Michigan Injury Hospitalizations, 2011

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Acknowledgments
The Michigan Health and Hospital Association is responsible for managing the Michigan Inpatient Database, the primary source of information for this report.

EXECUTIVE SUMMARY

This report examines Michigan resident injury hospitalizations for 2011. The age, sex, county of residence and the types of injuries sustained were analyzed. The cause of injury, which is a critical piece of information for injury prevention purposes, was also examined. In-depth cause of injury analyses were conducted for nineteen counties and the City of Detroit. Each of these areas met the standard set by the Michigan Department of Community Health of providing cause of injury codes (E-codes) for at least 90% of injury inpatients.

The report utilized data from the Michigan Inpatient Database (MIDB). The Michigan Department of Community Health purchases annual MIDB data from the Michigan Health and Hospital Association, which is responsible for data aggregation and maintenance. Definitions and analysis format were based on national recommendations that were released in 2003. Key findings of the report are as follows:

GENERAL

- In 2011, there were 61,932 Michigan resident hospitalizations for which the principal diagnosis was injury. This corresponds to an injury hospitalization rate of 627 per 100,000 residents.
- Injury hospitalizations comprised 4.8% of the 1,294,784 hospitalizations for any condition among Michigan residents in 2011.
- About half of the patients (46%) had routine discharges (i.e., to home with self-care); 2.1% died prior to discharge.

DEMOGRAPHIC CHARACTERISTICS

- Between ages one and sixty four, males had higher injury hospitalization rates than females. For every age group thereafter, females had higher rates.
- For both sexes, rates were lowest among those aged 5-9 and highest for those aged 85 and older.
- The rate for women aged 85 and older was more than eight times the overall rate.

GEOGRAPHIC DISTRIBUTION

- Among the counties with the five highest injury rates in the state, four were in the east central region of the Lower Peninsula (Saginaw, Gratiot, Bay, and Genesee).

TYPES OF INJURIES

- The most common type of injury listed as the primary diagnosis was hip fracture. These cases comprised about one in seven injury hospitalizations.
- Eleven percent of injury inpatients had traumatic brain injury as their primary diagnosis.

CAUSES OF INJURY

- An E-code indicating the cause of injury was provided for 50,584 of the 61,932 Michigan resident injury hospitalizations (E-coding rate: 81.7%).

- The E-coding rate has remained between 80%-82% since 2006. In the five years previous to 2006, the rate held steady between 85% and 86%.
- E-coding rates varied widely by county of residence, from 4% to 99%. There was no clear association between E-coding rates and state regions.
- Of the injury hospitalizations for which an E-code was provided, unintentional injuries comprised 81%, suicide attempts/intentional self-harm 10%, and assaults 5.6% (the remaining cases were of undetermined intent or otherwise classified).
- In each of the 20 areas for which a cause of injury analysis was performed, unintentional falls were the leading cause of injury. For most of these areas, falls caused about half of all injuries.
- Assaults caused nearly one-quarter of injury hospitalizations among Detroit residents. Among the other areas examined, assaults caused at most 10% of injury hospitalizations.
- Poisoning was by far the leading mechanism for those attempting suicide or otherwise intentionally harming themselves.

OCCUPATIONAL INJURIES

- Workers' compensation was the primary payment source for 2.2% of injury hospitalizations among those aged 16 and older. Because workers' compensation is not utilized as a payment source by everyone who is injured at work, the number of occupational injuries requiring hospitalization was likely understated in this study.
- Males had an occupational injury hospitalization rate that was more than three times that of females. Among those aged 65 and older, however, women had a rate that was 32% higher than the rate for men.
- Of Michigan's ten most populous counties, Macomb County had the highest occupational injury hospitalization rate. The rate for workers who lived in Macomb County was 21% greater than the statewide rate.
- Compared to all injury inpatients aged 16 and older, those who were injured at work sustained a greater proportion of upper limb fractures, open wounds, sprains/strains, and burns, but a lower proportion of poisonings and hip fractures.

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INTRODUCTION

Injuries are a significant public health issue in Michigan. In 2011, 6,159 Michigan residents died from injuries (including unintentional injuries, suicides, and homicides)[1] making injury the third leading cause of death in the state.[2] Deaths are the most serious and prominent outcome of injuries, but most injuries are not fatal. In Michigan, for every death due to injury, there are approximately 10 hospitalizations and more than 200 emergency department visits.[3]

The Injury and Violence Prevention Section (IVPS) in the Michigan Department of Community Health has sponsored five statewide reports on injury mortality[4-8] and four on injury hospitalization.[3,9-11] This report utilizes cause of injury information in a manner similar to the 2007 report. Information on causes of injury (e.g., pedestrian struck by a motor vehicle, suicide attempt via poisoning) is crucial to developing well-targeted prevention strategies. However, hospitalization data in Michigan have historically provided incomplete coding of injury causation. In an effort to maximize the use of this information while avoiding the presentation of data with a high level of missing values, cause of injury profiles were developed only for those counties with the most complete information. As cause of injury data become more complete, the IVPS anticipates analyses in subsequent reports to include more counties and eventually to perform an in-depth statewide analysis.

DATA SOURCES AND METHODS

Data Sources

The Michigan Inpatient Database (MIDB) was the source of data on injury hospitalizations. The MIDB is the aggregation of hospital discharge data voluntarily provided to the Michigan Health and Hospital Association (MHA) by every acute care hospital in Michigan. In addition, hospitals in contiguous states (Indiana, Ohio, and Wisconsin) and some non-contiguous states (sixteen in 2011) submit data on hospitalized Michigan residents to MHA.

The United States Census Bureau estimates for the 2011 Michigan population[12] were used to calculate state and county-level population-based hospitalization rates. The Bureau of Labor Statistics, U.S. Department of Labor provided data on the number of employed residents in 2011

by age and sex as ascertained by the Current Population Survey[13] and by county of residence per the Local Area Unemployment Statistics program.[14] These data were used to calculate worker-based hospitalization rates for occupational injuries.

Methods

An "injury hospitalization" was defined as a Michigan resident hospitalized for an injury in a non-federal, acute care facility in Michigan or another state. Out-of-state residents hospitalized in Michigan were excluded. An "injury" was defined as a hospitalization for which the principal diagnosis was among the following ICD-9-CM[15] codes: 800.0-909.2, 909.4, 909.9, 910.0-994.9, 995.50-995.59, 995.80-995.85. This range was based on the recommendations made by a panel of national injury surveillance experts.[16] Excluded were certain adverse effects (995.0-995.4, 995.6, 995.7, 995.89), and complications of surgical and medical care (996.0-999.9). Adverse effects of medical care are generally considered to be outside the scope of public health injury prevention programs.

Patients were limited to those discharged from a hospital between January 1, 2011 and December 31, 2011. Patients admitted to a hospital more than once for the same injury (i.e., readmissions) were not excluded (see discussion below). Patients who died during their hospitalization were included.

Injury diagnoses were categorized according to the Barell Matrix,[17] a two-dimensional array of ICD-9-CM codes grouped by body region and nature of injury. Use of this matrix was recommended by the national injury surveillance workgroup. The Barell Matrix and the ICD-9-CM codes defining each cell are presented in Table C-1 in Appendix C.

ICD-9-CM contains supplementary codes with which to specify the external cause of injury and poisoning. These "E-codes" indicate both the mechanism (e.g., struck by blunt object) and the intentionality (e.g., assault) of the injury cause. According to coding rules, an E-code should be assigned to every case involving an injury or poisoning (ICD-9-CM 800-999). In 1991, the rate at which injury hospitalizations were E-coded in Michigan was 51.9%.[18] In 1999, the rate surpassed 80%. Since that point, it has remained in the 80%-86% range. Analyzing the causes of

injury is crucial to developing well-targeted prevention efforts. However, it is unknown if the characteristics of the cases for which information on injury cause is not provided are similar to the characteristics of cases for which this information is provided. Therefore, great care must be taken when presenting cause of injury information when E-coding is incomplete.

For this report, we limited cause of injury analyses to counties whose residents were E-coded at 90% or greater (this included the City of Detroit as a special analysis). This approach allows for important cause of injury information to be presented while minimizing errors associated with missing data. In addition, a less in-depth cause of injury analysis was performed for the entire state even though the E-coding rate was below 90%. We felt that the benefit of presenting this broad profile outweighed the risk of mispresentation.

Some medical records contain more than one E-code. An algorithm for selecting the E-code to represent each record was provided by the national injury surveillance workgroup. That group also provided recommendations for calculating E-coding rates.* For more detail on these methodologies, please see the reference paper.[16]

A framework for presenting cause of injury information was developed by the U.S. Centers for Disease Control and Prevention (CDC) and was included in the national injury surveillance workgroup recommendations[16] (see Table D-1 in Appendix D for this framework). This matrix illustrates the cause and intent of each injury event and the E-codes that define each cell. Cells within this table that are shaded indicate that no ICD code exists for that category.

Hospitalization rates were calculated by dividing the number of hospital discharges by the appropriate population and multiplying by 100,000. For the analysis on occupational injuries, the population used was the number of people employed. Rates were calculated only when based on

* The workgroup recommended excluding E-codes E869.4 (Accidental poisoning by secondhand tobacco smoke) and E967.0-E967.9 (Child and adult battering and other maltreatment) from the numerator in E-coding rate calculations. Previous Michigan injury hospitalization reports[3,9] did not make this exclusion because it was felt that these codes do provide some information on injury cause. This report did exclude these codes from E-code rate calculations to be consistent with the guidelines and allow for comparison to other state rates. The effect of excluding these codes was minimal (it reduced the statewide E-coding rate by 0.1%).

six or more discharges. Rates based on less than six discharges were considered unreliable because the relative standard error exceeded 40%. Asterisks identify these cases in the tables.

A geographical analysis was performed allowing for comparison of county injury rates. Age adjustment was utilized to eliminate differences in crude rates between the counties that may have been due to differing age distributions. A substantial number of counties had insufficient numbers of cases to perform standard age-adjustment which requires parceling cases into eleven age groups. To increase the number of counties for which valid rates could be calculated, the number of years within each age group was increased. This reduced the number of age groups from eleven to three: ages 0-24, 25-64, 65 and older. Age adjusting with only three age groups seems reasonable given that a report[19] by the National Center for Health Statistics on age-adjusting methods provides several examples using these same age groups.

Geographic analyses also were performed for two specific types of injury: hip fracture and traumatic brain injury. Since hip fracture incidence is strongly associated with age, varying age distributions across counties could account for differing hip fracture hospitalization rates. Thus, age-adjustment is warranted. However, due to small cell sizes in many counties, age-adjustment was not a valid strategy, even using three broad age groups as described above. As a next-best approach, the hip fracture analysis was limited to those over age 65.[Δ] Incidence of traumatic brain injury also varies by age and age adjustment would be appropriate here too. Again, due to small cell sizes, this was not feasible. Also, because rates were high among the very young and the elderly, it was felt that no one age group could be selected for use in the geographical analysis. Thus, the county-specific rates for TBI reflect crude rates for all ages.

Michigan county rates were mapped using ArcView (software designed by ESRI). With the exception of the map illustrating E-coding levels, rates were categorized into four groups using the "equal interval" classification method. In this method, the range of hospitalization rates was divided into four equal sub ranges. For example, if the lowest county rate was 26 per 100,000 and the highest county rate was 125 per 100,000, the four sub ranges would be: 26-50, 51-75, 76-

[Δ] The National Center for Health Statistics found a significant effect of age adjusting within the 65 and older age group.[20] While performing this age adjustment would be beneficial, doing so for hip fractures would greatly limit the number of counties that could be included in the analysis.

100, and 101-125. In each geographical analysis, the quartile representing the highest rates contained the fewest counties. Thus, this methodology highlighted the relatively few counties with rates much higher than the state rate. Rates were not calculated for counties with less than six resident discharges due to the high statistical variability of these rates. Figure 6, which illustrates E-coding rates by county of residence, utilized three categories reflecting "low" (less than 70%), "medium" (70% - 89%), and "high" (90% and higher) rates of E-coding to be consistent with maps in previous Michigan injury hospitalization reports.

Michigan residents who were hospitalized more than once for the same injury in 2011 were counted for each hospital discharge. Optimally, these cases would have been counted once to reflect injury incidence. However, there was no way to reliably sort out readmissions (due to missing values and different interpretations across hospitals for coding the Readmission field) or to identify patients treated in different hospitals for the same injury because the MIDB does not contain personal identifiers. There is some evidence that patients who are readmitted for the same injury differ from those who are admitted only once per injury. One study found that females were readmitted to a greater degree than males and that readmission rates varied by age, with readmission most likely for those over age 75.[21] One injury researcher, who examined the Readmission variable in the MIDB for 1997,[22] estimated the prevalence of readmissions at 5%.♦ Because subsequent hospitalizations for the same injury incident could not be excluded, the frequencies and rates presented in this report represent frequencies and rates of injury hospitalization, not injury incidence.

Analyses involving patient race were not performed. The national injury surveillance panel does not recommend performing this analysis, citing the complexities regarding the collection of racial information.

The terms "hospitalization" and "discharge" are used interchangeably in the report and should be considered synonymous.

♦ The researcher found that 5.2% of records had a value in the Readmission field indicating that the visit was a readmission. He assumed that cases for which this field contained missing values were not readmission visits. (Readmission data were missing for 83% of the records.) In other states, he estimated the prevalence of readmission between 3.8% (1997 Vermont) and 8.4% (1994 Missouri).

RESULTS

In 2011, there were 61,932 Michigan resident hospitalizations for which the principal diagnosis was injury. This corresponds to an injury hospitalization rate of 627.1 per 100,000 residents. Injury inpatients comprised 4.8% of the 1,294,784 Michigan residents hospitalized for any reason. Nearly all (96.8%) of the injury discharges were from Michigan hospitals. Almost half (46.3%) of these patients had routine discharges (home with self care) and one in fifty (2.1%) died prior to discharge (Table 1).

TABLE 1
Number of Injury Hospitalizations
By Discharge Disposition
Michigan Residents, 2011

Discharge Disposition	Number	%
Home	35,197	56.8
Routine/self care	*28,656*	*46.3*
Home health services	*6,328*	*10.2*
Hospice care	*213*	*0.3*
Skilled nursing facility	13,919	22.5
Inpatient rehabilitation center	4,187	6.8
Acute care hospital	924	1.5
Intermediate care facility	198	0.3
Left against medical advice	948	1.5
Long-term care facility	377	0.6
Hospice care at medical facility	439	0.7
Died	1,288	2.1
Other disposition	4,452	7.2
Invalid/missing data	3	0.0
Total	61,932	100.0

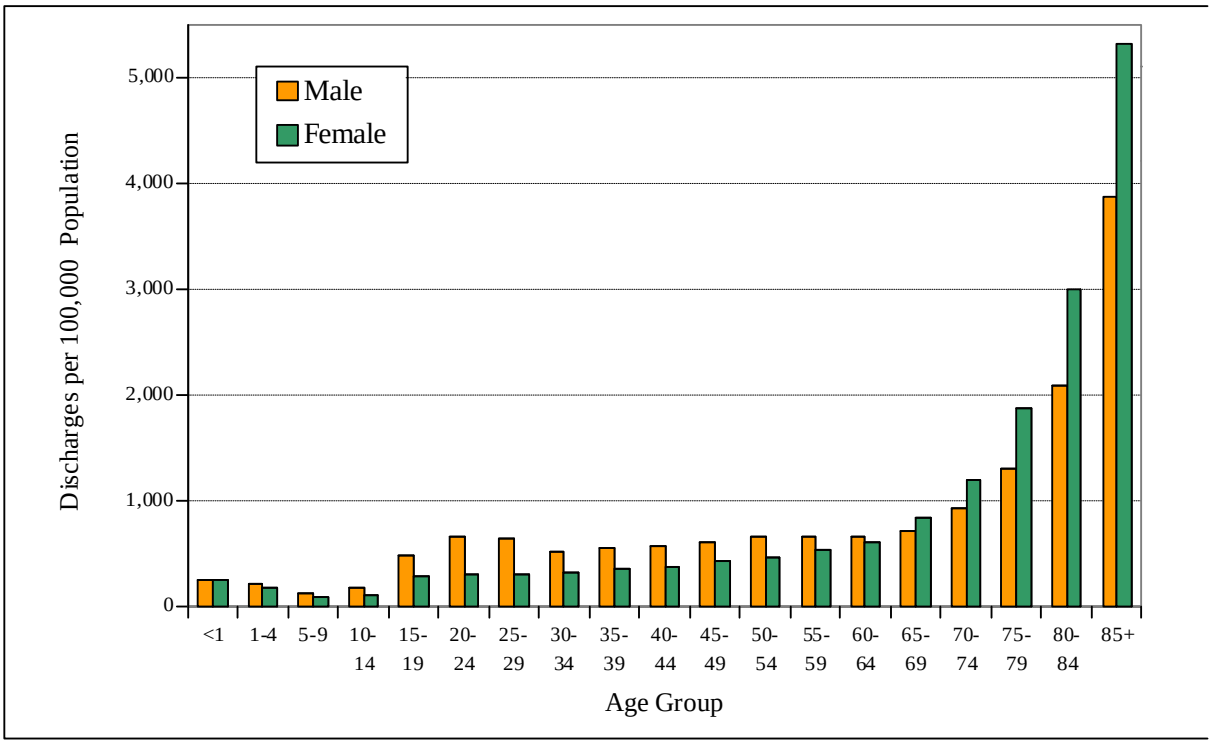
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

Demographics of Injury Inpatients

The hospitalization rate was higher for males than females for each age group up through ages 60-64 (Figure 1). For every age group thereafter, rates for females were greater. For both sexes, rates were lowest for those aged 5-9 years and highest for those aged 85 and older. Among those

over age 69, injury rates increased dramatically with each subsequent five-year age interval. (See Table A-1 in Appendix A for age and sex specific rates.)

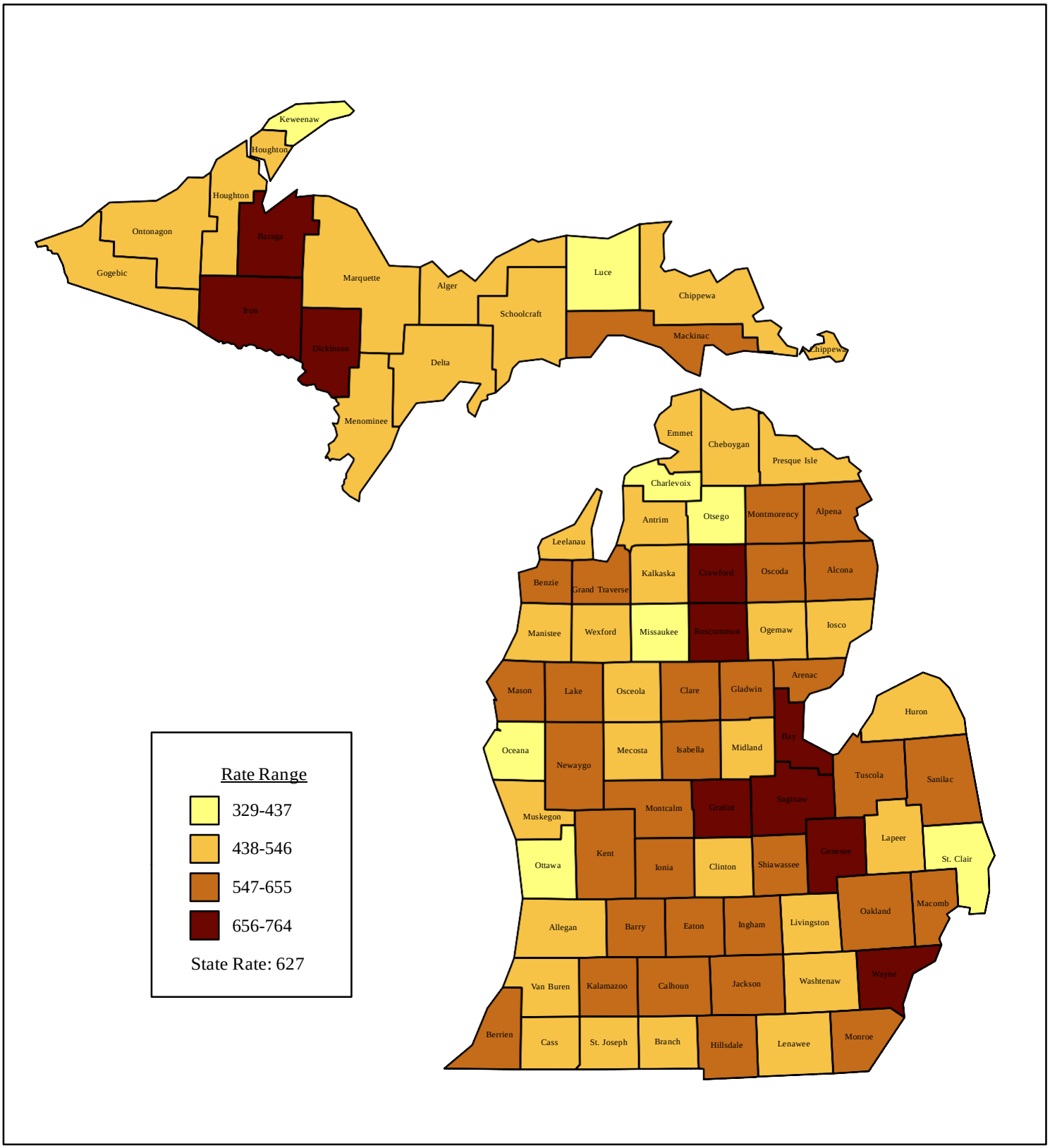
FIGURE 1
Rate of Injury Hospitalization
By Age and Sex
Michigan Residents, 2011



Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

The variation of injury hospitalization rates by county of residence is illustrated in Figure 2. Note that these rates have been age-adjusted, meaning that differences in injury rates cannot be explained by differences in county age distributions. Saginaw County (764 per 100,000), Wayne County (754), Gratiot County (731), and Bay County (724) had the highest age-adjusted injury rates. See Table A-2 in Appendix A for crude rates and age-adjusted rates for all counties.

FIGURE 2
Age-adjusted Hospitalization Rates for All Injuries
By County of Residence, Michigan, 2011



Hospitalization rates are the number of hospital discharges per 100,000 population.

Injury hospitalizations are discharges with a principal diagnosis code in the following range per ICD-9-CM:
800.0-909.2, 909.4, 909.9, 910.0-994.9, 995.50-995.59, 995.80-995.85.

Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

Types of Injuries Sustained

Major types of injuries are illustrated by body region in the Barell Matrix (Table 2). Fractures were the leading type of injury, comprising 53% of the principal diagnoses. More than a quarter (28%) of the fractures were to the hip. Twelve percent of injury hospitalizations were for traumatic brain injury (TBI). Most of these (77%) were Type 1 TBI, the most severe injury group. There were three Shaken Infant Syndrome TBI cases.

Geographic Profile of Selected Injury Types

Traumatic Brain Injuries

There were 7,191 hospitalizations of Michigan residents in which traumatic brain injury (TBI) was the principal diagnosis.[*] This corresponds to a statewide rate of 72.8 per 100,000 residents. Rates varied from 23.1 per 100,000 Charlevoix County residents to 115 per 100,000 Arenac County residents. (Rates were not calculated for two counties that had less than six discharges.) Figure 3 illustrates TBI hospitalization rates by county of residence. Among the state's ten most populous counties, Genesee County and Saginaw County had the highest rates (91.9 and 91.5 per 100,000, respectively). See Table A-3 in Appendix A for all county-specific TBI hospitalization rates.

Hip Fractures, Ages 65 and Older

There were 7,899 hospitalizations of Michigan residents aged 65 and older in which hip fracture was the principal diagnosis. This represented 86% of hip fractures among all ages. The corresponding hip fracture rate was 569 per 100,000 residents aged 65 and older. Figure 4 illustrates hip fracture hospitalization rates for those aged 65 and older by county of residence. Rates varied from 278 per 100,000 Arenac County residents to 1,045 per 100,000 Gratiot County residents. (Rates were not calculated for two counties that had less than six discharges.) See Table A-4 in Appendix A for all county-specific hip fracture hospitalization rates.

[*] It is likely that the number of true TBI hospitalizations was greater than 7,191 in 2011. Some hospitalizations that normally would be identified as TBI via ICD-9-CM code 854 ("Intracranial injury of other and unspecified nature") may have been coded as 959.01 ("Head injury, unspecified"), which was added to ICD-9-CM in 1997. The CDC notes that this type of misclassification has been occurring in a substantial number of cases.[17] In Michigan, the number of hospitalizations coded with ICD-9-CM 854 dropped noticeably starting in 1998.

TABLE 2

Number of Injury Hospitalizations By Body Region and Injury Type, Principal Diagnoses, Michigan Residents, 2011

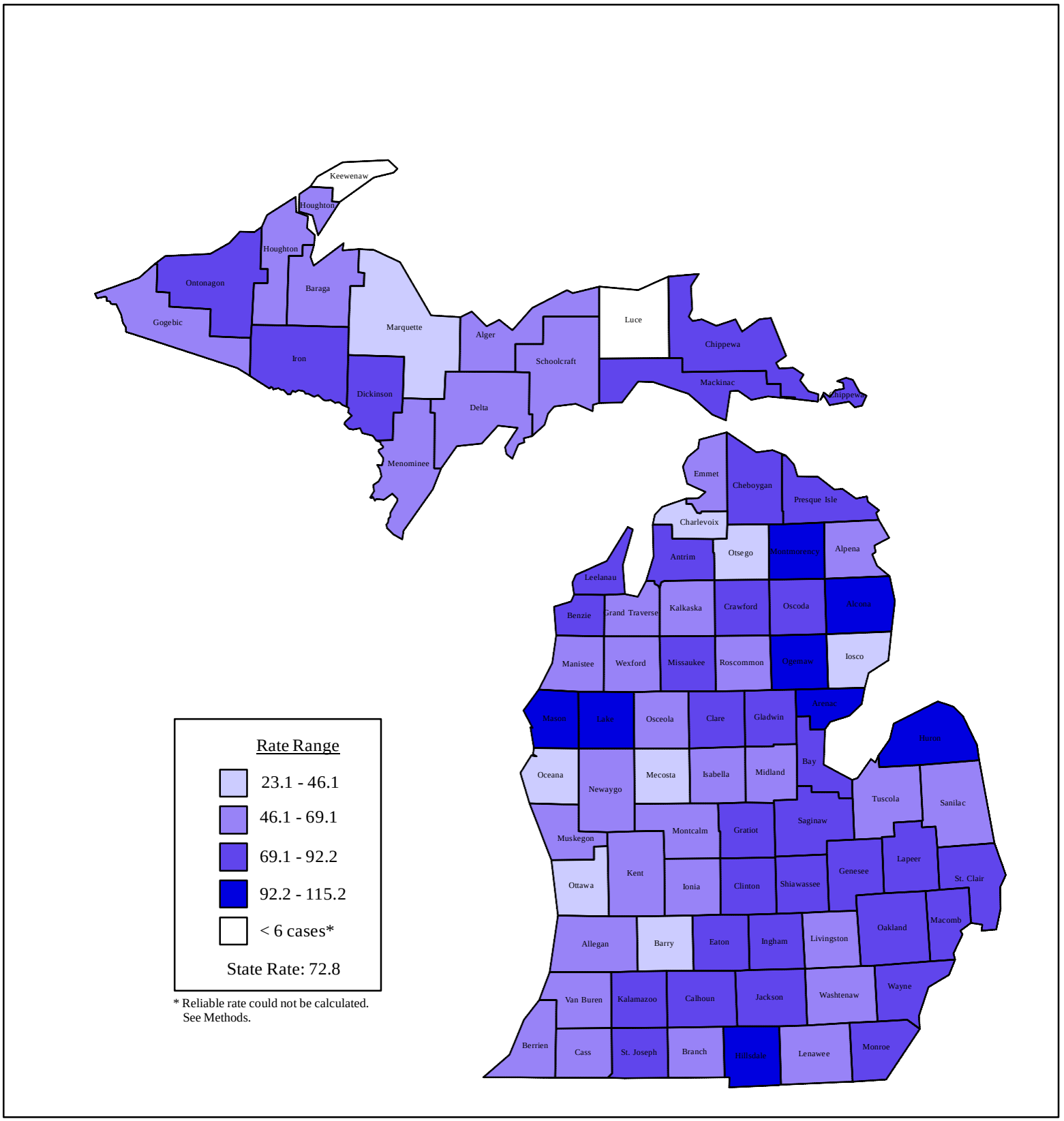
Body Region	Fracture	Dislocation	Sprain/ Strain	Internal	Open Wound	Amputation	Blood Vessels	Contusion/ Superficial	Crush	Burn	Nerves	Unspecified	TOTAL
Brain - Type 1 TBI[1]	1,290			4,217							0		5,507
Brain - Type 2 TBI[2]	195			1,270									1,465
Brain - Type 3 TBI[3]	219												219
Other Head					241					20	8	347	616
Face	1,306	9	0		314					76			1,705
Eye					143			42		6	1		192
Neck	12		0		93				4	17	2		128
Head, Face, Neck Unspecified							35	337	3	106	0	20	501
Cervical Spinal Cord (SCI)	162			128									290
Thoracic/Dorsal SCI	88			12									100
Lumbar SCI	34			2									36
Sacrum Coccyx SCI	6			0									6
Spine & Back Unspecified SCI	0			12									12
Cervical Vertebral Column (VCI)	1,050	106	139										1,295
Thoracic/Dorsal VCI	966	5	8										979
Lumbar VCI	1,365	60	62										1,487
Sacrum Coccyx VCI	248	4	1										253
Spine & Back Unspecified VCI	7	0											7
Chest	1,716	7	8	1,387	53		22	168	17	74	1		3,453
Abdomen				1,253	110		16	80		37	1		1,497
Pelvis & Urogenital	1,839	3	18	183	72		8	14	0	10	0		2,147
Trunk	1				8			31	1	22	0	103	166
Back & Buttock			13		24			67	5	59			168
Shoulder & Upper Arm	2,728	86	239		58	4		48	8	46		9	3,226
Forearm & Elbow	1,524	15	3		132	11		17	6	69			1,777
Wrist, Hand & Fingers	280	25	8		281	111		22	54	147		8	936
Other & Unspecified Upper Extremity	0				7	1	82	22	0	25	55	5	197
Hip	9,214	58	78					159	0				9,509
Upper Leg & Thigh	1,900	0				1		82	10	55			2,048
Knee	407	138	47					88	1	8			689
Lower Leg & Ankle	5,587	15	71			7		109	23	97			5,909
Foot & Toes	655	19	0		86	20		37	26	80			923
Other & Unspecified Lower Extremity	0		213		400	0	60	43	4	24		32	776
Other/Multiple	1						3			4	9		17
Unspecified	1	0	31	4	2		0	40	2	10	13	15	118
System-wide & Late Effects													13,578
TOTAL	32,801	550	939	8,468	2,024	155	226	1,406	164	992	90	539	61,932

1. Type 1 Traumatic Brain Injury: recorded evidence of an intracranial injury or a moderate or a prolonged loss of consciousness (LOC), shaken baby syndrome or injuries to the optic nerve pathways.
2. Type 2 Traumatic Brain Injury: injuries with no recorded evidence of intracranial injury, and LOC of less than one hour, or LOC of unknown duration, or unspecified LOC.
3. Type 3 Traumatic Brain Injury: Patients with no evidence of intracranial injury and no LOC.

See Table C-1 in Appendix C for ICD-9-CM codes defining cells in this matrix.

Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

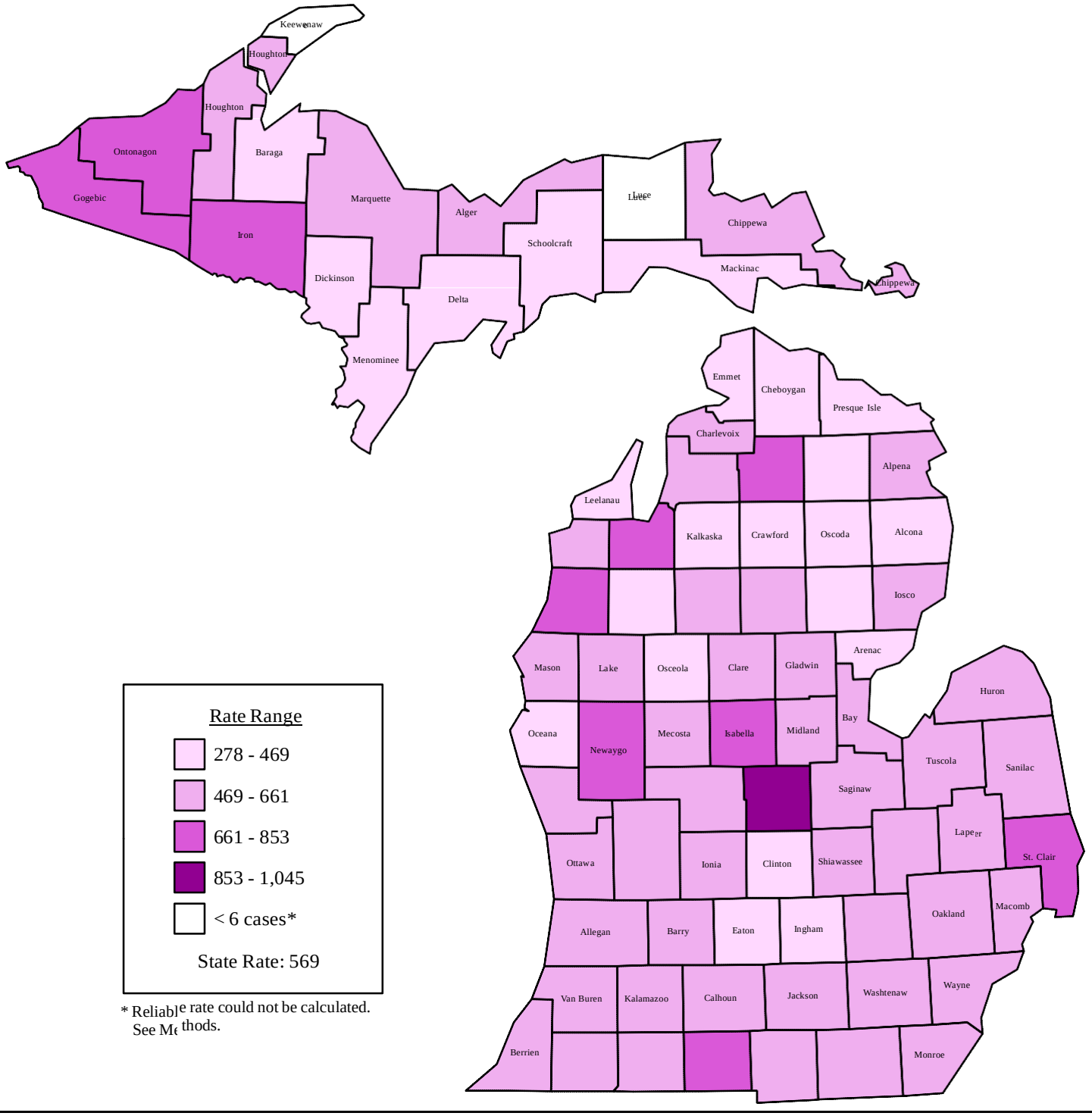
FIGURE 3
Hospitalization Rates for Traumatic Brain Injuries
By County of Residence, Michigan, 2011



* Reliable rate could not be calculated. See Methods.

Hospitalization rates are the number of hospital discharges per 100,000 population.
Traumatic brain injuries are discharges with a principal diagnosis in the following range per ICD-9-CM: 800, 801, 803, 804, 850-854, 950.1-950.3, 995.55.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 4
Hospitalization Rates for Hip Fractures, Ages 65 and Older
By County of Residence, Michigan, 2011



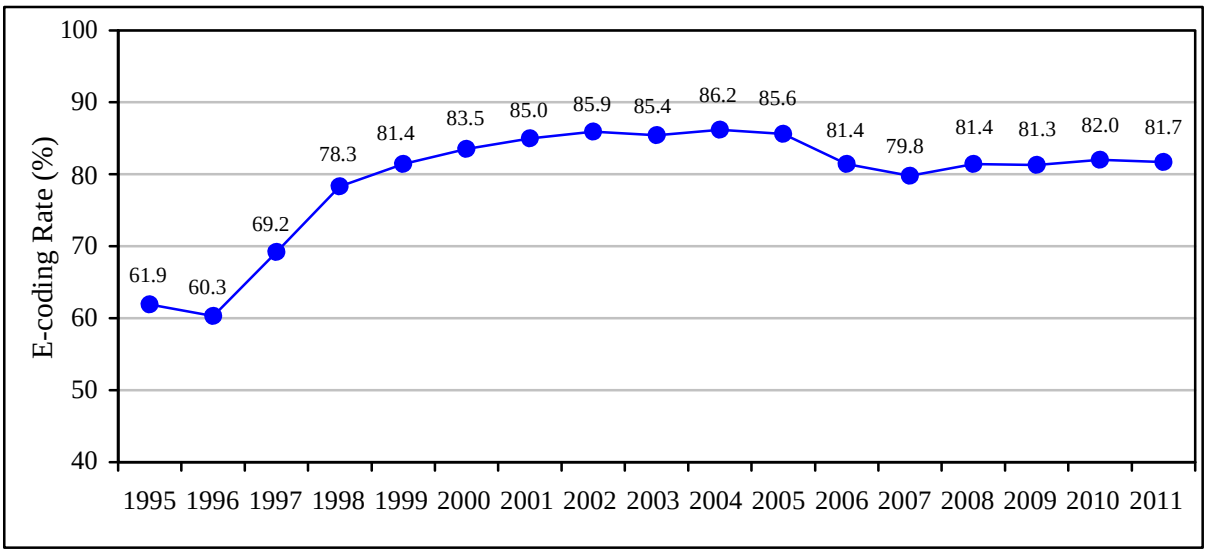
Hospitalization rates are the number of hospital discharges per 100,000 population.
Hip fractures are discharges with a principal diagnosis in the following range per ICD-9-CM: 820.0-820.9.
Sources: MI Resident Inpatient Files: Division for Vital Records and Health Statistics, MDCH

U.S. Census Bureau, Population Estimates Branch

Cause of Injury Coding – Trends and Geographical Characteristics

An E-code indicating the cause of injury was provided for 50,584 of the 61,932 Michigan resident hospital discharges in 2011. This 81.7% E-coding rate is consistent with the rates since 2006 (see Figure 5[*]).

FIGURE 5
Statewide E-coding Rate by Year
Michigan Resident Injury Hospitalizations, 1995-2011



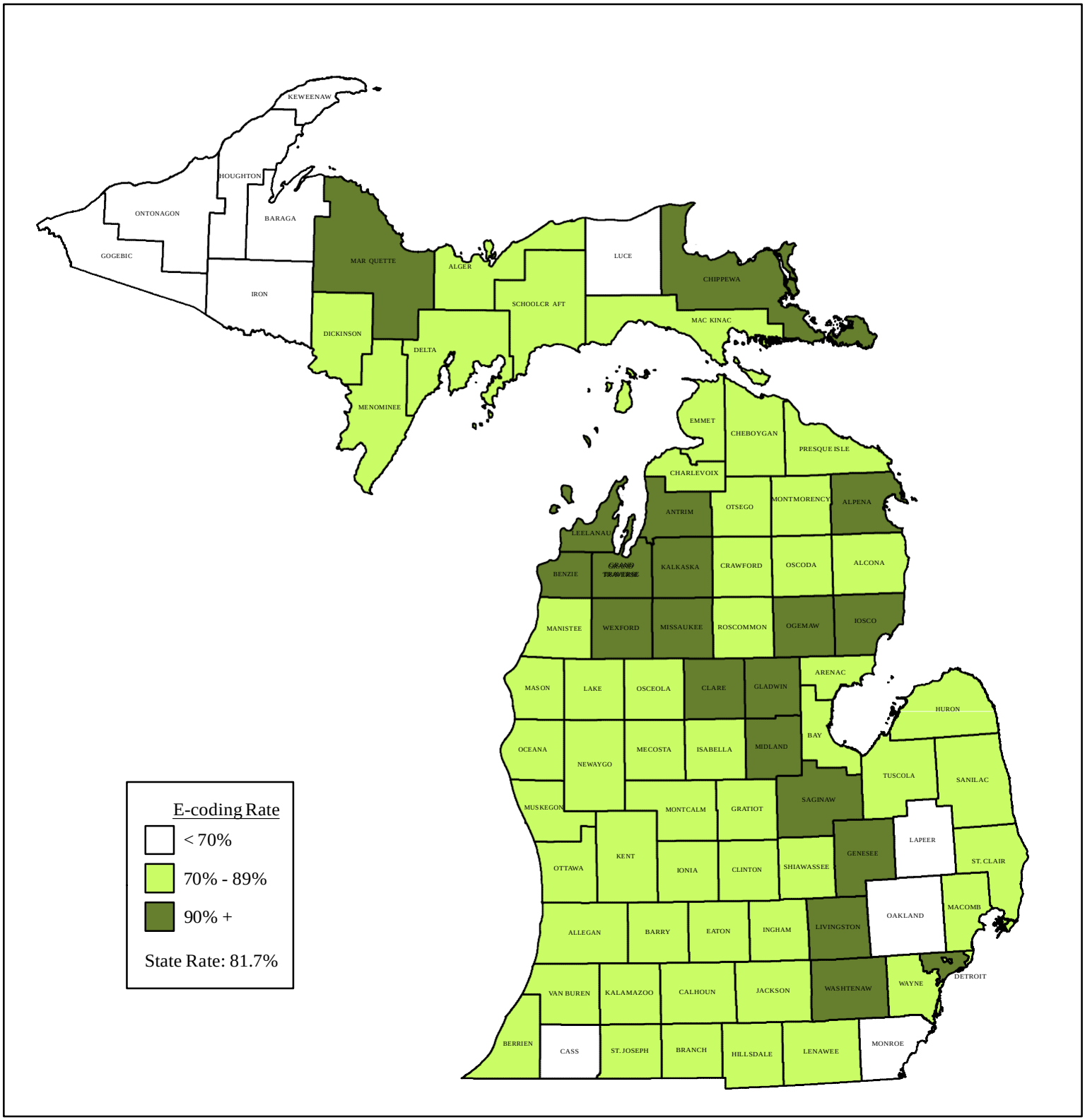
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

The Michigan Department of Community Health requires that the statewide E-coding rate be at least 90% before in-depth analyses of injury causes are performed. MDCH is concerned about using incomplete data because cases that are coded may not be representative of all injury cases. Note that medical epidemiologists at the Centers for Disease Control and Prevention who were involved in developing national recommendations for injury surveillance using hospital discharge data[16] consider a 90% E-coding rate very high and strongly encourage examining those data.[23]

[*] The E-coding rates illustrated in Figure 5 were calculated using the national injury surveillance workgroup guidelines[14] which recommend excluding E-codes E869.4 and E967.0-E967.9 from the numerator in the calculation. See *Methods* for more discussion of this exclusion.

Figure 6 illustrates the variability of E-coding rates by county of residence. Rates ranged from 4% to 99%. Nineteen counties and the City of Detroit had an E-coding rate of at least 90% (these are displayed in dark green in Figure 6). Compared to 2007, this is an increase of two counties with at least this level of E-coding. There was no clear association between geography and E-coding rates.

FIGURE 6
E-coding Rates by County of Residence
Michigan Resident Injury Hospitalizations, 2011



Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

Causes of Injury

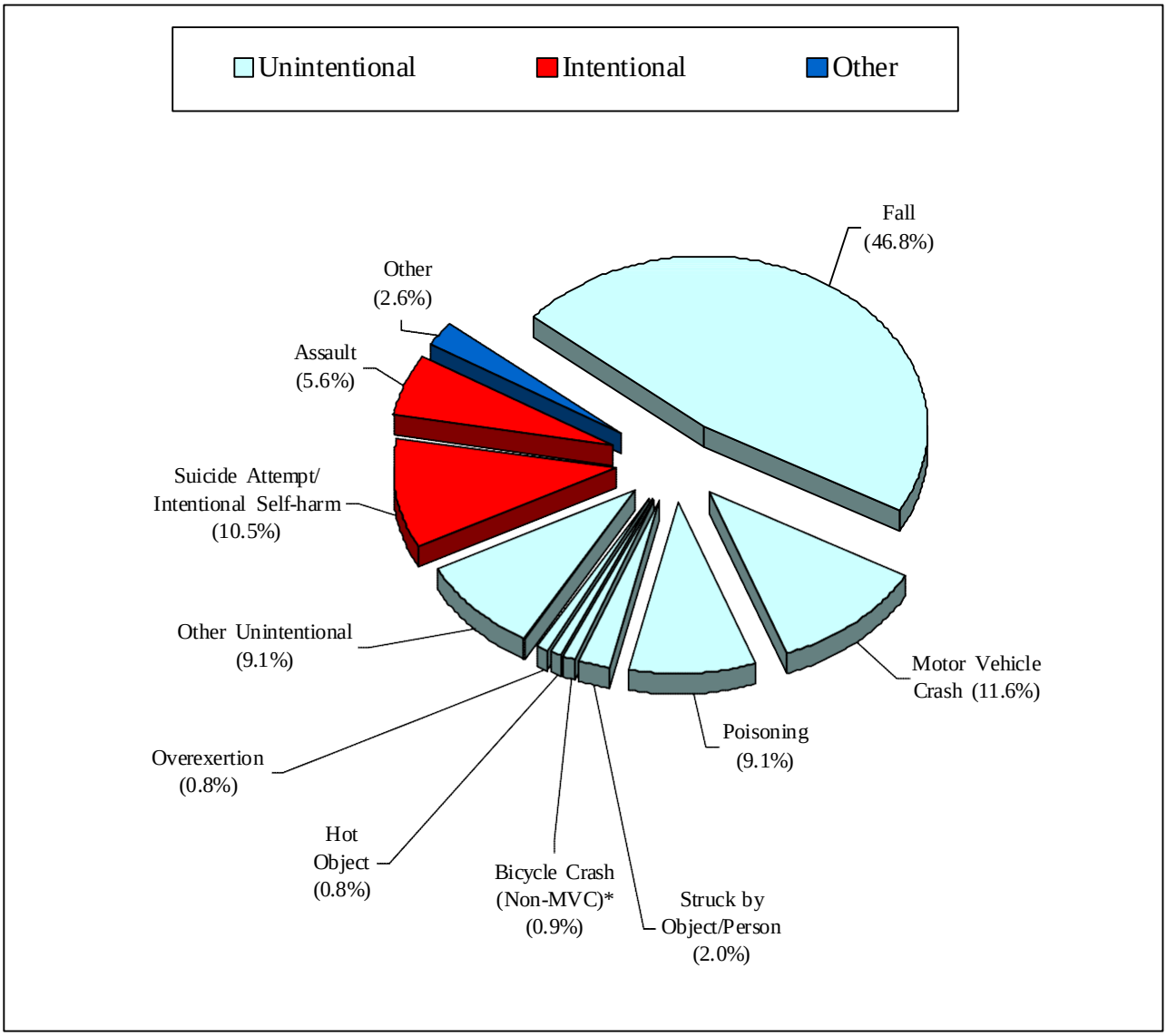
Michigan

An overall cause of injury profile for the state was developed (Figure 7). Because MDCH requires 90% E-coding for in-depth analyses to be performed, Figure 7 represents the extent of the statewide analysis.

The following should be noted about Figure 7:

- Unintentional injuries comprised 81.3% of all E-coded injury hospitalizations.
- Unintentional falls were by far the leading cause of injury.
- There were more hospitalizations for suicide attempts/intentional self-harm injuries than for assaults.
- Among motor vehicle crashes, 70% of those injured were vehicle occupants. Motorcyclists comprised 14% and pedestrians 10%.
- Seventy-six percent (76%) of bicycling injuries did not involve a collision with a motor vehicle (in Figure 7, bicyclists injured in motor vehicle crashes are included among the Motor Vehicle Crash category).

FIGURE 7
Causes of Injury Hospitalization
Michigan Residents, 2011
(N = 50,584 E-coded cases)



* Excludes bicyclists injured in motor vehicle crashes (MVC).
E-coding rate for Michigan: 81.7%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

Counties With At Least 90% Cause of Injury Coding

Brief cause of injury analyses were performed for the nineteen counties and the City of Detroit that had E-coding rates of 90% or higher. These analyses consisted of an overall profile of all injury causes and a list of the leading causes of injury for the major age groups.

Salient findings of these twenty area-specific analyses:

- Unintentional falls were the leading cause of injury for each area. The proportion of all injuries caused by falls varied substantially by area, from 28.4% in Detroit to 67.6% in Antrim County.

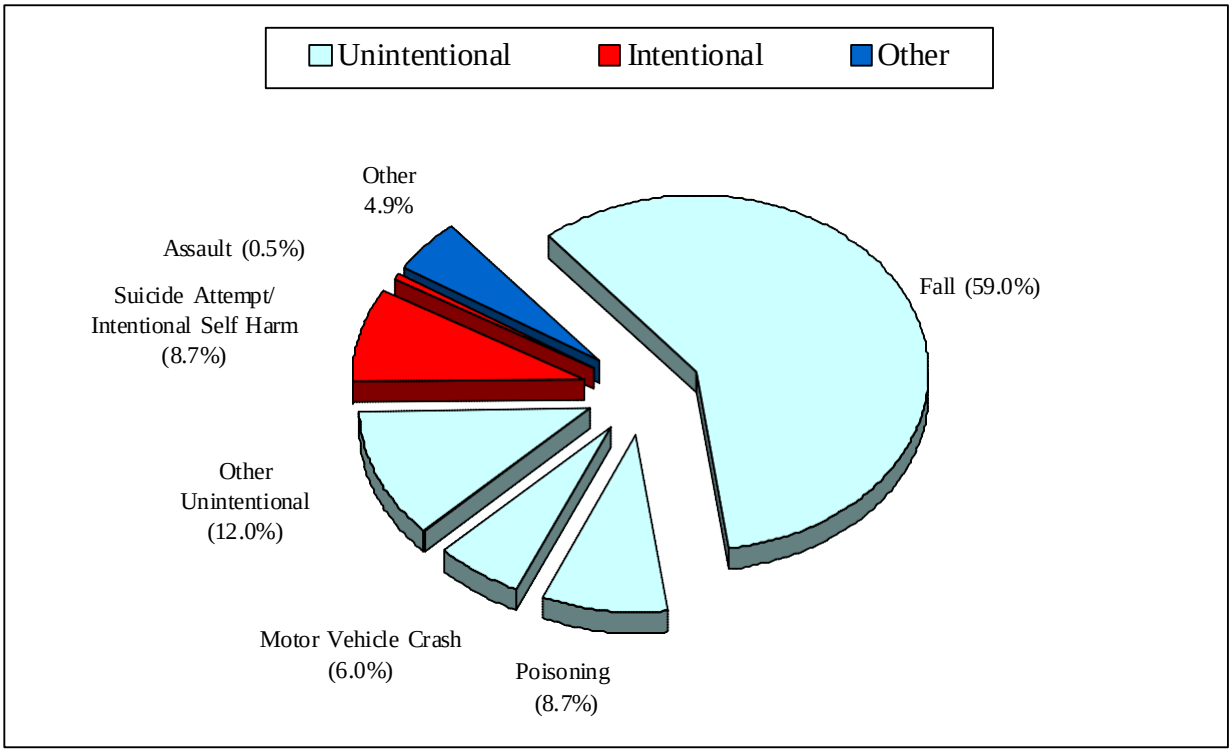
- The group most affected by falls were those aged 65 and older. Fall injury rates among this age group were at least 860 per 100,000, and most were over 1,000 per 100,000. These rates greatly exceeded rates for any other cause in the other age groups.

- Assaults caused nearly one-quarter (21.9%) of the injury hospitalizations among Detroit residents. Assaults caused 10% or less of the cases in each of the other areas examined.

- Poisoning was by far the leading mechanism for suicide attempts/intentional self-harm.

- The cause of injury profile was often distinct between counties. This provides support for continuing to perform area-specific analyses.

FIGURE 8
Causes of Injury Hospitalization
Alpena County Residents, 2011
(N = 183 E-coded cases)



E-coding rate for Alpena County: 92%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 3
Specific Causes of Injury Hospitalization
Alpena County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	108			Poisoning	16
Poisoning	16				
Machinery	5				
Bicycle Crash, non MVC	5				
MVC – Occupant	4				
Other	19				
Total	157	Total	1	Total	16

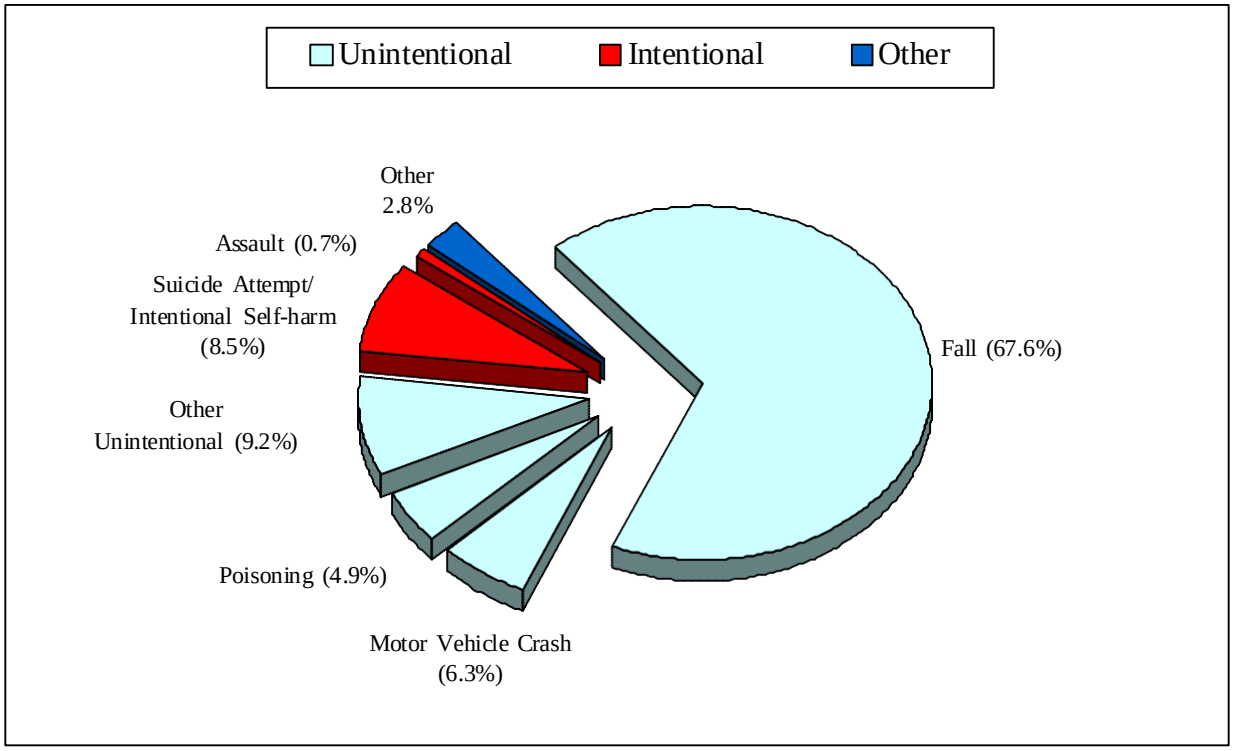
Causes not classifiable above comprised nine cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 4
Leading Causes of Injury Hospitalization, by Age Group
Alpena County Residents, 2011
Cause of Injury Coding Rate: 92% (183 of 200 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	2	100.0	*
5 – 14	All Causes	4	100.0	*
15 – 24	1. Unintentional Motor Vehicle Crash	4	28.6	*
	2. Unintentional Poisoning	3	21.4	*
	All Causes	14	100.0	420.7
25 – 44	1. Suicide Attempt/Intentional Self-harm	10	35.7	164.8
	2. Unintentional Fall	7	25.0	115.4
	All Causes	28	100.0	461.5
45 – 64	1. Unintentional Fall	17	41.5	182.5
	2. Unintentional Poisoning	6	14.6	64.4
	3. Suicide Attempt/Intentional Self-harm	4	9.8	*
	All Causes	41	100.0	440.1
65+	1. Unintentional Fall	83	88.3	1,433.5
	2. Unintentional Motor Vehicle Crash	3	3.2	*
	All Causes	94	100.0	1,623.5

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 9
Causes of Injury Hospitalization
Antrim County Residents, 2011
(N = 142 E-coded cases)



E-coding rate for Antrim County: 92%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 5
Specific Causes of Injury Hospitalization
Antrim County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	96			Poisoning	11
MVC – Occupant	8				
Poisoning	7				
Other	14				
Total	125	Total	1	Total	12

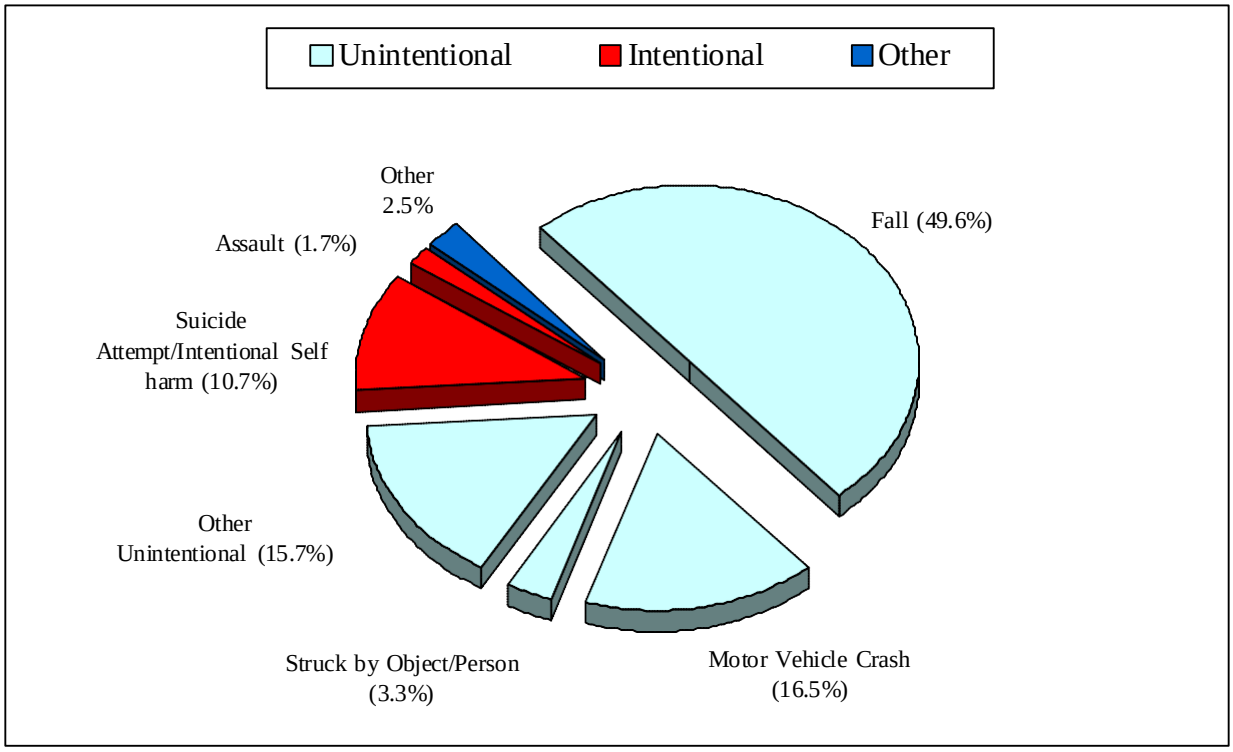
Causes not classifiable above comprised four cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 6
Leading Causes of Injury Hospitalization, by Age Group
Antrim County Residents, 2011
Cause of Injury Coding Rate: 92% (142 of 155 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	2	100.0	*
5 – 14	All Causes	2	100.0	*
15 – 24	1. Suicide Attempt/Intentional Self-harm	3	50.0	*
	All Causes	6	100.0	262.0
25 – 44	All Causes	9	100.0	200.3
45 – 64	1. Unintentional Fall	14	38.9	187.9
	2. Suicide Attempt/Intentional Self-harm	8	22.2	107.4
	3. Unintentional Motor Vehicle Crash	5	13.9	*
	All Causes	36	100.0	483.1
65+	1. Unintentional Fall	76	87.4	1,412.1
	All Causes	87	100.0	1,616.5

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 10
Causes of Injury Hospitalization
Benzie County Residents, 2011
(N = 121 E-coded cases)



E-coding rate for Benzie County: 98%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 7
Specific Causes of Injury Hospitalization
Benzie County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	60			Poisoning	11
MVC – Occupant	17				
Struck by Object/Person	4				
Other	22				
Total	103	Total	2	Total	13

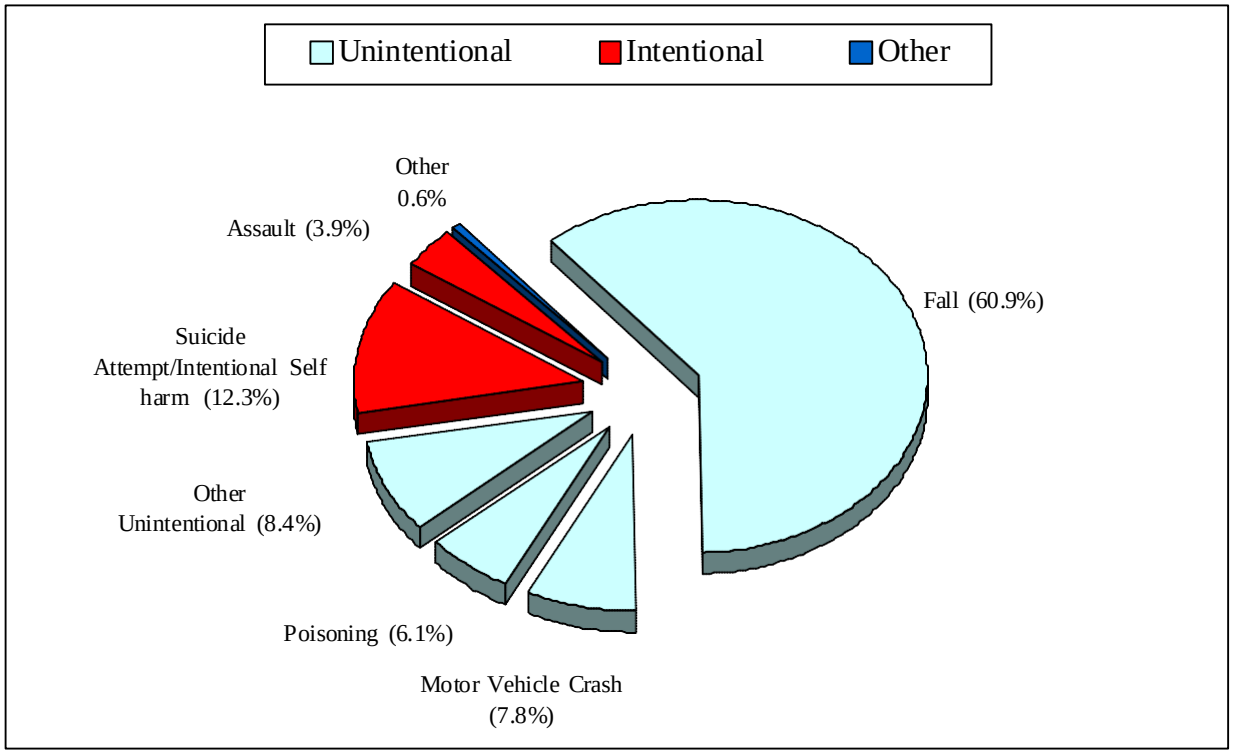
Causes not classifiable above comprised three cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 8
Leading Causes of Injury Hospitalization, by Age Group
Benzie County Residents, 2011
Cause of Injury Coding Rate: 98% (121 of 123 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes	0	-	-
5 – 14	All Causes	3	100.0	*
15 – 24	1. Unintentional Motor Vehicle Crash	9	69.2	534.8
	All Causes	13	100.0	772.4
25 – 44	1. Suicide Attempt/Intentional Self-harm	7	46.7	195.3
	All Causes	15	100.0	418.4
45 – 64	1. Unintentional Fall	15	37.5	271.4
	2. Unintentional Motor Vehicle Crash	8	20.0	144.7
	3. Suicide Attempt/Intentional Self-harm	6	15.0	108.6
	All Causes	40	100.0	723.7
65+	1. Unintentional Fall	41	82.0	1,084.7
	All Causes	50	100.0	1,322.8

* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 11
Causes of Injury Hospitalization
Chippewa County Residents, 2011
(N = 179 E-coded cases)



E-coding rate for Chippewa County: 92%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 9
Specific Causes of Injury Hospitalization
Chippewa County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	109	Struck by Object/Person	5	Poisoning	18
MVC – Occupant	12	Other	2	Other	4
Poisoning	11			Other	
Struck by Object/Person	5				
Other	12				
Total	149	Total	7	Total	22

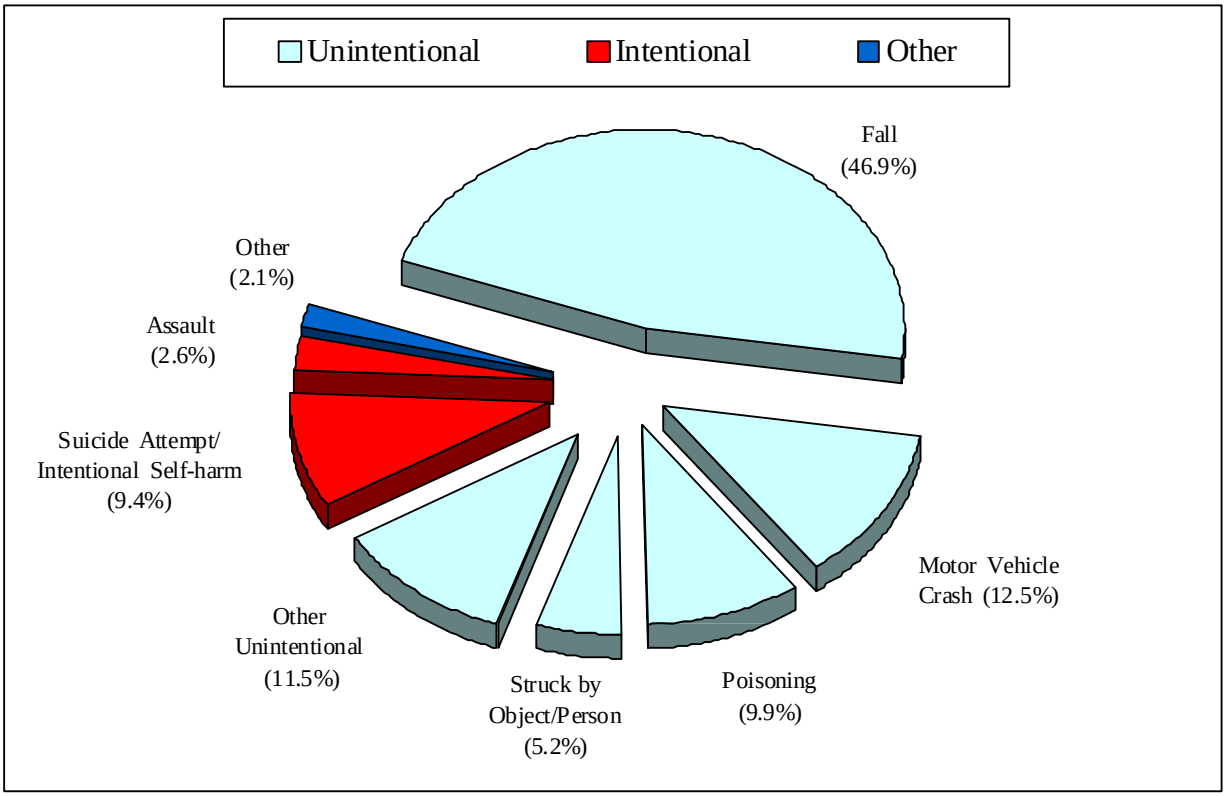
Causes not classifiable above comprised one case.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 10
Leading Causes of Injury Hospitalization, by Age Group
Chippewa County Residents, 2011
Cause of Injury Coding Rate: 92% (179 of 194 discharges)

Age Group	Cause of Injury	No.	%	Rate
< 5	All Causes[1]	5	100.0	*
5 – 14	All Causes	2	100.0	*
15 – 24	1. Suicide Attempt/Intentional Self-harm	6	40.0	107.5
	2. Assault	4	26.7	*
	All Causes	15	100.0	268.7
25 – 44	1. Suicide Attempt/Intentional Self-harm	8	30.8	77.9
	2. Unintentional Fall	5	19.2	*
	3. Unintentional Motor Vehicle Crash	4	15.4	*
	4. Unintentional Poisoning	4	15.4	*
	All Causes	26	100.0	253.1
45 – 64	1. Unintentional Fall	21	53.8	193.3
	2. Suicide Attempt/Intentional Self-harm	7	17.9	64.4
	3. Unintentional Poisoning	4	10.3	*
	All Causes	39	100.0	359.0
65+	1. Unintentional Fall	80	85.1	1,397.1
	2. Unintentional Motor Vehicle Crash	5	5.3	*
	All Causes	94	100.0	1,641.6

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 12
Causes of Injury Hospitalization
Clare County Residents, 2011
(N = 192 E-coded cases)



E-coding rate for Clare County: 95%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 11
Specific Causes of Injury Hospitalization
Clare County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	90	Struck by Object/Person	4	Poisoning	14
Poisoning	19	Other	1	Other	4
MVC – Occupant	18				
Struck by Object/Person	10				
Other	28				
Total	165	Total	5	Total	18

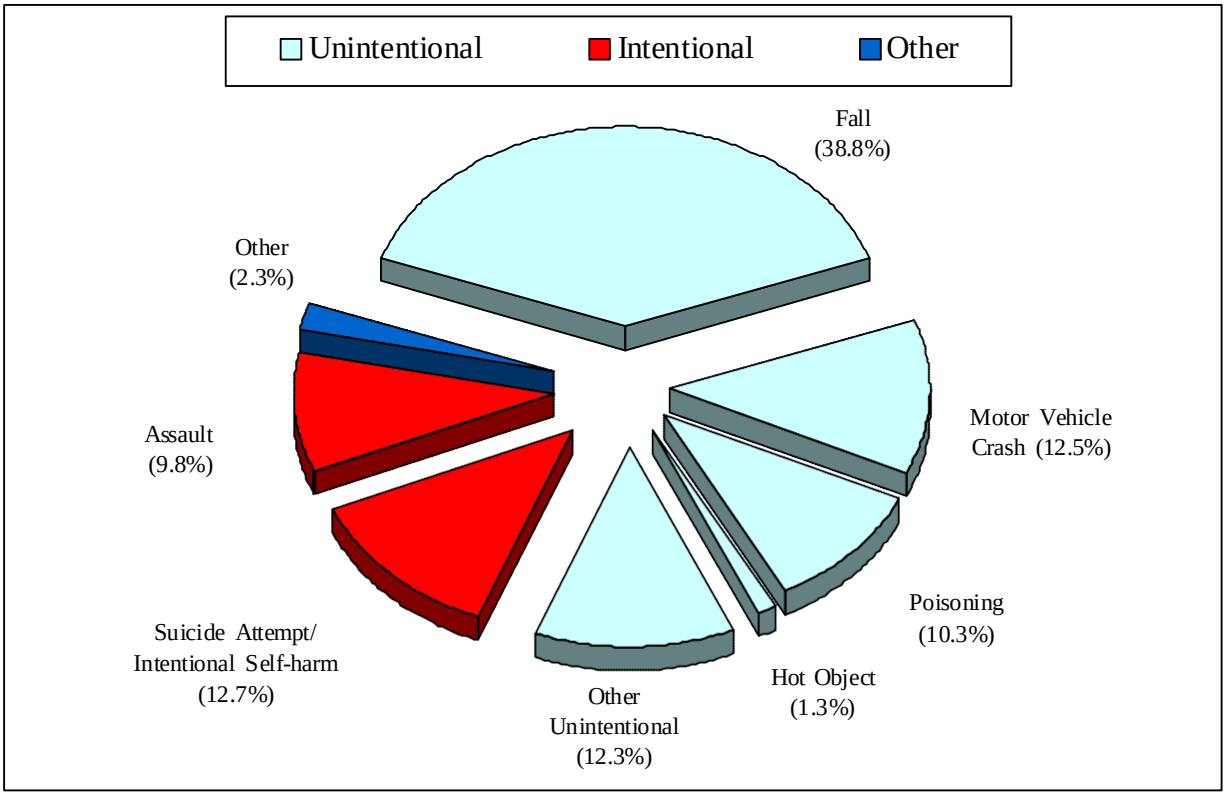
Causes not classifiable above comprised four cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 12
Leading Causes of Injury Hospitalization, by Age Group
Clare County Residents, 2011
Cause of Injury Coding Rate: 95% (192 of 203 discharges)

Age Group	Cause of Injury	No.	%	Rate
< 5	All Causes[1]	4	100.0	*
5 – 14	All Causes	6	100.0	175.5
15 – 24	1. Unintentional Motor Vehicle Crash	4	50.0	*
	All Causes	8	100.0	218.2
25 – 44	1. Suicide Attempt/Intentional Self-harm	8	22.2	125.8
	2. Unintentional Poisoning	7	19.4	110.0
	3. Unintentional Motor Vehicle Crash	6	16.7	94.3
	All Causes	36	100.0	565.9
45 – 64	1. Unintentional Fall	14	28.0	147.1
	2. Unintentional Poisoning	10	20.0	105.0
	3. Suicide Attempt/Intentional Self-harm	7	14.0	73.5
	4. Unintentional Struck by Object/Person	5	10.0	*
	All Causes	50	100.0	525.2
65+	1. Unintentional Fall	70	80.0	1,128.3
	2. Unintentional Motor Vehicle Crash	10	11.4	161.2
	All Causes	88	100.0	1,418.4

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 13
Causes of Injury Hospitalization
Genesee County Residents, 2011
(N = 2,710 E-coded cases)



E-coding rate for Genesee County: 91%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 13
Specific Causes of Injury Hospitalization
Genesee County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	1,052	Firearm	118	Poisoning	320
Poisoning	279	Struck by Object/Person	84	Sharp Object	9
MVC – Occupant	224	Sharp Object	43	Firearm	5
MVC – Motorcyclist	50	Other	21	Other	10
MVC – Pedestrian	44				
Hot Object	36				
Struck by Object/Person	34				
Machinery	23				
Animal/Insect Bite/Sting	23				
Fire/Flames	22				
Overexertion	17				
Sharp Object	17				
Bicycle, non-MV Crash	16				
Other	202				
Total	2,039	Total	266	Total	344

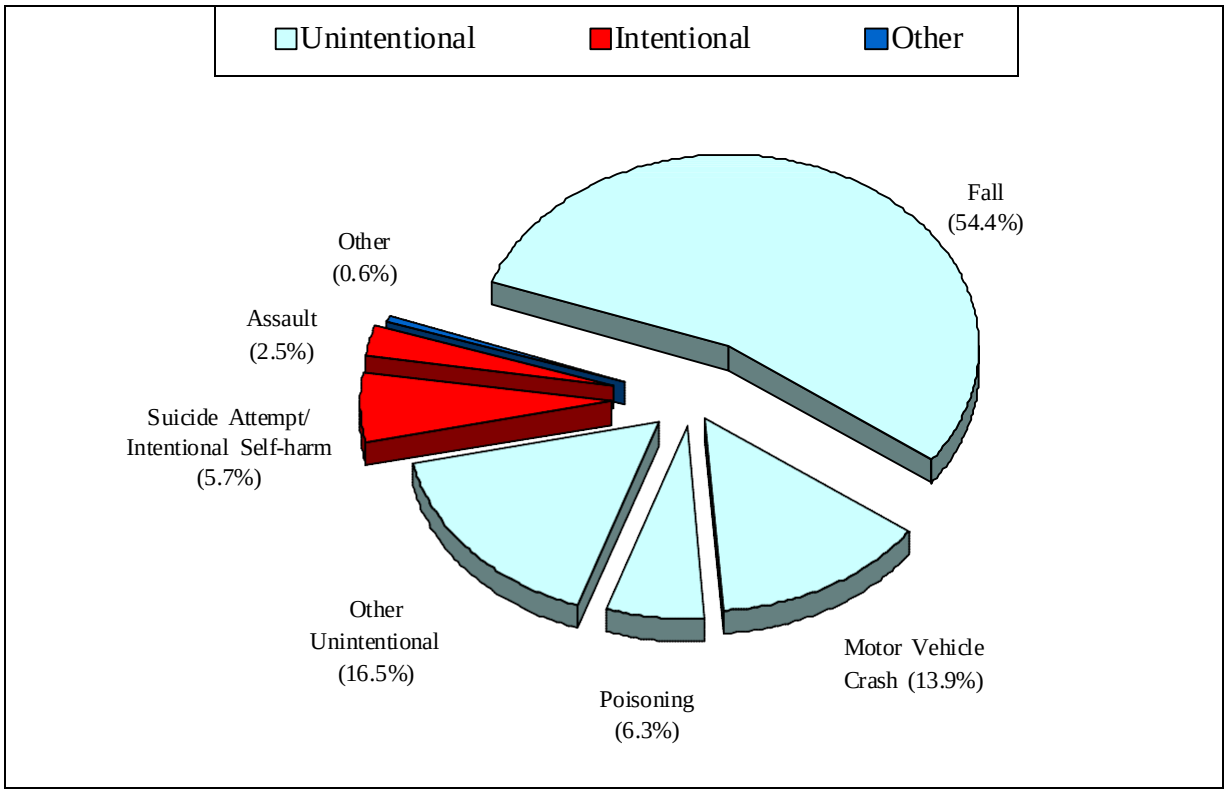
Causes not classifiable above comprised 61 cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 14
Leading Causes of Injury Hospitalization, by Age Group
Genesee County Residents, 2011
Cause of Injury Coding Rate: 91% (2,710 of 2,983 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	1. Unintentional Fall	26	30.2	97.1
	2. Unintentional Poisoning	21	24.4	78.4
	3. Unintentional Hot Object	11	12.8	41.1
	4. Unintentional Motor Vehicle Crash	5	5.8	*
	All Causes[1]	86	100.0	321.1
5 – 14	1. Unintentional Motor Vehicle Crash	22	25.3	37.8
	2. Unintentional Fall	12	13.8	20.6
	3. Suicide Attempt/Intentional Self-harm	11	12.6	18.9
	4. Unintentional Struck by Object/Person	6	6.9	10.3
	All Causes	87	100.0	149.5
15 – 24	1. Assault	90	26.9	157.6
	2. Suicide Attempt/Intentional Self-harm	69	20.6	120.8
	2. Unintentional Motor Vehicle Crash	69	20.6	120.8
	4. Unintentional Poisoning	26	7.8	45.5
	5. Unintentional Fall	22	6.6	38.5
	All Causes	335	100.0	586.7
25 – 44	1. Suicide Attempt/Intentional Self-harm	136	24.2	132.1
	2. Unintentional Motor Vehicle Crash	95	16.9	92.3
	3. Assault	92	16.3	89.4
	4. Unintentional Poisoning	68	12.1	66.1
	5. Unintentional Fall	58	10.3	56.3
	All Causes	563	100.0	546.9
45 – 64	1. Unintentional Fall	181	26.3	153.6
	2. Unintentional Poisoning	118	17.2	100.1
	3. Suicide Attempt/Intentional Self-harm	113	16.4	95.9
	4. Unintentional Motor Vehicle Crash	93	13.5	78.9
	5. Assault	68	9.9	57.7
	All Causes	688	100.0	583.7
65+	1. Unintentional Fall	753	79.2	1,272.7
	2. Unintentional Motor Vehicle Crash	54	5.7	91.3
	3. Unintentional Poisoning	42	4.4	71.0
	4. Suicide Attempt/Intentional Self-harm	15	1.6	25.4
	5. Unintentional Struck by Object/Person	10	1.1	16.9
	All Causes	951	100.0	1,607.4

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 14
Causes of Injury Hospitalization
Gladwin County Residents, 2011
(N = 158 E-coded cases)



E-coding rate for Gladwin County: 90%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 15
Specific Causes of Injury Hospitalization
Gladwin County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	86			Poisoning	8
MVC – Occupant	18			Other	1
Poisoning	10				
Other	30				
Total	144	Total	4	Total	9

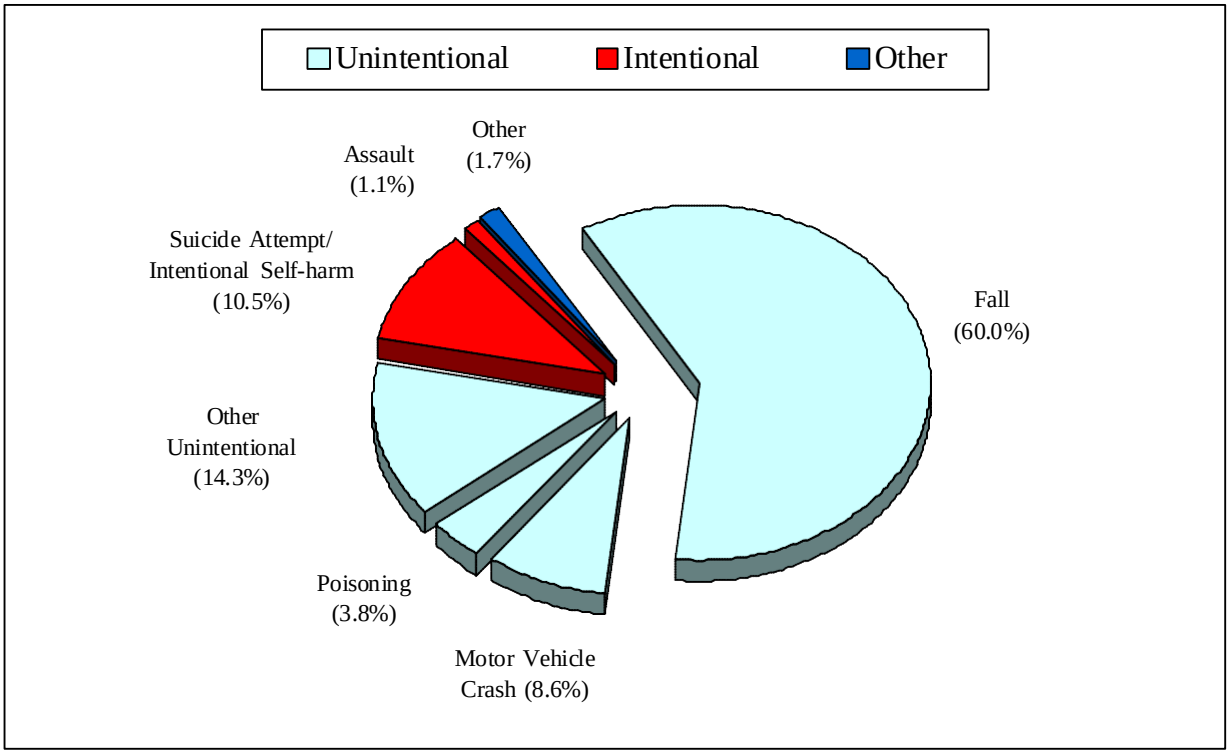
Causes not classifiable above comprised one case.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 16
Leading Causes of Injury Hospitalization, by Age Group
Gladwin County Residents, 2011
Cause of Injury Coding Rate: 90% (158 of 175 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	2	100.0	*
5 – 14	All Causes	6	100.0	203.9
15 – 24	1. Suicide Attempt/Intentional Self-harm	4	26.7	*
	1. Unintentional Motor Vehicle Crash	4	26.7	*
	All Causes	15	100.0	552.1
25 – 44	1. Unintentional Fall	9	42.9	179.9
	2. Unintentional Motor Vehicle Crash	6	28.6	120.0
	All Causes	21	100.0	419.8
45 – 64	1. Unintentional Fall	11	29.7	137.8
	2. Unintentional Motor Vehicle Crash	9	24.3	112.7
	All Causes	37	100.0	463.4
65+	1. Unintentional Fall	64	83.1	1,082.5
	All Causes	77	100.0	1,302.4

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 15
Causes of Injury Hospitalization
Grand Traverse County Residents, 2011
(N = 533 E-coded cases)



E-coding rate for Grand Traverse County: 98%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 17
Specific Causes of Injury Hospitalization
Grand Traverse County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	320	Struck by Object/Person	5	Poisoning	52
MVC – Occupant	30	Other	1	Other	4
Poisoning	20				
Bicyclist – non MVC	11				
Struck by Object/Person	11				
MVC – Motorcyclist	10				
Other	60				
Total	462	Total	6	Total	56

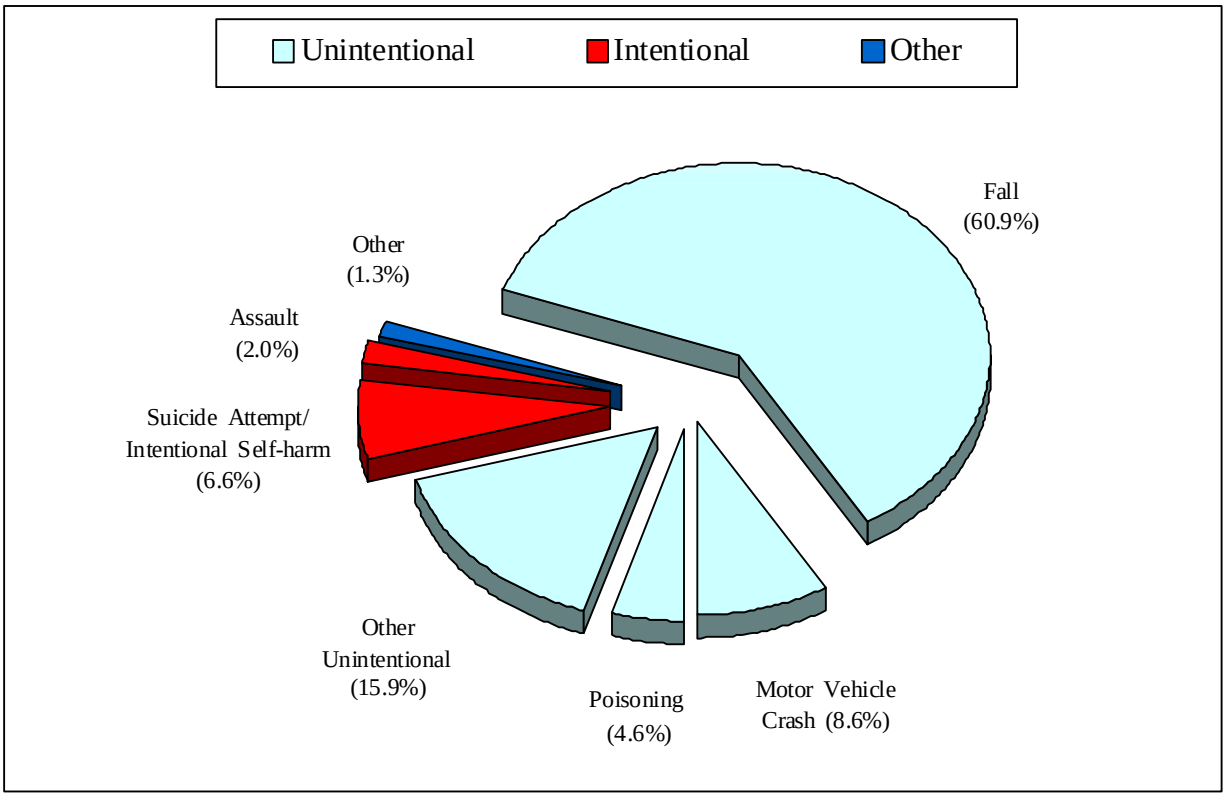
Causes not classifiable above comprised nine cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 18
Leading Causes of Injury Hospitalization, by Age Group
Grand Traverse County Residents, 2011
Cause of Injury Coding Rate: 98% (533 of 545 discharges)

Age Group	Cause of Injury	No.	%	Rate
< 5	All Causes[1]	6	100.0	120.6
5 – 14	1. Unintentional Fall	7	53.9	65.1
	All Causes	13	100.0	120.8
15 – 24	1. Suicide Attempt/Intentional Self-harm	10	30.3	94.5
	2. Unintentional Motor Vehicle Crash	9	27.3	85.1
	All Causes	33	100.0	312.0
25 – 44	1. Unintentional Fall	16	21.3	72.9
	2. Suicide Attempt/Intentional Self-harm	15	20.0	68.3
	3. Unintentional Motor Vehicle Crash	13	17.3	59.2
	All Causes	75	100.0	341.7
45 – 64	1. Unintentional Fall	45	38.5	168.9
	2. Suicide Attempt/Intentional Self-harm	25	21.4	93.8
	3. Unintentional Motor Vehicle Crash	11	9.4	41.3
	4. Unintentional Poisoning	7	6.0	26.3
	All Causes	117	100.0	439.0
65+	1. Unintentional Fall	245	84.8	1,830.4
	2. Unintentional Motor Vehicle Crash	12	4.2	89.7
	3. Unintentional Poisoning	5	1.7	*
	All Causes	289	100.0	2,159.1

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 16
Causes of Injury Hospitalization
Iosco County Residents, 2011
(N = 151 E-coded cases)



E-coding rate for Iosco County: 90%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 19
Specific Causes of Injury Hospitalization
Iosco County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	92			Poisoning	10
MVC – Occupant	11				
Poisoning	7				
Struck by Object/Person	5				
Other	21				
Total	136	Total	3	Total	10

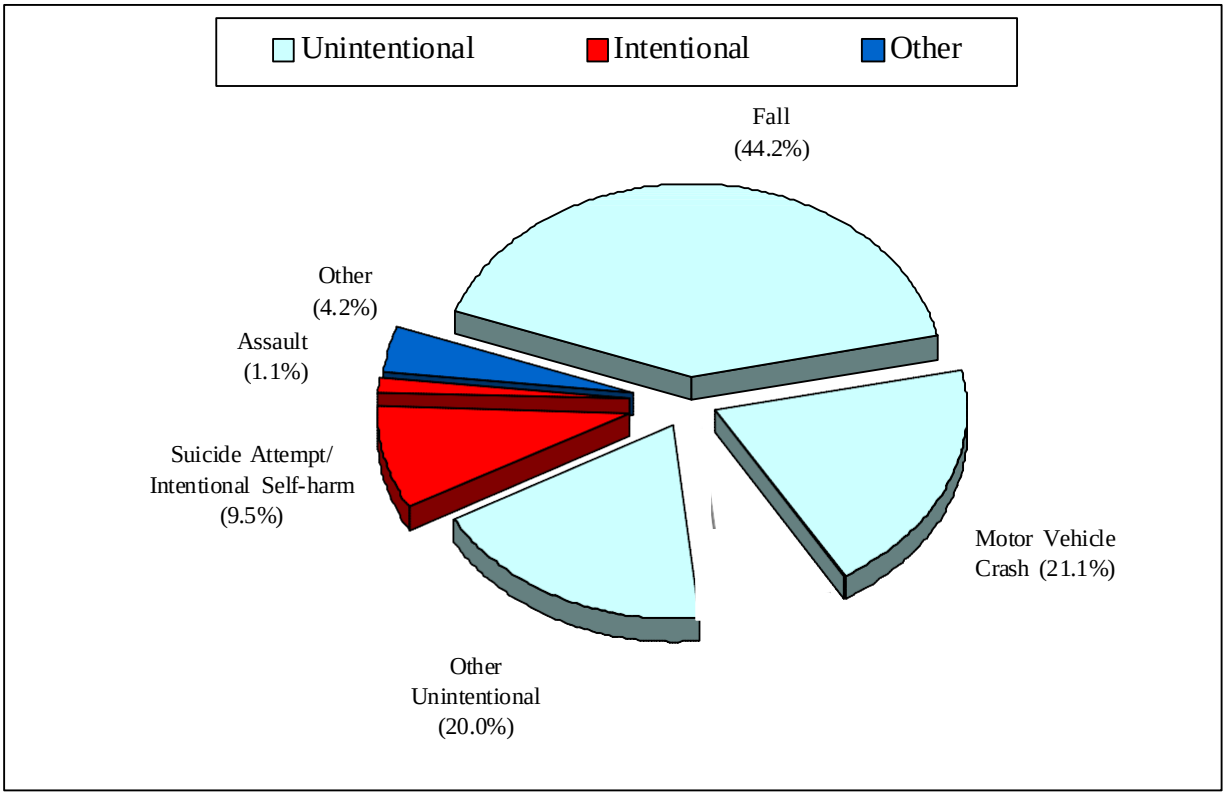
Causes not classifiable above comprised two cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 20
Leading Causes of Injury Hospitalization, by Age Group
Iosco County Residents, 2011
Cause of Injury Coding Rate: 90% (151 of 168 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	1	100.0	*
5 – 14	1. Unintentional Fall	4	57.1	*
	All Causes	7	100.0	275.9
15 – 24	All Causes	16	100.0	665.6
25 – 44	1. Suicide Attempt/Intentional Self-harm	6	27.3	135.2
	All Causes	22	100.0	495.8
45 – 64	1. Unintentional Fall	17	60.7	204.3
	2. Unintentional Motor Vehicle Crash	4	14.3	*
	All Causes	28	100.0	336.5
65+	1. Unintentional Fall	67	87.0	985.6
	All Causes	77	100.0	1,132.7

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 17
Causes of Injury Hospitalization
Kalkaska County Residents, 2011
(N = 95 E-coded cases)



E-coding rate for Kalkaska County: 99%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 21
Specific Causes of Injury Hospitalization
Kalkaska County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	42			Poisoning	9
MVC – Occupant	17				
Other	22				
Total	81	Total	1	Total	9

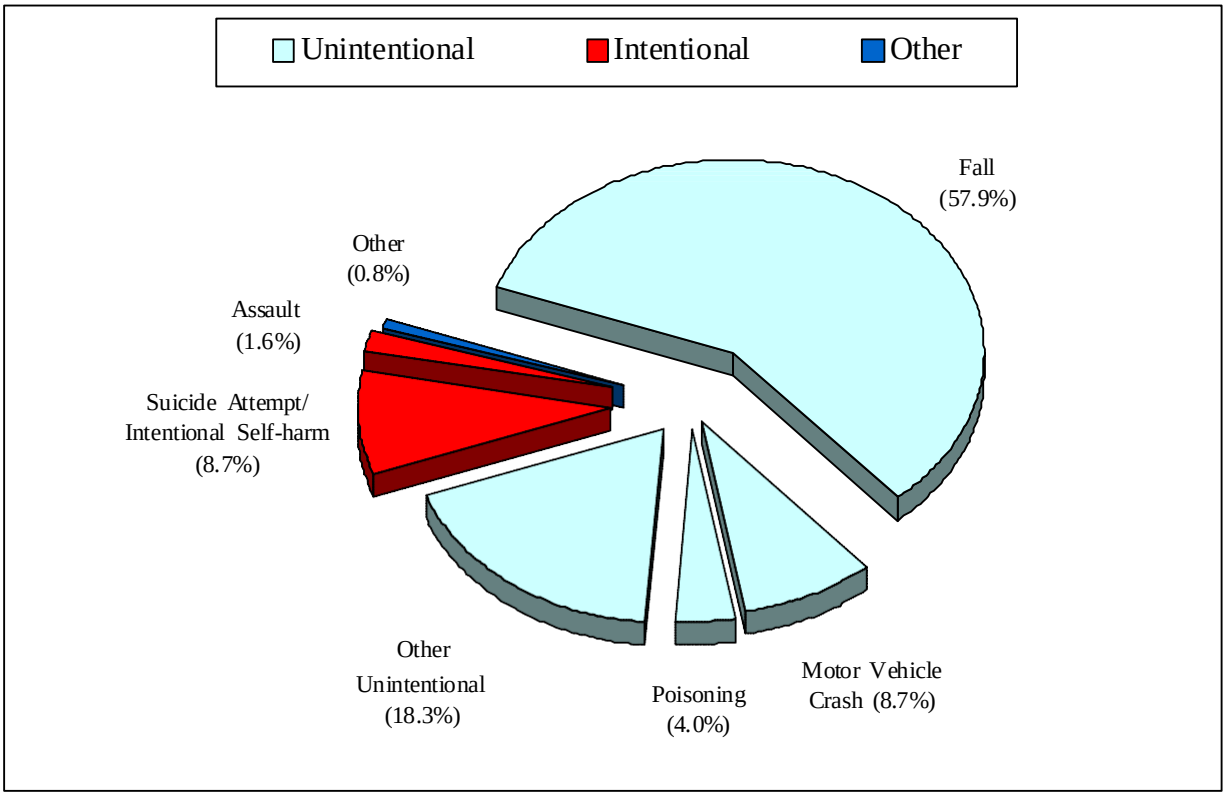
Causes not classifiable above comprised four cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 22
Leading Causes of Injury Hospitalization, by Age Group
Kalkaska County Residents, 2011
Cause of Injury Coding Rate: 99% (95 of 96 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	2	100.0	*
5 – 14	All Causes	1	100.0	*
15 – 24	1. Unintentional Motor Vehicle Crash	7	70.0	367.8
	All Causes	10	100.0	525.5
25 – 44	1. Unintentional Motor Vehicle Crash	5	31.3	*
	All Causes	16	100.0	415.0
45 – 64	1. Unintentional Fall	14	42.4	262.6
	2. Suicide Attempt/Intentional Self-harm	7	21.2	131.3
	3. Unintentional Motor Vehicle Crash	5	15.2	*
	All Causes	33	100.0	619.0
65+	1. Unintentional Fall	25	75.8	859.7
	All Causes	33	100.0	1,134.8

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 18
Causes of Injury Hospitalization
Leelanau County Residents, 2011
(N = 126 E-coded cases)



E-coding rate for Leelanau County: 98%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 23
Specific Causes of Injury Hospitalization
Leelanau County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	73			Poisoning	10
MVC – Occupant	9			Other	1
Poisoning	5				
Other	25				
Total	112	Total	2	Total	11

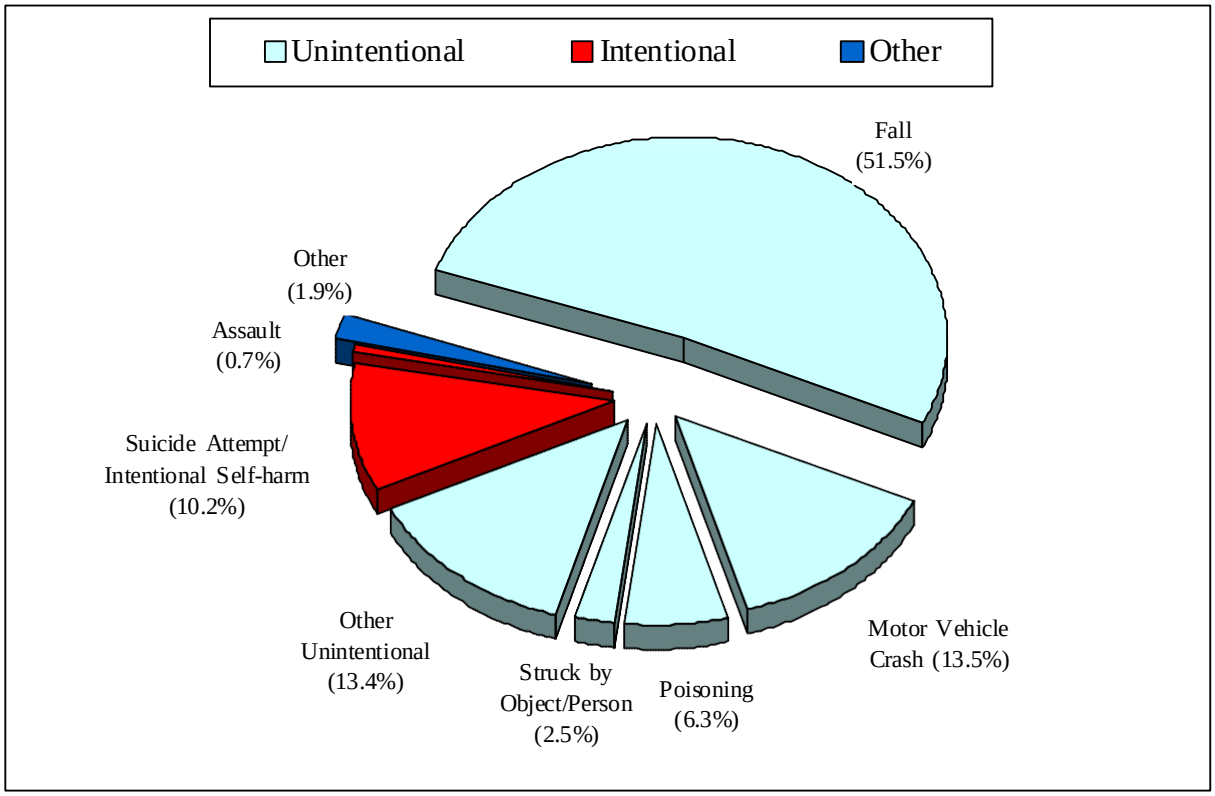
Causes not classifiable above comprised one case.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 24
Leading Causes of Injury Hospitalization, by Age Group
Leelanau County Residents, 2011
Cause of Injury Coding Rate: 98% (126 of 129 discharges)

Age Group	Cause of Injury	No.	%	Rate
< 5	All Causes[1]	2	100.0	*
5 – 14	All Causes	1	100.0	*
15 – 24	1. Unintentional Motor Vehicle Crash	4	30.8	*
	All Causes	13	100.0	598.0
25 – 44	1. Unintentional Fall	4	36.4	*
	All Causes	11	100.0	314.5
45 – 64	1. Unintentional Fall	7	36.8	94.3
	2. Suicide Attempt/Intentional Self-harm	5	26.3	*
	All Causes	19	100.0	255.9
65+	1. Unintentional Fall	60	75.0	1,106.0
	2. Unintentional Motor Vehicle Crash	4	5.0	*
	3. Unintentional Poisoning	4	5.0	*
	All Causes	80	100.0	1,474.7

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 19
Causes of Injury Hospitalization
Livingston County Residents, 2011
(N = 806 E-coded cases)



E-coding rate for Livingston County: 90%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 25
Specific Causes of Injury Hospitalization
Livingston County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	415			Poisoning	70
MVC – Occupant	81			Sharp Object	5
Poisoning	51			Other	7
Struck by Object/Person	20				
MVC – Motorcyclist	17				
Bicyclist – non MVC	11				
Bite/Sting	7				
Sharp Object	7				
Other	94				
Total	703	Total	6	Total	82

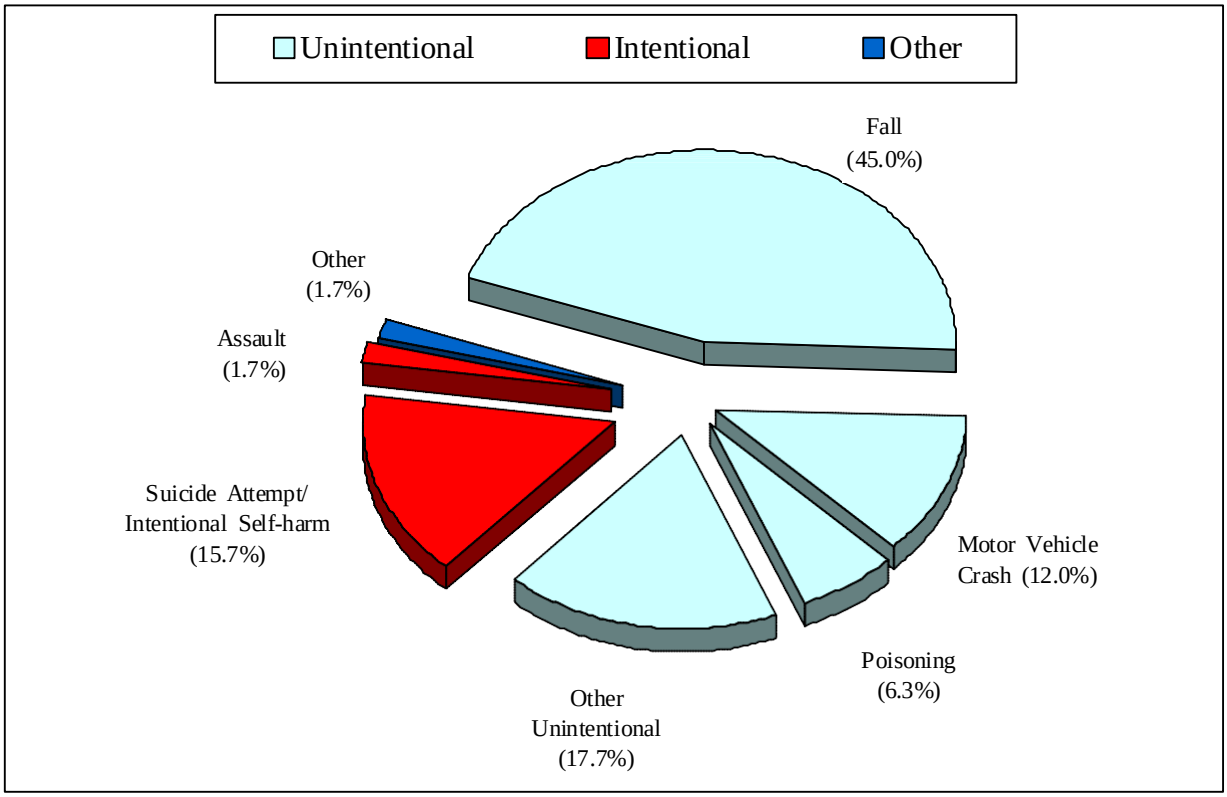
Causes not classifiable above comprised 15 cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 26
Leading Causes of Injury Hospitalization, by Age Group
Livingston County Residents, 2011
Cause of Injury Coding Rate: 90% (806 of 894 discharges)

Age Group	Cause of Injury	No.	%	Rate
< 5	All Causes[1]	15	100.0	158.2
5 – 14	1. Unintentional Fall	8	30.8	30.0
	2. Unintentional Motor Vehicle Crash	4	15.4	15.0
	All Causes	26	100.0	97.5
15 – 24	1. Unintentional Motor Vehicle Crash	29	29.6	130.0
	1. Suicide Attempt/Intentional Self-harm	29	29.6	130.0
	3. Unintentional Fall	9	9.2	40.3
	4. Unintentional Poisoning	7	7.1	31.4
	5. Unintentional Struck by Object/Person	6	6.1	26.9
	All Causes	98	100.0	439.3
25 – 44	1. Suicide Attempt/Intentional Self-harm	34	26.8	79.5
	2. Unintentional Motor Vehicle Crash	25	19.7	58.5
	3. Unintentional Fall	22	17.3	51.5
	4. Unintentional Poisoning	9	7.1	21.1
	All Causes	127	100.0	297.1
45 – 64	1. Unintentional Fall	92	44.0	158.6
	2. Unintentional Motor Vehicle Crash	31	14.8	53.4
	3. Unintentional Poisoning	17	8.1	29.3
	4. Suicide Attempt/Intentional Self-harm	15	7.2	25.9
	All Causes	209	100.0	360.2
65+	1. Unintentional Fall	282	85.2	1,221.7
	2. Unintentional Motor Vehicle Crash	18	5.4	78.0
	3. Unintentional Poisoning	16	4.8	69.3
	All Causes	331	100.0	1,434.0

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 20
Causes of Injury Hospitalization
Marquette County Residents, 2011
(N = 300 E-coded cases)



E-coding rate for Marquette County: 94%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 27
Specific Causes of Injury Hospitalization
Marquette County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	135			Poisoning	45
MVC – Occupant	24			Other	2
Poisoning	19				
Bicyclist – non MVC	7				
Struck by Object/Person	7				
Overexertion	5				
MVC – Pedestrian	5				
Other	41				
Total	243	Total	5	Total	47

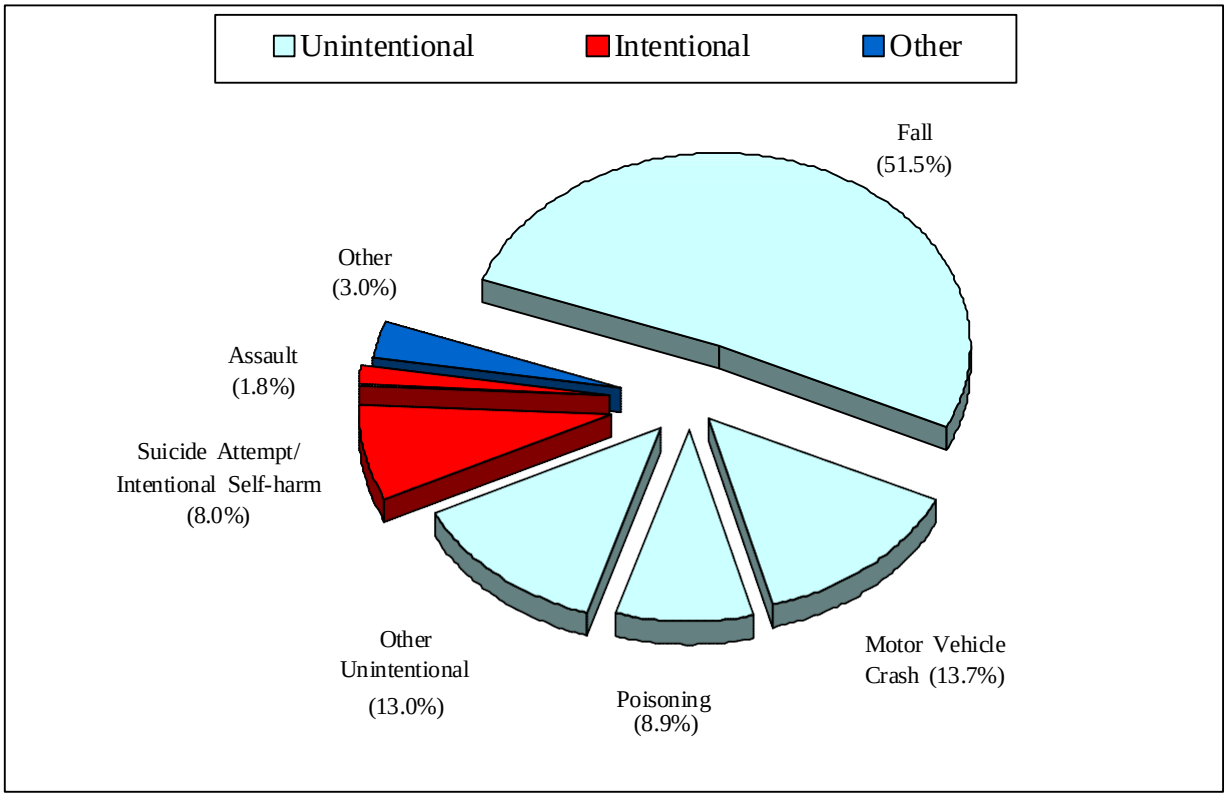
Causes not classifiable above comprised five cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 28
Leading Causes of Injury Hospitalization, by Age Group
Marquette County Residents, 2011
Cause of Injury Coding Rate: 94% (300 of 316 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	4	100.0	*
5 – 14	All Causes	12	100.0	178.4
15 – 24	1. Suicide Attempt/Intentional Self-harm	18	42.9	145.5
	2. Unintentional Fall	6	14.3	48.5
	2. Unintentional Motor Vehicle Crash	6	14.3	48.5
	All Causes	42	100.0	339.4
25 – 44	1. Suicide Attempt/Intentional Self-harm	19	33.9	122.0
	2. Unintentional Poisoning	8	14.3	51.4
	3. Unintentional Motor Vehicle Crash	7	12.5	44.9
	4. Unintentional Fall	5	8.9	*
	All Causes	56	100.0	359.6
45 – 64	1. Unintentional Fall	26	34.7	134.3
	2. Unintentional Motor Vehicle Crash	14	18.7	72.3
	3. Suicide Attempt/Intentional Self-harm	7	9.3	36.2
	4. Unintentional Overexertion	5	6.7	*
	5. Unintentional Poisoning	5	6.7	*
	All Causes	75	100.0	387.4
65+	1. Unintentional Fall	94	84.7	937.3
	2. Unintentional Motor Vehicle Crash	4	3.6	*
	All Causes	111	100.0	1,106.8

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 21
Causes of Injury Hospitalization
Midland County Residents, 2011
(N = 437 E-coded cases)



E-coding rate for Midland County: 94%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 29
Specific Causes of Injury Hospitalization
Midland County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	225	Sharp Object	4	Poisoning	34
MVC – Occupant	43	Other	4	Other	1
Poisoning	39				
MVC – Motorcyclist	13				
Struck by Object/Person	9				
Bicyclist – non MVC	6				
Snowmobile Crash	4				
Other	42				
Total	381	Total	8	Total	35

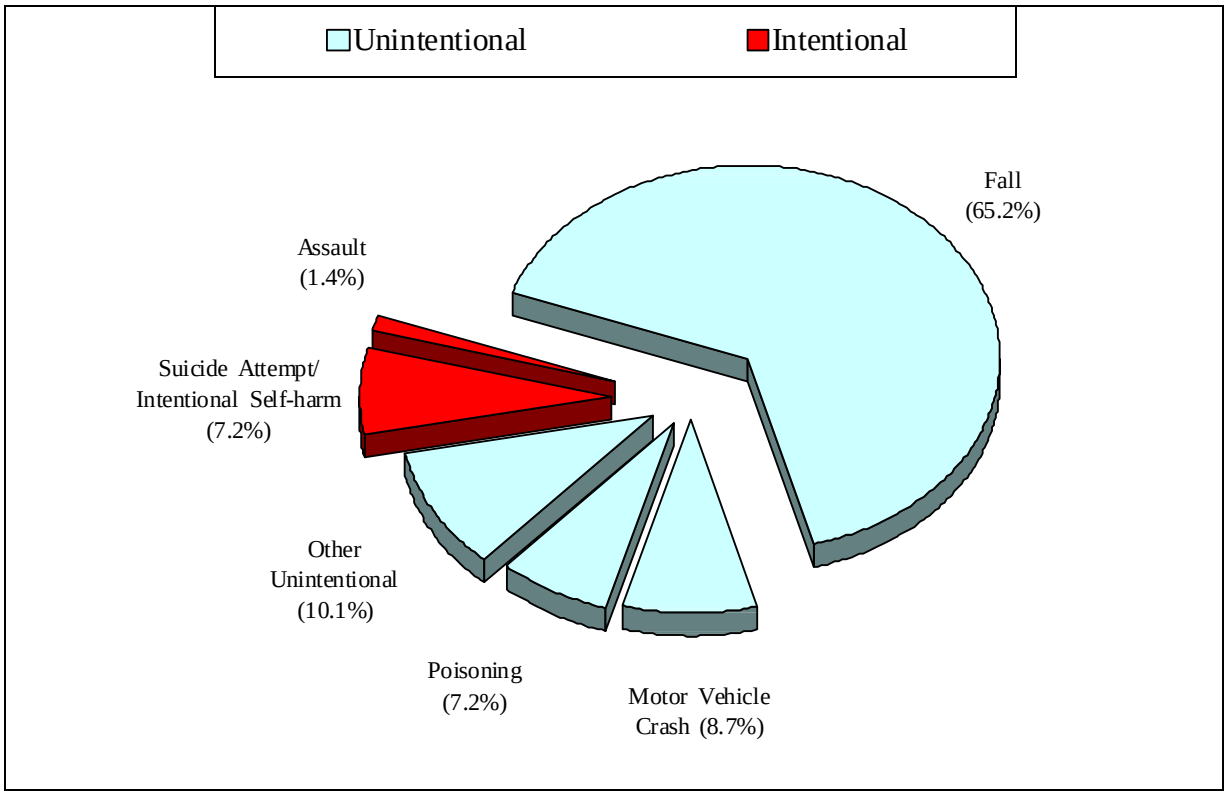
Causes not classifiable above comprised 13 cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 30
Leading Causes of Injury Hospitalization, by Age Group
Midland County Residents, 2011
Cause of Injury Coding Rate: 94% (437 of 463 discharges)

Age Group	Cause of Injury	No.	%	Rate
< 5	All Causes[1]	6	100.0	130.9
5 – 14	1. Unintentional Fall	7	31.8	63.3
	All Causes	22	100.0	198.8
15 – 24	1. Unintentional Motor Vehicle Crash	11	23.9	94.8
	2. Unintentional Poisoning	10	21.7	86.2
	3. Suicide Attempt/Intentional Self-harm	7	15.2	60.3
	4. Unintentional Fall	4	8.7	*
	All Causes	46	100.0	396.3
25 – 44	1. Unintentional Motor Vehicle Crash	18	26.5	90.9
	2. Suicide Attempt/Intentional Self-harm	13	19.1	65.6
	3. Unintentional Fall	10	14.7	50.5
	4. Unintentional Poisoning	6	8.8	30.3
	All Causes	68	100.0	343.4
45 – 64	1. Unintentional Fall	38	40.9	155.6
	2. Suicide Attempt/Intentional Self-harm	14	15.1	57.3
	3. Unintentional Motor Vehicle Crash	12	12.9	49.1
	4. Unintentional Poisoning	11	11.8	45.0
	All Causes	93	100.0	380.9
65+	1. Unintentional Fall	165	81.7	1,316.0
	2. Unintentional Motor Vehicle Crash	15	7.4	119.6
	3. Unintentional Poisoning	9	4.5	71.8
	All Causes	202	100.0	1,611.1

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 22
Causes of Injury Hospitalization
Missaukee County Residents, 2011
(N = 69 E-coded cases)



E-coding rate for Missaukee County: 93%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 31
Specific Causes of Injury Hospitalization
Missaukee County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	45			Poisoning	5
Poisoning	5				
MVC – Occupant	4				
Other	9				
Total	63	Total	1	Total	5

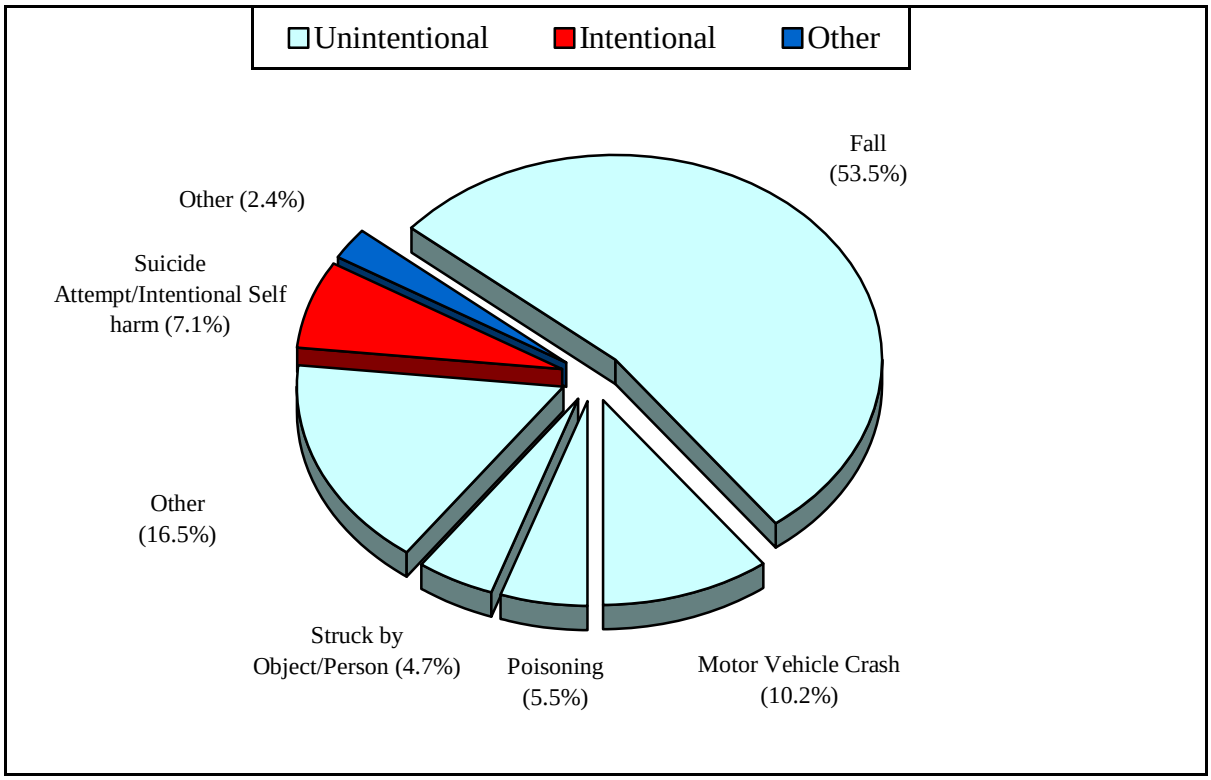
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 32
Leading Causes of Injury Hospitalization, by Age Group
Missaukee County Residents, 2011
Cause of Injury Coding Rate: 93% (69 of 74 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	2	100.0	*
5 – 14	All Causes	2	100.0	*
15 – 24	All Causes	8	100.0	449.4
25 – 44	All Causes	9	100.0	281.2
45 – 64	1. Unintentional Fall	6	54.6	135.2
	All Causes	11	100.0	248.2
65+	1. Unintentional Fall	34	91.9	1,278.2
	All Causes	37	100.0	1,391.0

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 23
Causes of Injury Hospitalization
Ogemaw County Residents, 2011
(N = 127 E-coded cases)



E-coding rate for Ogemaw County: 91%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 33
Specific Causes of Injury Hospitalization
Ogemaw County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	68			Poisoning	8
MVC – Occupant	10			Other	1
Poisoning	7				
Struck by Object/Person	6				
Other	24				
Total	115	Total	0	Total	9

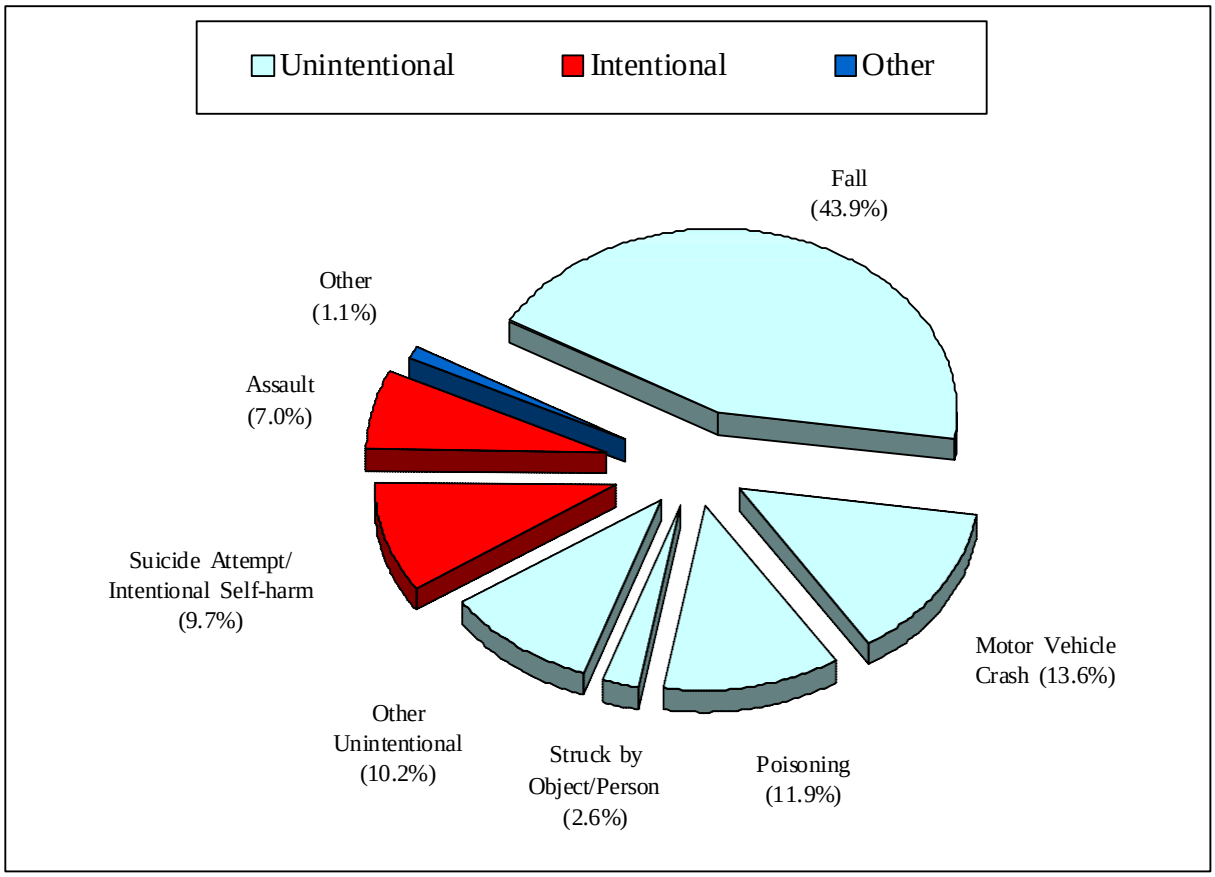
Causes not classifiable above comprised three cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 34
Leading Causes of Injury Hospitalization, by Age Group
Ogemaw County Residents, 2011
Cause of Injury Coding Rate: 91% (127 of 139 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	3	100.0	*
5 – 14	All Causes	3	100.0	*
15 – 24	All Causes	10	100.0	424.8
25 – 44	1. Unintentional Fall	5	33.3	*
	All Causes	15	100.0	362.8
45 – 64	1. Unintentional Fall	15	40.5	219.7
	All Causes	37	100.0	542.0
65+	1. Unintentional Fall	45	76.3	929.9
	2. Unintentional Motor Vehicle Crash	4	6.8	*
	All Causes	59	100.0	1,219.3

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 24
Causes of Injury Hospitalization
Saginaw County Residents, 2011
(N = 1,490 E-coded cases)



E-coding rate for Saginaw County: 94%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 35
Specific Causes of Injury Hospitalization
Saginaw County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	654	Firearm	43	Poisoning	138
Poisoning	178	Struck by Object/Person	34	Other	6
MVC – Occupant	164	Sharp Object	17		
Struck by Object/Person	39	Other	10		
MVC – Motorcyclist	22				
Overexertion	17				
Hot Object	15				
Bicyclist – non MVC	13				
Sharp Object	10				
MVC – Pedestrian	8				
Other	105				
Total	1,225	Total	104	Total	144

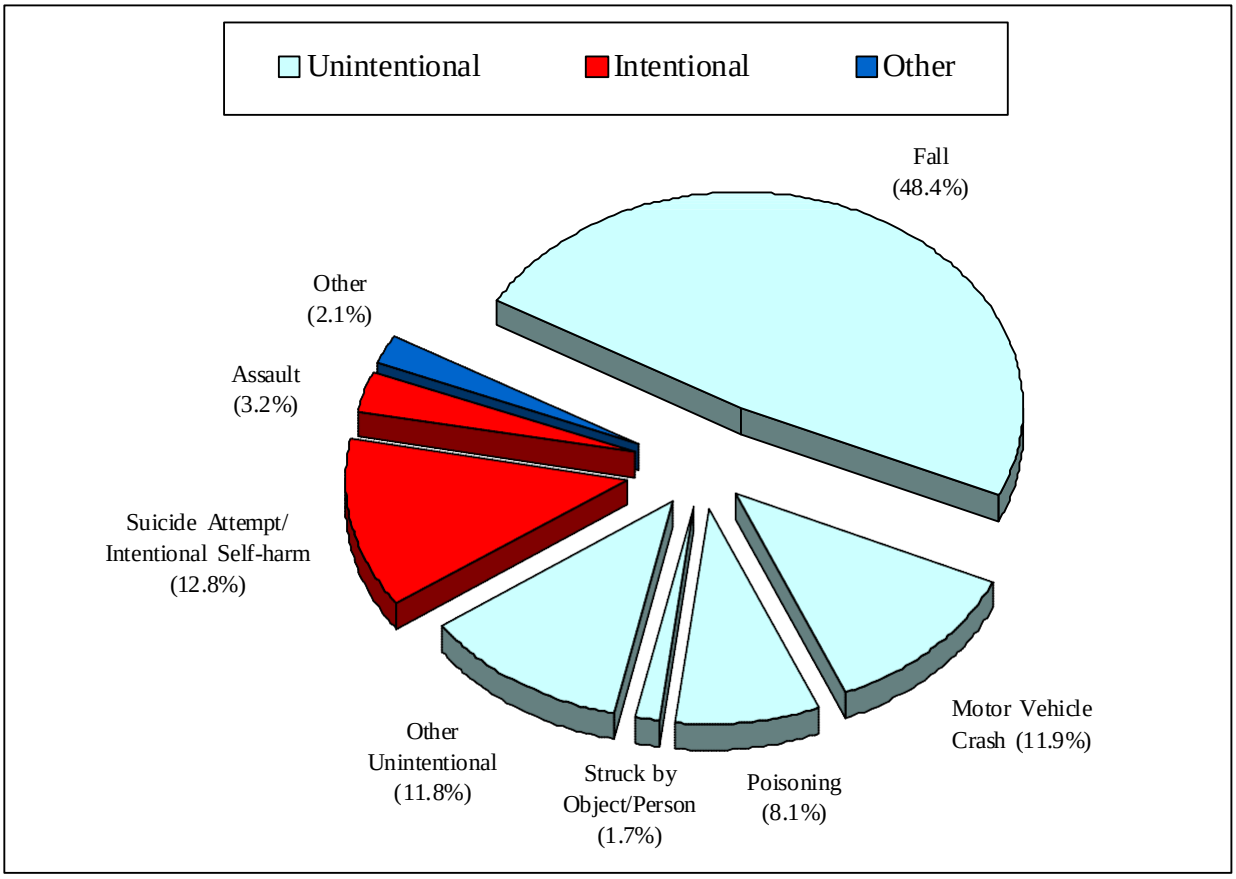
Causes not classifiable above comprised 17 cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 36
Leading Causes of Injury Hospitalization, by Age Group
Saginaw County Residents, 2011
Cause of Injury Coding Rate: 94% (1,490 of 1,592 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	1. Unintentional Poisoning	20	40.8	171.9
	2. Unintentional Fall	12	24.5	103.1
	3. Unintentional Hot Object	6	12.2	51.6
	All Causes[1]	49	100.0	421.1
5 – 14	1. Unintentional Fall	11	29.0	42.9
	2. Unintentional Struck by Object/Person	7	18.4	27.3
	3. Unintentional Poisoning	5	13.2	*
	All Causes	38	100.0	148.2
15 – 24	1. Assault	47	24.9	158.0
	2. Unintentional Motor Vehicle Crash	45	23.8	151.3
	3. Suicide Attempt/Intentional Self-harm	34	18.0	114.3
	4. Unintentional Poisoning	21	11.1	70.6
	5. Unintentional Fall	17	9.0	57.2
	All Causes	189	100.0	635.4
25 – 44	1. Suicide Attempt/Intentional Self-harm	66	22.0	145.9
	2. Unintentional Motor Vehicle Crash	53	17.7	117.1
	3. Unintentional Fall	51	17.0	112.7
	4. Unintentional Poisoning	41	13.7	90.6
	5. Unintentional Struck by Object/Person	11	3.7	24.3
	All Causes	300	100.0	663.1
45 – 64	1. Unintentional Fall	147	38.3	263.7
	2. Unintentional Poisoning	71	18.5	127.4
	3. Unintentional Motor Vehicle Crash	56	14.6	100.5
	4. Suicide Attempt/Intentional Self-harm	40	10.4	71.8
	5. Assault	20	5.2	35.9
	All Causes	384	100.0	688.8
65+	1. Unintentional Fall	416	78.5	1,343.1
	2. Unintentional Motor Vehicle Crash	42	7.9	135.6
	3. Unintentional Poisoning	20	3.8	64.6
	4. Unintentional Struck by Object/Person	9	1.7	29.1
	All Causes	530	100.0	1,711.2

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 25
Causes of Injury Hospitalization
Washtenaw County Residents, 2011
(N = 1,510 E-coded cases)



E-coding rate for Washtenaw County: 92%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 37
Specific Causes of Injury Hospitalization
Washtenaw County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	731	Struck by Object/Person	16	Poisoning	174
MVC – Occupant	132	Firearm	11	Sharp Object	10
Poisoning	123	Sharp Object	10	Other	9
Struck by Object/Person	25	Other	11		
MVC – Pedestrian	22				
MVC – Motorcyclist	16				
Bicyclist – Non-MVC	15				
Machinery	10				
Overexertion	10				
Other	153				
Total	1,237	Total	48	Total	193

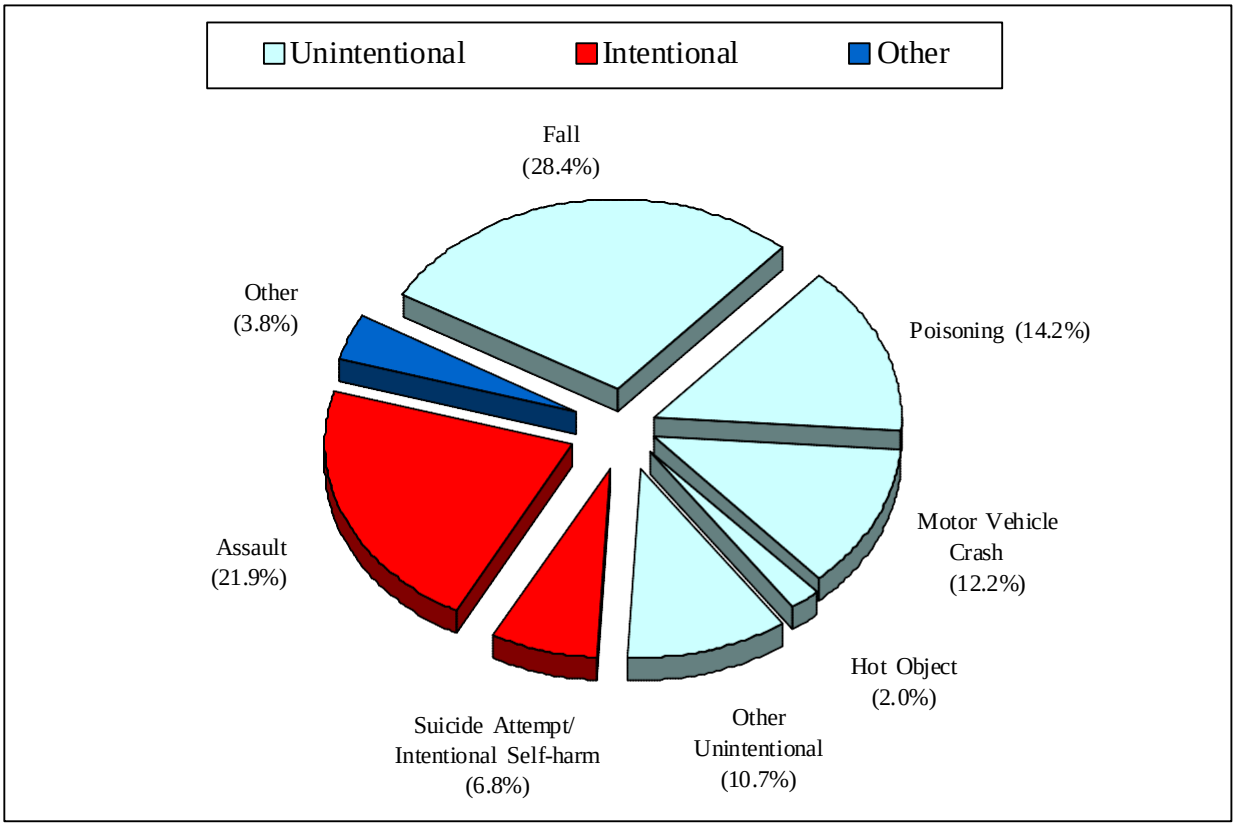
Causes not classifiable above comprised 32 cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 38
Leading Causes of Injury Hospitalization, by Age Group
Washtenaw County Residents, 2011
Cause of Injury Coding Rate: 92% (1,510 of 1,638 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	1. Unintentional Fall	9	37.5	48.0
	2. Unintentional Poisoning	6	25.0	32.0
	All Causes[1]	24	100.0	128.1
5 – 14	1. Unintentional Fall	12	33.3	30.2
	2. Suicide Attempt/Intentional Self-harm	6	16.7	15.1
	All Causes	36	100.0	90.6
15 – 24	1. Suicide Attempt/Intentional Self-harm	60	33.3	82.0
	2. Unintentional Motor Vehicle Crash	44	24.5	60.1
	3. Unintentional Poisoning	18	10.0	24.6
	4. Assault	12	6.7	16.4
	5. Unintentional Fall	11	6.1	15.0
	All Causes	180	100.0	245.9
25 – 44	1. Suicide Attempt/Intentional Self-harm	74	26.2	79.6
	2. Unintentional Motor Vehicle Crash	55	19.5	59.1
	3. Unintentional Fall	46	16.3	49.5
	4. Unintentional Poisoning	34	12.1	36.6
	5. Assault	23	8.2	24.7
	All Causes	282	100.0	303.2
45 – 64	1. Unintentional Fall	171	42.4	195.7
	2. Unintentional Motor Vehicle Crash	52	12.9	59.5
	3. Unintentional Poisoning	48	11.9	54.9
	4. Suicide Attempt/Intentional Self-harm	44	10.9	50.4
	5. Assault	11	2.7	12.6
	All Causes	403	100.0	461.3
65+	1. Unintentional Fall	482	82.4	1,317.9
	2. Unintentional Motor Vehicle Crash	24	4.1	65.6
	3. Unintentional Poisoning	17	2.9	46.5
	4. Suicide Attempt/Intentional Self-harm	9	1.5	24.6
	All Causes	585	100.0	1,599.6

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 26
Causes of Injury Hospitalization
Detroit City Residents, 2011
(N = 5,255 E-coded cases)



E-coding rate for Detroit City: 90%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 39
Specific Causes of Injury Hospitalization
Detroit City Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	1,495	Firearm	445	Poisoning	322
Poisoning	748	Struck by Object/Person	344	Sharp Object	14
MVC – Occupant	402	Sharp Object	156	Jump	6
MVC – Pedestrian	153	Other	205	Other	14
Hot Object	106				
Struck by Object/Person	67				
Fire/Flames	62				
Firearm	60				
MVC – Motorcyclist	47				
Animal/Insect Bite/Sting	31				
Bicyclist – Non-MVC	30				
Sharp Object	30				
Overexertion	26				
Other	294				
Total	3,551	Total	1,150	Total	356

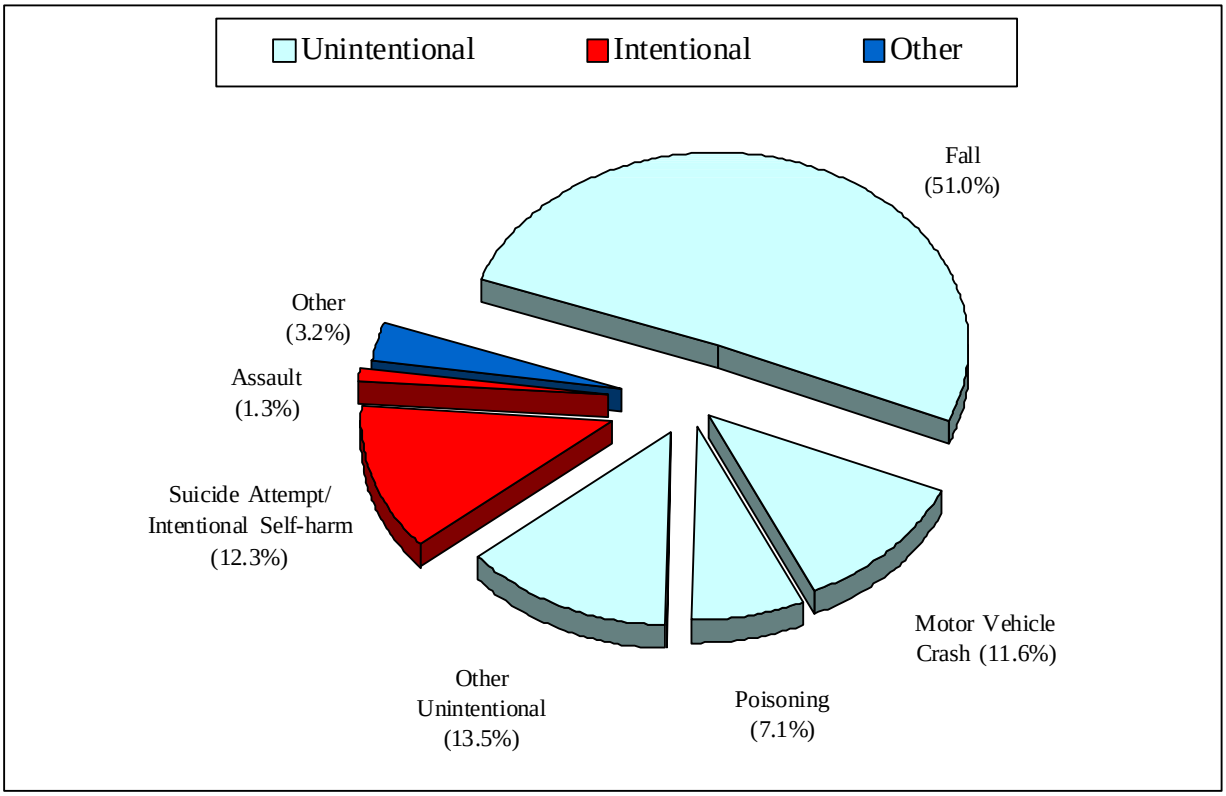
Causes not classifiable above comprised 198 cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 40
Leading Causes of Injury Hospitalization, by Age Group
Detroit City Residents, 2011
Cause of Injury Coding Rate: 90% (5,255 of 5,841 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	1. Unintentional Hot Object	46	30.9	92.7
	2. Unintentional Poisoning	39	26.2	78.6
	3. Unintentional Fall	21	14.1	42.3
	4. Assault	16	10.7	32.2
	All Causes[1]	149	100.0	300.1
5 – 14	1. Unintentional Fall	26	19.3	26.2
	1. Unintentional Motor Vehicle Crash	26	19.3	26.2
	3. Unintentional Hot Object	19	14.1	19.1
	4. Assault	11	8.2	11.1
	All Causes	135	100.0	136.0
15 – 24	1. Assault	344	44.3	290.0
	2. Unintentional Motor Vehicle Crash	160	20.6	134.9
	3. Suicide Attempt/Intentional Self-harm	88	11.3	74.2
	4. Unintentional Fall	49	6.3	41.3
	5. Unintentional Poisoning	33	4.3	27.8
	All Causes	776	100.0	654.3
25 – 44	1. Assault	445	35.0	254.0
	2. Unintentional Motor Vehicle Crash	184	14.5	105.0
	3. Unintentional Fall	170	13.4	97.0
	4. Unintentional Poisoning	133	10.5	75.9
	5. Suicide Attempt/Intentional Self-harm	129	10.1	73.6
	All Causes	1,272	100.0	726.0
45 – 64	1. Unintentional Fall	488	26.2	271.0
	2. Unintentional Poisoning	423	22.7	234.9
	3. Assault	296	15.9	164.4
	4. Unintentional Motor Vehicle Crash	223	12.0	123.9
	5. Suicide Attempt/Intentional Self-harm	120	6.4	66.6
	All Causes	1,861	100.0	1,033.6
65+	1. Unintentional Fall	741	69.8	904.1
	2. Unintentional Poisoning	112	10.5	136.7
	3. Unintentional Motor Vehicle Crash	42	3.9	51.2
	4. Assault	38	3.6	46.4
	All Causes	1,062	100.0	1,295.8

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 27
Causes of Injury Hospitalization
Wexford County Residents, 2011
(N = 155 E-coded cases)



E-coding rate for Wexford County: 92%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 41
Specific Causes of Injury Hospitalization
Wexford County Residents, 2011

Unintentional		**Assault**		**Suicide Attempt/ Intentional Self-harm**	
Cause	No.	Cause	No.	Cause	No.
Fall	79			Poisoning	18
MVC – Occupant	15			Other	1
Poisoning	11				
Struck by Object/Person	4				
Other	20				
Total	129	Total	2	Total	19

Causes not classifiable above comprised five cases.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE 42
Leading Causes of Injury Hospitalization, by Age Group
Wexford County Residents, 2011
Cause of Injury Coding Rate: 92% (155 of 169 discharges)

Age Group	Cause of Injury	No.	%	Rate
<5	All Causes[1]	3	100.0	*
5 – 14	All Causes	8	100.0	186.6
15 – 24	All Causes	10	100.0	261.8
25 – 44	1. Unintentional Motor Vehicle Crash	9	30.0	118.0
	1. Suicide Attempt/Intentional Self-harm	9	30.0	118.0
	All Causes	30	100.0	393.3
45 – 64	1. Unintentional Fall	18	47.4	188.4
	2. Suicide Attempt/Intentional Self-harm	5	13.2	*
	3. Unintentional Motor Vehicle Crash	4	10.5	*
	All Causes	38	100.0	397.7
65+	1. Unintentional Fall	52	78.8	987.8
	2. Unintentional Poisoning	5	7.6	*
	All Causes	66	100.0	1,253.8

1. Represents the total number of E-coded cases, not the total number of injury hospitalizations, in the age group.
* Reliable rate could not be calculated. See Methods.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

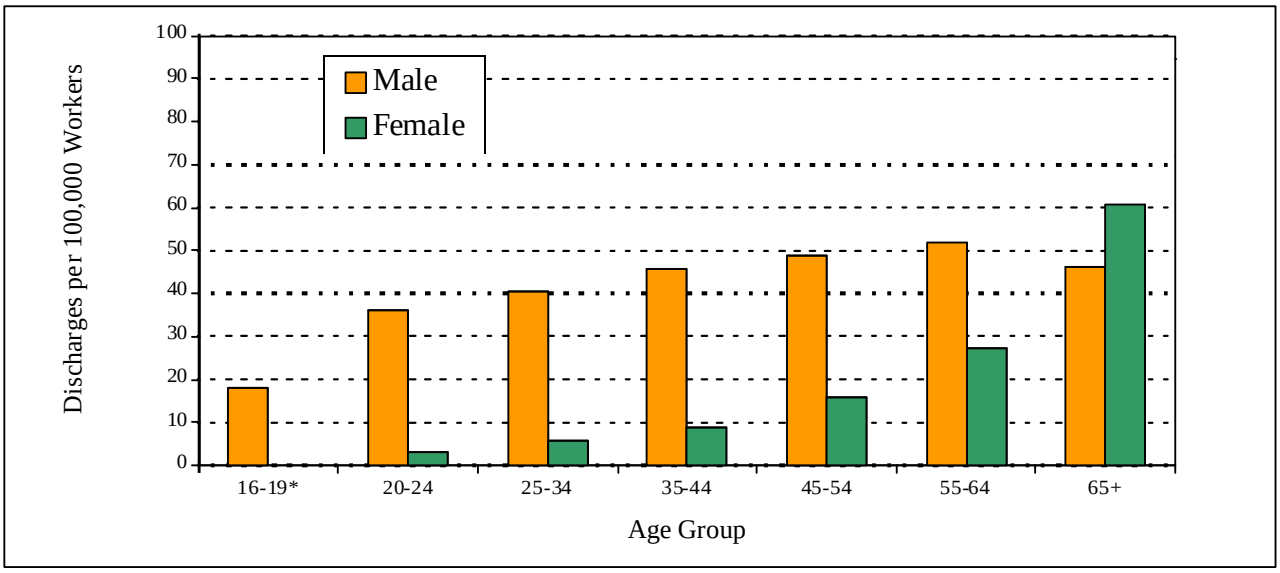
Occupational Injuries

Workers' compensation was listed as the primary payer for 1,260 (2.2%) of the 58,564 injury hospitalizations to Michigan residents aged 16 and older. Forty-nine (3.9%) of the 1,260 cases were out-of-state hospitalizations.

Demographics

Rates of work-related injury hospitalization by age and sex are illustrated in Figure 26. (The corresponding data can be found in Table B-1 in Appendix B.) Rates were substantially higher for males than females for each age group except ages 65 and older, where rates were noticeably higher for females. Among males, rates were lowest for those aged 16-19 and increased consistently up through the 55-64 age group, then decreased for those aged 65 and over. Female rates increased substantially with each age group, including those aged 65 and older. Similar results were found in the 2001, 2002, and 2007 Michigan injury hospitalization studies.[3,10,11]

FIGURE 26
Rate of Occupational Injury Hospitalizations
By Age and Sex
Michigan Residents Aged 16 and Older, 2011



* A statistically valid rate for females in this age group could not be calculated because of an insufficient number of cases.
Occupational injury discharges were defined as those for which the primary payment source was workers' compensation.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
Bureau of Labor Statistics, U.S. Department of Labor, Current Population Survey

Table 39 illustrates hospitalization rates for occupational injury by county of worker residence. Rates ranged from 17.7 per 100,000 workers in Washtenaw County to 71.2 per 100,000 workers in Huron County. Among Michigan's ten most populous counties, Macomb had the highest rate (36.5). Rates were not calculated for 40 counties that had less than six discharges. Due to this level of missing information, a map illustrating county-specific hospitalization rates was not developed.

TABLE 39
Number and Rate of Occupational Injury Hospitalizations
By County of Residence
Michigan Residents Aged 16 and Older, 2011

County	Number of Hospitalizations	Rate	County	Number of Hospitalizations	Rate
Alcona	4	*	Lapeer	13	37.3
Alger	1	*	Leelanau	0	-
Allegan	10	20.6	Lenawee	19	47.4
Alpena	6	49.5	Livingston	18	22.6
Antrim	4	*	Luce	0	-
Arenac	2	*	Mackinac	2	*
Baraga	0	-	Macomb	129	36.5
Barry	4	*	Manistee	2	*
Bay	21	44.6	Marquette	6	19.1
Benzie	1	*	Mason	5	*
Berrien	17	25.8	Mecosta	3	*
Branch	8	45.0	Menominee	3	*
Calhoun	24	40.8	Midland	10	25.9
Cass	4	*	Missaukee	2	*
Charlevoix	6	53.3	Monroe	33	52.5
Cheboygan	6	62.0	Montcalm	8	35.9
Chippewa	4	*	Montmorency	1	*
Clare	2	*	Muskegon	23	31.0
Clinton	11	31.5	Newaygo	7	36.6
Crawford	4	*	Oakland	117	22.2
Delta	6	35.8	Oceana	4	*
Dickinson	1	*	Ogemaw	3	*
Eaton	25	49.3	Ontonagon	0	-
Emmet	6	36.6	Osceola	4	*
Genesee	31	18.7	Oscoda	1	*
Gladwin	3	*	Otsego	1	*
Gogebic	0	-	Ottawa	35	29.6
Grand Traverse	16	37.9	Presque Isle	3	*
Gratiot	11	65.3	Roscommon	2	*
Hillsdale	11	64.4	Saginaw	21	25.4
Houghton	4	*	St. Clair	28	43.1
Huron	10	71.2	St. Joseph	6	24.1
Ingham	33	25.2	Sanilac	5	*
Ionia	9	34.7	Schoolcraft	2	*
Iosco	5	*	Shiawassee	14	47.2
Iron	2	*	Tuscola	13	56.5
Isabella	7	20.6	Van Buren	9	27.8
Jackson	17	26.4	Washtenaw	30	17.7
Kalamazoo	36	31.0	Wayne	228	31.8
Kalkaska	3	*	Wexford	3	*
Kent	72	25.5			
Keweenaw	0	-			
Lake	0	-	Michigan	1,260	30.1

* Reliable rate could not be calculated. See Methods.
Occupational injury discharges were defined as those for which payment source was workers' compensation.
Hospitalization rate is the number of hospitalizations per 100,000 workers.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
Bureau of Labor Statistics, U.S. Department of Labor, Local Area Unemployment Statistics

Types of Injuries Sustained

The types of occupational injuries requiring hospitalization are illustrated in Table 40. The table is a modified version of the more detailed Barell Matrix (Table 2) (body region categories have been collapsed into more general categories). The predominant type of injury was a fracture: it was the principal diagnosis in 56.0% of all work-related injury hospitalizations. More than half of all fractures were to the lower extremities. Certain types of injuries were much more common among occupational injury inpatients than among all injury inpatients aged 16 and older: upper limb fractures (12.0% vs. 7.3%); open wounds (6.4% vs. 3.3%); sprains and strains (4.8% vs. 1.5%); and burns (5.1% vs. 1.6%). Conversely, poisonings (1.4% vs. 18.8%) and hip fractures (6.1% vs. 14.9%) were much less prevalent among occupational injuries.

Causes of Injury

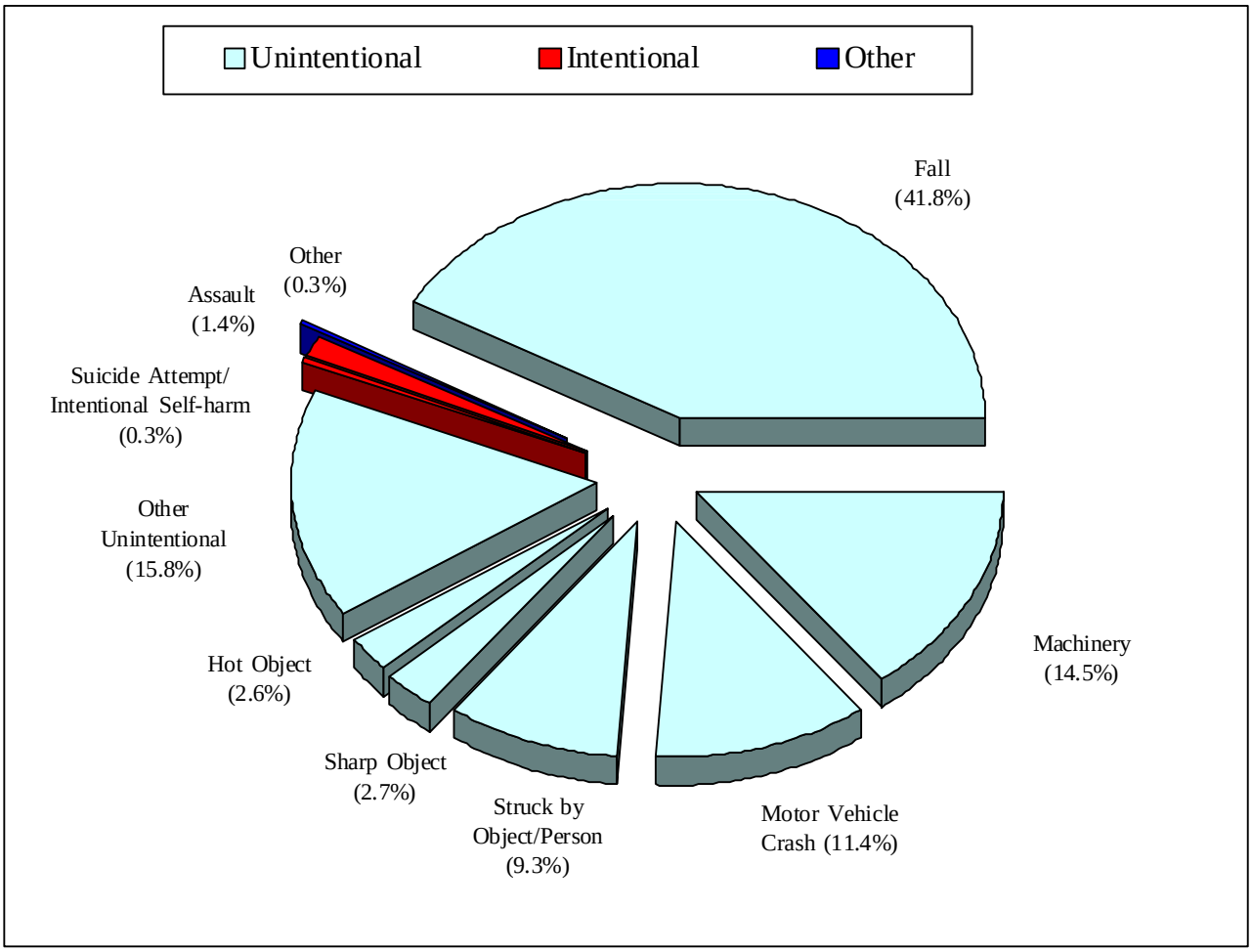
A cause of injury code (E-code) was provided for 1,034 of the 1,260 work-related injury hospitalizations (E-coding rate: 82%). The leading causes of injury are illustrated in Figure 27. Falls were the leading cause of occupational injuries. Certain causes of injury were much more common among occupational injury inpatients than among all injury inpatients aged 16 and older: unintentional injury via machinery (14.5% vs. 0.7%), and unintentional injury via being struck by an object or person (9.3% vs. 1.7%). Conversely, unintentional poisoning (1.0% vs. 9.0%), suicide attempt/intentional self-harm (0.3% vs. 10.5%), and assault (1.4% vs. 5.7%) were much less prevalent among occupational injuries.

TABLE 40
Number of Occupational Injury Hospitalizations
By Injury Type and Body Region
Michigan Residents Aged 16 and Older, 2011

Body Region	Fracture	Dislocation	Sprain/ Strain	Internal	Open Wound	Amputation	Blood Vessels	Contusion/ Superficial	Crush	Burn	Nerves	Unspecified	TOTAL
Brain/Skull	44			73							0		117
Other Head, Face, Neck	20	0	0		22		2	3	3	17	1	6	74
Spinal Cord	4			7									11
Vertebral Column	58	13	14										85
Torso	52	0	0	62	3		2	4	7	10	0	2	142
Upper Extremity	151	4	24		28	27	4	3	26	13	4	2	286
Lower Extremity	376	11	23		28	2	3	9	21	23		2	498
Other & Unspecified	0	0	0	0	0	0	0	0	1	1	2	1	5
System-wide & Late Effects													42
TOTAL	705	28	61	142	81	29	11	19	58	64	7	13	1,260

Injury categories were based on principal diagnosis.
The Barell Matrix illustrated in Table 2 utilized more specific body regions. Table C-2 in Appendix C illustrates the composition of the broader body regions listed above.
Occupational injury discharges were defined as those for which primary payment source was workers' compensation.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

FIGURE 27
Causes of Occupational Injury Hospitalization
Michigan Residents Aged 16 and Older, 2011
(N = 1,034 E-coded cases)



E-coding rate for occupational injuries: 82%
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

Temporal Analysis

Table 41 and Table 42 illustrate the day of week and the month in which patients were admitted to the hospital with a work-related injury. Day of admission is not necessarily equivalent to day of injury incident, but in most cases it is probably a good marker for it. The greatest number of admissions occurred on Wednesday, while the least occurred on Sunday. The 2001, 2002, and 2007 Michigan injury hospitalization reports found that most admissions occurred on Tuesday and fewest occurred on Sunday. The greatest number of admissions occurred in June. The 2001 and 2002 reports identified January as the highest admission month, while the 2007 report identified August. (Note that some admissions occurring late in the year may not have been discharged until 2012. Such cases would not be in the 2011 hospital discharge dataset analyzed for this report.)

TABLE 41
Number of Occupational Injury Hospitalizations
By Day of Hospital Admission
Michigan Residents Aged 16 and Older, 2011

Day of Week	Number	%
Monday	187	14.8
Tuesday	223	17.7
Wednesday	242	19.2
Thursday	209	16.6
Friday	223	17.7
Saturday	112	8.9
Sunday	64	5.1
Total	1,260	100.0

TABLE 42
Number of Occupational Injury Hospitalizations
By Month of Hospital Admission
Michigan Residents Aged 16 and Older, 2011

Month of Admission	Number	%
January	123	9.8
February	106	8.4
March	118	9.4
April	80	6.3
May	74	5.9
June	125	9.9
July	101	8.0
August	106	8.4
September	112	8.9
October	115	9.1
November	114	9.0
December	86	6.8
Total	1,260	100.0

Occupational injury discharges were defined as those for which primary payment source was workers' compensation.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

APPENDIX A

Data Tables for Michigan Resident Injury Hospitalizations

TABLE A-1
Number and Rate of Injury Hospitalizations
By Age and Sex
Michigan Residents, 2011

Age Group	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
<1	151	260.9	141	255.1	292	258.1
1-4	524	217.7	405	175.7	929	197.1
5-9	439	137.7	267	87.6	706	113.3
10-14	639	187.2	371	113.8	1,010	151.3
15-19	1,797	489.0	1,024	294.5	2,821	394.5
20-24	2,359	666.9	1,050	304.4	3,409	487.9
25-29	1,877	636.9	916	313.8	2,793	476.1
30-34	1,528	527.3	936	319.0	2,464	422.5
35-39	1,585	552.4	1,051	358.5	2,636	454.4
40-44	1,868	568.7	1,237	370.8	3,105	469.0
45-49	2,156	606.6	1,580	435.6	3,736	520.2
50-54	2,470	658.7	1,792	460.8	4,262	558.0
55-59	2,248	658.8	1,950	544.7	4,198	600.4
60-64	1,949	666.6	1,912	611.8	3,861	638.3
65-69	1,477	718.7	1,880	835.9	3,357	779.9
70-74	1,358	935.7	2,042	1,201.2	3,400	1,078.9
75-79	1,387	1,307.0	2,603	1,885.7	3,990	1,634.1
80-84	1,684	2,084.5	3,589	3,005.9	5,273	2,634.1
85+	2,517	3,883.5	7,170	5,333.2	9,687	4,861.6
Total	30,015	619.4	31,917	634.5	61,932	627.1

Age was not specified for two males and one female. These cases are included in the totals.
Hospitalization rate is the number of hospitalizations per 100,000 population.
An injury discharge was defined as one with a principal diagnosis in the following range per ICD-9-CM[13]:
800.0-909.2, 909.4, 909.9, 910.0-994.9, 995.50-995.59, 995.80-995.89.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE A-2
Number, Crude Rate and Age-Adjusted Rate of Hospitalizations for All Injury Types
By County of Residence
Michigan Residents, 2011

County of Residence	Number	Crude Rate	Age Adjusted Rate	County of Residence	Number	Crude Rate	Age Adjusted Rate
Alcona	82	760	619	Lapeer	481	546	525
Alger	54	564	475	Leelanau	129	596	448
Allegan	516	462	450	Lenawee	579	583	542
Alpena	200	681	576	Livingston	894	490	487
Antrim	155	662	500	Luce	27	413	329
Arenac	105	672	608	Mackinac	72	650	562
Baraga	64	726	673	Macomb	5,886	698	655
Barry	367	623	581	Manistee	152	614	473
Bay	855	797	724	Marquette	316	468	449
Benzie	123	703	615	Mason	198	691	599
Berrien	978	625	561	Mecosta	215	497	480
Branch	259	590	546	Menominee	129	538	471
Calhoun	895	660	628	Midland	463	551	519
Cass	278	529	463	Missaukee	74	495	436
Charlevoix	120	462	400	Monroe	1,026	677	651
Cheboygan	165	635	522	Montcalm	375	593	568
Chippewa	194	500	462	Montmorency	73	761	584
Clare	203	656	564	Muskegon	898	528	511
Clinton	367	484	473	Newaygo	299	617	577
Crawford	107	764	663	Oakland	7,187	593	570
Delta	213	576	509	Oceana	113	427	400
Dickinson	192	736	660	Ogemaw	139	645	538
Eaton	638	591	567	Ontonagon	50	757	533
Emmet	189	576	517	Osceola	139	593	539
Genesee	2,983	707	686	Oscoda	56	647	561
Gladwin	175	678	570	Otsego	101	419	374
Gogebic	97	602	501	Ottawa	1,029	387	398
Grand Traverse	545	617	562	Presque Isle	84	637	497
Gratiot	333	790	731	Roscommon	210	864	666
Hillsdale	289	621	572	Saginaw	1,592	800	764
Houghton	170	463	443	St. Clair	1,052	651	606
Huron	210	642	522	St. Joseph	330	541	508
Ingham	1,651	586	627	Sanilac	283	663	591
Ionia	393	615	630	Schoolcraft	44	518	421
Iosco	168	658	532	Shiawassee	374	535	506
Iron	104	884	663	Tuscola	375	678	630
Isabella	339	480	558	Van Buren	386	508	486
Jackson	996	623	591	Washtenaw	1,638	470	503
Kalamazoo	1,445	573	583	Wayne	13,656	758	754
Kalkaska	96	560	517	Wexford	169	517	476
Kent	3,219	529	550	Unknown	7	-	-
Keweenaw	13	583	419				
Lake	87	758	597	Michigan	61,932	627	603

Rates are the number of hospitalizations per 100,000 population.
An injury discharge was defined as one with a principal diagnosis in the following range per ICD-9-CM[15]:
800.0-909.2, 909.4, 909.9, 910.0-994.9, 995.50-995.59, 995.80-995.85.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE A-3
Number and Crude Rate of Hospitalizations for Traumatic Brain Injuries
By County of Residence
Michigan Residents, 2011

County of Residence	Number of Hospitalizations	Crude Hospitalization Rate	County of Residence	Number of Hospitalizations	Crude Hospitalization Rate
Alcona	11	102.0	Lapeer	64	72.7
Alger	6	62.6	Leelanau	17	78.5
Allegan	62	55.6	Lenawee	62	62.4
Alpena	19	64.7	Livingston	111	60.9
Antrim	21	89.7	Luce	5	*
Arenac	18	115.2	Mackinac	8	72.2
Baraga	6	68.0	Macomb	657	77.9
Barry	27	45.8	Manistee	13	52.5
Bay	90	83.9	Marquette	25	37.0
Benzie	16	91.5	Mason	29	101.2
Berrien	101	64.5	Mecosta	16	37.0
Branch	29	66.1	Menominee	13	54.2
Calhoun	95	70.1	Midland	55	65.5
Cass	30	57.1	Missaukee	11	73.6
Charlevoix	6	23.1	Monroe	133	87.7
Cheboygan	18	69.3	Montcalm	30	47.4
Chippewa	27	69.6	Montmorency	11	114.7
Clare	25	80.8	Muskegon	93	54.7
Clinton	56	73.8	Newaygo	29	59.9
Crawford	10	71.4	Oakland	914	75.5
Delta	23	62.2	Oceana	11	41.6
Dickinson	20	76.6	Ogemaw	21	97.5
Eaton	86	79.7	Ontonagon	6	90.8
Emmet	16	48.8	Osceola	15	64.0
Genesee	388	91.9	Oscoda	6	69.3
Gladwin	23	89.1	Otsego	9	37.3
Gogebic	9	55.8	Ottawa	106	39.8
Grand Traverse	55	62.3	Presque Isle	11	83.3
Gratiot	38	90.2	Roscommon	13	53.5
Hillsdale	49	105.2	Saginaw	182	91.5
Houghton	19	51.8	St. Clair	110	68.1
Huron	33	100.9	St. Joseph	31	50.8
Ingham	242	85.9	Sanilac	35	82.0
Ionia	37	57.9	Schoolcraft	7	82.5
Iosco	11	43.1	Shiawassee	49	70.1
Iron	10	85.0	Tuscola	37	66.9
Isabella	41	58.0	Van Buren	48	63.1
Jackson	128	80.1	Washtenaw	186	53.4
Kalamazoo	187	74.1	Wayne	1,524	84.6
Kalkaska	10	58.3	Wexford	17	52.0
Kent	357	58.7			
Keweenaw	4	*			
Lake	12	104.5	Michigan	7,191	72.8

* Reliable rate could not be calculated. See Methods.
Discharge rate is the number of discharges per 100,000 population.
Traumatic brain injuries were defined as discharges with a principal diagnosis in the following range per ICD-9-CM[15]:
800, 801, 803, 804, 850-854, 950(.1-.3), 995.55.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE A-4
Number and Crude Rate of Hospitalizations for Hip Fractures, Ages 65 and Older
By County of Residence
Michigan Residents, 2011

County of Residence	Number of Hospitalizations	Crude Hospitalization Rate	County of Residence	Number of Hospitalizations	Crude Hospitalization Rate
Alcona	13	372	Lapeer	67	548
Alger	11	554	Leelanau	19	364
Allegan	83	561	Lenawee	95	637
Alpena	36	617	Livingston	110	486
Antrim	29	549	Luce	2	*
Arenac	9	278	Mackinac	11	440
Baraga	6	395	Macomb	773	632
Barry	58	656	Manistee	35	672
Bay	90	507	Marquette	52	517
Benzie	20	536	Mason	28	498
Berrien	172	658	Mecosta	39	587
Branch	47	690	Menominee	21	449
Calhoun	128	631	Midland	71	563
Cass	54	648	Missaukee	14	535
Charlevoix	31	620	Monroe	114	546
Cheboygan	21	368	Montcalm	53	580
Chippewa	35	612	Montmorency	11	414
Clare	32	510	Muskegon	137	576
Clinton	34	340	Newaygo	51	664
Crawford	13	439	Oakland	1,003	610
Delta	33	456	Oceana	14	302
Dickinson	15	298	Ogemaw	22	454
Eaton	61	387	Ontonagon	15	833
Emmet	23	406	Osceola	18	444
Genesee	348	586	Oscoda	6	298
Gladwin	31	519	Otsego	29	691
Gogebic	24	679	Ottawa	189	587
Grand Traverse	107	796	Presque Isle	11	316
Gratiot	66	1,045	Roscommon	36	518
Hillsdale	44	589	Saginaw	152	489
Houghton	34	612	St. Clair	171	705
Huron	39	542	St. Joseph	53	570
Ingham	117	385	Sanilac	37	485
Ionia	47	630	Schoolcraft	8	438
Iosco	39	572	Shiawassee	63	616
Iron	22	706	Tuscola	51	563
Isabella	48	689	Van Buren	54	500
Jackson	127	550	Washtenaw	210	574
Kalamazoo	172	550	Wayne	1,258	544
Kalkaska	13	448	Wexford	22	413
Kent	427	621			
Keweenaw	1	*			
Lake	14	499	Michigan	7,899	569

* Reliable rate could not be calculated. See Methods.
Discharge rate is the number of discharges per 100,000 population.
Hip fractures were defined as discharges with the principal diagnosis code 820 per ICD-9-CM.[15]
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

APPENDIX B

Data Table for Occupational Injury Hospitalizations

TABLE B-1
Number and Rate of Occupational Injury Hospitalizations
By Age and Sex
Michigan Residents Aged 16 and Older, 2011

Age Group	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
16-19	15	17.9	3	*	18	10.7
20-24	70	36.1	7	3.3	77	19.0
25-34	183	40.7	23	5.9	206	24.6
35-44	211	45.6	35	8.9	246	28.7
45-54	265	48.9	83	16.0	348	32.8
55-64	183	52.1	88	27.4	271	40.4
65+	46	46.0	48	60.8	94	52.5
Total	973	44.6	287	14.4	1,260	30.1

* Reliable rate could not be calculated. See Methods.
Occupational injury discharges were defined as those for which primary payment source was workers' compensation.
Rates are the number of hospitalizations per 100,000 workers.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
Bureau of Labor Statistics, U.S. Department of Labor, Current Population Survey

APPENDIX C

Barell Injury Diagnosis Matrix

The Barell Injury Diagnosis Matrix, Classification by Body Region and Nature of the Injury

based on **5** digit icd-9 CM codes

				ICD-9-CM codes	A FRACTURE 800-829	B DISLOCATION 830-839	C SPRAINS & STRAINS 840-848	D INTERNAL 850-854,860-869 952, 995.55	E OPEN WOUND 870-884, 890-894	F AMPUTATIONS 885-887, 895-897	G BLOOD VESSELS 900-904	H CONTUSION / SUPERFICIAL 910-924	I CRUSH 925-929	J BURNS 940-949	K NERVES 950-951 953-957	L UNSPECIFIED 959
Head and Neck	Traumatic Brain Injury	1	**Type 1 TBI**	800,801,803,804(.1-.4,.6-.9), (.03-.05,.53-.55) 850(.2-.4), 851-854, 950(.1-.3), 995.55	800,801,803,804(.1-.4,.6-.9) 800,801,803,804(.03-.05,.53-.55)	/	/	850(.2-.4) 851-854*, 995.55	/	/	/	/	/	/	950.1-.3	/
		2	**Type 2 TBI**	800,801,803,804(.00,.02,.06,.09) (.50,.52,.56,.59) , 850(.0,.1,.5,.9)	800,801,803,804(.00,.02,.06,.09), 800,801,803,804(.50,.52,.56,.59)			850(.0,.1,.5,.9)								
		3	**Type 3 TBI**	800,801,803,804(.01, .51)	800,801,803,804(.01,.51)	/	/	/	/	/	/	/	/	/	/	/
37	Other head, face and neck	4	**Other Head**	873(.0-.1,.8-.9), 941.x6, 951, 959.01	/	/	/	/	873.0-.1,.8-.9	/	/	/	/	941.x6	951	959.01*
		5	**Face**	802, 830, 848.0-.1, 872, 873.2-.7, 941(.x1,.x3-.x5,.x7)	802	830	848.0-.1	/	872, 873.2-.7	/	/	/	/	941.x1,.x3-.x5,.x7	/	/
		6	**Eye**	870-871, 918, 921, 940, 941.x2, 950(.0,.9)	/	/	/	/	870-871	/	/	918, 921	/	940, 941.x2	950(.0,.9)	/
		7	**Neck**	807.5-.6, 848.2, 874, 925.2, 941.x8, 953.0, 954.0	807.5-.6	/	848.2	/	874	/	/	/	925.2	941.x8	953.0, 954.0	/
39		8	**Head, Face and Neck Unspecified**	900, 910, 920, 925.1, 941.x0, .x9, 947.0, 957.0, 959.09	/	/	/	/	/	/	900	910, 920	925.1	941.x0,.x9, 947.0	957.0	959.09
spine and back	Spinal Cord (SCI)	9	**Cervical SCI**	806(.0-.1), 952.0	806.0-.1	/	/	952.0	/	/	/	/	/	/	/	/
		10	**Thoracic/ Dorsal SCI**	806(.2-.3), 952.1	806.2-.3	/	/	952.1	/	/	/	/	/	/	/	/
		11	**Lumbar SCI**	806(.4-.5), 952.2	806.4-.5	/	/	952.2	/	/	/	/	/	/	/	/
		12	**Sacrum Coccyx SCI**	806(.6-.7), 952(.3-.4)	806.6-.7	/	/	952.3-.4	/	/	/	/	/	/	/	/
40		13	**Spine+ Back unspecified SCI**	806(.8-.9), 952(.8-.9)	806.8-.9	/	/	952.8-.9	/	/	/	/	/	/	/	/
	Vertebral Column (VCI)	14	**Cervical VCI**	805(.0-.1), 839(.0-.1), 847.0	805.0-.1	839.0-.1	847.0	/	/	/	/	/	/	/	/	/
		15	**Thoracic /Dorsal VCI**	805(.2-.3), 839(.21,.31), 847.1	805.2-.3	839.21,.31	847.1	/	/	/	/	/	/	/	/	/
		16	**Lumbar VCI**	805(.4-.5), 839(.20,.30), 847.2	805.4-.5	839.20,.30	847.2	/	/	/	/	/	/	/	/	/
		17	**Sacrum Coccyx VCI**	805(.6-.7), 839(.41-.42), 839(.51-.52), 847.3-.4	805.6-.7	839(.41-.42, .51-.52)	847.3-.4	/	/	/	/	/	/	/	/	/
42		18	**Spine+ Back unspecified VCI**	805(.8-.9), 839(.40,.49), 839(.50,.59)	805.8-.9	839(.40,.49,.50,.59)	/	/	/	/	/	/	/	/	/	/
Torso	Torso	19	**Chest (Thorax)**	807(.0-.4), 839(.61,.71), 848(.3-.4), 860-862, 875, 879(.0-.1), 901, 922(.0-.1,.33), 926.19, 942.x1-.x2 953.1	807.0-.4	839.61,.71	848.3-.4	860-862	875, 879.0-.1	/	901	922(.0,.1,.33)	926.19	942.x1-x2	953.1	/
		20	**Abdomen**	863-866, 868, 879(.2-.5), 902(.0-.4), 922.2,942.x3, 947.3, 953(.2,.5)	/	/	/	863-866, 868	879.2-.5	/	902.0-.4	922.2	/	942.x3, 947.3	953.2, 953.5	/
		21	**Pelvis & Urogenital**	808, 839(.69,.79), 846, 848.5, 867,877-878 902(.5,.81-.82), 922.4, 926(.0,.12), 942.x5,947.4, 953.3	808	839.69,.79	846, 848.5	867	877-878	/	902(.5, .81-.82)	922.4	926(.0, .12)	942.x5, 947.4	953.3	/
		22	**Trunk**	809, 879(.6-.7), 911, 922(.8-.9), 926(.8-.9), 942(.x0,.x9), 954(.1,.8-.9), 959.1	809	/	/	/	879.6-.7	/	/	911, 922.8-.9	926.8-.9	942.x0, 942.x9	954.1, .8-.9	959.1
43		23	**Back and Buttock**	847.9, 876, 922(.31-.32), 926.11, 942.x4	/	/	847.9	/	876	/	/	922.31-.32	926.11	942.x4	/	/
Extremities	Upper	24	**Shoulder & upper arm**	810-812, 831, 840, 880, 887(.2-.3), 912,923.0, 927.0, 943(.x3-.x6) ,959.2	810-812	831	840	/	880	887.2-.3	/	912, 923.0	927.0	943.x3-.x6	/	959.2
		25	**Forearm & elbow**	813, 832, 841, 881(.x0-.x1), 887(.0-.1), 923.1, 927.1, 943(.x1-.x2)	813	832	841	/	881.x0-x1	887.0-.1	/	923.1	927.1	943.x1-x2	/	/
		26	**Wrist, hand & fingers**	814-817, 833-834, 842,881.x2, 882, 883, 885-886, 914-915, 923(.2-.3) ,927(.2-.3), 944 ,959(.4-.5)	814-817	833, 834	842 /	/ /	881.x2,882, 883	885-886	/ /	914-915, 923.2-.3	927.2-.3	944 /	/ /	959.4-.5
		27	**Oher & unspecified**	818, 884, 887(.4-.7), 903, 913, 923(.8-.9), 927(.8-.9), 943(.x0,.x9), 953.4, 955, 959.3	818	/	/	/	884	887.4-.7	903	913,923.8,.9	927.8-.9	943.x0,.x9	953.4, 955	959.3
44																
	Lower	28	**Hip**	820, 835, 843, 924.01, 928.01	820	835	843	/	/	/	/	924.01	928.01	/	/	/
		29	**Upper leg & thigh**	821, 897(.2-.3), 924.00, 928.00, 945.x6	821			/	/	897.2-.3	/	924.00	928.00	945.x6	/	/
		30	**Knee**	822, 836, 844.0-.3, 924.11, 928.11, 945.x5	822	836	844.0-.3	/	/	/	/	924.11	928.11	945.x5	/	/
		31	**Lower leg & ankle**	823-824, 837, 845.0, 897(.0-.1), 924(.10,.21), 928(.10,.21), 945(.x3-.x4)	823-824	837	845.0	/		897.0-.1	/	924.10,.21	928.10,.21	945.x3-.x4	/	/
		32	**Foot & toes**	825-826, 838, 845.1, 892-893, 895-896, 917, 924(.3,.20), 928 (.3,.20), 945 (.x1-.x2)	825-826	838	845.1	/	892-893	895-896	/	917, 924.3,.20	928.3,.20	945.x1-.x2	/	/
46		33	**Other & unspecified**	827,844(.8-.9), 890-891, 894, 897(.4-.7), 904(.0-.8), 916, 924(.4-.5), 928(.8-.9), 945(.x0,.x9), 959.6-.7	827	/	844.8,.9	/	890-891,894	897.4-.7	904.0-.8	916, 924.4-.5	928.8,.9	945.x0-.x9	/	959.6-.7
Unclassifiable by site	Other & unspecified	34	**Other/ multiple**	819, 828, 902(.87,.89), 947(.1-.2), 953.8, 956	819, 828	/	/	/	/	/	902.87,.89	/	/	947.1-.2	953.8, 956	/
		35	**Unspecified site**	829, 839(.8-.9), 848(.8-.9), 869, 879(.8,.9), 902.9, 904.9, 919, 924(.8,.9), 92 946, 947(.8,.9), 948, 949, 953.9, 957(.1,.8,.9), 959(.8,.9)	829	839.8-.9	848.8-.9	869	879(.8-.9)	/	902.9, 904.9	919, 924.8,.9	929	946, 947.8,.9 948, 949	953.9, 957.1,.8,.9	959.8,.9
47																
Unclassifiable by system	System-wide	36	**System-wide & late effects**	905-908, 909 (.0,.1,.2,.4,.9), 930-939,958, 960-994, 995.50-.54,.59, 995(.80-.85)	Foreign body (930-939), Early complications of trauma (958), Poisoning (960-979), Toxic Effects (980-989), Other and unspecified effects of external cause (990-994) Child and adult maltreatment (995.50-.54,.59, 995.80-.85) Late effects of injuries, poisonings, toxic effects and other external causes (905-909) excluding 909(.3, .5)											
48																

Special diagnostic codes for trauma: Flail Chest (807.4) Pneumothorax (860)

For purposes of classification, head injuries are labeled as **Type 1 TBI** if there is recorded evidence of an intracranial injury or a moderate or a prolonged loss of consciousness (LOC), Shaken Infant Syndrome (SIS), or injuries to the optic nerve pathways.

Type 2 TBI includes injuries with no recorded evidence of intracranial injury, and LOC of less than one hour, or LOC of unknown duration, or unspecified level of consciousness. **Type 3 TBI** includes patients with no evidence of intracranial injury and no LOC.

*** Note from CDC:** 959.01 (added to ICD-9-CM in 1997) is not intended to be assigned to TBI cases; however, in the USA it has been assigned incorrectly to a substantial proportion of cases previously coded 854.

The Matrix is available on the net at www.cdc.gov/nchs/about/otheract/ice/barellmatrix.htm

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Table C-2
Specific Injury Types Comprising
Barell Injury Diagnosis Matrix Categories Used in Table 40

Body Region	Injury Types Comprising Category
Brain/Skull	• Type 1[1] Traumatic Brain Injury • Type 2[2] Traumatic Brain Injury • Type 3[3] Traumatic Brain Injury
Other Head, Face, Neck	• Other Head • Face, Eye, Neck • Head, Face and Neck,Unspecified
Spinal Cord	• Cervical Spinal Cord Injury • Thoracic/Dosal Spinal Cord Injury • Lumbar Spinal Cord Injury • Sacrum Coccyx Spinal Cord Injury • Spine & Back, Unspecified Spinal Cord Injury
Vertebral Column	• Cervical Vertebral Column Injury • Thoracic/Dorsal Vertebral Column Injury • Lumbar Vertebral Column Injury • Sacrum Coccyx Vertebral Column Injury • Spine & Back, Unspecified Vertebral Column Injury
Torso	• Chest (Thorax) • Abdomen • Pelvis & Urogenital • Trunk • Back and Buttock
Upper Extremity	• Shoulder & Upper Arm • Forearm & Elbow • Wrist, Hand & Fingers • Other & Unspecified Upper Extremity
Lower Extremity	• Hip • Upper Leg & Thigh • Knee • Lower Leg & Ankle • Foot & Toes • Other and Unspecified Lower Extremity
Other & Unspecified	• Other/multiple • Unspecified Site
System-wide & Late Effects	• System-wide & Late Effects

1. Recorded evidence of an intracranial injury or a moderate or prolonged loss of consciousness (LOC), Shaken Infant Syndrome (SIS), or injuries to the optic nerve pathways.
2. No recorded evidence of intracranial injury, and LOC of less than one hour, or LOC of unknown duration, or unspecified level of consiousness.
3. No evidence of intracranial injury and no LOC.

APPENDIX D

Cause and Manner/Intent of Injury and Corresponding E-codes

TABLE D-1 (Page 1 of 2)
ICD-9-CM Codes Defining Cause and Manner/Intent of Injury Categories

Mechanism	Manner/Intent				
	Unintentional	Intentional Self-harm	Assault	Undetermined	Other
Cut/pierce	E920	E956	E966	E986	E974
Drowning/submersion	E830, E832, E910	E954	E964	E984	
Boat-related	E830, E832				
Non-boat-related	E910				
Boat-related non-drowning*	E831				
Fall	E880-E886, E888	E957	E968.1	E987	
Fire/hot objects or substances	E890-E899, E924	E958.1,.2,.7	E961, E968.0,.3	E988.1,.2,.7	
Fire/flame	E890-E899	E958.1	E968.0	E988.1	
Hot object/substance	E924	E958.2,.7	E961, E968.3	E988.2,.7	
Firearm	E922.0-.3, .8, .9	E955.0-.4	E965.0-.4	E985.0-.4	E970
Machinery	E919				
Motor vehicle traffic	E810-E819	E958.5	E968.5	E988.5	
Occupant	E810-E819(.0,.1)				
Motorcycle	E810-E819(.2,.3)				
Pedalcyclist	E810-E819(.6)				
Pedestrian	E810-E819(.7)				
Other specified	E810-E819(.4,.5,.8)				
Unspecified	E810-E819(.9)				
Pedalcyclist, other	E800-E807(.3), E820-E825(.6), E826.1,.9,E827-E829(.1)				
Pedestrian, other	E800-E807(.2), E820-E825(.7), E826-E829(.0)				

* This cause is contained within “Other Transport” in the recommended framework.[16] It was separated out for this report due to state-specific interest in boat-related non-drowning injuries.

TABLE D-1 (Page 2 of 2)
ICD-9-CM Codes Defining Cause and Manner/Intent of Injury Categories

Mechanism	Manner/Intent				
	Unintentional	Intentional Self-harm	Assault	Undetermined	Other
Snowmobile, non-traffic*	E820				
Transport, other**	E800-E807(.0,.1,.8,.9), E821-E825(.0-.5,.8,.9), E826.2-.8, E827-E829(.2-.9), E833-E845	E958.6		E988.6	
Natural/environmental	E900-E909, E928.0-.2	E958.3		E988.3	
Bites & stings	E905(.0-.6,.9), E906(.0-.5,.9)				
Other	E900-E904, E905.7,.8, E906(.6-.8), E907-E909, E928.0-.2				
Overexertion	E927				
Poisoning	E850-E869	E950-E952	E962	E980-E982	E972
Struck by, against	E916-E917		E960.0, E968.2		E973, E975
Suffocation, strangulation	E911-E913	E953	E963	E983	
Other specified & classifiable	E846-E848, E914-E915, E918, E921, E922.4, E923, E925-E926, E928.3, E929.0-.5	E955.5, .6, .9, E958.0,.4	E960.1, E965.5-.9, E967, E968.4, .6, .7	E985.5, .6, E988.0,.4	E971, E978, E990-E994, E996, E997.0-.2
Other specified, not elsewhere classifiable	E928.8, E929.8	E958.8, E959	E968.8, E969	E988.8, E989	E977, E995, E997.8, E998, E999
Unspecified	E887, E928.9, E929.9	E958.9	E968.9	E988.9	E976, E997.9
Adverse effects/events***					E870-E879, E930-E949
Medical care					E870-E879
Drugs					E930-E949

* This cause is contained within "Other Transport" in the recommended framework.[16] It was separated out for this report due to state-specific interest in snowmobile injuries.
** The recommended framework includes boat-related non-drownings and snowmobile, non-traffic incidents in this category. These injury causes have been separated out for this report.
*** Adverse effects are part of the framework, however, the national panel on using hospital discharge data[16] recommends excluding adverse effects from calculations of E-coding rates and in all cause of injury analyses.

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