KENTUCKY TRAUMA REGISTRY

2011 ANNUAL REPORT

August 2012

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Forward

The 2011 Kentucky Trauma Registry (KTR) Report, a publication of the Kentucky Injury Prevention and Research Center (KIPRC), presents data from the state's trauma facilities. The data are structured to follow reports to the National Trauma Data Bank (NTDB),which receives uniform data from hospitals verified by the American College of Surgeons (ACS) or state law as trauma centers. Clinical Data Management, Inc. (CDM) is the vendor that maintains the central Kentucky Trauma Registry repository and the Kentucky eTraumaBase TraumaLite web system, and supplies injury data to the Kentucky Injury Prevention and Research Center. CDM also manages the downloading and compilation of data from participating trauma centers, including unverified facilities that report to the repository. CDM provides analysis and reports on repository data and recommends the collection of new data elements.

Statewide data collection from ACS-verified and state-verified hospitals is critical to the completeness of the Kentucky traumatic injury data. In response to a legislative initiative, Kentucky has set a goal of expanding the number of trauma registry reporting facilities from 4 in 2009 to 12 by 2012. All these facilities are required to report in compliance with the NTDB standards as a condition of their new or applicant status. Trauma hospitals are required to submit data to the Kentucky Trauma Registry (KTR) system in the same format used for reports to the NTDB.

KIPRC has received funding from the Kentucky Transportation Cabinet and the Foundation for a Healthy Kentucky to analyze the statewide trauma registry data and provide a more detailed profile of the traumatic injuries treated in the Kentucky trauma facilities. This report is intended to provide a baseline for subsequent years' assessment of the input from newly verified facilities.

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This report and previous trauma reports are posted on KIPRC website:
http://www.kiprc.uky.edu/projects/trauma/index.html

Introduction

The body of this report summarizes data on trauma* cases seen during 2011 at Kentucky trauma centers, both verified and in applicant status, and reported to the Kentucky Trauma Registry as of July 31, 2012. A list of these facilities appears on the next page. It is important to note several limitations to the data reported here.

a. Patients transferred between hospitals have separate records for treatment at each reporting facility that cannot be merged due to the lack of personal identifiers. Therefore the number of records in KTR reflects total episodes of care in reporting facilities and is greater than the number of distinct patients treated. The rest of this report refers to each episode of trauma care as a "case".

b. These data represent primarily the most serious injuries rather than all traumatic injuries in the state.

c. Trauma that results in death at the scene of the event is not part of the reported data.

d. Data for trauma sustained in Kentucky but treated in out-of-state facilities are not available. Border areas are thus under-represented in this report.

A broad overview of the hospital care provided to Kentucky residents whose primary diagnosis was some form of physical trauma appears in the Kentucky Inpatient and Emergency Department Traumatic Injury Data Report, available at http://www.kiprc.uky.edu/projects/trauma/index.html.

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*Kentucky law (KRS 311A.010) defines "trauma" as a single or multi-system life-threatening or limb-threatening injury requiring immediate medical or surgical intervention or treatment to prevent death or permanent disability.

Kentucky's Reporting Trauma Centers in 2011

American College of Surgeons Verified Facilities

Kosair Children's Hospital (Level I Pediatric)
University of Kentucky Hospital (Level I)
University of Louisville Hospital (Level I)
Taylor Regional Medical Center (Level III)

Facilities Pending Verification under State or ACS Criteria

The following facilities were at varying stages of the application process in 2011. State-specific criteria for Level IV facilities had not been approved at the time of this report.

Ephraim McDowell Regional Medical Center: verified at Level III in 2012
Fort Logan Hospital: applicant for Level IV status
Georgetown Community Hospital: lapse in reporting
Harrison Memorial Hospital: lapse in reporting
James B. Haggin Memorial Hospital: applicant for Level IV status
Livingston Hospital: applicant for Level IV status
Marcum and Wallace Hospital: applicant for Level IV status
Pikeville Medical Center: applicant for Level II status
Spring View Hospital: applicant for Level III status
St. Joseph Hospital Berea: pending applicant status
Trigg County Hospital: lapse in reporting

Crittenden County Hospital: subsequently withdrew application

Research Findings

The Kentucky Trauma Registry expanded from 11 reporting facilities in 2010 to 16 reporting facilities in 2011. A total of 8,509 records were reported to the Kentucky Trauma Registry in 2011, an increase of 800 cases compared with year 2010.

Table 1: KTR records by facility, 2011

Facility	N	%
Crittenden County Hospital	*	*
Ephraim McDowell Regional Medical Center	108	1.27
Fort Logan Hospital	81	0.95
Georgetown Community Hospital	*	*
Harrison Memorial Hospital	24	0.28
James B. Haggin Memorial Hospital	242	2.84
Kosair Children's Hospital	810	9.52
Livingston Hospital	59	0.69
Marcum Wallace Memorial Hospital	100	1.18
Pikeville Medical Center	505	5.93
Spring View Hospital	153	1.8
St. Joseph Berea	54	0.63
Taylor Regional Medical Center	239	2.81
Trigg County Hospital	*	*
University of Kentucky Medical Center	3,230	37.96
University of Louisville Hospital	2,894	34.01
Total	8,509	100.00

*Totals less than 5 were suppressed by state data management policy

The University of Kentucky Medical Center reported 3,230 records for both children and adults, or 38% of all KTR cases in 2011 (Table 1). The University of Louisville hospital reported 2,894 trauma cases (34% of all KTR cases), and the Kosair Children's Hospital saw 810 (9.5%). Among the newly reporting facilities by far the largest number of records were submitted by Pikeville Medical Center (505 cases or 5.9% of all KTR cases).

Males comprised 64% of KTR cases (Table 2), reflecting the predominance of males in the injury categories classified by the American College of Surgeons as trauma. ACS trauma

classification excludes hip fractures, the most common traumatic injury in older adults, and a category that is therefore predominantly female. Thus, KTR demographics are strikingly different from those of the related report on traumatic injuries as a whole, in which males and females are roughly equally represented (see Kentucky Inpatient and Emergency Department Traumatic Injury Data Reports, www.kiprc.uky.edu/projects/trauma/index.html).

Table 2: KTR cases by gender, 2011

Gender	N	%
Female	3,060	35.96
Male	5,448	64.03
Total	8,508	100.00

Note: one record was excluded due to missing information on gender

The same issue of inclusion criteria influences the distribution of trauma cases by age group. Whereas the statewide hospitalization data for traumatic injury (including hip fractures) is skewed towards older age groups, the KTR data is concentrated in working-age adults (Figure 1 and Table 3).

Figure 1: KTR records by age group, 2011

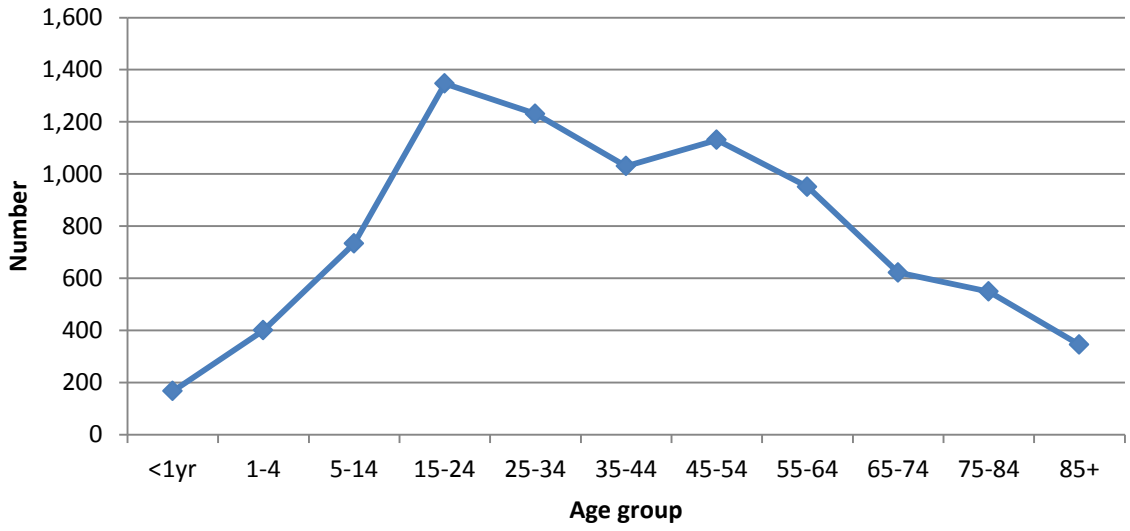


Table 3: KTR records by age group, 2011

Facility	Age Group										
	<1yr	1-4yr	5-14yr	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Crittenden County Hospital	0	0	0	0	0	*	*	0	0	*	*
Ephraim McDowell Regional MC	*	*	*	10	17	6	11	9	16	16	15
Fort Logan Hospital	*	*	14	15	8	11	*	6	7	6	*
Georgetown Community Hospital	0	*	0	0	0	0	0	*	*	0	0
Harrison Memorial Hospital	0	*	*	5	*	*	0	*	5	*	*
James B. Haggin Memorial Hospital	13	19	33	48	30	19	26	16	19	8	9
Kosair Children's Hospital	104	212	385	109	0	0	0	0	0	0	0
Livingston Hospital	0	*	*	8	*	6	8	9	6	7	8
Marcum Wallace Memorial Hospital	0	5	*	16	11	13	16	10	12	6	9
Pikeville Medical Center	*	9	25	35	50	47	45	83	68	86	56
Spring View Hospital	*	5	12	22	18	14	22	18	14	12	14
St. Joseph Berea	*	*	6	7	11	6	*	5	*	5	*
Taylor Regional Medical Center	6	6	11	36	24	13	30	32	26	29	26
Trigg County Hospital	0	0	0	0	0	0	*	0	0	0	0
University of Kentucky MC	36	131	236	508	530	482	426	370	228	184	99
University of Louisville Hospital	0	0	0	528	526	411	536	391	217	187	98

*Totals less than 5 were suppressed by state data management policy

Table 4: KTR cases by race and ethnicity, 2011

	Ethnicity			
Race	**Hispanic or Latino**	**Not Hispanic or Latino**	**Missing**	**Total**
Asian	0	17	6	23
Other Race	129	18	6	153
Native Hawaiian or Other Pacific Islander	6	16	6	28
Black or African American	0	576	167	743
White	30	6,476	1,013	7,519
Missing	14	14	15	43
Total	179	7,117	1,213	8,509

The completeness of the ethnicity variable continues to improve from 56.3% missing values in 2009, to 18.1% missing ethnicity codes in 2010, and 14.2% in 2011. The distribution of the cases by race did not change significantly from last year: 88% of the records indicated treatment for white patients, 9% for black patients (Table 4).

Trauma rates vary by season, with higher incidence during summer months (Table 5), mainly due to the increased number of motor vehicle traffic collision injuries and falls.

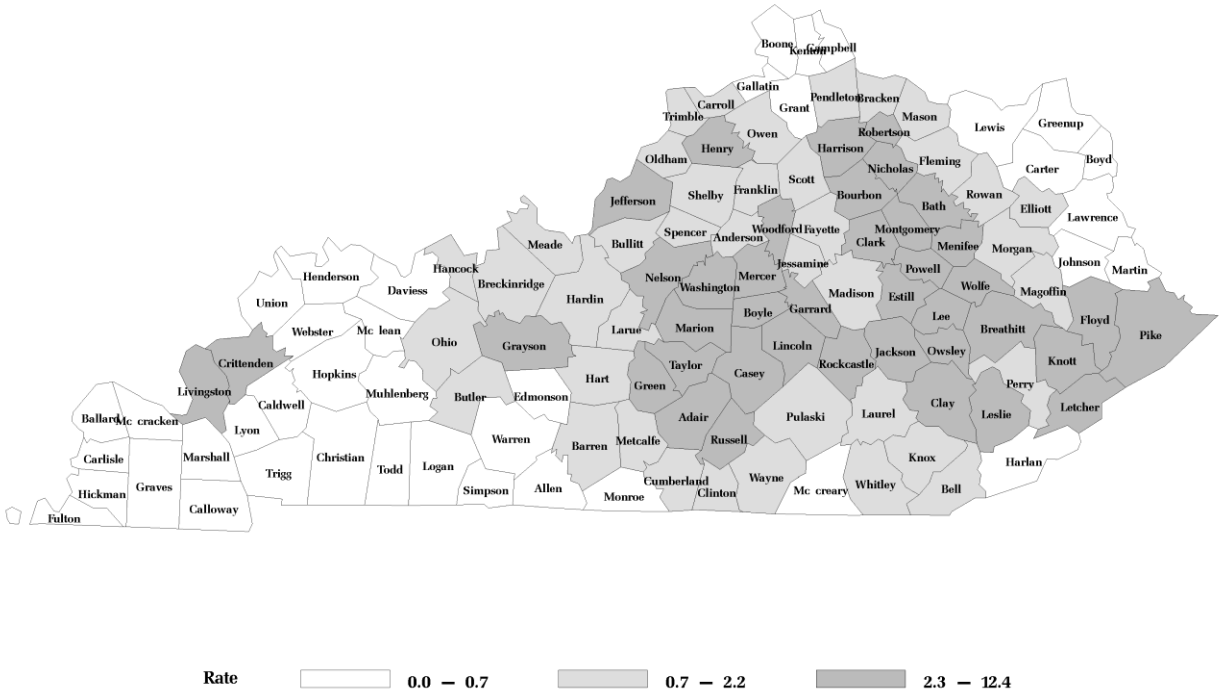
Table 5: KTR cases by month of hospital arrival, 2011

	Month												
Facility	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**Total**
Crittenden County Hospital	0	0	0	0	0	0	0	0	0	0	0	*	*
Ephraim McDowell Regional MC	9	10	16	13	16	17	15	5	7	0	0	0	108
Fort Logan Hospital	9	*	*	*	6	7	6	*	6	8	17	8	81
Georgetown Community Hospital	*	0	0	0	0	0	0	0	0	0	0	0	*
Harrison Memorial Hospital	0	0	0	0	0	0	0	0	0	*	12	9	*
James B. Haggin Memorial Hospital	31	*	20	36	31	20	25	8	17	22	11	17	242
Kosair Children's Hospital	35	44	54	67	82	81	77	105	76	74	54	61	810
Livingston Hospital	*	*	*	8	*	*	*	7	7	10	*	5	59
Marcum Wallace Memorial Hospital	11	*	10	6	7	15	10	5	9	11	10	*	100
Pikeville Medical Center	34	30	56	41	42	43	37	53	40	30	54	45	505
Spring View Hospital	8	10	15	13	10	11	16	15	12	15	19	9	153
St. Joseph Berea	0	5	*	6	*	*	*	7	*	6	7	8	54
Taylor Regional Medical Center	7	17	15	16	27	27	23	29	18	18	27	15	239
Trigg County Hospital	0	0	0	0	0	0	0	0	0	*	0	*	*
University of Kentucky MC	177	197	233	238	305	339	351	296	277	316	271	230	3,230
University of Louisville Hospital	172	156	232	233	260	264	305	273	222	294	253	230	2,894
Total	499	485	659	680	792	831	869	807	695	808	739	645	8,509

*Totals less than 5 were suppressed by state data management policy

The resident county is not a required data element in the NTDB, while the patient home zip code is required. The county of residence was calculated based on a zip-to-county algorithm that may misclassify counties where zip codes cross county lines. County-specific data must also be read with the caveat that we are only reporting on Kentucky facilities, so patients from the northern and southern tiers of counties, who often receive trauma care in Ohio and Tennessee respectively, are underrepresented in the current data. About 88% of the KTR cases had Kentucky home zip codes. The majority of the Kentucky resident cases were from Jefferson (1,689 cases) and Fayette (618) counties, reflecting the larger population of these counties. Rural Appalachian counties have the highest rates of injury cases treated in KTR facilities per 1,000 population (Figure 2).

Figure 2: Rate of KTR cases per 1,000 population by county, 2011



Tables 6 and 7 present summaries of the injuries by nature and body region, based on the Barell Matrix (http://www.cdc.gov/nchs/data/ice/final_matrix_post_ice.pdf). Head injuries were labeled as Type 1 TBI if there were principal diagnosis codes for an intracranial injury, moderate/prolonged loss of consciousness, shaken infant syndrome, or injuries to the optic nerve pathways. Type 2 TBI included head injuries with no intracranial injury coded, and coded with loss of consciousness of less than 1 hour unknown duration, or unspecified level. Type 3 TBI included patients with no intracranial injury and no loss of consciousness coded. TBI accounted

for 24.8% of all trauma registry cases, followed by lower extremity injuries (20.7%) and torso injuries (19.65%) (Table 6). More than half of the injuries (52.8%) were fractures (Table 7).

Table 6: KTR cases by body region, 2011

Injuries by Body Region			N	%
Head and Neck	Traumatic Brain Injury (TBI)	Type 1 TBI	1,207	14.38
		Type 2 TBI	721	8.59
		Type 3 TBI	155	1.85
	Other head, face and neck	Other Head	187	2.23
		Face	440	5.24
		Eye	42	0.50
		Neck	43	0.51
		Head, Face and Neck Unspecified	62	0.74
Spine and back	Spinal Cord (SCI)	Cervical SCI	61	0.73
		Thoracic/ Dorsal SCI	19	0.23
		Lumbar SCI	7	0.08
		Sacrum Coccyx SCI	0	0.00
		Spine+ Back unspecified SCI	*	*
	Vertebral Column (VCI)	Cervical VCI	299	3.56
		Thoracic /Dorsal VCI	146	1.74
		Lumbar VCI	190	2.26
		Sacrum Coccyx VCI	20	0.24
Torso	Torso	Chest (Thorax)	1,000	11.91
		Abdomen	368	4.38
		Pelvis and Urogenital	222	2.64
		Trunk	32	0.38
		Back and Buttock	20	0.24
Extremities	Upper	Shoulder and upper arm	449	5.35
		Forearm and elbow	374	4.46
		Wrist, hand and fingers	271	3.23
		Other and unspecified	50	0.60
	Lower	Hip	444	5.29
		Upper leg and thigh	344	4.10
		Knee	40	0.48
		Lower leg and ankle	592	7.05
		Foot and toes	190	2.26
		Other and unspecified	131	1.56
Unclassifiable by site	Other and un-specified	Other/multiple	5	0.06
		Unspecified site	241	2.87
	System-wide	System-wide & late effects	19	0.23

Note: Diagnosis codes were missing for 114 cases; Totals < 5 were suppressed by state data management policy

Table 7: KTR cases by nature of injury, 2011

Nature of Injury	N	%	Nature of Injury	N	%
Fractures	4,431	52.78	**Dislocation**	108	1.29
Internal Organ	2,271	27.05	**Blood Vessels**	84	1.00
Open Wounds	755	8.99	**Amputations**	75	0.89
Burns	346	4.12	**Crushing**	24	0.29
Unspecified	144	1.72	**Nerves**	19	0.23
Sprains & Strains	120	1.43	**System Wide & Late Effects**	19	0.23

Note: Diagnosis codes were missing for 113 cases

Motor vehicle traffic collisions (MVTC) continue to be the leading cause of injuries reported to KTR, accounting for 2,906 records or 34% of all trauma registry cases in 2011 (Table 8). Falls (2,078 or 27%) were the second leading cause of reported injuries.

Table 8: KTR cases by cause and intent of injury, 2011

	Intent			
Cause	**Unintentional**	**Intentional**	**Other/ Undetermined**	**Total**
Motor vehicle traffic collisions	2,865	8	33	2,906
Firearm	81	288	26	395
Falls	2,516	8	9	2,533
Suffocation	0	8	*	*
Drowning	6	0	0	6
Fire/burn	293	6	*	*
Cut/pierce	143	193	14	350
Struck by/against	299	218	*	*
Machinery	152	0	0	152
Other pedal cycle	117	0	0	117
Other pedestrian	17	0	0	17
Other transportation	801	0	0	801
Natural/environmental	86	0	0	86
Overexertion	20	0	0	20
Other specified	101	77	0	178
NEC	20	11	*	*
Not specified	24	34	11	69
Missing Ecode	0	0	0	13
Total	7,541	851	104	8,509

*Totals less than 5 were suppressed by state data management policy

Among the unintentional motor vehicle traffic collision cases, 73.3% were coded as vehicle occupants, 14.9% as motorcyclists, and 7.3% as pedestrians (Table 9).

Table 9: Role in motor vehicle collisions, 2011

Role in motor vehicle traffic collision	Number	%
Occupant	2,099	73.3
Motorcyclist	428	14.9
Pedal cyclist	49	1.7
Pedestrian	209	7.3
Unknown	59	2.1
Other	21	0.7
Total	2,865	100.0

Table 10 describes the use of protective devices for the pediatric patients injured in motor vehicle traffic collisions: 191 records (41.7%) indicated that protective devices were not used, and in 49 cases (10.7%) the presence or use of a protective device was not documented.

Table 10: Pediatric MVT KTR cases by protective device, 2011

Protective device	Number of cases	%
None	191	41.7%
Shoulder Belt	*	*
Lap Belt	68	14.8%
Lap & Shoulder Belt	68	14.8%
Child Restraint	35	7.6%
Helmet (e.g., bicycle, skiing, motorcycle)	15	3.3%
Not Applicable	31	6.8%
Not documented	49	10.7%
Total	458	100.0%

*Totals less than 5 were suppressed by state data management policy

Data on age of children and adolescents admitted for motor vehicle crash-related injuries (464 cases) are presented in greater detail in Table 11.

Table 11: Pediatric KTR cases by age, 2011

Age in years	Number of cases due to motor vehicle traffic collision	All KTR cases	Percent of all pediatric motor vehicle traffic collision cases	Percent of all trauma registry cases for this age
0	12	154	2.6%	7.8%
1	5	100	1.1%	5.0%
2	13	99	2.8%	13.1%
3	20	106	4.4%	18.9%
4	25	95	5.5%	26.3%
5	17	78	3.7%	21.8%
6	6	87	1.3%	6.9%
7	27	87	5.9%	31.0%
8	21	70	4.6%	30.0%
9	15	63	3.3%	23.8%
10	10	55	2.2%	18.2%
11	11	65	2.4%	16.9%
12	10	68	2.2%	14.7%
13	16	87	3.5%	18.4%
14	16	73	3.5%	21.9%
15	24	99	5.2%	24.2%
16	58	116	12.7%	50.0%
17	73	140	15.9%	52.1%
18	79	157	17.2%	50.3%
Total	458	1799	100.0%	25.5%

Patients ages 15-24 accounted for 21.3% of the MVT-related trauma, followed by those ages 25-34 (18%). The trend is similar to those of previous years. Falls among those 75-84 years old accounted for 15% of all unintentional falls treated in trauma centers. Almost one fourth (70 cases) of the injuries attributed to being unintentionally struck by or against an object were experienced by patients 5-14 years of age. The review of the struck by/against injuries in this group showed that more than 60% of these injuries were due to striking against or struck accidentally in sports (E-codes E917.0, E917.5). Half of the assault injuries were among young adults ages 15-34 (Table 12).

Table 12: KTR cases by age and major causes of injury, 2011

	Unintentional Injuries										Intentional	
	Motor vehicle traffic collisions		Other transport. injuries		Falls		Struck by/against		All other		Assault	
	N	%	N	%	N	%	N	%	N	%	N	%
Age												
<1yr	13	0.45	*	*	84	3.34	8	2.68	25	1.88	36	5.19
1-4yr	62	2.16	11	1.37	164	6.52	28	9.36	109	8.18	26	3.75
5-14yr	147	5.13	80	9.99	244	9.70	70	23.41	187	14.03	5	0.72
15-24	610	21.30	182	22.72	132	5.25	45	15.05	208	15.60	170	24.50
25-34	515	17.98	142	17.73	147	5.84	31	10.37	209	15.68	187	26.95
35-44	417	14.56	141	17.60	163	6.48	33	11.04	158	11.85	118	17.00
45-54	434	15.15	107	13.36	263	10.46	39	13.04	190	14.25	98	14.12
55-64	340	11.87	79	9.86	341	13.56	20	6.69	125	9.38	46	6.63
65-74	180	6.28	35	4.37	315	12.52	16	5.35	71	5.33	5	0.72
75-84	106	3.70	20	2.50	378	15.03	6	2.01	36	2.70	*	*
85+	40	1.40	*	*	284	11.29	*	*	15	1.13	0	0

*Totals less than 5 were suppressed by state data management policy

Alcohol use beyond legal limits was confirmed by test for 319 (11.1%) of the unintentional motor vehicle traffic collision injury cases and for 137 (19.7%) of the assaults (Table 13).

Table 13: KTR cases by cause of injury and alcohol use, 2011

	Cause of Injury				
	Unintentional MVTC	Other transport.	Falls	Other unintentional	Assault
	N	N	N	N	N
Alcohol Use Indicators					
No (not tested)	998	291	1,492	804	253
No (confirmed by test)	1,170	271	356	279	179
Yes (confirmed by test [trace levels])	132	51	37	47	49
Yes (confirmed by test [beyond legal limit])	319	80	97	84	137
Not Applicable	78	41	141	82	20
Not documented/Missing	168	67	393	337	56

Illegal drug use was confirmed in 298 (10.4%) of the unintentional MVT collision injuries. The category "illegal use drug" includes illegal use of a prescription drug according to the NTDS (Table 14).

Table 14: KTR cases by cause of injury and drug use indicator, 2011

	Cause of Injury				
	Unintentional MVTC	**Other transport.**	**Falls**	**Other unintentional**	**Assault**
	N	**N**	**N**	**N**	**N**
Drug Use Indicator					
No (not tested)	1,069	305	1,627	864	305
No (confirmed by test)	723	112	219	153	144
Yes (confirmed by test [prescription drug])	578	192	178	174	75
Yes (confirmed by test [illegal use drug])	298	118	71	90	106
Not Applicable	60	28	93	49	11
Not documented	137	46	328	303	53

Illegal drug use (including illegal use of prescription drugs) was also confirmed by test in 21 work-related trauma cases (Table 15).

Table 15: KTR cases by work-related indicator and drug use indicator, 2011

	Work Related Trauma Injury			
Drug Use Indicator	**No**	**Yes**	**Missing**	**Total**
No (not tested)	3,908	223	39	4,170
No (confirmed by test)	1,303	44	*	1,351
Yes (confirmed by test [prescription drug])	1,146	51	0	1,197
Yes (confirmed by test [illegal use drug])	660	21	*	683
Not Applicable	225	15	*	241
Not documented	802	6	59	867
Total	8,044	360	105	8,509

*Totals less than 5 were suppressed by state data management policy

Work-related trauma is defined as injury that occurred during paid employment. A total of 360 work-related trauma cases were recorded in the KTR dataset in 2011. Table 16 shows the industry associated with patient's work environment for the work-related trauma cases.

Table 16: KTR work related trauma cases, 2011

Patient Industry	N	%
Natural Resources and Mining	11	3.06
Information Services	*	*
Wholesale Trade	*	*
Leisure and Hospitality	*	*
Other Services	89	24.72
Manufacturing	39	10.83
Retail Trade	9	2.50
Transportation and Public Utilities	20	5.56
Agriculture, Forestry, Fishing	20	5.56
Professional and Business Services	16	4.44
Education and Health Services	12	3.33
Construction	40	11.11
Government	8	2.22
Not available/missing	93	25.83
Total	360	100.00

*Totals less than 5 were suppressed by state data management policy

The mode of transportation by inter-facility transfer is available in Table 17. Inter-facility transfer indicated whether the patient was transferred to the reporting facility from another acute care facility. Helicopter ambulance was used in 759 (25.2%) of the inter-facility transfers and in 1,106 (23.9%) of the non-transfer cases. Ground ambulance was used in 4,851 (62.9%) of all trauma patients transported to KTR reporting facilities.

The exact time from incident to hospital arrival could not be calculated for almost half (40.8%) of the cases, primarily due to missing or unknown time of incident. The distribution of KTR cases by time to hospital arrival and inter-facility transfer status is presented in Table 18.

Table 17: KTR cases by mode of transportation and inter facility transfer status, 2011

	Inter Facility Transfer			
Mode of Transportation	**Yes**	**No**	**Missing**	**Total**
Ground Ambulance	2,076	3,340	22	5,438
Helicopter Ambulance	674	1,118	*	1,795
Private/Public Vehicle/Walk-in	170	1,059	0	1,229
Police	*	27	0	28
Other	0	*	0	*
Not documented	*	14	0	16
Total	2,923	5,561	25	8,509

*Totals less than 5 were suppressed by state data management policy

Table 18: KTR cases by time to hospital arrival, 2011

Time to hospital	**Inter Facility Transfer**		
	Yes	**No**	**Missing**
	N	**N**	**N**
<1 hour	19	1,265	10
[1-2) hr	117	1,062	12
[2-5) hr	827	301	*
[5-12) hr	730	71	0
[12-24) hr	86	53	*
24+ hr	169	208	*
Same day (exact incident time unknown)	753	2,356	0
Next day or later (exact incident time unknown)	222	143	0
Incorrect (negative, zero, missing)	0	102	0
Total	2,923	5,561	25

*Totals less than 5 were suppressed by state data management policy

Admission shift is a metric that provides evidence for planning prevention initiatives and staffing trauma care facilities. The busiest time of the day is the 3pm to 11pm shift (Table 19).

Table 19: KTR cases by facility and admission shift, 2011

	Shift			
	11pm-7am	7am-3pm	3pm-11pm	missing
Facility	N	N	N	N
Crittenden County Hospital	*	*	*	0
Ephraim McDowell Regional Medical Center	13	50	44	*
Fort Logan Hospital	*	39	39	0
Georgetown Community Hospital	0	0	*	0
Harrison Memorial Hospital	*	8	12	0
James B. Haggin Memorial Hospital	23	87	100	32
Kosair Children's Hospital	175	134	501	0
Livingston Hospital	8	17	34	0
Marcum Wallace Memorial Hospital	20	26	54	0
Pikeville Medical Center	81	158	266	0
Spring View Hospital	21	58	74	0
St. Joseph Berea	10	12	32	0
Taylor Regional Medical Center	33	79	127	0
Trigg County Hospital	0	*	*	0
University of Kentucky Medical Center	814	847	1,569	0
University of Louisville Hospital	782	751	1,360	*

*Totals less than 5 were suppressed by state data management policy

The Glasgow coma score (GCS) rates patients with regard to the severity of symptoms associated with brain injury. Detailed information on the first recorded eye, verbal, and motor Glasgow scores in the ED/hospital is presented in Table 20 for pediatric patients under age of 2 years and in Table 21 for patients older than 2 years.

Table 20: KTR cases: first recorded Glasgow Coma Score in the ED/hospital patients, age≤2 years, 2011

Pediatric patients, age≤2 years	N	%
Glasgow Coma Score (Eye)		
1 (No eye movement when assessed)	20	5.42
2 (Opens eyes in response to painful stimulation)	*	*
3 (Opens eyes in response to verbal stimulation)	*	*
4 (Opens eyes spontaneously)	286	77.51
Missing	58	15.72
Glasgow Coma Score (Verbal)		
1 (No vocal response)	25	6.78
2 (Inconsolable, agitated)	6	1.63
3 (Inconsistently consolable, moaning)	0	0.00
4 (Cries but is consolable, inappropriate interactions)	5	1.36
5 (Smiles, oriented to sounds, follows objects, Interacts)	275	74.53
Missing	58	15.72
Glasgow Coma Score (Motor)		
1 (No motor response)	14	3.79
2 (Extension to pain)	0	0
3 (Flexion to pain)	5	1.36
4 (Withdrawal from pain)	7	1.90
5 (Localizing pain)	24	6.50
6 (Appropriate response to stimulation)	261	70.73
Missing	58	15.72

*Totals less than 5 were suppressed by state data management policy

Table 21: KTR cases: first recorded Glasgow Coma Score in the ED/hospital patients, age>2 years, 2011

Patients, age>2 years	N	%
Glasgow Coma Score (Eye)		
1 (No eye movement when assessed)	606	7.44
2 (Opens eyes in response to painful stimulation)	47	0.58
3 (Opens eyes in response to verbal stimulation)	225	2.76
4 (Opens eyes spontaneously)	5,991	73.60
Missing	1,271	15.61
Glasgow Coma Score (Verbal)		
1 (No verbal response)	687	8.44
2 (Incomprehensible sounds)	58	0.71
3 (Inappropriate words)	40	0.49
4 (Confused)	504	6.19
5 (Oriented)	5,573	68.46
Missing	1,278	15.70
Glasgow Coma Score (Motor)		
1 (No motor response)	487	5.98
2 (Extension to pain)	23	0.28
3 (Flexion to pain)	22	0.27
4 (Withdrawal from pain)	91	1.12
5 (Localizing pain)	183	2.25
6 (Obeys commands)	6,060	74.45
Missing	1,274	15.65

The Injury Severity Score (ISS) is an anatomical rating system that provides numerical values for patients with multiple and varying injuries. The National Trauma Data Bank characterizes ISS scores of 1-9 as mild, 10-15 as moderate, 16-24 as severe, and over 24 as very severe. Using this metric, 61.2% of trauma registry injuries were mild, 17.2% moderate, 13.2% severe, and 6.6% very severe. ISS was missing for 1.8% of the cases (Table 22).

Table 22: KTR cases by ISS, 2011

ISS	Number	%
1-9	5,210	61.23
10-15	1,463	17.19
16-24	1,119	13.15
25-34	438	5.15
35-44	89	1.05
45-75	35	0.41
Missing	155	1.82

Most trauma patients (68%) were discharged in less than a week, 1.1% stayed between one to four weeks, and 13.5% were treated for more than one month in KTR hospitals. About 17.4% of the KTR cases (including 119 deaths) were discharged from ED and therefore length of hospital stay for these cases is not available. Details on the length of hospital stay by hospital facility are presented in Table 23.

Table 23: KY Trauma Registry patient distribution by length of stay, 2011

		Length of hospital stay			
		1-7 days	**8-30 days**	**>30 days**	**not available**
Crittenden County Hospital	%	0	0	0	100.00
Ephraim McDowell Regional Medical Center	%	36.11	0	12.04	51.85
Fort Logan Hospital	%	1.23	0	0	98.77
Georgetown Community Hospital	%	0	0	0	100.00
Harrison Memorial Hospital	%	25.00	0	0	75.00
James B. Haggin Memorial Hospital	%	0	0	0	100.00
Kosair Children's Hospital	%	90.86	0.99	7.78	0.37
Livingston Hospital	%	59.32	0	0	40.68
Marcum Wallace Memorial Hospital	%	1.00	0	0	99.00
Pikeville Medical Center	%	64.16	1.39	5.35	29.11
Spring View Hospital	%	38.56	0	3.27	58.17
St. Joseph Berea	%	0	0	0	100.00
Taylor Regional Medical Center	%	48.54	0	5.44	46.03
Trigg County Hospital	%	0	0	0	100.00
University of Kentucky Medical Center	%	68.73	0.93	15.02	15.33
University of Louisville Hospital	%	77.99	1.52	18.87	1.62

The primary expected source of payment was not reported for the cases treated in Marcum and Wallace Memorial Hospital and for almost half of the cases treated in Ephraim McDowell Regional Medical Center. The primary source of payment for the majority of the KO patients was Medicaid (55%), followed by private/commercial insurance (37.4%). The most common primary pay source for trauma patients at the University of Kentucky Medical Center was no-fault automobile insurance (34.1%), followed by "self pay" (15.2%), reflecting lack of any third party payment source. "Self pay" was the most common primary method of payment for the trauma cases at the University of Louisville Hospital (32%) and for the patients at St. Joseph Berea (40%). Because "self pay" patients are often medically indigent, the implications of this finding are very serious and warrant further analysis. For more details on primary method of payment see Table 24.

Table 24: Percent KTR cases by primary method of payment, 2011

	Crittenden County Hospital	Ephraim McDowell Regional MC	Fort Logan Hospital	Georgetown Community Hospital	Harrison Memorial Hospital
	%	%	%	%	%
Primary Method of Payment					
Missing information	50	38.89	17.28	.	.
Blue Cross/Blue Shield	.	5.56	3.7	.	12.5
Medicaid	.	5.56	14.81	66.67	12.5
Medicare	50	26.85	22.22	.	41.67
No Fault Automobile	.	10.19	.	.	20.83
Not Billed (for any reason)	.	2.78	.	.	.
Other	.	.	1.23	33.33	.
Other Government	.	.	1.23	.	.
Private/Commercial Insurance	.	5.56	11.11	.	4.17
Self Pay	.	1.85	22.22	.	4.17
Workers Compensation	.	2.78	6.17	.	4.17

Table 24: Percent KTR cases by primary method of payment, 2011- continued

	James B. Haggin Memorial Hospital	Kosair Children's Hospital	Livingston Hospital	Marcum Wallace Memorial Hospital	Pikeville Medical Center
	%	%	%	%	%
Primary Method of Payment					
Missing information	2.89	2.72	8.47	100	.
Blue Cross/Blue Shield	9.09	.	8.47	.	9.7
Medicaid	19.42	54.69	18.64	.	15.25
Medicare	15.29	.	35.59	.	41.58
No Fault Automobile	.	1.98	.	.	11.88
Not Billed (for any reason)	.	0.12	.	.	.
Other	.	.	1.69	.	.
Other Government	.	.	.	.	.
Private/Commercial Insurance	28.93	38.4	13.56	.	8.51
Self Pay	20.25	2.1	11.86	.	10.69
Workers Compensation	4.13	.	1.69	.	2.38

Table 24: Percent KTR cases by primary method of payment, 2011- continued

	Spring View Hospital	St. Joseph Berea	Taylor Regional MC	Trigg County Hospital	University of Kentucky MC	University of Louisville Hospital
	%	%	%	%	%	%
Primary Method of Payment						
Missing information	0.65	1.85	.	.	5.48	0.31
Blue Cross/Blue Shield	7.84	1.85	.	.	4.02	.
Medicaid	10.46	14.81	10.04	.	11.64	7.26
Medicare	22.22	22.22	37.24	33.33	12.32	16.93
No Fault Automobile	20.26	.	4.18	.	29.57	20.21
Not Billed (for any reason)	.	.	.	.	.	.
Other	.	.	.	33.33	.	0.03
Other Government	2.61	.	0.42	.	1.73	1.17
Private/Commercial Insurance	16.99	16.67	27.2	.	10.56	19.59
Self Pay	11.76	37.04	19.67	33.33	20.43	29.85
Workers Compensation	7.19	5.56	1.26	.	4.24	4.63

Table 25 gives information on the discharge disposition for the KTR cases. When hospital discharge disposition was not available (presumably because the patient was not admitted to the hospital), the ED discharge disposition was reported. A total of 7,013 cases were reported as discharged from a KTR hospital. The large majority of these cases, 70.4%, were discharged to home with no home health services; 13.3% were discharged/transferred to another type of rehabilitation or long-term care facility; 7.5% were discharged to home under care of organized home health services; 3.5% (246 patients) expired.

Table 25: Percent KTR cases by discharge disposition, 2011

Hospital Discharge Disposition		
Hospital Discharge Disposition	**Number**	**%**
Discharged/Transferred to a short-term general hospital for inpatient care	33	0.47
Discharged/Transferred to an Intermediate Care Facility (ICF)	51	0.73
Discharge/Transferred to home under care of organized home health service	529	7.54
Left against medical advice or discontinued care	27	0.38
Expired	246	3.51
Discharged home with no home services	4,934	70.36
Discharged/Transferred to Skilled Nursing Facility	247	3.52
Discharged/ Transferred to hospice care	12	0.17
Discharged/Transf. to another type of rehabilitation or long-term care facility	934	13.32
Total	7,013	100.00
ED Discharge Disposition		
ED Discharge Disposition	**Number**	**%**
Floor bed (general admission, non specialty unit bed)	29	1.94
Observation unit (unit that provides < 24 hour stays)	4	0.27
Home with services	1	0.07
Died	119	7.95
Other (jail, institutional care, mental health, etc.)	50	3.34
Operating Room	3	0.20
Intensive Care Unit (ICU)	2	0.13
Home without services	625	41.78
Left against medical advice	41	2.74
Transferred to another hospital	616	41.18
Missing	6	0.40
Total	1,496	100

Conclusion

As the number of reporting hospitals grows, we will have a more nuanced account of traumatic injury in Kentucky. It is even more important that participating facilities coordinate their care with the state's trauma system as a whole in order to assure the delivery of timely services at appropriate levels of care for patients across the state. Future developments may include statewide run reporting for emergency medical services providers, information that would add yet another dimension to the state's ability to address the burden of traumatic injury.