

**Kentucky Injury Prevention and Research Center**

**2014 Kentucky Inpatient  
Traumatic Injury Data Report**

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## Introduction

This report is an overview of 2014 hospital care provided to Kentucky residents whose primary diagnosis was some form of physical trauma. The data source is inpatient claims from all Kentucky non-federal general acute-care hospitals. In contrast, the Kentucky Trauma Registry (KTR) Report collects data only from Kentucky hospitals that have been verified by the American College of Surgeons (ACS) or the Kentucky Department for Public Health as trauma facilities, or have voluntarily reported their trauma cases according to the National Trauma Data Bank standard. As Kentucky moves toward a broader and deeper network for trauma care, review of the full statewide hospital discharge data gives a comprehensive account of trauma-related hospitalizations across the full range of facilities in the state.

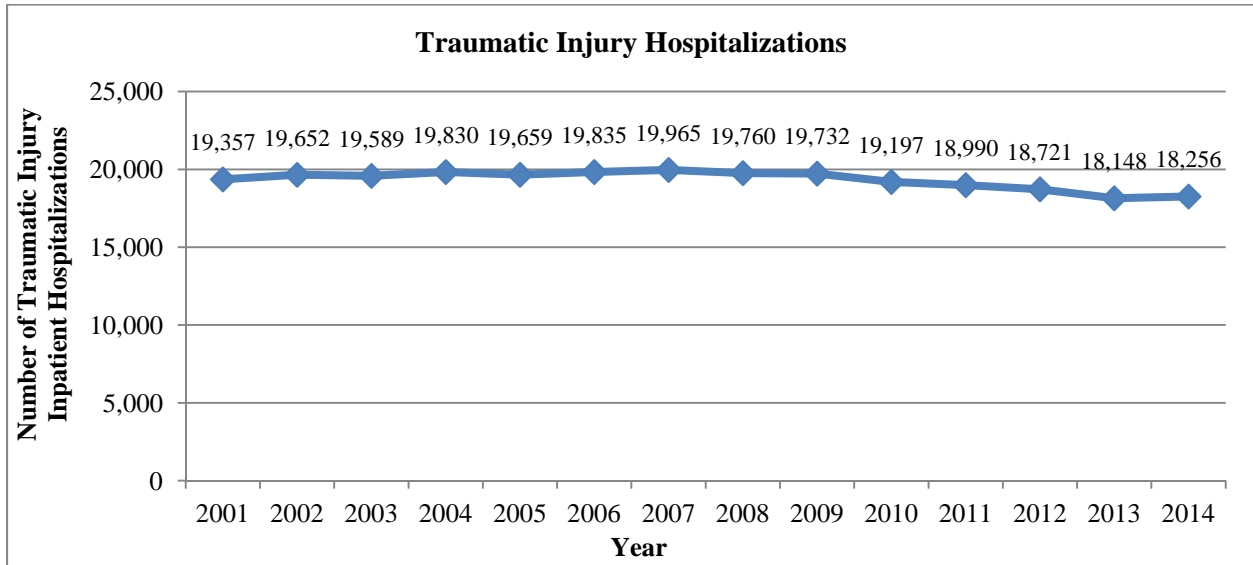
The data presented in the report reflects inpatient hospital discharges, rather than discrete patient information. State data management policy requires the removal of all personal identifiers from the data sets before we receive them. Thus, our counts may not necessarily correspond to the number of injured persons, because follow-up hospitalizations and ED visits for an earlier injury cannot be identified and removed from the datasets.

The hospital discharge data is coded according to the International Classification of Diseases, Clinical Modification, ninth revision (ICD-9-CM). The ICD system describes an injury using diagnosis codes and E-codes. An injury diagnosis code is a single code that describes the nature of the injury (e.g., fracture, open wound, etc.) and the body region (head, arm, skull, etc.). The first coded diagnosis is the principal diagnosis and reflects the primary reason for the patient's hospital stay based on clinical findings. For the purpose of this report, a case was selected as a traumatic injury case if the principal diagnosis was in the following range of codes: 800-897, 900, 901, 902, 903, 904, 925, 926, 927, 928, 929, 940-949, 950-959.

Injury diagnoses should be supplemented (when circumstances of an injury are known) with E-codes, which specify external cause of injury, place of injury, and activity. The external cause of injury E-code is a single code that describes the mechanism of injury (e.g., fall, motor vehicle collision, firearm, etc.) and the intent of injury (e.g., unintentional, assault, self-inflicted, or undetermined). The completeness and accuracy of the E-codes is very important for successful injury surveillance, to identify and target priority areas and populations at higher risk.

In 2014, there were 18,256 hospitalizations for Kentucky residents in non-federal, acute care Kentucky hospitals due to traumatic injuries. This is a slight (0.6%) increase from the 18,148 hospitalizations for traumatic injuries in 2013. A decrease of about 3 percent was observed in the 2013 traumatic injury hospitalizations (from 18,721 in 2012 to 18,148 in 2013).

**Figure 1: Traumatic injury hospitalizations for Kentucky residents in Kentucky acute care hospitals, 2001-2014**



About 10% of all hospital discharges (1,803 records) with a principal diagnosis of traumatic injury did not have an external cause of injury code (E-code) that described the injury mechanism and intent (Table 1). Among the remaining 16,452 injuries leading to hospitalizations, 15,825 (96%) were unintentional, 3% were due to assaults, and 1% followed intentional self-harm. The large majority of the unintentional injuries, 70%, were due to falls. There were 2,528 hospitalizations for traumatic injuries from motor vehicle traffic collisions, 16% of all unintentional injuries. The majority of hospitalized assault injuries were caused by firearms (n=130, 27%) or being struck by or against an object or person (n=147, 30%). Among the intentional self-harms, 47 (42%) were due to cuts and 41 (37%) to firearms.

**Table 1: Traumatic injury hospitalizations by cause and intent, 2014**

Cause	Un-intentional	Self-harm	Assault	Other	Undetermined	Missing E-code	Total
MV Traffic	2,528	0	*	0	*	0	2,531
Firearm	91	41	130	5	*	0	270
Poisoning	6	*	0	0	*	0	11
Falls	11,121	5	0	0	*	0	11,129
Suffocation	*	*	*	0	*	0	5
Drowning	*	0	0	0	0	0	*
Fire/Burn	250	*	*	0	*	0	255
Cut/Pierce	109	47	92	0	*	0	250
Struck by/against	287	0	147	*	0	0	438
Machinery	115	0	0	0	0	0	115
Other Pedal Cycle	119	0	0	0	0	0	119
Other Pedestrian	16	0	0	0	0	0	16
Other Transportation	481	0	0	0	0	0	481
Natural/Environmental	119	0	0	0	0	0	119
Overexertion	160	0	0	0	0	0	160
Other Specified	127	6	20	*	0	0	154
Not elsewhere classified	87	7	30	0	*	0	127
Not specified	205	0	61	0	5	0	271
Missing E-code	*	0	0	0	0	1,803	1,804
<b>TOTAL</b>	<b>15,825</b>	<b>112</b>	<b>484</b>	<b>10</b>	<b>22</b>	<b>1,803</b>	<b>18,256</b>

\*Counts less than 5 were suppressed by state data management policy

Among age groups, patients 85 and older accounted for the largest proportion of trauma-related hospitalizations (3,011, 18%). Overall, the number of hospitalizations increased with age (Figure 2). This age distribution is quite different from that of the patients treated in Kentucky trauma centers,\* where the majority of patients are in the 18-55 age range; the number of cases in the Kentucky Trauma Registry decreases with increasing age. The difference is primarily because the current report includes fall-related fractures, the leading cause of inpatient stays in those 65 and older. Isolated hip fractures, the most common cause of hospitalization following serious falls in older adults, are not included in the diagnostic categories reported to the Kentucky Trauma Registry because such admissions do not require trauma team activation. Another reason for the high proportion of hospitalizations for patients aged 85 and older in the present report is their high rate of comorbidities, conditions that make them more vulnerable to serious health consequences than younger persons with injuries of the same type and severity.

\*[http://www.mc.uky.edu/kiprc/projects/trauma/reports/Trauma\\_Registry\\_Report-2013-posted.pdf](http://www.mc.uky.edu/kiprc/projects/trauma/reports/Trauma_Registry_Report-2013-posted.pdf)

**Figure 2: Traumatic injury hospitalizations by age group, 2014**

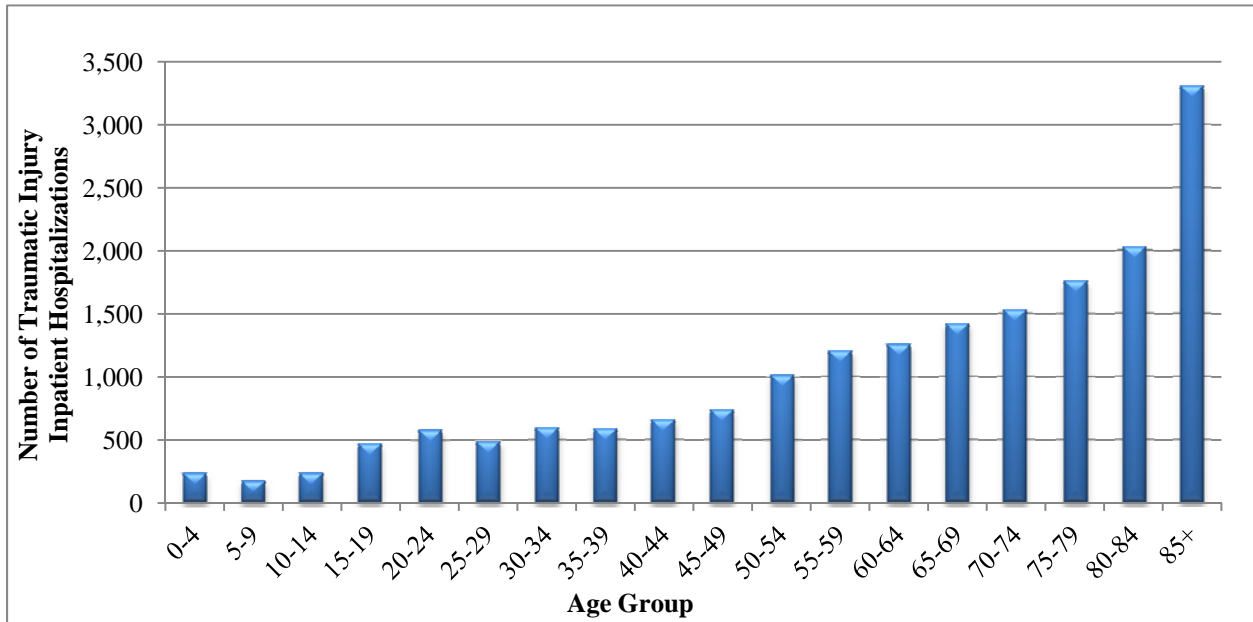
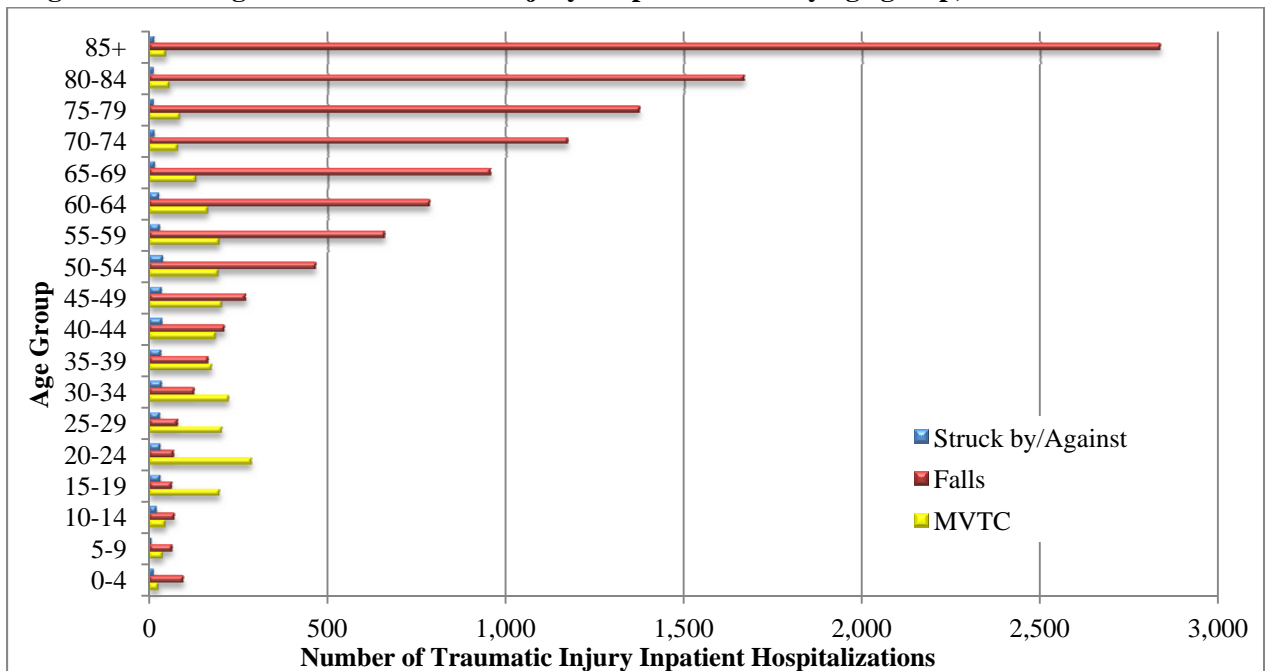


Figure 3 shows the age-related distribution of the three leading causes of traumatic injury hospitalizations: motor vehicle traffic collisions (MVTC), falls, and being struck by or against an object or person.

**Figure 3: Leading causes of traumatic injury hospitalizations by age group, 2014**



**Table 2: Traumatic injury hospitalizations by body region, 2014**

Injuries by Body Region			N	%
Head and Neck	Traumatic Brain Injury (TBI)	Type 1 TBI	1,900	10.41
		Type 2 TBI	251	1.37
		Type 3 TBI	66	0.36
	Other head, face and neck	Other head	84	0.46
		Face	337	1.85
		Eye	16	0.09
		Neck	28	0.15
		Head, face and neck unspecified	41	0.22
Spine and back	Spinal Cord (SCI)	Cervical SCI	74	0.41
		Thoracic/Dorsal SCI	29	0.16
		Lumbar SCI	8	0.04
		Sacrum coccyx SCI	*	0.01
		Spine + back unspecified SCI	7	0.04
	Vertebral Column (VCI)	Cervical VCI	354	1.94
		Thoracic/Dorsal VCI	453	2.48
		Lumbar VCI	661	3.62
		Sacrum coccyx VCI	113	0.62
		Spine + back unspecified VCI	8	0.04
Torso	Torso	Chest (Thorax)	1,188	6.51
		Abdomen	535	2.93
		Pelvis and urogenital	846	4.63
		Trunk	29	0.16
		Back and buttock	25	0.14
Extremities	Upper	Shoulder and upper arm	1,215	6.66
		Forearm and elbow	651	3.57
		Wrist, hand and fingers	247	1.35
		Other and unspecified	47	0.26
	Lower	Hip	5,053	27.68
		Upper leg and thigh	872	4.78
		Knee	167	0.91
		Lower leg and ankle	2,255	12.35
		Foot and toes	321	1.76
		Other and unspecified	251	1.37
Unclassifiable by site	Other and unspecified	Other/multiple	12	0.07
		Unspecified site	24	0.13
	System-wide	System-wide & late effects	86	0.47

\*Counts less than 5 were suppressed by state data management policy

Hip fractures were the primary diagnoses for more than one in four (27.7%) traumatic injury hospitalizations (Table 2). Lower leg and ankle injuries accounted for 12.4%. Almost half of the hospitalizations involved a lower extremity injury. Traumatic brain injuries (TBI) accounted for a total of 12.1%, the majority of which were Type I TBI. Head injuries are labeled as Type 1 TBI if the first diagnosis code is for an intracranial injury, there is moderate or prolonged loss of consciousness, shaken infant syndrome, or injuries to the optic nerve pathways. Type 2 TBI includes head injuries with no intracranial injury coded, and coded with loss of consciousness of less than 1 hour or unknown duration, or unspecified level. Type 3 TBIs have neither intracranial injury nor loss of consciousness

Using the principal diagnosis code, injuries are described by nature in Table 3. Three-quarters of the hospitalizations involved fractures and 14.7% involved internal organs. Many patients hospitalized for injuries have multi-system involvement.

**Table 3: Traumatic injury hospitalizations by nature, 2014**

<b>Injuries by Nature</b>	<b>Number</b>	<b>Percent</b>
<b>Fractures</b>	13,892	76.10
<b>Dislocation</b>	115	0.63
<b>Sprains and strains</b>	316	1.73
<b>Internal organ</b>	2,685	14.71
<b>Open wounds</b>	537	2.94
<b>Amputations</b>	45	0.25
<b>Blood vessels</b>	82	0.45
<b>Crushing</b>	58	0.32
<b>Burns</b>	310	1.70
<b>Nerves</b>	20	0.11
<b>Unspecified</b>	110	0.60
<b>System wide &amp; late effects</b>	86	0.47
<b>Total</b>	18,256	100



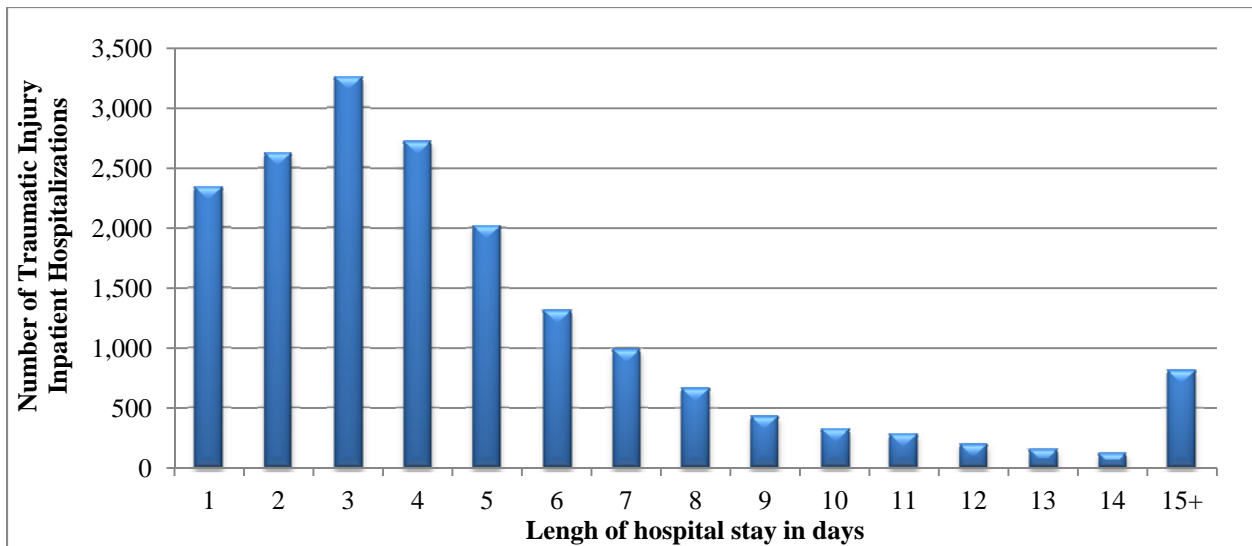
The majority (56.4%) of those hospitalized for traumatic injuries were women (Table 4), again reflecting the disproportionate representation from older age groups and women’s greater longevity.

**Table 4: Traumatic injury hospitalizations by gender, 2014**

Gender	N	%
Female	10,299	56.41
Male	7,957	43.59

Trauma accounted for a total of 95,148 inpatient days in 2013, an increase of 3% from the 92,030 total days in 2013. The mean length of stay in 2014 was 5.2 days, similar to 2011-2013 (5.1 days), while the median stay was 4 days. About 74% of the patients with one or two day stays were discharged to self-care at home (routine discharge). Figure 4 shows the length of stay distribution.

**Figure 4: Number of hospitalizations by length of stay, 2014**



For statewide trauma system planning, the inclusion of the large group of older adults hospitalized for injuries has important implications, because it identifies a substantial group that can usually be managed safely at community facilities. The overrepresentation of older adults accounted for the high proportion of discharges to skilled nursing facilities (n=5,482, 30%), home health (n=1,844,

10.1%), or inpatient rehabilitation (n=2,113, 11.6%) (Table 5). Less than half (n=6,995, 38%) of discharges were routine discharges to home/self-care. This finding is particularly important because it indicates an ongoing cost of post-discharge care: over half of Kentuckians hospitalized for traumatic injury in 2014 required additional formal health services in the period immediately following discharge. While the proportion who died was relatively small (2.7%), it nonetheless reflects the deaths of 494 Kentuckians who survived traumatic injury to the point of hospitalization.

**Table 5: Traumatic injury hospitalizations by discharge status, 2014**

Discharge Status	Age Group										Total
	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	
<b>Routine discharge (home/self-care)</b>	219	379	828	834	901	1,132	1,167	802	538	195	6,995
<b>Another acute care hospital</b>	*	*	12	*	16	15	11	12	16	13	102
<b>Inpatient rehabilitation</b>	*	11	96	104	91	171	357	445	639	488	2,405
<b>Skilled nursing facility</b>	*	*	10	23	48	166	478	1,117	2,033	2,139	6,021
<b>Home health</b>	*	12	58	74	127	207	373	445	346	201	1,844
<b>Hospice</b>	0	0	*	0	*	*	11	30	71	91	212
<b>Expired/Did not recover</b>	*	*	24	12	22	27	43	72	124	166	495
<b>Other</b>	0	0	11	29	33	29	24	25	17	14	182
<b>Total</b>	233	407	1,041	1,080	1,241	1,751	2,464	2,948	3,784	3,307	18,256

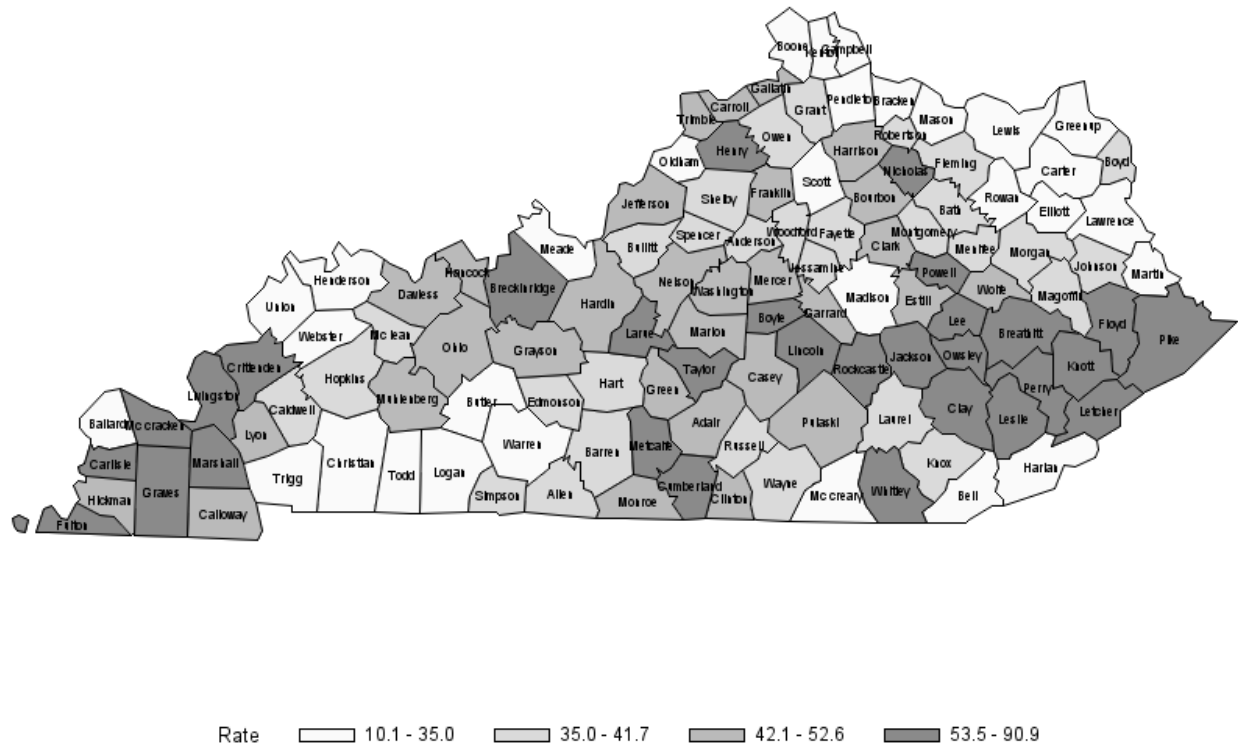
\*cells with less than 5 counts were suppressed by the state data management policy

The hospital discharge data includes information on total charges billed for the hospital stay. We report the total charges as a proxy for the actual cost of the hospital stay and treatment, with the caveat that reimbursement is substantially lower than charges for most payers. Medicare alone accounted for 54% of the number of hospitalizations and 45% (\$480,397,503) of the total charges billed (Table 6). About 2% of all traumatic injury hospitalizations in 2014 were coded as self-pay or charity, accounting for a commensurate 2% of the total charges billed. This is a significant decline from the 9% of charges and 8% of hospitalizations for uninsured patients in 2013 and reflects the impact of Kentucky’s Medicaid expansion in reducing the proportion of uninsured Kentuckians.

**Table 6: Traumatic injury hospitalizations by primary payer and total charges, 2014**

Primary expected source of payment	Hospitalizations		Total Charges	
	N	%	Amount billed	% of the total amount billed
Auto Insurance	768	4.2%	\$81,903,647	7.7%
CHAMPUS/TriCare	102	0.6%	\$5,914,203	0.6%
Commercial Insurance	3623	19.8%	\$232,578,863	21.9%
Medicaid/Passport	2932	16.1%	\$201,699,261	19.0%
Medicare	9931	54.4%	\$480,397,503	45.2%
Other	95	0.5%	\$5,182,758	0.5%
Self-Pay or Charity	373	2.0%	\$22,930,862	2.2%
Workers Compensation	432	2.4%	\$32,025,016	3.0%
Total	18256	100.0%	\$1,062,632,113	100.0%

**Figure 5: County rates of traumatic injury hospitalizations per 10,000 residents, 2014**



## Conclusion

The number of trauma-related hospitalizations in Kentucky's non-federal acute care facilities increased slightly in 2014 after four years of modest decline, which may reflect one or more trends, such as increased motor vehicle traffic during a period of economic recovery or increases in the proportion of vulnerable older adults. Fall-related injuries sustained by older Kentuckians represent the largest single factor in the state's burden of traumatic injury, as is the case throughout the developed world. While falls do not typically require trauma team activation, their aggregate impact dwarfs all other causes of injury. The mean age of Kentuckians and the proportion of the population over 65 continue to increase, so this problem will only increase unless more effective preventive interventions are identified and implemented.

A related trend with important policy implications is the large proportion of injury patients who require additional institutional or home health care after hospital discharge. Because older adults are more likely to have comorbidities and care needs beyond the capacity of informal caregivers, they make up the majority of those needing post-acute care. The social and economic cost of injury is borne disproportionately by these patients and their families, again primarily attributable to fall-related injury.

Finally, it is clear that many Kentucky hospitals that are providing substantial proportions of the state's aggregate trauma care do not participate in the state's trauma system. As participation increases, the more nuanced data from the Kentucky Trauma Registry will shed more light on issues arising from traumatic injury across the state.