



Data Brief

Injuries Among Massachusetts Residents, 2015

Massachusetts Department of Public Health

September 2020

Injuries are a Major Public Health Problem in Massachusetts

Injuries are the *third* leading cause of death among Massachusetts (MA) residents and the *leading* cause of death among MA residents ages 1 to 44. In 2015, 4,176 MA residents died as a result of injuries that were unintentional, self-inflicted, assault-related or of other or undetermined intent (57.4 per 100,000¹). In addition, there were 77,251 hospital stays (1,003.0 per 100,000) and 663,581 emergency department (ED) visits (9,922.7 per 100,000) among MA residents associated with nonfatal injuries (Figure 1).

In 2015, the injury death rate in MA was 10% lower than the U.S. rate of 63.7 injury deaths per 100,000 persons. MA suicide and homicide rates were 32% and 61% lower than U.S. rates, respectively. The rate of drug overdose deaths, however, was 66% higher in MA than in the U.S. (27.1 per 100,000 vs. 16.3 per 100,000).²

What do we mean by “injury”?

Injuries are bodily harm - fatal or nonfatal - that can be caused by car crashes, drowning, sharp objects, guns, poisoning, being hit by something, falling, fires, and more. Injuries may be unintentional (sometimes called “accidental”), self-harm or assault-related.

Report Contents

This report describes injuries to MA residents in 2015 that resulted in death or required treatment at a MA acute care hospital. Sections include:

- **Leading Causes of Injury**
- **Fatal and Nonfatal Injury Rates**
- **10-year Nonfatal Injury Trends**
- **Injury Costs**
- **Injury Prevention in Massachusetts**
- **Injury Prevention Resources**

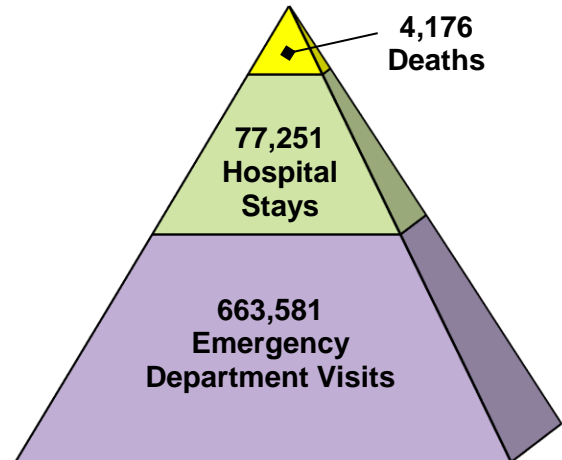


Figure 1. Total Burden of Injuries, MA Residents, 2015

Key Findings

Among MA residents in 2015:

- There were a total of 4,176 injury deaths, and 77,251 hospital stays and 663,581 ED visits associated with nonfatal injuries.
- Unintentional injuries accounted for 80% of injury deaths and 72% of injury-related hospital stays.
- The leading causes of unintentional injury death were poisoning/overdoses (53%), falls (22%) and motor vehicle traffic-related injuries (11%).
- Drug overdoses accounted for 1,816 deaths, 9,070 hospital stays and 18,595 ED visits (when all intents are combined).
- Among adults ages 65 and older, there were 619 deaths, 23,772 hospital stays and 51,322 ED visits associated with unintentional fall injuries.
- One in five injury deaths (20%) and one in ten injury-related hospital stays (11%) involved a traumatic brain injury.

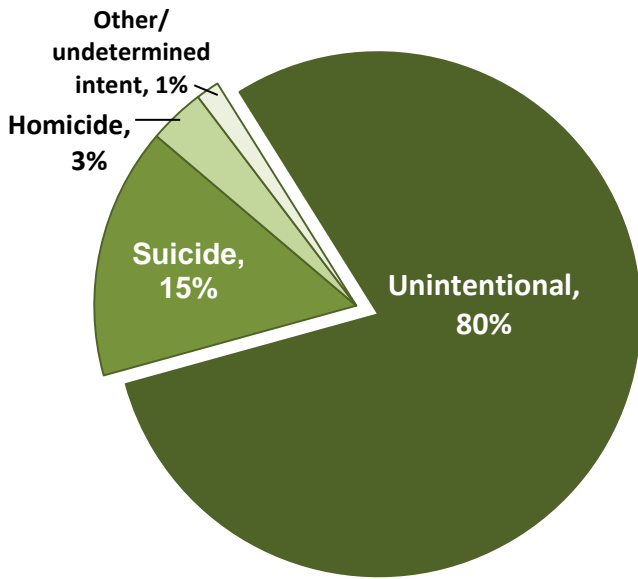
1. All rates are age-adjusted rates per 100,000 MA residents unless otherwise specified.

2. U.S. injury death rates are from: <https://www.cdc.gov/injury/wisqars/fatal.html> accessed 9/23/19.



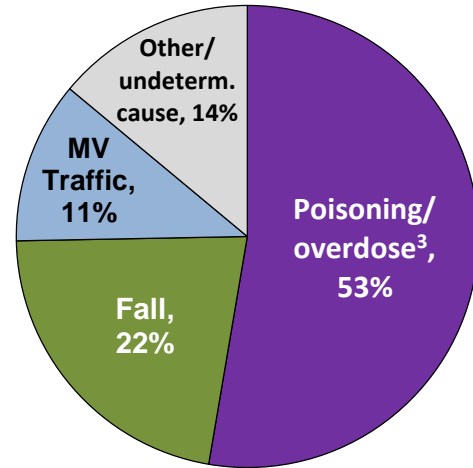
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Leading Causes of Injury Death



Injury Deaths by Intent³
(n = 4,176)

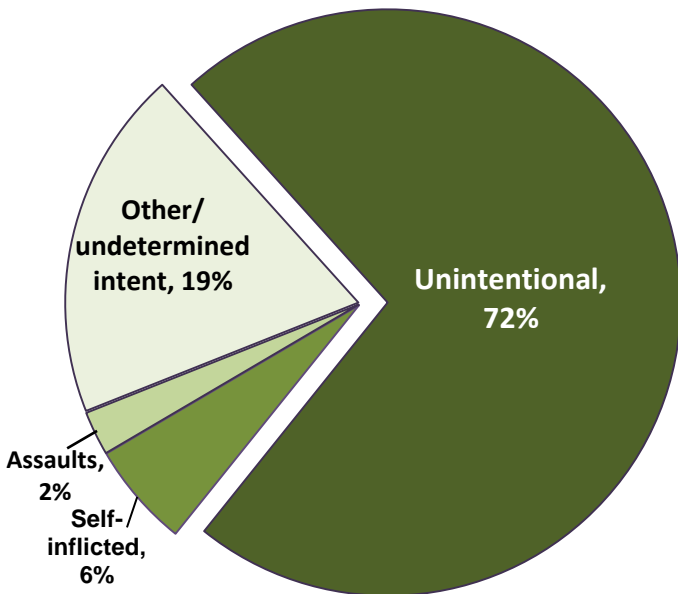
- Of the 4,176 injury deaths of MA residents in 2015, 80% were due to unintentional injuries.



Unintentional Injury Deaths by Cause
(n = 3,324)

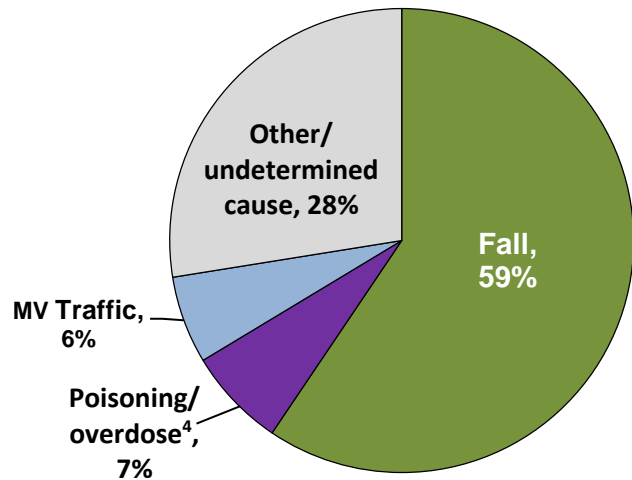
- The leading causes of the 3,324 unintentional injury deaths among MA residents in 2015 were poisoning/overdoses⁴ (53%), falls (22%) and motor vehicle (MV) traffic-related injuries (11%).

Leading Causes of Injury-related Hospital Stays



Injury-related Hospital Stays by Intent³
(n = 77,251)

- Unintentional injuries accounted for over two-thirds (72%) of the 77,251 injury-related hospital stays of MA residents in 2015.



Unintentional Injury Hospital Stays by Cause
(n = 55,955)

- Falls accounted for 59% of hospital stays for unintentional injury in 2015. Of these 33,259 fall-related hospital stays, over two-thirds (71%) involved MA adults ages 65 and older (65+). (Data on page 3.)

3. Percentages may not total 100% due to rounding.

4. Unintentional poisoning/overdoses only. Does not include intentional poisoning/overdoses or those of undetermined intent.



Injuries Among Massachusetts Residents, 2015

Fatal and Nonfatal Injury Overview

Among MA residents in 2015:

- There were a total of 4,176 injury deaths, as well as 77,251 hospital stays and 663,581 ED visits for nonfatal injuries.
- Drug overdoses accounted for 1,816 deaths, 9,070 hospital stays and 18,595 ED visits (when all intents are combined).
- Among adults ages 65+, there were 619 deaths, 23,772 hospital stays and 51,322 ED visits associated with unintentional fall injuries.
- Over one in five injury deaths (20%) and one in ten injury-related hospital stays (11%) involved a traumatic brain injury.



Table 1. Leading Fatal and Nonfatal Injuries among MA Residents, 2015

	Deaths		Nonfatal Hospital Stays		Nonfatal ED Visits	
	All rates are age-adjusted per 100,000 MA residents					
	Number	Rate	Number	Rate	Number	Rate
TOTAL INJURIES	4,176	57.4	77,251	1,003.0	663,581	9,922.7
Selected injuries⁵ (regardless of intent)						
Traumatic brain injury (TBI) ⁶	820	10.4	8,788	113.8	68,117	1,003.3
Primary poisoning/overdose	1,913	28.4	8,537	120.9	21,850	332.2
Drug overdose ⁶	1,816	27.1	9,070	128.6	18,595	281.0
Firearms	214	3.0	321	4.8	397	5.9
Unintentional	3,324	45.5	55,955	709.3	614,221	9,163.0
Fall-related	732	8.4	33,259	404.9	186,639	2,690.2
Falls among persons 65+	619	56.4	23,772	2,227.9	51,322	4,856.6
Motor vehicle traffic-related	377	5.2	3,415	47.6	73,475	1,090.2
Motor vehicle occupant ⁷	223	3.1	2,215	30.7	65,918	978.7
Motorcyclist ⁷	63	0.9	495	7.1	2,393	35.2
Pedestrian ⁸	100	1.3	614	8.5	3,860	56.7
Pedal Cyclist ⁸	15	0.2 ⁹	495	6.8	7,631	119.5
Drowning/submersion	45	0.6	28	0.4	173	2.9
Fire/burn	43	0.5	539	7.5	8,401	128.4
Suicide/self-inflicted	647	9.0	4,464	64.9	7,180	108.9
Homicide/assault	145	2.2	1,878	28.0	23,240	350.0

5. Selected injury categories are not mutually exclusive and may overlap with each other and the categories listed below.

6. Counts and rates for TBI and drug overdoses are based on all diagnosis and E-code fields, whereas counts and rates for other categories are based on the first-listed E-code field.

7. Motor vehicle occupant includes drivers, passengers, and unspecified persons. Motorcyclist includes operators and passengers.

8. Due to traffic or non-traffic related incidents.

9. Rate is based on a count of less than 20 and therefore may be unstable.



Injuries Among Massachusetts Residents, 2015

Trends in Hospital Stay Rates, 2006 - 2015

Drug Overdoses

- The number of hospital stays associated with drug overdoses¹⁰ among MA residents increased from 6,925 in 2006 to 9,070 in 2015 (data not shown).
- This corresponds to a 21.6% increase in the rate of drug overdose-related hospital stays over this time period, from 105.8 per 100,000 in 2006 to 128.6 per 100,000 in 2015 (Fig. 2).¹¹

Figure 2. Drug Overdose¹⁰-Related Hospital Stay Rates, MA Residents, 2006-2015

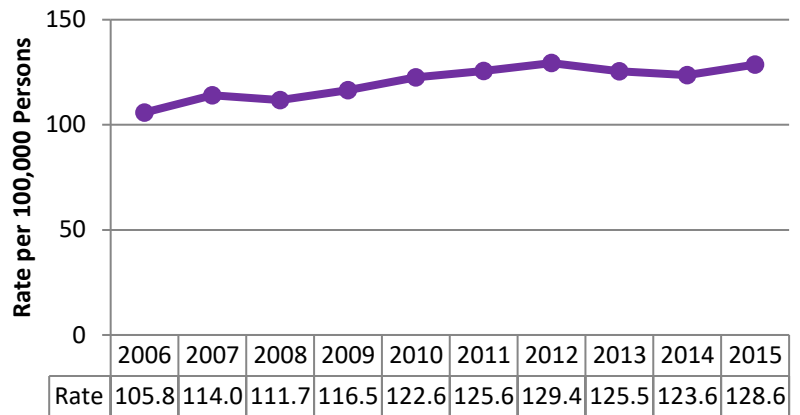
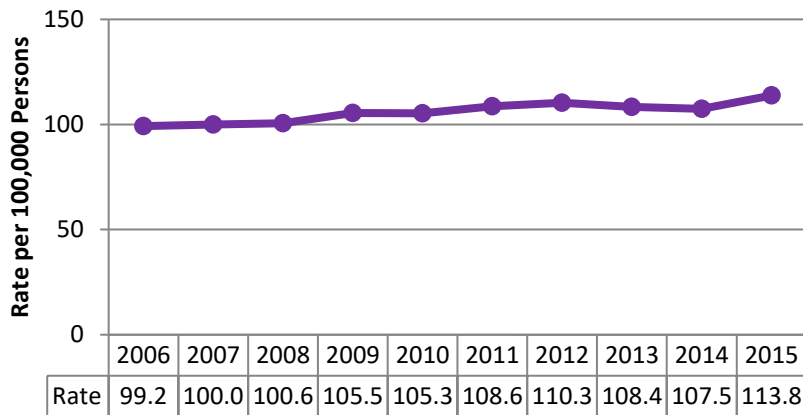


Figure 3. Traumatic Brain Injury-Related Hospital Stay Rates, MA Residents, 2006-2015



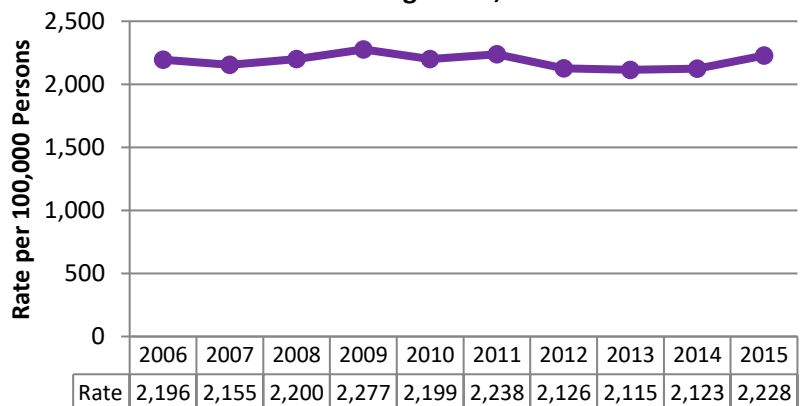
Traumatic Brain Injury

- The number of hospital stays associated with traumatic brain injury among MA residents increased from 6,665 in 2006 to 8,788 in 2015 (data not shown).
- This corresponds to a 14.7% increase in the rate of hospital stays associated with traumatic brain injury over this time period, from 99.2 per 100,000 in 2006 to 113.8 per 100,000 in 2015 (Fig. 3).¹¹

Unintentional Falls among MA Residents Ages 65+

- The number of hospital stays associated with unintentional falls among MA residents ages 65+ increased from 20,603 in 2006 to 23,772 in 2015 (data not shown).
- Despite the increased number of such falls, the rate of fall-related hospital stays among older adults did not change significantly (Fig. 4), indicating that the increased number of fall injuries was due to the increased population of older adults in MA.

Figure 4. Unintentional Fall-Related Hospital Stay Rates, MA Residents Ages 65+, 2006-2015



10. Drug overdoses include all intents.

11. Statistically significant at $p < 0.05$. Joinpoint Regression Program used for trend analysis.



Injuries Among Massachusetts Residents, 2015

Trends in Hospital Stay Rates, 2006 – 2015 (cont.)

Motor Vehicle Occupant Injuries

- The number of hospital stays associated with motor vehicle (MV) occupant injuries decreased steadily from 3,694 in 2006 to 2,215 in 2015 (data not shown).
- This corresponds to a 45.1% decrease in the rate of hospital stays associated with MV occupant injuries, from 55.9 per 100,000 in 2006 to 30.7 per 100,000 in 2015 (Fig. 5).¹¹

Figure 5. Hospital Stay Rates Associated with MV Occupant Injuries, MA Residents, 2006-2015

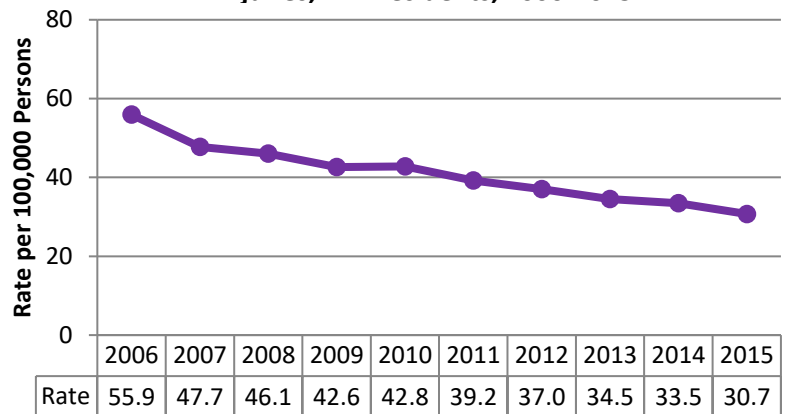
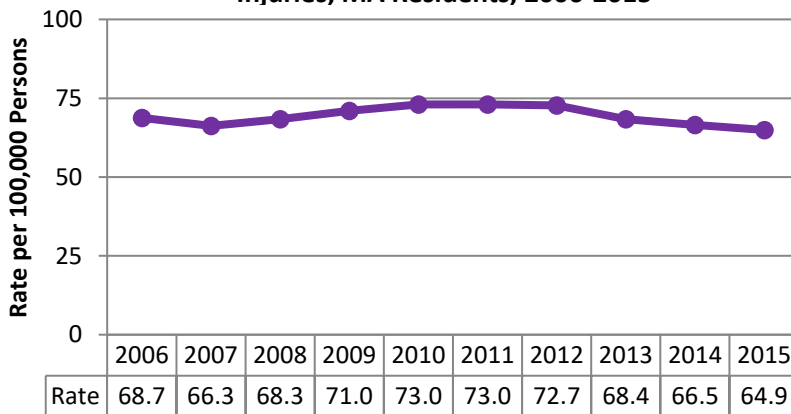


Figure 6. Hospital Stay Rates Associated with Self-Inflicted Injuries, MA Residents, 2006-2015



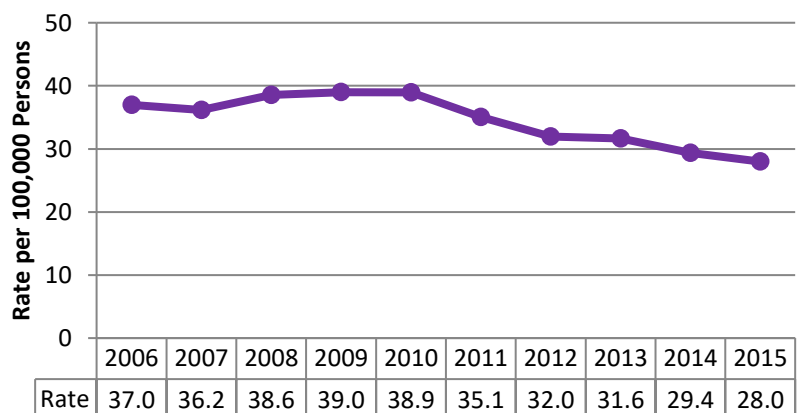
Self-Inflicted Injuries

- The number of hospital stays associated with self-inflicted injuries was 4,444 in 2006, increased to a maximum of 4,841 in 2011, then decreased to 4,464 in 2015 (data not shown).
- This corresponds to a 10.1% increase in the rate of self-inflicted injury hospital stays between 2007 and 2010 and an 11.1% decrease between 2011 and 2015. There was no significant net change in these rates over the entire 10-year period (Fig. 6).

Assault-Related Injuries

- The number of hospital stays associated with assault-related injuries among MA residents decreased from 2,373 in 2006 to 1,878 in 2015 (data not shown).
- This corresponds to a 24.3% decrease in the rate of hospital stays associated with assault-related injuries over this time period, from 37.0 per 100,000 in 2006 to 28.0 per 100,000 in 2015 (Fig. 7).¹¹

Figure 7. Hospital Stay Rates Associated with Assault-Related Injuries, MA Residents, 2006-2015



11. Statistically significant at $p < 0.05$. Joinpoint Regression Program used for trend analysis.



Injuries Among Massachusetts Residents, 2015

Injury Costs

While the true cost of injuries - including physical and emotional suffering - cannot be measured, costs that can be estimated provide additional indicators of the burden of injury in Massachusetts.

- **Years of Potential Life Lost (YPLL):** Due to injury deaths in 2015, MA residents lost an estimated 105,429 years of life prior to age 75, more years than for heart disease and stroke combined. (CDC WISQARS)
- **Work Loss Costs:** In addition, deaths of Massachusetts residents due to injuries in 2015 were associated with an estimated \$5.5 billion in lifetime work loss costs. (CDC WISQARS)
- **Hospital Charges:**¹²
 - In 2015, MA residents incurred \$3.5 billion in charges associated with injury-related hospital stays and ED visits. Of these charges, \$2.8 billion (80%) were associated with unintentional injuries.
 - Hospital charges associated with unintentional fall injuries totaled \$1.4 billion, of which 59% (\$826 million) were associated with fall injuries among adults ages 65 and older.
 - Hospital charges associated with traumatic brain injuries (TBI) totaled \$537 million, of which over half (55%) were associated with fall injuries and one-fifth (21%) with MV traffic injuries. (Table 2)

Table 2. MA Hospital Charges¹² for Injury-related Cases, MA Residents, 2015

	Hospital Stay Charges	ED Visit Charges	Total Charges
TOTAL INJURIES	\$2,336,261,353	\$1,166,851,534	\$3,503,112,887
Selected Injuries¹³ (regardless of intent)			
Traumatic brain injury	\$334,671,152	\$202,026,888	\$536,698,040
Primary poisoning/overdose	\$177,298,520	\$41,754,890	\$219,053,410
Drug overdose	\$188,823,356	\$38,010,041	\$226,833,397
Firearms	\$21,663,366	\$2,235,312	\$23,898,678
Unintentional	\$1,761,160,275	\$1,057,649,618	\$2,818,809,893
Fall-related	\$970,284,849	\$419,249,465	\$1,389,534,314
Falls among persons 65+	\$662,174,684	\$164,074,718	\$826,249,402
Motor vehicle traffic-related	\$192,964,214	\$155,592,940	\$348,557,154
Motor vehicle occupant ¹⁴	\$101,517,241	\$130,973,328	\$232,490,569
Motorcyclist ¹⁴	\$37,024,290	\$8,627,886	\$45,652,176
Pedestrian ¹⁵	\$50,480,206	\$12,324,310	\$62,804,516
Pedal cyclist ¹⁵	\$16,317,405	\$17,413,100	\$33,730,505
Drowning/submersion	\$559,864	\$369,224	\$929,088
Fire/burn	\$32,588,803	\$9,331,660	\$41,920,463
Suicide/self-inflicted	\$99,186,585	\$19,782,328	\$118,968,913
Homicide/assault	\$62,925,698	\$58,675,641	\$121,601,339

12. Initial charges by acute care hospitals, which may not reflect actual costs or amounts paid. Some charges may be related to conditions other than injury. All dispositions are included when calculating charges, including transfers and in-hospital deaths.

13. Selected injury categories are not mutually exclusive and may overlap with each other and the categories listed below.

14. Motor vehicle occupant includes drivers, passengers, and unspecified persons. Motorcyclist includes operators and passengers.

15. Due to traffic or non-traffic related incidents.



Injuries Among Massachusetts Residents, 2015

Injury Prevention in Massachusetts

While we have made tremendous progress in the field of injury prevention over the past several decades, this report highlights that there is still work to be done. Injuries are largely preventable events. The public health approach to preventing injury is similar to that for preventing disease. Injuries are not simply “acts of fate”. The Massachusetts Department of Public Health’s (MDPH) Division of Violence and Injury Prevention works closely with our internal partners, other state agencies and external institutions and organizations to advance practices and policies that both protect Massachusetts residents from injury and reduce injury severity. One approach to violence and injury prevention utilizes a framework sometimes referred to as “the four E’s” of injury prevention. These include:

- *Environmental Design and Engineering*: Adoption of safer products, roadway layout, and home modification can greatly reduce one’s risk of injury.
- *Enactment and Enforcement of Policies*: Laws, regulations and institutional policies can promote safe behaviors or responses and prevent injury.
- *Education*: Educating the public and professionals to change behaviors and reduce injuries.
- *Emergency Medical Services*: Ensuring a high quality trauma management system so that individuals who are injured are transported to facilities with the most appropriate care in order to reduce deaths and improve outcomes after an injury.

The data described in this bulletin provides useful information on the primary reasons people are injured in Massachusetts and injury trends over time. There are significant disparities in injury rates by sex and race/ethnicity, which are described in *Injuries among Massachusetts Residents, 2013*, at www.mass.gov/files/documents/2017/02/bad/injury-surveillance-report-2013.pdf. We plan to include data on injury rates by demographic, geographic, and other conditions in future MA injury reports. Through a concerted effort, we can use this data to inform strategies to advance the latest best practices and policies for injury prevention in Massachusetts and to improve the quality and length of life for many citizens each year.

Massachusetts Injury Prevention Activities

Through its collaborations with internal and external partners, the MDPH Injury Prevention and Control Program promotes injury prevention policies and programs in a number of key areas, some of which are described below.

Falls among Older Adults

MDPH strategies to prevent falls among older adults include supporting prevention infrastructure and stakeholders including the efforts of the MA Falls Prevention Coalition, promoting community-based programs to improve strength and balance, highlighting the key role of primary care providers in performing fall risk assessments, developing and disseminating educational materials, convening the MA Commission on Falls Prevention to draft policy and programming recommendations, and improving Massachusetts data on fall injuries. For data see: <https://www.mass.gov/files/documents/2018/07/19/special-emphasis-older-adult-falls-jun-2018.pdf>

Youth Sports Concussions

Massachusetts has been a leader in the implementation of “Return to Play” (sports concussion) legislation, by developing regulations; providing model policies, concussion history and medical clearance forms; offering technical assistance to middle and high schools; and conducting numerous trainings for a range of stakeholders throughout the Commonwealth. MDPH is also collecting sports concussion data from schools and evaluating school policies on sports concussion.



Injuries Among Massachusetts Residents, 2015

Massachusetts Injury Prevention Activities (cont.)

Drug Overdoses

A growing number of drug overdoses in MA are caused by opioid-related drugs. In February 2015, Governor Baker established an Opioid Addiction Working Group to gather information from communities and develop a statewide strategy to combat opioid addiction. DPH strategies to prevent opioid overdoses include funding community prevention coalitions, the Parent Power educational campaign, expanding the availability of Naloxone (to reverse opioid overdoses) and requiring prescribers to use the Prescription Monitoring Program for initial opioid prescriptions. DPH also helps fund the Regional Center for Poison Control and Prevention at Children's Hospital Boston, which, in addition to treatment assistance, provides education and outreach to prevent poisoning and overdoses.

Motor Vehicle Crashes

Occupant protection is a priority area of the MDPH's Injury Prevention and Control Program. Specific strategies include supporting prevention infrastructure and stakeholders through the MA Traffic Safety Coalition, a coalition of transportation safety advocates from across the state; disseminating relevant state data, research findings and evidence-based strategies to injury prevention partners; participating in the planning and implementation of the MA Strategic Highway Safety Plan (SHSP); and developing a Model Safe Transportation Policy for MDPH-funded youth-serving organizations.

Child and Infant Injury Prevention

Unintentional injuries are the leading cause of death among children. MDPH's Injury Prevention Program prioritizes the prevention of unintentional injuries among children and infants through three core programs: Child Fatality Review (CFR), Infant Safe Sleep, and Emergency Medical Services for Children (EMSC). Local CFR Teams systematically review all child fatalities in the state, identifying opportunities to improve prevention and treatment activities. The state CFR team then works to implement systemic changes that leverage those opportunities. The infant safe sleep program establishes model policies, educates the public and providers about best practices, and tracks Sudden Unexpected Infant Deaths in the Commonwealth. Finally, the EMSC program prepares emergency medical technicians and emergency department staff to treat ill and injured children. For more information about injuries to children, please see the *Special Emphasis Report: Infant and Early Childhood Injury* 2013 at: <https://www.mass.gov/files/documents/2016/08/sa/special-emphasis-child-injuries-aug-2016.pdf>.

Spinal Cord Injury

Under the authorization of the Massachusetts Legislature, the Department of Public Health established a Spinal Cord Injury Cure Research Trust Fund in 2004. An amendment in 2015 renamed the fund the Thomas P. Kennedy Spinal Cord Injury Trust Fund. The purpose of this fund is to promote medical research that may lead to enhanced treatment and potential cures for spinal cord injury. The fund also facilitates networking between scientists working in the field of spinal cord injury. Spinal cord injury represents a very serious public health challenge. MDPH is looking to support investigators who have demonstrated an outstanding commitment to Spinal Cord Injury Cure Research in the Commonwealth of Massachusetts through a competitive Request for Response process.



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Resources

For further information about Massachusetts injury prevention efforts or injury data, see:

DPH Injury Prevention and Control Program (IPCP)
www.mass.gov/dph/injury

DPH Injury Surveillance Program (ISP)
www.mass.gov/dph/isp

Fall Prevention Resources

CDC National Center for Injury Prevention and Control
www.cdc.gov/homeandrecreationalafety/falls

National Council on Aging
www.ncoa.org/healthy-aging/falls-prevention



National Council on Aging

Concussion/TBI Resources

Centers for Disease Control and Prevention
<https://www.cdc.gov/TraumaticBrainInjury/index.html>

DPH Injury Prevention and Control Program
<http://www.mass.gov/eohhs/gov/departments/dph/programs/community-health/dvip/injury-prevention/traumatic-brain-injury.html>

Motor Vehicle Safety Resources

National Highway Traffic Safety Administration
www.nhtsa.gov

Safe Kids: www.safekids.org

Centers for Disease Control and Prevention
www.cdc.gov/motorvehiclesafety



Suicide Prevention Resources

National Suicide Prevention Lifeline: 1-800-273-TALK (8255);
Veterans, press 1

MA Samaritans Helpline: 1-877-870-HOPE (4673)

DPH Suicide Prevention Program
www.mass.gov/dph/suicideprevention

Sexual and Domestic Violence Prevention

National Domestic Violence Hotline: 1-800-799-7233;
1-800-787-3224 (TTY); www.thehotline.org

DPH Sexual and Domestic Violence Prevention and Services
www.mass.gov/orgs/division-of-sexual-and-domestic-violence-prevention-and-services



Youth Violence Prevention

DPH Division of Violence and Injury Prevention
www.mass.gov/dph/dvip

CDC Youth Violence Prevention Strategies
www.cdc.gov/violenceprevention/youthviolence/prevention.html



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Data Sources and Notes

Due to differences in data sources and injury definitions, data in this report should not be compared with the MA Death Report 2015 or reports based on data from the MA Violent Death Reporting System.

Deaths: Registry of Vital Records and Statistics, MA Department of Public Health. Includes MA residents who died in or out-of-state; non-MA residents are excluded. Deaths are compiled and reported by calendar year.

Nonfatal Injuries and Hospital Charges: MA Inpatient Hospital Discharge, Outpatient Observation Stay and Emergency Department Discharge databases, MA Center for Health Information and Analysis. These data are compiled and reported by fiscal year. Data do not include non-MA residents or MA residents who received care out-of-state.

Population: Missouri Census Data Center, Population Estimates by Age. This site provides the most recent population estimates from the U.S. Census Bureau. <https://census.missouri.edu/population-by-age/>

Counts and Rates: Due to confidentiality guidelines, counts and rates based on less than 11 nonfatal injuries are suppressed. Rates based on counts of less than 20 may be unstable and should be interpreted with caution; rates are not calculated on counts of less than 5 deaths. Rates are age-adjusted rates per 100,000 persons unless otherwise noted.

Injury Definitions

Injury Deaths: Injury deaths are defined as those with an ICD-10 code of V01-Y36, Y85-Y87, Y89 or U01-U03 in the underlying cause of death field. Adverse medical/surgical effects and late entry deaths are excluded.¹⁶

Injury-related Hospital Stays: Hospital stays include hospital discharges and observation stays; in-hospital deaths and transfers are excluded. Injury cases are defined as those with an ICD-9-CM code of 800-909.2, 909.4, 909.9, 910-994.9, 995.5-995.59 or 995.80-995.85 in *any* diagnosis field. Adverse medical/surgical effects are excluded.¹⁶ In contrast with CDC guidelines, the MA injury definition searches all diagnosis fields for these codes, rather than just the principal diagnosis field.

Injury-related Emergency Department (ED) Visits: Injury cases in ED data are defined as those with an ICD-9-CM code of 800-909.2, 909.4, 909.9, 910-994.9, 995.5-995.59 or 995.80-995.85 in the *principal* diagnosis field, (which excludes adverse medical/surgical effects), OR E800-E869, E880-E929, or E950-E999 in *any* external-cause-of-injury (E-code) field.¹⁶ Deaths are excluded.

Injury Cause and Intent: With the exception of drug overdoses, injury deaths are classified according to CDC guidelines using ICD-10 underlying cause of death code¹⁷ and nonfatal injuries are classified by cause and intent according to CDC external cause groupings using the first valid ICD-9-CM E-code.¹⁸

Drug Overdoses: Fatal drug overdoses are defined as those with an ICD-10 code of X40-X449, X60-X649, X85-X859 or Y10-Y149 in the underlying cause of death field. Nonfatal drug overdoses are those with an ICD-9-CM code of 9600-9799 in *any* diagnosis field OR E850.0-E858.9, E950.0-E950.5, E962.0 or E980.0-E980.5 in *any* E-code field.

16. Thomas KE, Johnson RL. *State injury indicator report: Instructions for preparing 2011 data*. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2015.

17. See http://ftp.cdc.gov/pub/Health_Statistics/NCHS/injury/sascodes/icd10_external.xls

18. See http://www.cdc.gov/injury/wisqars/ecode_matrix.html

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