Understanding TBI

Traumatic brain injury (TBI) is a serious public health problem in the United States. A TBI is caused by a bump, blow, jolt, or penetration to the head that disrupts the normal function of the brain. Each year, traumatic brain injuries contribute to a substantial number of deaths and cases of permanent disability.

Impact and Magnitude of TBI

During 2011, there were 794 deaths to MA residents that involved a traumatic brain injury (10.9 per 100,000). In addition, there were 5,306 hospitalizations (73.6 per 100,000), and 63,706 emergency department (ED) visits (928.6 per 100,000) of MA residents involving a TBI. An unknown number of individuals sustained injuries that were treated in other settings or went untreated. This report defines TBI-related deaths or injuries as cases in which TBI was reported alone or in combination with other injuries or conditions.

Causes of TBI

Unintentional falls were the leading cause of TBI-related deaths, hospitalizations, and ED visits in 2011. Motor vehicle traffic crashes were the second leading cause of TBI-related deaths, hospitalizations, and ED visits. Suicides were the third leading cause of TBI-related deaths, whereas assaults were the third leading cause of TBI-related hospitalizations and ED visits.

TBI by Age

MA residents aged 65 years and older had the highest number and rate of TBI-related deaths and hospitalizations, accounting for 46% of TBI-related deaths and 48% of TBI-related hospitalizations. MA children ages 0 to 14 years had the highest number and rate of TBI-related emergency department visits, accounting for 24% of such visits.

1. Death, hospitalization, and ED data are mutually exclusive, e.g. an ED visit that leads to a hospitalization is counted in hospitalization data, not ED data. Hospitalization and ED data are visit-based, therefore a person hospitalized twice in one year for the same or different injuries is counted as two hospitalizations. All rates are per 100,000 MA residents.

2. Completeness of external-cause coding for TBI-related cases can impact the accuracy of the cause classifications for hospitalizations and emergency department visits.

3. Firearm-related injuries were reported but excluded from Figure 1 due to overlap with multiple categories (e.g., homicide/assault, suicide). Firearms were involved in 20% of TBI deaths, 1% of TBI hospitalizations, and <1% of TBI emergency department visits.

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**TBI by Gender**

Men were more likely to sustain a traumatic brain injury than women. The magnitude of this difference was greatest for TBI-related deaths. In Massachusetts, the rate of TBI deaths was three times higher among men than women (17.0 vs. 5.5 per 100,000). TBI-related hospitalization rates were 74% higher among men than women (94.3 vs. 54.2 per 100,000), and rates of TBI-related emergency department (ED) visits were 27% higher among men than women (1,097.3 vs. 862.0 per 100,000).  

4. All rates for comparison by gender are age-adjusted.

**Sports-related TBI**

In 2011, 21% of MA middle and high school students who had played on a sports team reported experiencing TBI symptoms due to a sports-related injury in the past year. Boys were more likely than girls to report experiencing sports-related TBI symptoms in the past year (26% vs. 16% of middle school athletes and 24% vs. 18% of high school athletes). Sports-related TBI symptoms were reported most frequently by 8th grade (24%), followed by 9th and 10th grade athletes (22%).

5. TBI symptoms defined as “suffered a blow or jolt to your head that caused you to get “knocked out”, have memory problems, double or blurry vision, headaches or “pressure” in the head or nausea or vomiting”. Results do not include students who reported that they did not play on a sports team in the past year.

**Unintentional Falls & TBI**

In 2011, unintentional falls were the leading cause of fatal and nonfatal TBI among MA residents, accounting for 41% of TBI-related deaths, 62% of TBI-related hospitalizations, and 47% of TBI-related ED visits.

Fall-related TBI death and injury rates increase dramatically in residents ages 65 and older; rates are highest in MA residents ages 85 and older (85.3 per 100,000 for TBI-related deaths, 581.0 per 100,000 for TBI-related hospitalizations, and 2,343.4 per 100,000 for TBI-related ED visits).

Rates of ED visits for fall-related TBIs are also very high in MA infants under age one (2,223.8 per 100,000) and children ages 1-4 (1,276.1 per 100,000).
TBI Prevention Strategies

CDC’s National Center for Injury Prevention and Control (Injury Center) is committed to protecting people against preventable TBI by putting science into action.

- **State Injury Prevention Programs** - The Injury Center’s Core Violence and Injury Prevention Program (Core VIPP) funds state health departments to estimate the impact of TBIs and define the groups most affected. [www.cdc.gov/injury](http://www.cdc.gov/injury)
- **STEADI Tool Kit** – The Injury Center’s STEADI Tool Kit provides health care providers with the information and tools they need to assess and address their older patients’ fall risk. [www.cdc.gov/homeandrecreationalsafety/falls/steadi](http://www.cdc.gov/homeandrecreationalsafety/falls/steadi)
- **Heads Up** – Injury Center campaigns with free tools for health care providers, school administrators, nurses, teachers, coaches, and parents to help them recognize and respond to a TBI. [www.cdc.gov/traumaticbraininjury](http://www.cdc.gov/traumaticbraininjury)
- **Motor Vehicle Safety** – Motor vehicle crashes are a leading cause of death, injury, and TBI in the US. CDC’s primary prevention focuses on child passenger safety, seat belt use, and reducing impaired driving. [www.thecommunityguide.org/mvoi](http://www.thecommunityguide.org/mvoi); [www.cdc.gov/motorvehiclesafety](http://www.cdc.gov/motorvehiclesafety)

Massachusetts TBI Activities

**Prevention** – The Massachusetts Department of Public Health (MDPH) works in close collaboration with the MA Prevent Injuries Now! Network (MassPINN), a statewide coalition of injury prevention practitioners, public agencies, and advocates, to prevent TBI and reduce its consequences in Massachusetts. MDPH also administers The Prevention and Wellness Trust Fund, which aims to reduce health care costs by funding community partnerships to address leading health conditions, including falls among older adults. MDPH utilizes surveillance data and evidence-based/best practice methods to inform injury prevention policy development, programming and reduction of environmental hazards. Our three priority areas for TBI prevention are falls in older adults, motor vehicle injuries, and sports-related TBI in youth.

**Partnerships** – Preventing TBI depends upon the work and collaboration of many partners. MDPH works closely with MassPINN, representatives from the Brain Injury Association of MA, the MA Falls Prevention Coalition, the MA Medical Society, Blue Cross/Blue Shield of MA, Partnership for Passenger Safety, AAA Southern New England, the MA Department of Transportation, the MA Interscholastic Athletic Association, the MA Rehabilitation Commission, trauma coordinators from MA hospitals, injury research and prevention experts from MA academic centers, and others to reduce TBI.

**Accomplishments** – Significant policy advances have been made in MA to help prevent or reduce the impact of TBI.

- **MA has convened a statutory Commission on Falls Prevention to study and recommend evidence-based strategies to prevent falls among older adults in both community and health care settings.** Massachusetts also has an active Falls Prevention Coalition, which works to raise awareness of the preventability of falls and promote prevention strategies.
- **In 2010, MA passed an expanded junior operator law and MDPH is working with the Registry of Motor Vehicles to optimize its implementation. Since passage of this law, the 3-year average annual number of motor vehicle occupant deaths among MA 16-17 year olds has dropped 48% compared with the 3 years prior to its passage.**
- **Massachusetts has also been a leader in the implementation of “Return to Play” (sports concussion) legislation, by developing regulations, model policies for middle and high schools, concussion history, and medical clearance forms, and conducting numerous trainings throughout the Commonwealth for a range of stakeholders. MDPH is also collecting sports concussion data from schools and evaluating school policies on sports concussion.**

Nonfatal injuries: MA Inpatient Hospital Discharge, Outpatient Observation Stay and Emergency Department Discharge Databases, MA Center for Health Information and Analysis, 2011.
Sports-related head injuries: MA Youth Health Survey, MDPH, 2011.

Note: This report used CDC criteria to identify TBI cases, i.e. injury cases were first selected based on external cause of injury (deaths), primary diagnosis (hospitalizations), or both (ED visits). All fields were then searched for TBI diagnostic codes. Results may differ from reports that use MA criteria to define injury cases. Reference to any commercial entity or product or service in this report should not be construed as an endorsement by the Government of the company or its products or services.
Resources and Related Publications

This report and other MA injury data reports are available online at no cost at: www.mass.gov/dph/isp.

Custom data analysis may also be requested by contacting the Injury Surveillance Program directly.

Injury Surveillance Program (ISP)
Massachusetts Department of Public Health
Bureau of Community Health and Prevention
250 Washington Street, 6th Floor
Boston, MA 02108
Phone: (617) 624-5648; Email: MDPH-ISP@state.ma.us
www.mass.gov/dph/isp

Injury Prevention and Control Program (IPCP)
Massachusetts Department of Public Health
Bureau of Community Health and Prevention
250 Washington Street, 4th Floor
Boston, MA 02108
Phone: (617) 624-5413
IPCP home page: www.mass.gov/dph/injury

IPCP Sports Concussion Program:
www.mass.gov/dph/sportsconcussion

Brain Injury and Statewide Specialized Community Service
Massachusetts Rehabilitation Commission
600 Washington Street
Boston, MA 02111
Phone: (617) 204-3852, (800) 223-2559 ext. 2 (toll-free)
www.mass.gov/eohhs/consumer/disability-services/services-by-type/head-injury/bisscs.html

Brain Injury Association of Massachusetts
30 Lyman Street, Suite 10
Westborough, MA 01581
Phone: (508) 475-0032; Email: biama@biama.org
www.biama.org

Traumatic Brain Injury
Centers for Disease Control and Prevention
www.cdc.gov/traumaticbraininjury

Heads Up Tool Kit for Youth Sports
Centers for Disease Control and Prevention
www.cdc.gov/concussion/headsup/youth.html

Heads Strong provides guidance to schools on implementing MA youth sports concussion regulations and is available at: www.mass.gov/dph/sportsconcussion

Fall-Related Injuries and Deaths among Older MA Adults: 2002-2010

Overview
Falls are a leading cause of injury and death among older adults in the United States and account for a significant portion of health care dollars spent on injury-related care.

Key Findings
 Among MA residents ages 65 and over:
- Men had higher fall rates than women.
- Fall-related injury and death rates increased significantly with age.
- Falls among MA residents 85+ were higher than among adults aged 65-74.
- Falls-related deaths have increased significantly for the older age group over the past several years.

Fall-Related Injuries and Deaths among Older MA Adults includes data on fall injuries involving a TBI and is available at: www.mass.gov/dph/isp