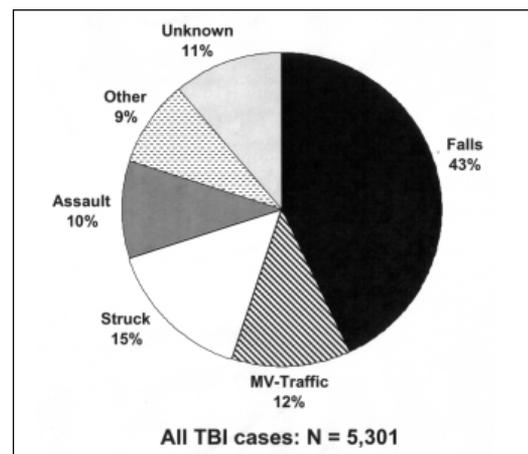


Figure 2. Leading Cause of Traumatic Brain Injury, Rhode Island, July 1, 2007-June 30, 2008

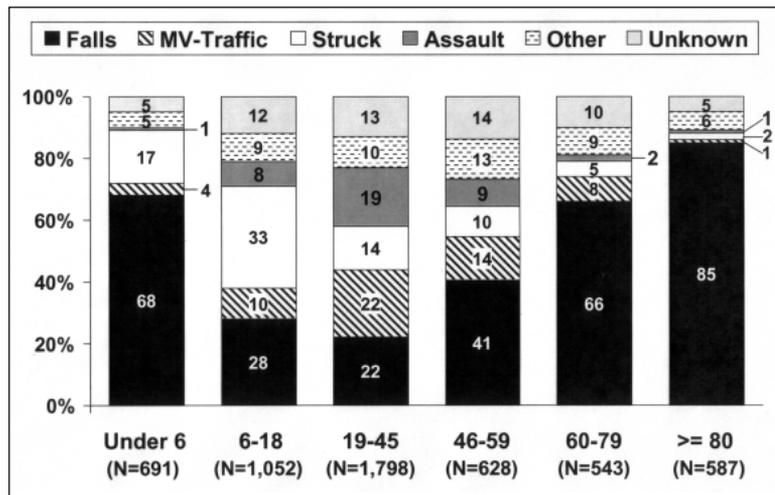


Figure 3. Leading Cause of Traumatic Brain Injury by Age, Rhode Island, July 1, 2007-June 30, 2008

In general, males had higher rates of TBI (584.3 per 100,000) than females (420.2 per 100,000) in RI. Except for infants and adults aged 60-79 years where females had higher rate of TBI than males, all other age groups showed males had higher rates. The male-female differences in the rates were larger for children through young adults (6-25 years of age groups) than the rest of the groups.

Causes of TBI

Overall, falls (unintentional) were the leading cause of TBI in RI (2,278 cases or 43%), followed by striking against / struck accidentally (810 cases or 15%), motor vehicle traffic accidents (653 cases or 12%), and assaults (505 cases or 10%). (Figure 2) Rhode Island had a higher percentage of unintentional falls than the US (43.0% for RI in 2007 vs. 32.1% for the US in 2003).⁶ Although unintentional falls were the leading cause of TBI for all age groups except for those 6-18 years of age, the proportion of falls varied significantly by age group, ranging from 22% for those 19-45 years of age to 85% for adults 80 years and older. (Figure 3) The highest percentage of striking against / struck accidentally occurred among adolescents 6-18 years of age (33%), followed by children under 6 years of age (17%). Adults aged 19-45 had the highest percentage of motor vehicle traffic accidents (22%) and assaults (19%) compared to other age groups.

Specifically, the most frequent cause of TBI for infants was "falls from bed" (24%); for children aged 6-18 years, "striking against or struck by objects in sports" (18%); for adults aged 19-45 years, "motor vehicle traffic accident involving collision motor vehicle" (16%) and "unarmed fight/brawl" (10%); and for those aged 80 and older, "falls from other slipping, tripping or stumbling" (32%).

DISCUSSION

The data in this report are based on the first full year of hospital emergency and inpatient reporting of TBI to the RI Department of Health. With the passage of requirements, the reporting rate increased by 3600% (from 147 cases in 2006 to 5,301 cases in 2007) resulting in increased insight into the demographics of TBI in RI including the incidence, diagnosis and cause of injury. Although there are limitations in the data, e.g., large missing data in race and ethnicity, this report demonstrates some interesting findings. While RI had a slightly lower rate of TBI than the US overall, the proportion of falls as a cause of TBI was much higher in RI than the US. This report also identifies high-risk populations for TBI such as the elderly, infants, teens and males. The leading causes of TBI were found to be different for each age

group, indicating that different intervention programs are needed for different age groups.

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Disclosure of Financial Interests

The authors have no financial interests to disclose.