

Trauma Care Advisory Council

Trauma Care in Tennessee

2016 Report to the 110th General Assembly

Tennessee Department of Health

Trauma Care Advisory Council

December 31, 2016

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STATE OF TENNESSEE
DEPARTMENT OF HEALTH
DIVISION OF HEALTH LICENSURE AND REGULATION
TRAUMA CARE ADVISORY COUNCIL
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NASHVILLE, TN 37243

December 31, 2016

Dear Members of the General Assembly,

As required by Tenn. Code Ann §68-59-103, we are pleased to submit our Annual Trauma Report. This report reflects activities and accomplishments of the Trauma Care Advisory Council (TCAC) and Tennessee's designated Trauma Hospitals.

The Trauma Care Advisory Council was implemented in 1990 to advise the Board for Licensing Health Care Facilities and the Emergency Medical Services (EMS) Board in regards to regulatory standards to ensure the adequacy of statewide trauma care. Rule promulgation is guided by national standards.

In 2007, the General Assembly enacted the Trauma Fund Law, providing valuable resources to support and maintain Tennessee's vital Trauma System.

The data in this publication give an overview of patients cared for in Tennessee designated Trauma Centers and Comprehensive Regional Pediatric Centers. With your ongoing support, the TCAC hopes to continue to expand access to quality trauma care for injured Tennesseans.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Oscar Guillamondegui".

Oscar Guillamondegui, MD, MPH, FACS
Professor of Surgery
Vanderbilt University Medical Center
Chair, Trauma Care Advisory Council
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2016 EXECUTIVE SUMMARY

Last year, 28,647 patients received care in a Trauma Center or Comprehensive Regional Pediatric Center (CRPC) as a result of an injury. This number is higher than the previous years' 23,827. The overall cost to Tennesseans is reflected in the potential years of life lost and the associated price attendant with trauma care, whether it is the associated hospital charges, lost wages or damages associated with the trauma. The Trauma Care Advisory Council does believe that the majority of injury to the citizens of Tennessee is largely avoidable or preventable with education and outreach. Through such measures as outreach to the elderly to educate on fall risks, maintaining the helmet laws and safe driving promotion, we should be able to decrease the fatal effects of injury. Most importantly though, is the maintenance of trauma centers to ensure optimal care of the injured. Our trauma centers provided care for Tennesseans from every county in the state, as well as patients from nearly every state in the continental US.

The Trauma Care Advisory Council (TCAC) was established in 1990 to advise the Office of Health Care Facilities regarding trauma care policy and regulation. Currently, Tennessee has 6 Level I trauma centers, 2 Level II centers, 1 level III center, and 3 provisional Level III centers, for 12 total adult centers. There are an associated 4 CRPC's treating those injured under the age of 16. There are currently two hospitals in the middle Tennessee region that have applied for provisional Level III status and one previously designated level III trauma center has elected not to pursue continued trauma center designation. This year, we have successfully updated the trauma center rules to include the verification process of the American College of Surgeons Committee on Trauma to assess the programs at the highest national standard for trauma care. The one major impediment to accurate trauma triage remains the influence of helicopter services that maintain medical command outside of the state and are not held to the standards of the Tennessee transport guidelines.

Five years ago, the Board for Licensing Health Care Facilities approved the call for higher standards of care with increased requirements for designation of trauma centers in Tennessee, raising the bar for quality care of injured Tennesseans. This process continues to ensure that trauma centers have the necessary resources available to care for the severely injured at the appropriate level. Level I trauma centers are required to have fully staffed operating rooms, lab and radiologic capabilities, intensive care units, and professional personnel in the hospital (including emergency physicians and surgeons) available on a moment's notice – 24 hours a day, 7 days a week, 365 days a year. This service availability provides a safety net for all local communities and regions – this preparedness for trauma emergency care makes these same centers uniquely capable of increasing the readiness for other medical emergencies within the state such as stroke and acute myocardial infarctions (heart attacks), within the same time frame as the injured patient. This value is unquantifiable.

The trauma registry, initiated in 2007, has added over 205,000 trauma patients along with data available from hospital billing information identified in the last eight years. This year, at least one citizen from every county in Tennessee was treated at a Tennessee trauma center. Falls remain the number one cause of trauma admission in the state and the number of patients continues to increase as the population ages. Although falls have surpassed motor vehicle crashes (MVCs) for trauma admissions, MVCs remain the highest fatality rate in the state. As gun violence remains a topic of national discourse, the rate of gun-related suicide death continues to overshadow homicide at both the state and national level.

This report provides information on injury patterns across the state, referral patterns, and financial statistics. Other key aspects of this report include Injury Prevention activities and statewide research efforts. It is the goal of the TCAC to target future outreach and prevention activities through data from the state registry and to continually strive to improve patient outcomes through an array of performance improvement initiatives, research activities, and outcomes-based evidence research. Such efforts consist of outreach to nursing homes and specific communities to educate the elderly on fall risk, “Battle of the Belts” for high school student awareness of seatbelt use and motorcycle and ATV safety education.

This report reflects the ongoing effort of the Trauma Centers as dedicated to caring for the injured patient. It also suggests that there is more work to accomplish. There are areas of the state that remain outside the contiguous counties of the major metropolitan areas that are not within easy reach of a designated trauma center. A formal system of designating more centers as Level II, III or IV may be beneficial in maintaining the highest possible level of care for the injured patient. This will require dedicated funding to maintain the infrastructure of many of the smaller, rural hospitals to support a complete trauma system.

With your ongoing support we can continue with our mission of providing the highest level of care, injury prevention, education, and research to minimize the death and disability occurring as a result of injury across the state of Tennessee

Oscar D. Guillamondegui, MD, MPH, FACS
Chair, Trauma Care Advisory Council
Chair, Tennessee Committee on Trauma

INJURY PREVENTION

Injuries are the leading cause of death among Tennessee residents ages 1-44 and the fourth leading cause of death overall after heart disease, cancer and lower respiratory disease. The majority of injuries are unintentional; however, injuries can be intentional through self-harm or by another individual. In 2014, over 5,219 Tennessee residents were fatally injured, another 35,907 were hospitalized for non-fatal injuries, and 717,550 visited an emergency department due to injury.

The cost of all of these injuries is tremendous. In 2014, (the last year we have data) the median admission charge in Tennessee for non-fatal injury hospitalizations was \$34,746. The total charges exceeded \$3.9 billion: \$2 billion from ED visits and \$1.9 billion from hospitalizations (which do not include rehabilitation, emergency medical services, or physician costs). Many of these injuries were preventable.

The Tennessee Department of Health first received the Core Injury Surveillance, Prevention, and Control Grant from the Centers for Disease Control and Prevention (CDC) in 2005 to address injuries. An objective of this grant was to ensure that injury prevention efforts provided by public health and private agencies were coordinated. This coordination assisted with eliminating redundancy, sharing resources, and increasing support and impact for injury prevention initiatives statewide. As part of this coordinated effort, the Commissioner's Council on Injury Prevention and Control was established as an advisory council for injury prevention efforts in Tennessee. The statewide membership includes injury prevention experts from a variety of public and private agencies with a common goal of reducing injuries among Tennesseans.

The Tennessee Department of Health recently received a five year continuation of that grant in 2016. Under that new grant, the priority areas for 2016 – 2021 include: child abuse and neglect, traumatic brain injury (TBI), motor vehicle crash injury and death, and intimate partner/sexual violence. Many injury prevention efforts are being implemented related to these areas and others throughout Tennessee.

Trauma centers and the comprehensive regional pediatric centers (CRPCs) are integral partners in the implementation of programmatic efforts to reduce the burden of injury in Tennessee. Examples of injury prevention efforts among designated trauma centers and CRPCs include:

- **REDUCETNCRASHES.ORG** – This program is an interactive website unique to Tennessee that was developed using the National Highway Transportation and Safety (NHTSA) best practices known to reduce crashes. High schools and colleges can join an annual contest to promote safe driving in their community.
- **Safe Kids Coalitions** – The safe kids coalitions provide education to families and advocate for better laws to keep children safe and healthy. In addition, the Safe Kids coalitions often provide safety devices, such as car seats, to families in need.

- **Champ’s Corner Store** - Champ’s Corner Store is located at Monroe Carell Jr. Children's Hospital at Vanderbilt and is the first of its kind in Tennessee. Open to the public, the store serves families in Middle Tennessee and across the state by providing low cost safety products for children such as child passenger safety seats, cabinet locks and bicycle helmets.
- **Battle of the Belt** – This competition is a collaborative effort between trauma centers and high schools to increase seat belt usage among teens. Trauma centers work with schools to conduct two seat belt checks and education for students throughout the year. A winning school is chosen at the end of the school year based on increased percentage of seat belt usage and quality of educational campaign.
- **“BE IN THE ZONE”** – This program, supported by the Trauma Center’s Injury Programs, promotes teen driver safety to reduce cell phone use and texting while driving.
- **Trauma Nurses Talk Tough** – This program teaches parents, teenagers and children about safety topics and injury prevention. Topics include: seatbelt safety, dangers of speeding and driving impaired, and the importance of wearing helmets when bicycling and skating.
- **Safe Sleep Education** – The Tennessee Department of Health has provided educational materials and encouraged hospitals to educate staff and parents about safe sleep practices. All birthing hospitals in Tennessee have developed safe sleep policies which require training for their staff, education for parents and modeling of safe sleep practices in the hospital.
- **Direct On Scene Education (D.O.S.E)** – D.O.S.E is an innovative program to reduce sleep-related infant death due to suffocation, strangulation, or positional asphyxia by using First Responders to identify and remove hazards from an infant’s sleep space while on scene during emergency and non-emergency 911 calls.
- **Tennessee Falls Prevention Coalition** – The Tennessee Department of Health has partnered with the Tennessee Commission on Aging and Disability and other stakeholders to support a coalition to reduce falls among older adults. Evidence-based falls prevention educational programs have been conducted, including “Matter of Balance”, “Stepping On”, “Staying Active and Independent for Life”, and Tai Chi.

TRAUMA CENTER FUNDING

With the passage of the Tennessee Trauma Center Funding Law of 2007, the Trauma Care Advisory Council was charged with developing recommendations on how to distribute Trauma System Fund reserves. In keeping with the intent of the statute, three broad categories for disbursement were identified:

- Money to support the **trauma system infrastructure** at the state level.
- **Readiness costs** to designated trauma centers and comprehensive regional pediatric centers.
- Money for **uncompensated care**.

Trauma System Infrastructure:

Robert Seesholtz is the State Trauma System Manager as of August 2010 and is responsible for providing general oversight for Tennessee's Trauma Care System. Responsibilities include oversight of the trauma fund, the trauma registry, administrative support to the Trauma Care Advisory Council, and the coordination of site visits for new and existing trauma centers.

Readiness Costs:

Tennessee trauma centers and CRPC's are ready at a moment's notice to treat those suffering from traumatic injury and are required to maintain life critical services 24 hours a day, 7 days a week, 365 days a year. While readiness costs disbursed from the trauma fund cannot realistically compensate centers for all of their costs, readiness funds help to ensure that these necessary life critical services are maintained. Readiness cost amounts for state designated trauma centers and CRPC's may be found in **appendix III**.

Uncompensated Care Methodology:

The trauma funding law provides for uncompensated care funding to be distributed to: 1) designated trauma centers 2) comprehensive regional pediatric centers and 3) other acute care hospitals functioning as a part of the trauma system.

Distribution to eligible hospitals is based on: 1) the level of funding within the reserve account following infrastructure and readiness costs and 2) the documented level of each hospital's uncompensated trauma cost. Though this amount will vary from year to year, at the end of 2015 this portion of the fund was approximately \$7,867,741.77. **Appendix III** shows quarterly payments made to eligible hospitals for calendar year 2015.

Trauma Fund disbursement totals have seen a steady decline for the past three years. Since its inception, the trauma fund has decreased over \$1,200,000.00 dollars making finding alternative sources of funding a priority to ensure the viability of Tennessee's Trauma System.

TRAUMA REGISTRY

The Tennessee Trauma Registry is the data repository for patients treated at Tennessee's 12 participating trauma centers and 4 CRPC's. 2007 marked the first full year of data submission. Since that date the Registry shows Tennessee trauma facilities have treated over 205,000 patients (including 14,566 for the first 6 months of 2016). The cumulative annual average through 2016 is 22,872 patients. In 2015 the number of patients treated (28,647) increased by 4,820 from the preceding year (23,827).

Reporting for the current Registry assessment is primarily based on patient abstractions completed at the 12 trauma facilities through 2015. The registry reports represent cross-sectional views of the injuries sustained in 2015 with additional trend reporting that includes the 4 years prior.

RESEARCH

Level 1 trauma centers are charged with performing research. These endeavors spur improvements in care on an ongoing basis. **Appendix IV** represents just a sample of these state wide research publication efforts.

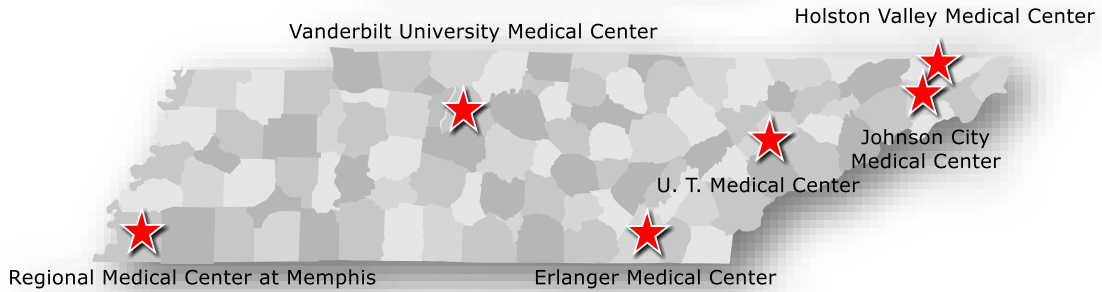
OUTREACH

Tennessee's trauma centers and CRPC's provide many different outreach opportunities for both the public and for those who are responsible for the specialized care of injured Tennesseans and visitors in our state. The outreach activities listed below represent just a sample of the opportunities that are being provided the public and health care providers.

- Advanced Trauma Life Support
- Trauma Nurse Core Course
- Advanced Trauma Care for Nurses
- Emergency Nursing Pediatric Course
- AARP Smart Driver for elderly drivers
- Helicopter scene safety
- Senior Falls Education and Training
- Community Health Leaders Program
- Transport Ventilator Management course
- Prom Promise
- Wilderness First Aid
- Rural Trauma Team Development Course
- Pre-hospital Trauma Life Support
- Trauma Nurses Talk Tough
- Paramedic and EMT Refresher Courses
- Trauma Symposiums
- Bike Helmet Fittings
- Car Seat Inspections
- Health Fairs
- Distracted Driving Simulator
- Sports Safety
- Advanced Burn Life Support

Appendix I: Trauma Center Location & Level Designation

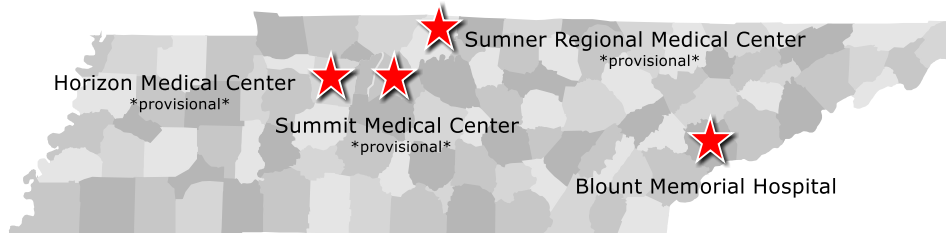
Level I Tennessee Trauma Centers



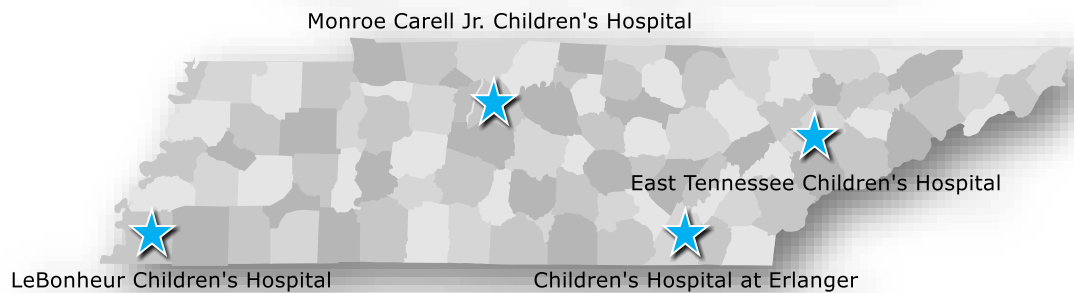
Level II Tennessee Trauma Centers



Level III Tennessee Trauma Centers



Tennessee Comprehensive Regional Pediatric Centers

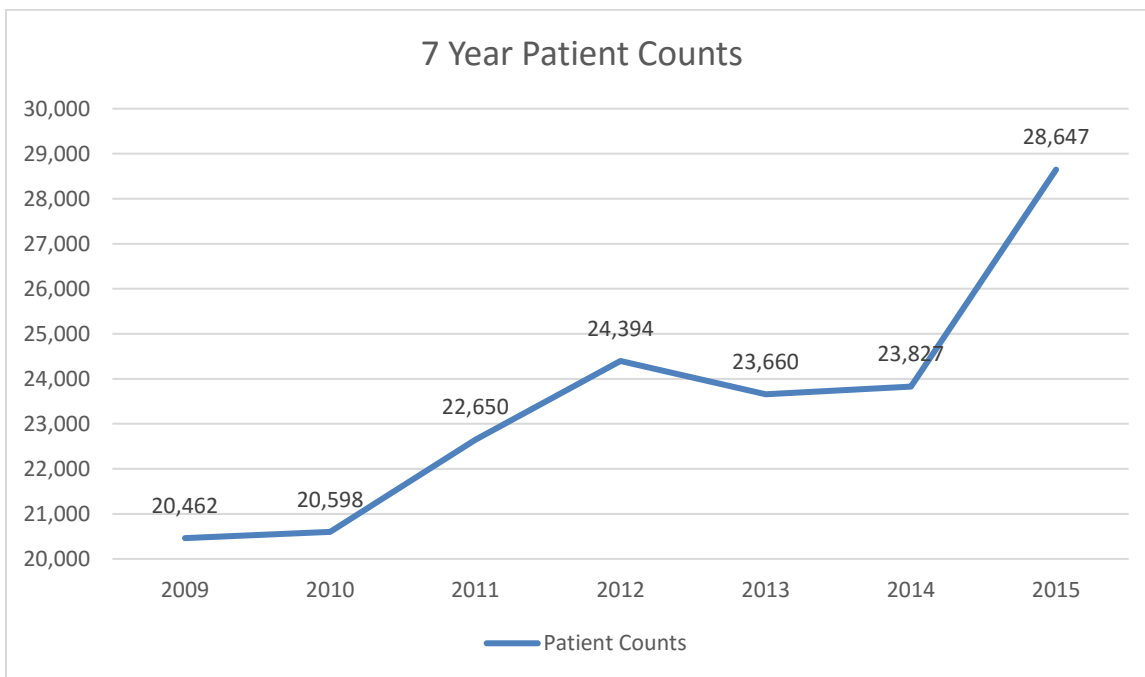


Appendix II:

Trauma Registry Reports

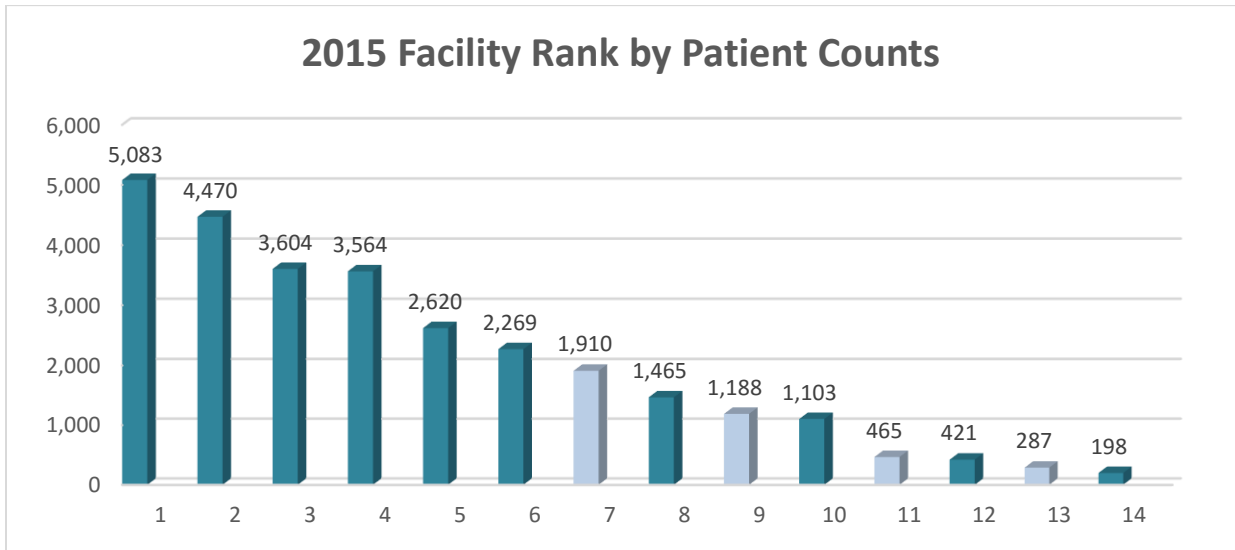
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Figure 1:



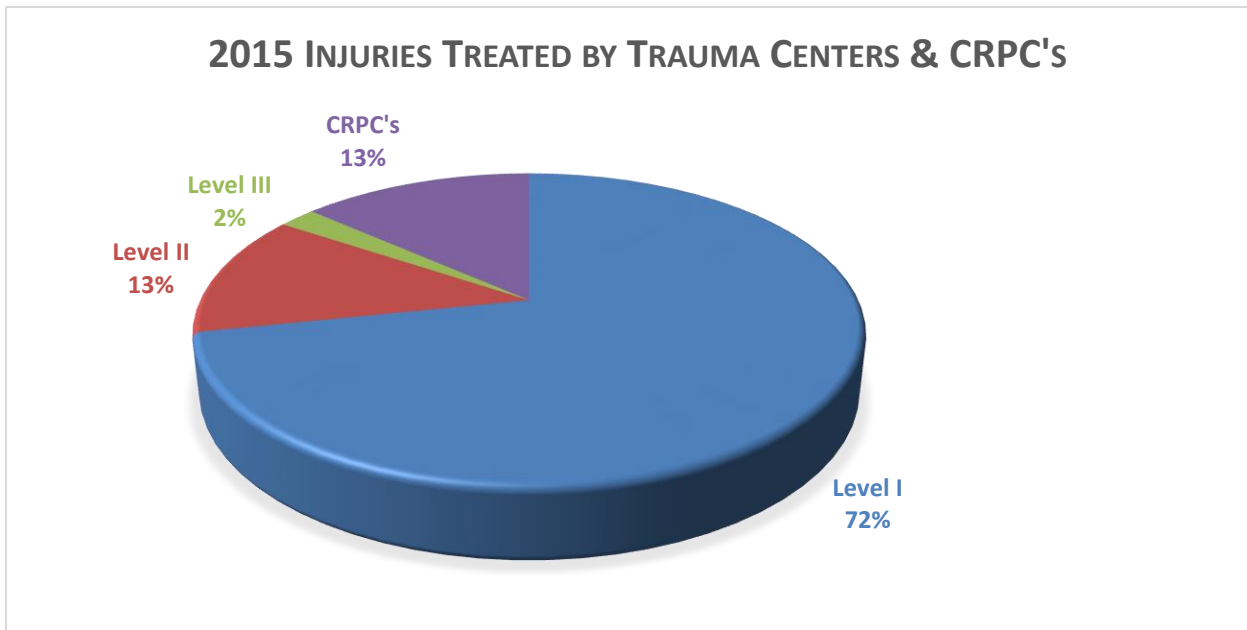
In 2015 28,647 traumatically injured patients were treated in Tennessee trauma centers and CRPC's. The overall growth pattern of patient totals recorded in the registry since 2009 is shown above in figure 1.

Figure 2a:



Patient count is shown above in order of maximum patient counts to minimum. Comprehensive Regional Pediatric Centers are indicated by .

Figure 2b:



As might be expected over two thirds of all trauma patients were treated at a Level 1 trauma facility.

2015 Motor Vehicle, Motorcycle, and ATV Primary Safety Equipment Reported

Figure 3a:

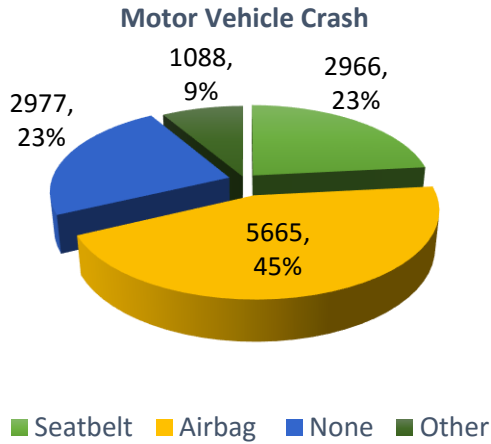
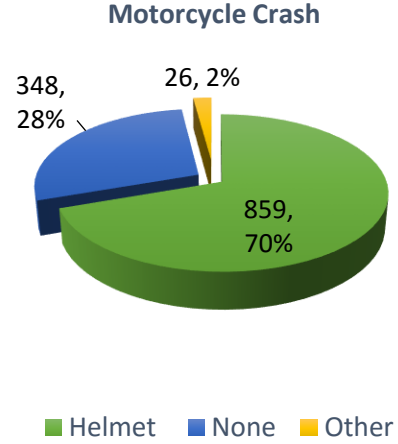


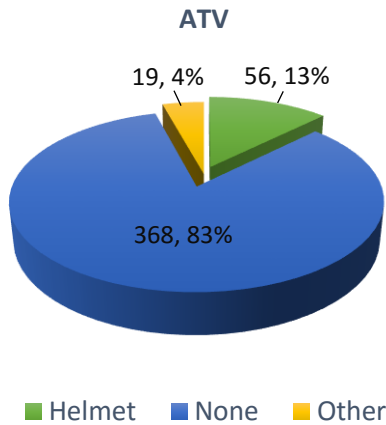
Figure 3b:



Total injuries = 26,285; Primary safety measure not available = 13,589

Total injuries = 5,489; Primary safety measure not available = 4,257

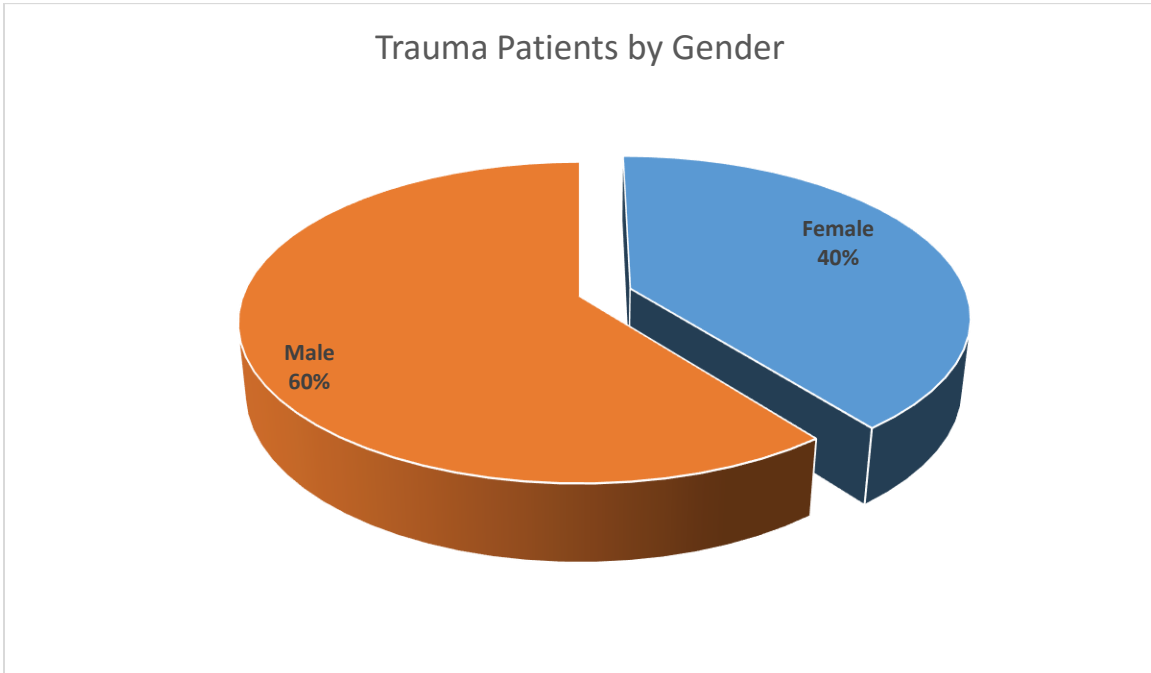
Figure 3c:



Total injuries = 589; Primary safety measure not available = 146

Primary Safety Equipment measurements reflect the first piece of safety equipment listed during the record abstraction. In some cases, multiple equipment measures may have been utilized; however, the more critical result is an indication that no safety measure was applied. The least compliance was seen for ATV injuries in which 83% of patients treated show equipment use of “None”. The percent is not applicable to the entire 2015 trauma population (28,647), but instead to the total injuries for that MVC group. The injuries total for Motor Vehicle Collision was 26,285; Motorcycle crash was 5,489 and ATV was 589.

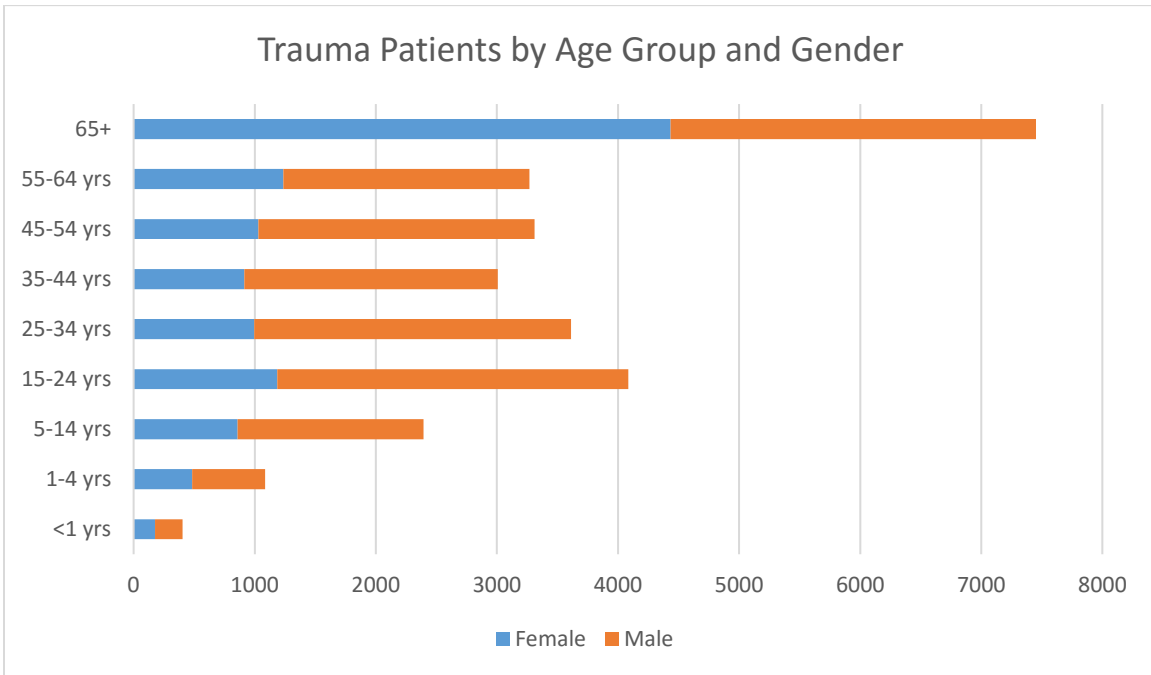
Figure 4:



Female	Male
11321	17306

60 percent of all patients treated at a Tennessee trauma center or CRPC were male. This 2015 data reflects a 1 percentage point decrease in male trauma patients and a one percentage point increase in female trauma patients seeking treatment at trauma centers and CRPC's.

Figure 5:

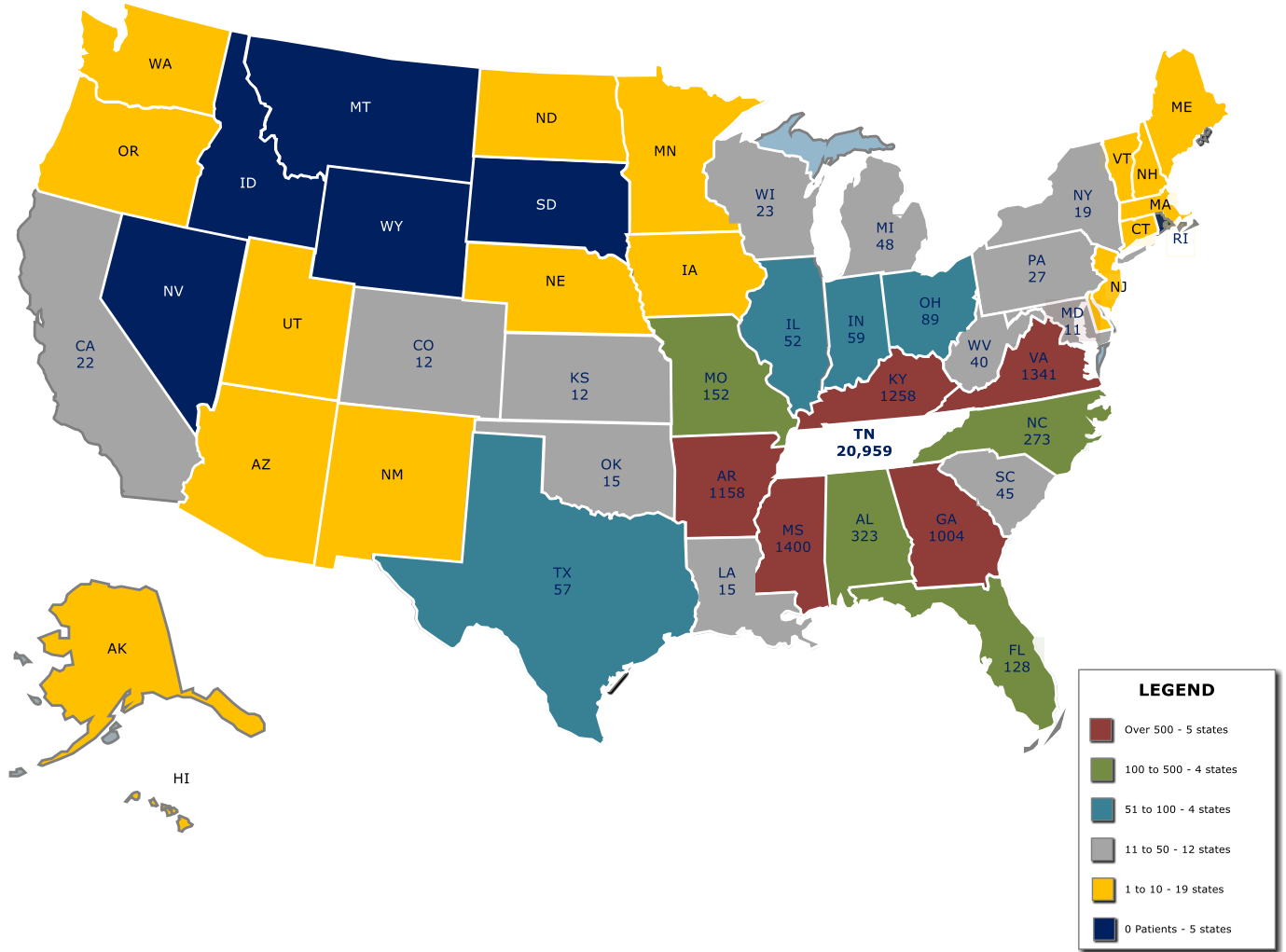


The information above is reflective of trauma patients by age and gender. Females in the 65+ age category made up 60 percent of the total in that age category.

	Female	Male	Total by Age Group
<1 yrs	177	226	403
1-4 yrs	483	604	1087
5-14 yrs	859	1534	2393
15-24 yrs	1185	2900	4085
25-34 yrs	996	2616	3612
35-44 yrs	914	2093	3007
45-54 yrs	1031	2280	3311
55-64 yrs	1237	2032	3269
65+	4435	3016	7451

Figure 6:

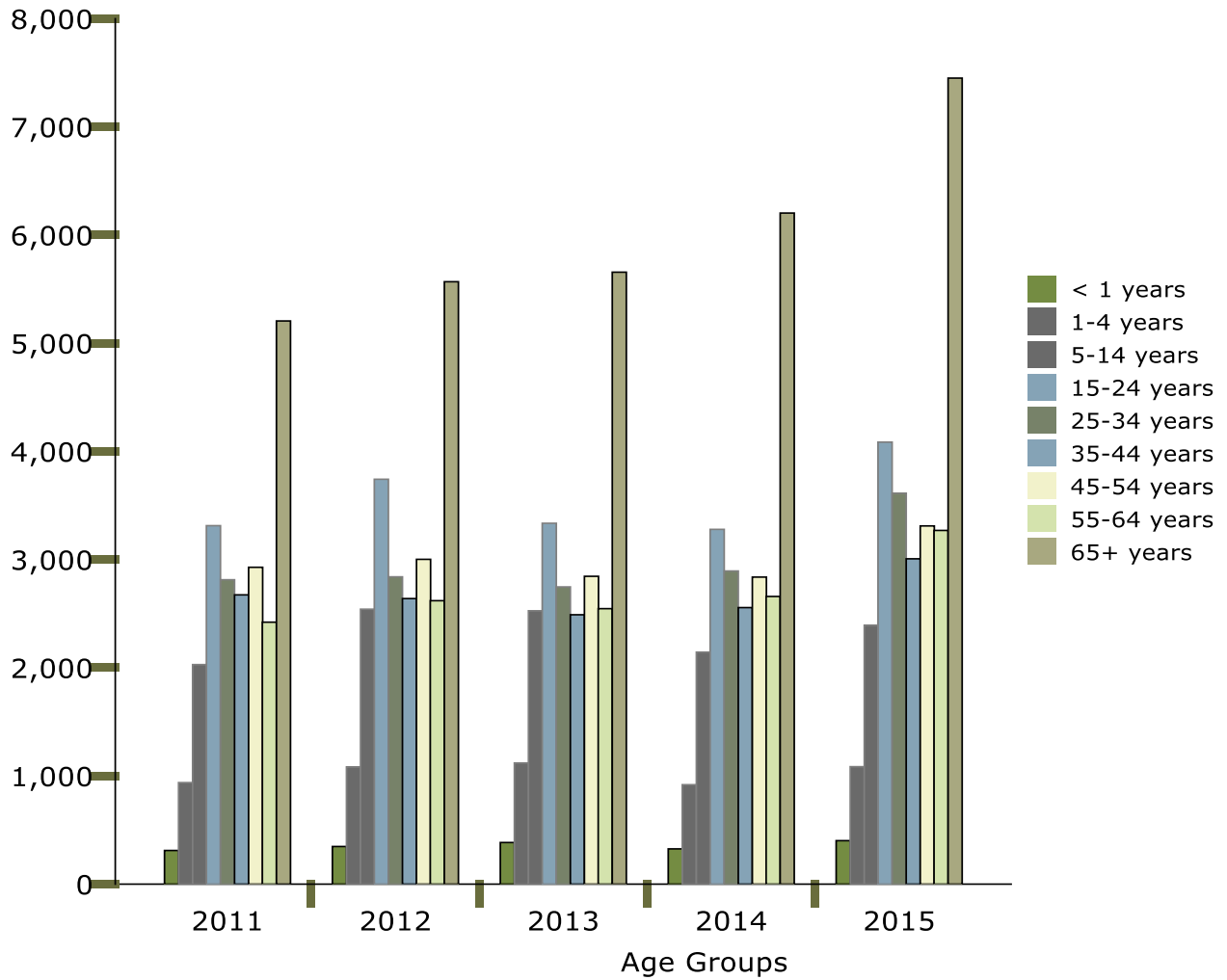
**2015 Trauma Patients Treated in Tennessee Trauma Centers and CRPC's
by State of Residence**



73% of all trauma cases treated in Tennessee trauma facilities were Tennesseans (20,959); 27% of all cases (28,647) were residents of other states. (State residence was not reported for 89 patients.)

Figure 7:

**5-Year Patient Counts by Age Group
2011 through 2015**

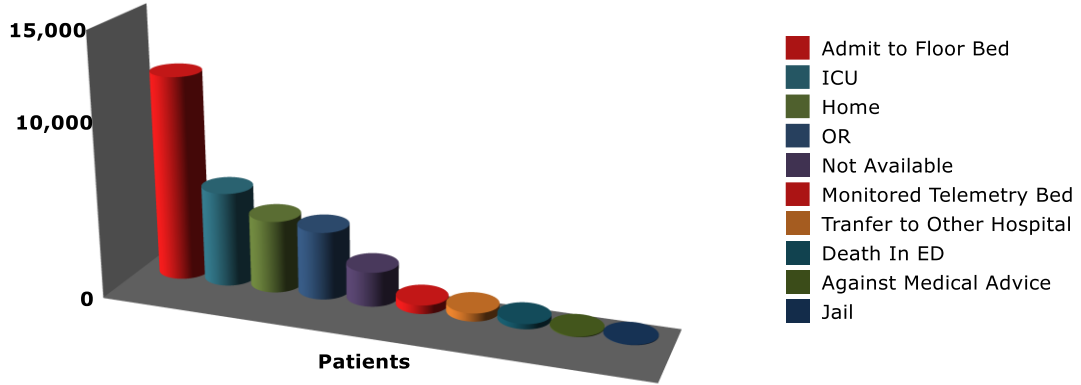


Age Group	2011	2012	2013	2014	2015
< 1 years	312	347	386	326	403
1-4 years	939	1,084	1,120	920	1,087
5-14 years	2,029	2,541	2,527	2,144	2,393
15-24 years	3,314	3,743	3,335	3,279	4,085
25-34 years	2,813	2,841	2,748	2,894	3,612
35-44 years	2,673	2,640	2,491	2,556	3,007
45-54 years	2,929	3,003	2,846	2,838	3,311
55-64 years	2,421	2,619	2,546	2,659	3,269
65+ years	5,206	5,569	5,657	6,204	7,451

The 65+ age group continues to be the fastest growing group of patients receiving care at a trauma center.

Figure 8:

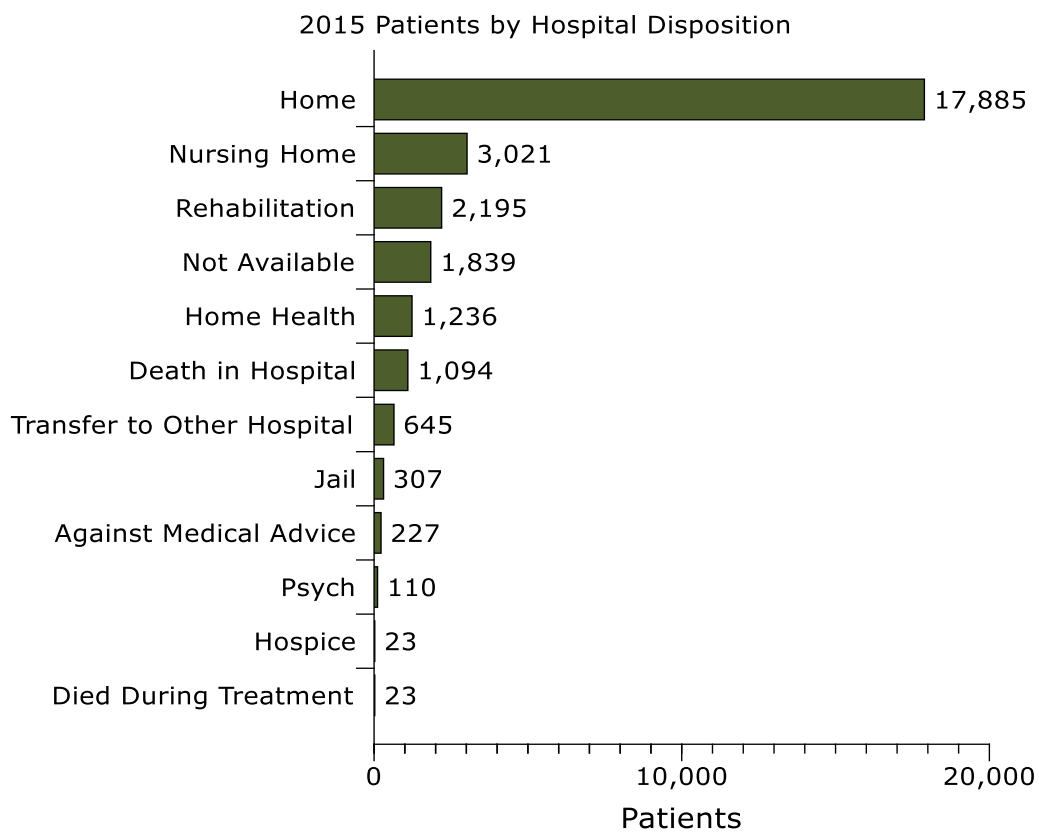
Trauma Patients by ED Disposition



The majority of persons who met inclusion criteria for trauma registry submissions by ED Disposition were admitted to a floor bed. 14.51% were discharged home.

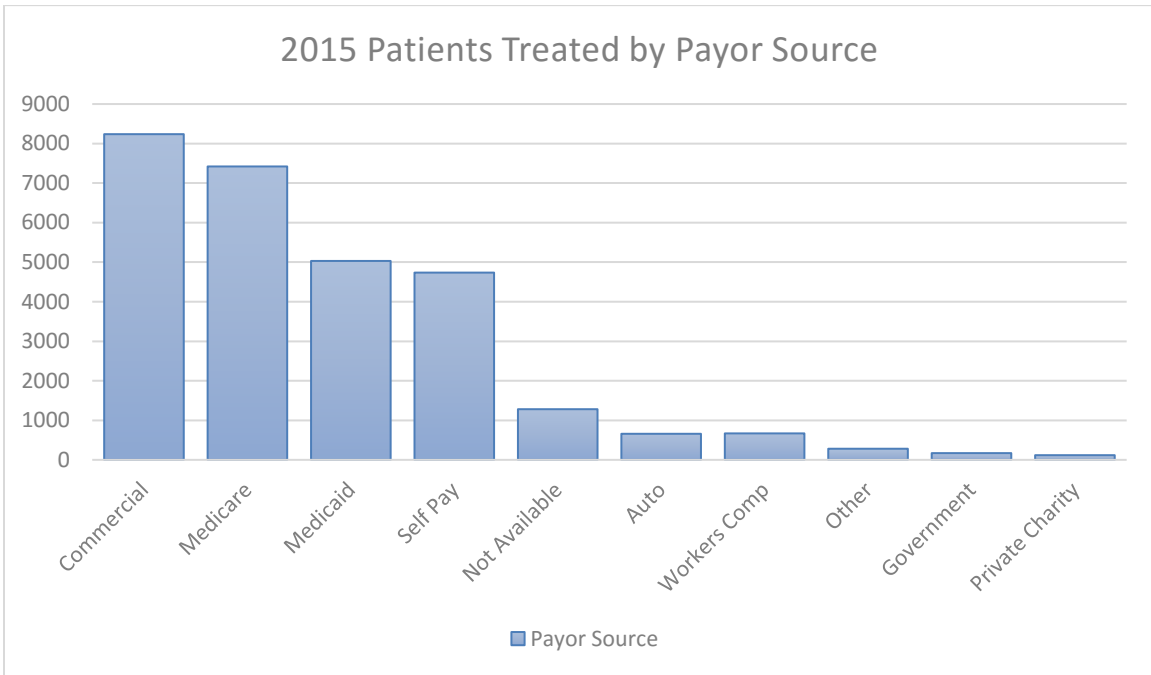
<i>Admit to Floor Bed</i>	11,762	41.06
<i>ICU</i>	5,430	18.95%
<i>Home</i>	4,157	14.51%
<i>OR</i>	3,899	13.61%
<i>Not Available</i>	1,986	6.93%
<i>Monitored Telemetry Bed</i>	500	1.75%
<i>Transfer to Other Hospital</i>	472	1.65%
<i>Death in ED</i>	300	1.05%
<i>Against Medical Advice</i>	43	0.15%
<i>Jail</i>	30	0.10%

Figure 9:



Sixty three percent of patients seeking care from a trauma facility were released back to their home or other facility upon treatment completion. A little more than 4% had an outcome of death.

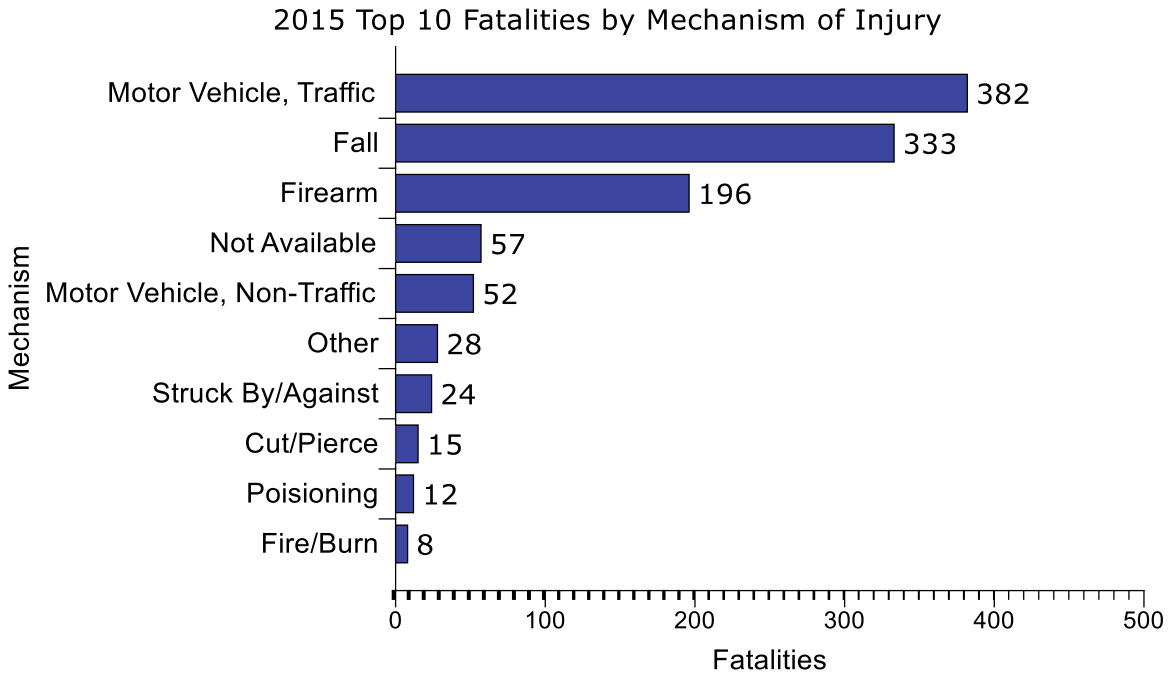
Figure 10:



<i>Payor Source</i>	
<i>Commercial</i>	8,238
<i>Medicare</i>	7,421
<i>Medicaid</i>	5,031
<i>Self Pay</i>	4,736
<i>Not Available</i>	1,281
<i>Auto</i>	659
<i>Workers Comp</i>	669
<i>Other</i>	281
<i>Government</i>	170
<i>Private Charity</i>	118

Commercial insurance continues to be the number one payor source for those being treated at a trauma center or CRPC.

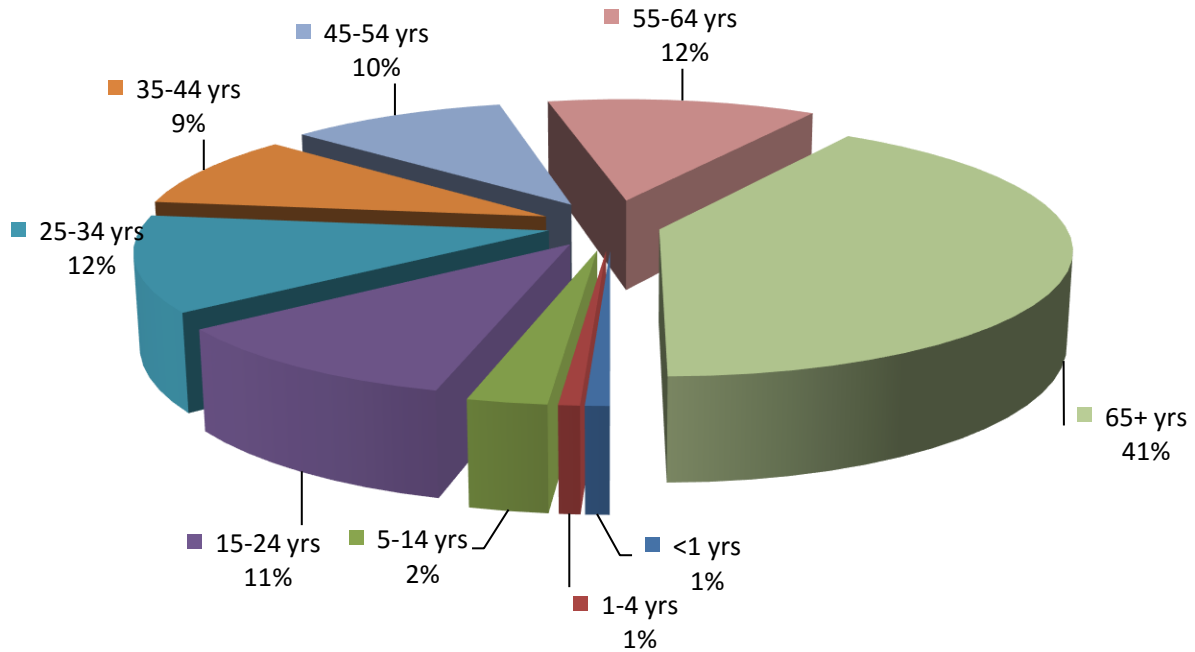
Figure 11:



Motor vehicle crashes continue to be the leading cause of death for patients brought to trauma facilities. Deaths due to falls follow closely with only 49 fewer fatalities.

Figure 12:

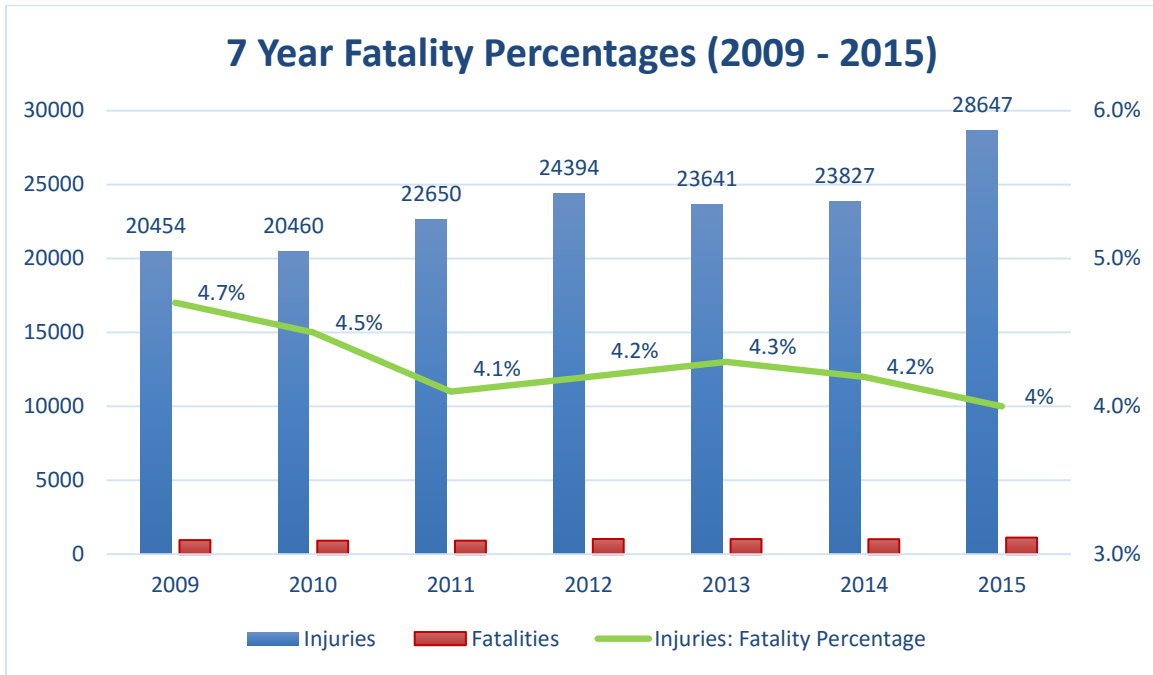
Fatalities by Age Group



As the 65+ age group shows the largest percentage of injuries (26%), it similarly experiences the largest percentage of fatal outcomes (41%). This comparison shows a relative disproportion of percentages – 1.7 injuries rate to death rate.

Total	<1 yrs.	1-4 yrs.	5-14 yrs.	15-24 yrs.	25-34 yrs.	35-44 yrs.	45-54 yrs.	55-64 yrs.	65+ yrs.	Not Available
1126	9	8	30	119	121	102	105	141	461	2

Figure 13:



	2009	2010	2011	2012	2013	2014	2015
Injuries	20,454	20,460	22,650	24,394	23,641	23,827	28,647
Fatalities	957	917	918	1,032	1,026	1,018	1,126
Fatalities Percentage	4.7%	4.5%	4.1%	4.2%	4.3%	4.2%	4.0%

Fatality percentages continue to trend downward even with the increase in trauma volume.

Figure 14a:

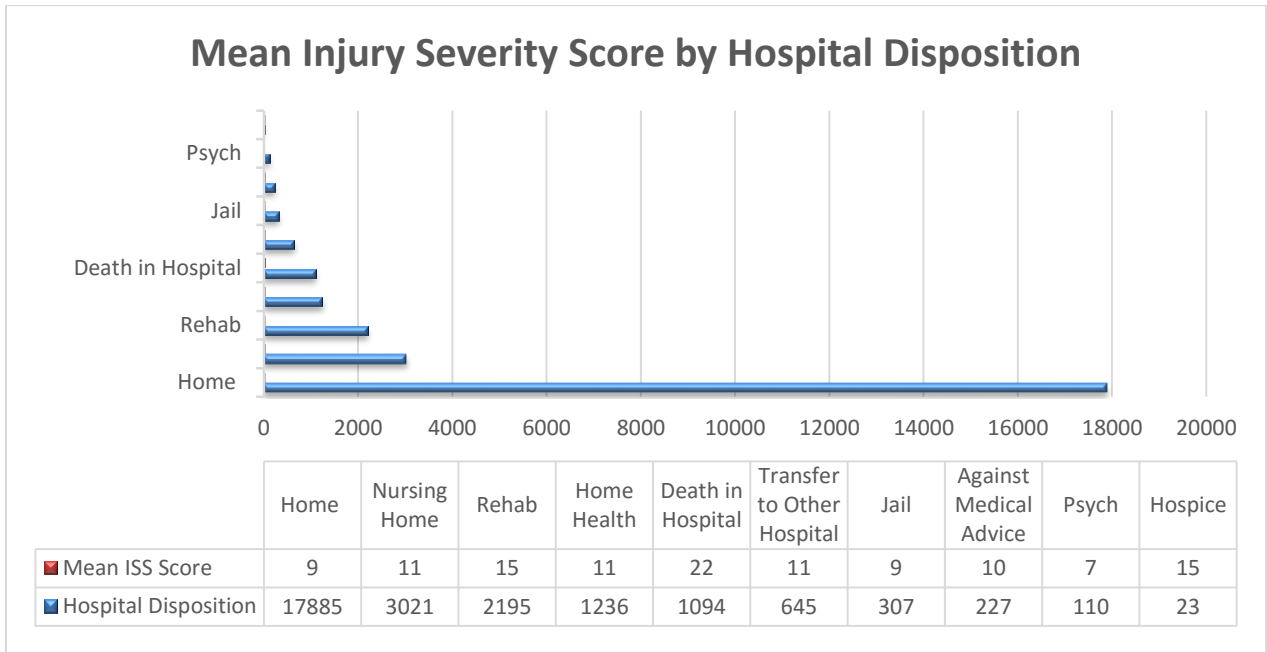
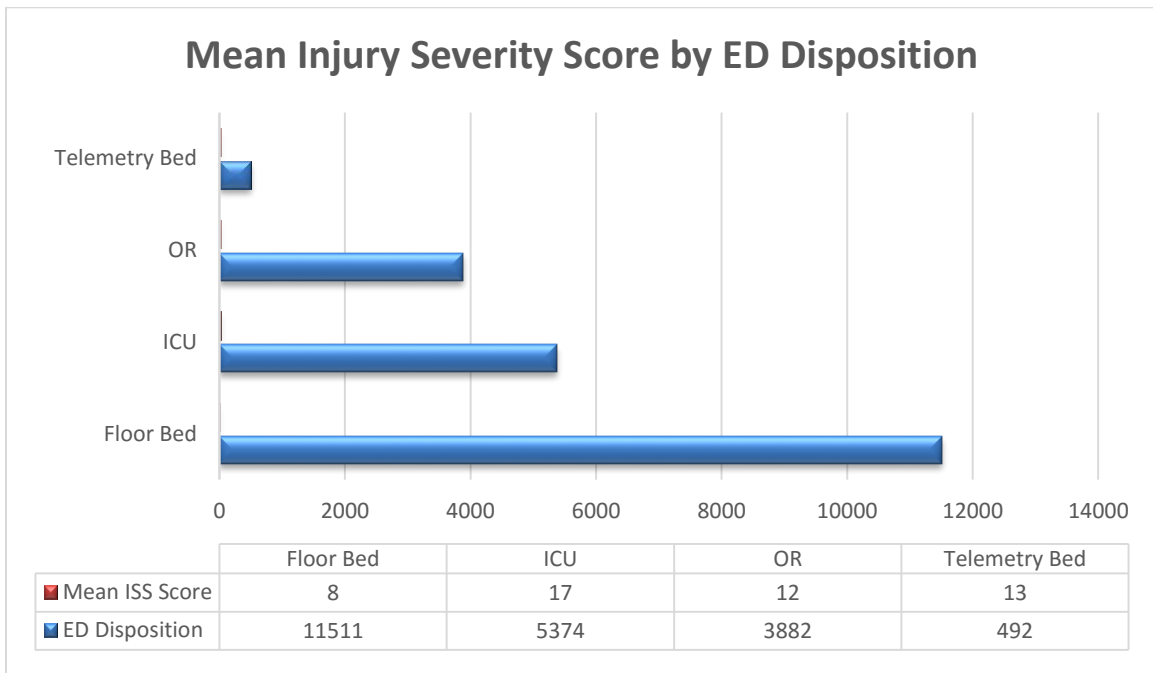
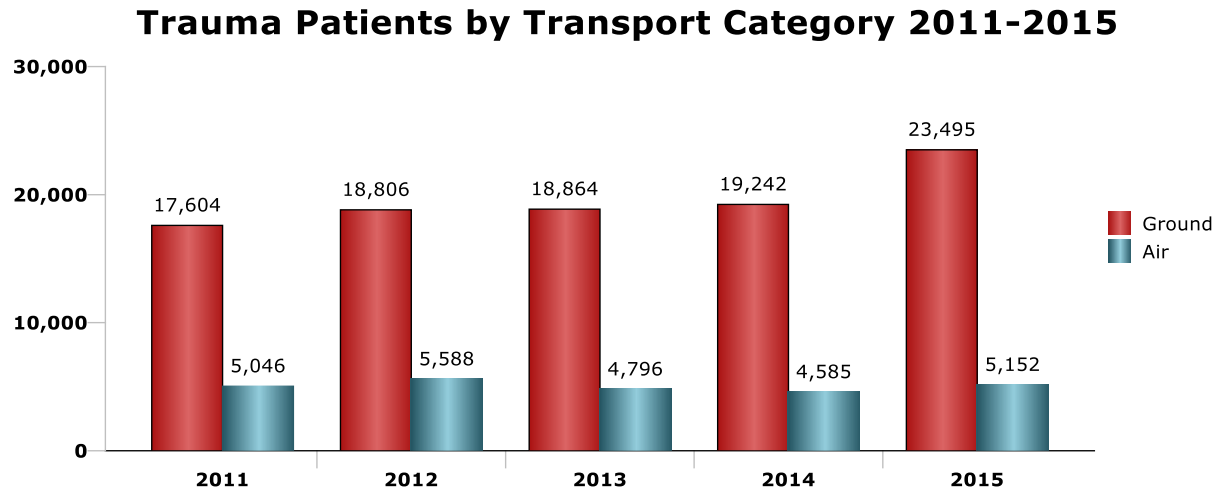


Figure 14a:



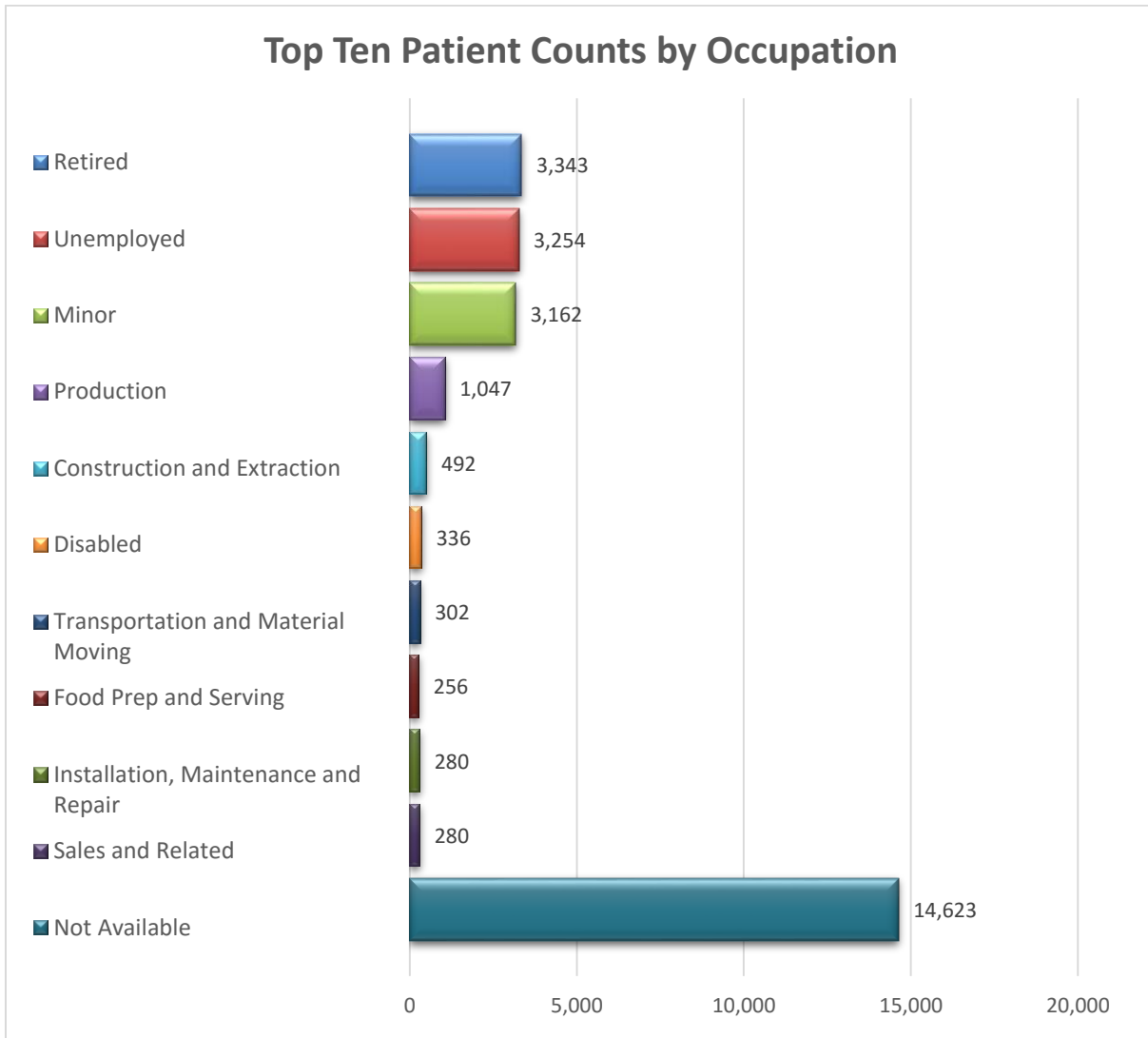
Major trauma is commonly defined using an Injury Severity Score (ISS) of 15. In 2015, the average reported ISS for all hospitals submitting to the registry was 11.17.

Figure 15:



Patient transport by ground travel has shown an upward trend for the past 5 years. Since 2007 patients are increasingly arriving to the trauma facilities using ground transportation.

Figure 16:



Occupation	Patient Count	Percentage
<i>Retired</i>	3,343	12%
<i>Unemployed</i>	3,254	12%
<i>Minor</i>	3,162	12%
<i>Production</i>	1,047	4%
<i>Construction and Extraction</i>	492	2%
<i>Disabled</i>	336	1%
<i>Transportation and Material Moving</i>	302	1%
<i>Food Prep and Serving</i>	256	1%
<i>Installation, Maintenance and Repair</i>	280	1%
<i>Sales and Related</i>	280	1%
<i>Not Available</i>	14,623	53%

Appendix III:

2015 Trauma Fund Distribution

FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS FROM TENNESSEE TRAUMA FUND - FY2015 – 1st QUARTER DISTRIBUTION				
Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,272,456.53	\$835,000.00	\$2,107,456.53
Lev I	Vanderbilt University Hospital	\$413,610.40	\$153,250.00	\$566,860.40
Lev I	Regional One Health	\$411,529.38	\$97,250.00	\$508,779.38
Lev I	Erlanger Health System	\$128,271.76	\$153,250.00	\$281,521.76
Lev I	The University of Tennessee Med. Cntr.	\$99,239.82	\$102,250.00	\$201,489.82
Lev I	Johnson City Medical Center	\$54,760.86	\$72,500.00	\$127,260.86
Lev I	Wellmont Holston Valley Medical Ctr.	\$31,968.91	\$72,500.00	\$104,468.91
PED	LeBonheur Children Hospital	\$2,094.35	\$64,250.00	\$66,344.35
Lev II	Wellmont Bristol Regional Med. Ctr.	\$15,117.33	\$37,750.00	\$52,867.33
PED	East Tennessee Childrens Hospital	\$0.00	\$51,000.00	\$51,000.00
Lev III	Blount Memorial Hospital	\$8,554.45	\$15,500.00	\$24,054.45
Lev III	Starr Regional Medical Center	\$1,798.05	\$15,500.00	\$17,298.05
	Methodist University Hospital	\$17,298.05		\$17,298.05
	Jackson-Madison Cnty. General Hospital	\$10,837.22		\$10,837.22
	Baptist Memorial Hospital-Memphis	\$9,920.19		\$9,920.19
	Saint Thomas West Hospital	\$8,373.84		\$8,373.84
	TriStar Skyline Medical Center	\$7,427.93		\$7,427.93
	Maury Regional Medical Center	\$5,135.81		\$5,135.81
	Williamson Medical Center	\$4,952.57		\$4,952.57
	Physicians Regional Medical Center	\$4,045.74		\$4,045.74
	Dyersburg Regional Medical Center	\$3,846.61		\$3,846.61
	River Park Hospital	\$3,766.93		\$3,766.93
	Methodist North Hospital	\$3,749.35		\$3,749.35
	TriStar Summit Medical Center	\$3,642.31		\$3,642.31
	University Medical Center	\$3,164.98		\$3,164.98
	Morristown-Hamblen Healthcare System	\$3,035.77		\$3,035.77
	Methodist Medical Center of Oak Ridge	\$2,899.93		\$2,899.93
	LeConte Medical Center	\$2,243.27		\$2,243.27
	Baptist Memorial Hospital-Union City	\$1,935.16		\$1,935.16
	TriStar Southern Hills Medical Center	\$1,704.43		\$1,704.43
	Cumberland Medical Center	\$1,694.83		\$1,694.83
	NorthCrest Medical Center	\$1,651.00		\$1,651.00
	Henry County Medical Center	\$1,384.51		\$1,384.51
	Fort Loudoun Medical Center	\$1,017.95		\$1,017.95
	Roane Medical Center	\$911.77		\$911.77
	Parkwest Medical Center	\$578.85		\$578.85
	Sweetwater Hospital Association	\$158.01		\$158.01
	Jefferson Memorial Hospital	\$134.22		\$134.22

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2015 – 2nd QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$951,596.64	\$835,000.00	\$1,786,596.64
Lev I	Regional One Health	\$353,253.41	\$97,250.00	\$450,503.41
Lev I	Vanderbilt University Hospital	\$274,034.96	\$153,250.00	\$427,284.96
Lev I	Erlanger Health System	\$100,196.88	\$153,250.00	\$253,446.88
Lev I	The University of Tennessee Med. Cntr.	\$68,398.62	\$102,250.00	\$170,648.62
Lev I	Johnson City Medical Center	\$37,174.90	\$72,500.00	\$109,674.90
Lev I	Wellmont Holston Valley Medical Ctr.	\$34,342.27	\$72,500.00	\$106,842.27
PED	LeBonheur Children Hospital	\$22,933.06	\$64,250.00	\$87,183.06
Lev II	Wellmont Bristol Regional Med. Ctr.	\$19,478.85	\$37,750.00	\$57,228.85
PED	East Tennessee Childrens Hospital		\$51,000.00	\$51,000.00
Lev III	Blount Memorial Hospital	\$2,086.94	\$15,500.00	\$17,586.94
Lev III	Starr Regional Medical Center	\$1,094.77	\$15,500.00	\$16,594.77
	Jackson-Madison Cnty. General Hospital	\$8,874.22		\$8,874.22
	TriStar Skyline Medical Center	\$4,496.81		\$4,496.81
	Maury Regional Medical Center	\$4,427.84		\$4,427.84
	Harton Regional Medical Center	\$3,189.54		\$3,189.54
	Henry County Medical Center	\$3,124.73		\$3,124.73
	TriStar Southern Hills Medical Center	\$3,103.62		\$3,103.62
	TriStar Summit Medical Center	\$2,129.40		\$2,129.40
	Physicians Regional Medical Center	\$1,904.21		\$1,904.21
	Methodist Medical Center of Oak Ridge	\$1,900.96		\$1,900.96
	Williamson Medical Center	\$1,224.51		\$1,224.51
	Morristown-Hamblen Healthcare System	\$1,128.29		\$1,128.29
	Cumberland Medical Center	\$1,049.56		\$1,049.56
	TriStar Hendersonville Medical Center	\$800.69		\$800.69
	University Medical Center	\$617.87		\$617.87
	Sweetwater Hospital Association	\$333.09		\$333.09
	Roane Medical Center	\$194.51		\$194.51
	Memorial Hospital Hixon	\$102.13		\$102.13

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2015 – 3rd QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,060,592.54	\$835,000.00	\$1,895,592.54
Lev I	Vanderbilt University Hospital	\$310,848.40	\$153,250.00	\$464,098.40
Lev I	Regional One Health	\$347,259.82	\$97,250.00	\$444,509.82
Lev I	Erlanger Health System	\$120,333.88	\$153,250.00	\$273,583.88
Lev I	The University of Tennessee Med. Cntr.	\$108,335.07	\$102,250.00	\$210,585.07
Lev I	Johnson City Medical Center	\$51,875.38	\$72,500.00	\$124,375.38
Lev I	Wellmont Holston Valley Medical Ctr.	\$24,325.65	\$72,500.00	\$96,825.65
PED	LeBonheur Children Hospital	\$10,855.87	\$64,250.00	\$75,105.87
PED	East Tennessee Childrens Hospital	\$0.00	\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$10,034.27	\$37,750.00	\$47,784.27
Lev III	Blount Memorial Hospital	\$1,056.90	\$15,500.00	\$16,556.90
Lev III	Starr Regional Medical Center	\$958.14	\$15,500.00	\$16,458.14
	Methodist University Hospital	\$16,458.14		\$16,458.14
	Jackson-Madison Cnty. General Hospital	\$11,486.30		\$11,486.30
	Baptist Memorial Hospital-Memphis	\$8,309.97		\$8,309.97
	TriStar Skyline Medical Center	\$7,126.89		\$7,126.89
	Maury Regional Medical Center	\$3,356.52		\$3,356.52
	TriStar Summit Medical Center	\$2,904.39		\$2,904.39
	Methodist North Hospital	\$2,670.60		\$2,670.60
	Physicians Regional Medical Center	\$2,341.56		\$2,341.56
	Morristown-Hamblen Healthcare System	\$2,179.11		\$2,179.11
	Southern TN Reg. Health Sys.- Winchester	\$2,028.55		\$2,028.55
	Parkwest Medical Center	\$1,625.13		\$1,625.13
	LeConte Medical Center	\$1,543.93		\$1,543.93
	Saint Thomas West Hospital	\$1,541.85		\$1,541.85
	River Park Hospital	\$1,324.75		\$1,324.75
	Williamson Medical Center	\$1,293.23		\$1,293.23
	TriStar Hendersonville Medical Center	\$1,251.01		\$1,251.01
	TriStar Horizon Medical Center	\$1,203.08		\$1,203.08
	Cumberland Medical Center	\$1,076.17		\$1,076.17
	Henry County Medical Center	\$1,018.42		\$1,018.42
	Cookeville Regional Medical Center	\$1,014.18		\$1,014.18
	University Medical Center	\$923.58		\$923.58
	Memorial Hospital Hixon	\$614.72		\$614.72
	Methodist Medical Center of Oak Ridge	\$598.22		\$598.22
	Sumner Regional Medical Center	\$476.24		\$476.24
	Indian Path Medical Center	\$342.59		\$342.59

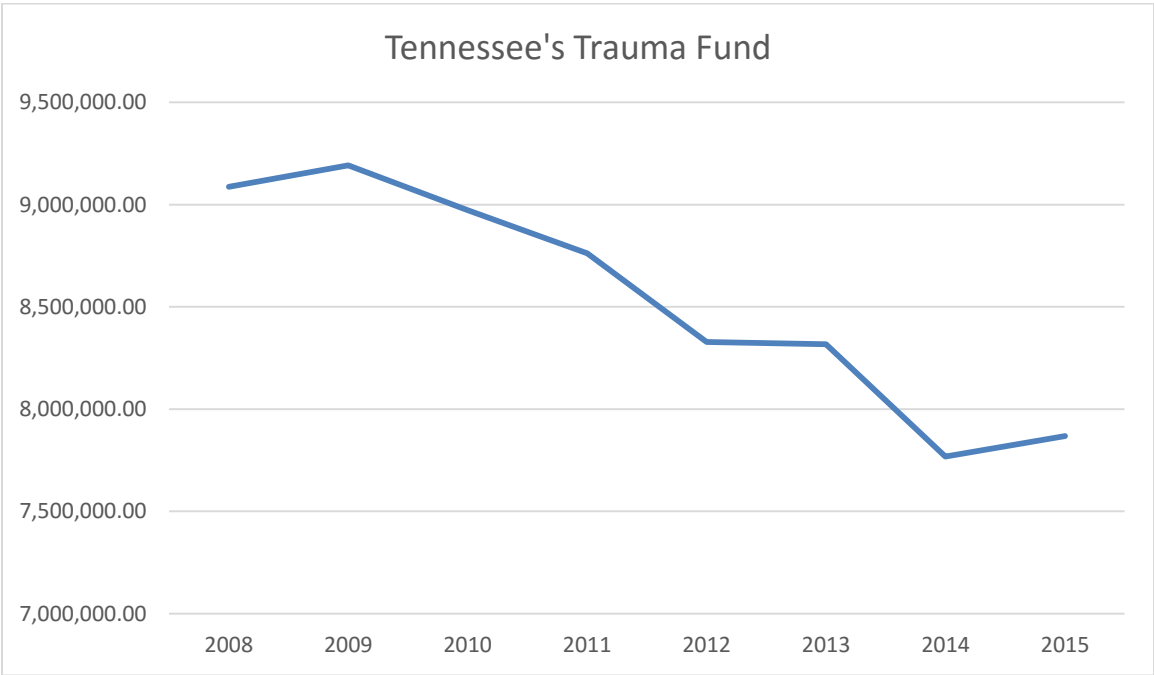
**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2015 – 4th QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,243,096.06	\$835,000.00	\$2,078,096.06
Lev I	Regional One Health	\$484,755.78	\$97,250.00	\$582,005.78
Lev I	Vanderbilt University Hospital	\$344,832.15	\$153,250.00	\$498,082.15
Lev I	Erlanger Health System	\$144,299.40	\$153,250.00	\$297,549.40
Lev I	The University of Tennessee Med. Cntr.	\$76,476.07	\$102,250.00	\$178,726.07
Lev I	Wellmont Holston Valley Medical Ctr.	\$35,060.87	\$72,500.00	\$107,560.87
Lev I	Johnson City Medical Center	\$31,360.66	\$72,500.00	\$103,860.66
PED	LeBonheur Childrens Hospital	\$11,723.58	\$64,250.00	\$75,973.58
PED	East Tennessee Childrens Hospital		\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$7,484.64	\$37,750.00	\$45,234.64
Lev III	Starr Regional Medical Center	\$1,342.48	\$15,500.00	\$16,842.48
Lev III	Blount Memorial Hospital	\$588.34	\$15,500.00	\$16,088.34
	Methodist University Hospital	\$11,104.69		\$11,104.69
	Baptist Memorial Hospital-Memphis	\$9,648.93		\$9,648.93
	TriStar Skyline Medical Center	\$9,083.18		\$9,083.18
	Henry County Medical Center	\$7,073.85		\$7,073.85
	TriStar Summit Medical Center	\$6,796.66		\$6,796.66
	Jackson-Madison Cnty. General Hospital	\$6,673.54		\$6,673.54
	Saint Thomas West Hospital	\$5,978.38		\$5,978.38
	Methodist North Hospital	\$5,561.29		\$5,561.29
	Memorial Health Care System	\$4,635.55		\$4,635.55
	Maury Regional Medical Center	\$3,879.12		\$3,879.12
	Unicoi County Memorial Hospital, Inc.	\$3,857.99		\$3,857.99
	LeConte Medical Center	\$3,644.71		\$3,644.71
	Cookeville Regional Medical Center	\$3,555.32		\$3,555.32
	Parkwest Medical Center	\$3,371.52		\$3,371.52
	Methodist Medical Center of Oak Ridge	\$3,291.78		\$3,291.78
	Roane Medical Center	\$1,657.10		\$1,657.10
	Southern TN Reg. Health Sys.- Winchester	\$1,648.86		\$1,648.86
	Lakeway Regional Hospital	\$1,620.55		\$1,620.55
	Indian Path Medical Center	\$1,378.55		\$1,378.55
	University Medical Center	\$1,208.71		\$1,208.71
	Physicians Regional Medical Center	\$1,135.85		\$1,135.85
	Baptist Memorial Hospital-Collierville	\$1,050.28		\$1,050.28
	TriStar Southern Hills Medical Center	\$1,020.73		\$1,020.73
	Memorial Hospital Hixon	\$970.41		\$970.41
	Jefferson Memorial Hospital	\$946.17		\$946.17
	NorthCrest Medical Center	\$910.80		\$910.80
	Cumberland Medical Center	\$730.00		\$730.00
	Harton Regional Medical Center	\$728.12		\$728.12
	Morristown-Hamblen Healthcare System	\$715.05		\$715.05
	Sumner Regional Medical Center	\$560.33		\$560.33
	Williamson Medical Center	\$403.61		\$403.61
	River Park Hospital	\$170.79		\$170.79
	Sweetwater Hospital Association	\$159.67		\$159.67

Trauma Fund Disbursement Totals Since Inception

	Fiscal Year	Trauma Fund Disbursement Totals
*Start of Trauma Fund	FY2008	\$9,086,822.57
	FY2009	\$9,192,013.69
	FY2010	\$8,973,548.13
	FY2011	\$8,762,345.31
	FY2012	\$8,328,132.57
	FY2013	\$8,316,610.13
	FY2014	\$7,768,758.15
	FY2015	\$7,867,741.77

\$1,219,080.80 below initial disbursement when trauma fund started



Appendix IV:

Research Publications

1. Zuckerman SL, Morgan CD, Burks S, Forbes JA, Chambless LB, Solomon GS, Sills AK. "Functional and Structural Traumatic Brain Injury in Equestrian Sports: A Review of the Literature." *World NSGY* 2015; 83(6): 1098-1113.
2. Zuckerman SL, Lee YM, Odom MJ, Forbes JA, Solomon GS, Sills AK." Sports-Related Concussion in Helmeted vs. Unhelmeted Athletes: Who Fares Worse?" *Int J Sports Med* 2015; 36(05): 419-425.
3. Morgan CD, Zuckerman SL, Lee YM, King L, Beaird S, Sills AK, Solomon GS. "Predictors of post-concussion syndrome after sports-related concussion in young athletes: a matched case-control study." *J NSGY: Ped* 2015; 15(6): 589-598.
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5. Westrick AC, Moore M, Monk S, Greeno A, Shannon C. "Identifying Characteristics in Abusive Head Trauma: A Single-Institution Experience." *Ped NSGY* 2015; 50(4): 179-186.
6. Yuasa M, Mignemi NA, Nyman JS, Duvall CL, Schwartz HS, Okawa A, Yoshii T, Bhattacharjee G, Zhao C, Bible JE, Obremskey WT. "Fibrinolysis is essential for fracture repair and prevention of heterotopic ossification." *J Clinical Investigation* 2015; 125(8):3117-31
7. Waldrop JL, Sargent LA, Dale EL, Halsey J. Palate Fracture Repair with Light-Cured Resin Splint: A Technical Note. *Journal of Oral and Maxillofacial Surgery*, October 2015; (73)10:1977-1980.
8. Patel MB, Jackson JC, Morandi A, Girard TG, Hughes CG, Thompson JL, Kiehl AL, Elstad MR, Wasserstein ML, Goodman RB, Beckham JC, Chandrasekhar R, Ely EW, Pandharipande PP. PTSD Incidence and Risk Factors for ICU-related Posttraumatic Stress Disorder In Veterans and Civilians. *American Journal of Respiratory and Critical Care Medicine*. 2016 Jan 6.
9. Maxwell CA, Mion LC, Mukherjee K, Dietrich MS, Minnich A, May A, Miller RS. Feasibility of Screening for Pre-injury Frailty in Hospitalized Injured Older Adults. *The Journal of Trauma and Acute Care Surgery*. 2015; 78:844-851. (PMID:25742247)
10. Christie JD, Vaslef S, Chang PK, May AK, Gunn SR, Yang S, Harges K, Kahl L, Powley WM, Lipson DA, Bayliffe AI, Lazaar AL. A Randomized Dose-escalation Study of the Safety and Anti-inflammatory Activity of the p38 mitogen-activated protein kinase

(MAPK) inhibitor Dilmapiomod in Severe Trauma Subjects at Risk for ARDS. *Critical Care Medicine*. 2015;43:1859-1869. (PMID:26102252)

11. Brown JB, Guyette FX, Neal MD, Claridge JA, Daley BJ, Harbrecht BG, Miller RS, Phelan HA, Adams PW, Early BJ, Peitzman AB, Billiar TR, Sperry JL. Taking the Blood Bank to the Field: The Design and Rationale of the Prehospital Air Medical Plasma (PAMPer) Trial. *Prehosp Emerg Care* 2015 Jul-Sep; 19(3): 343-50.
12. Morris BJ, Richards JE, Guillaumondegui OD, Sweeney KR, Mir HR, Obremsky WT, Kregor PJ. Obesity increase Early Complications after High Energy Pelvic and Acetabular Fractures. *Orthopedics* 2015 Oct; 38(10):e881-7.
13. Bachier M, Hammond SE, Williams R, Jancelewicz T, Feliz A. Pediatric Scalds: do cooking- related burns have a higher injury burden? *J Surg Res*. 2015 Nov; 199(1): 230-6.
14. Pershad J. Intravenous ketamine bolus: not so fast! *Ann Emerg Med*. 2015 Jun; 65(6): 649-51.
15. Murphy RF, Davidson AR, Kelly DM, Warner WC Jr, Sawyer JR. Subaxial cervical spine injuries in children and adolescents. *J Pediatr Orthop*. 2015 Mar; 35(2): 136-9.
16. Ditta LC, Choudhri AF, Blitz AM, Fleming JC, Kerr NC, O'Donnell T. Traumatic avulsion of the oculomotor nerve documented by high- resolution magnetic resonance imaging. *J AAPOS*. 2015 Aug; 19(4): 385-7.
17. Notrica DM, Eubanks JW 3rd, Tuggle DW, Maxson RT, Letton RW, Garcia NM, Alder AC, Lawson KA, St Peter SD, Megison S, Garcia- Filion P. Nonoperative management of blunt liver and spleen injury in children: Evaluation of the ATOMAC guideline using GRADE. *J Trauma Acute Care Surg*. 2015 Oct; 79 (4): 683-93.
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19. Testerman GM, Anderson DR, Beatty JS, Skibba AA, Al-Balbissi LA, O'Neal JW, Barcel A, Heim TR. All-terrain vehicle accident trends at a Tennessee trauma center in 2014. *Am Surg*. 2015 Mar; 81(3):E128-9. No abstract available.
20. Alexander CM1, Ramseyer M, Beatty JS. Missed Extravasation Injury from Peripheral Infusion of Norepinephrine Resulting in Forearm Compartment Syndrome and Amputation. *Am Surg*. 2016 Jul; 82(7):162-3