

Trauma Care Advisory Council

Trauma Care in Tennessee

2017 Report to the 110th General Assembly

Tennessee Department of Health

Trauma Care Advisory Council

December 31, 2017

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

December 31, 2017

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
Chair, Tennessee Committee on Trauma

2017 EXECUTIVE SUMMARY

Last year, 31,878 patients met criteria for trauma registry inclusion and received care in a state designated or American College of Surgeons Committee on Trauma verified Trauma Center or Comprehensive Regional Pediatric Center (CRPC) as a result of an injury. This number is higher than the previous years' 28,647. 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 physical or emotional injuries associated with the trauma. The Trauma Care Advisory Council believes 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 promoting safe driving practices, we should be able to decrease the catastrophic or 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, 2 level III centers, and 3 provisional Level III centers, for 13 total adult centers. There are an associated 4 CRPC's treating those injured under the age of 16, two of which are American College of Surgeons Committee on Trauma verified Children's trauma centers. 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.

Over 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. The service availability provides a safety net for all local communities and regions – and 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 elevated service to the community cannot be overstated.

The trauma registry, initiated in 2007, has added over 250,000 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. Although 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. As the number of trauma patients continues to increase in the state, we believe the efforts of the trauma care advisory council are paramount to maintain the high level of care and move the bar of excellence ever higher. 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. We continue to push for a formal universal system of designating all hospitals as Level II, III or IV trauma centers to allow capture of all injured patients and maintain the highest possible level of care for all Tennesseans. This would 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

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:

1. Money to support the **trauma system infrastructure** at the state level:
 - The State Trauma System Manager is responsible for providing general oversight for Tennessee's Trauma Care System. Responsibilities include oversight of Tennessee's trauma fund, trauma registry, administrative support to the Trauma Care Advisory Council, and the coordination of site visits for new and existing trauma centers. In addition, trauma system infrastructure has been bolstered as monies were approved by the Trauma Care Advisory Council for the expenditure on trauma education, trauma registry improvements and a state-wide trauma symposium.

2. **Readiness costs** to designated trauma centers and comprehensive regional pediatric centers:
 - 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**.

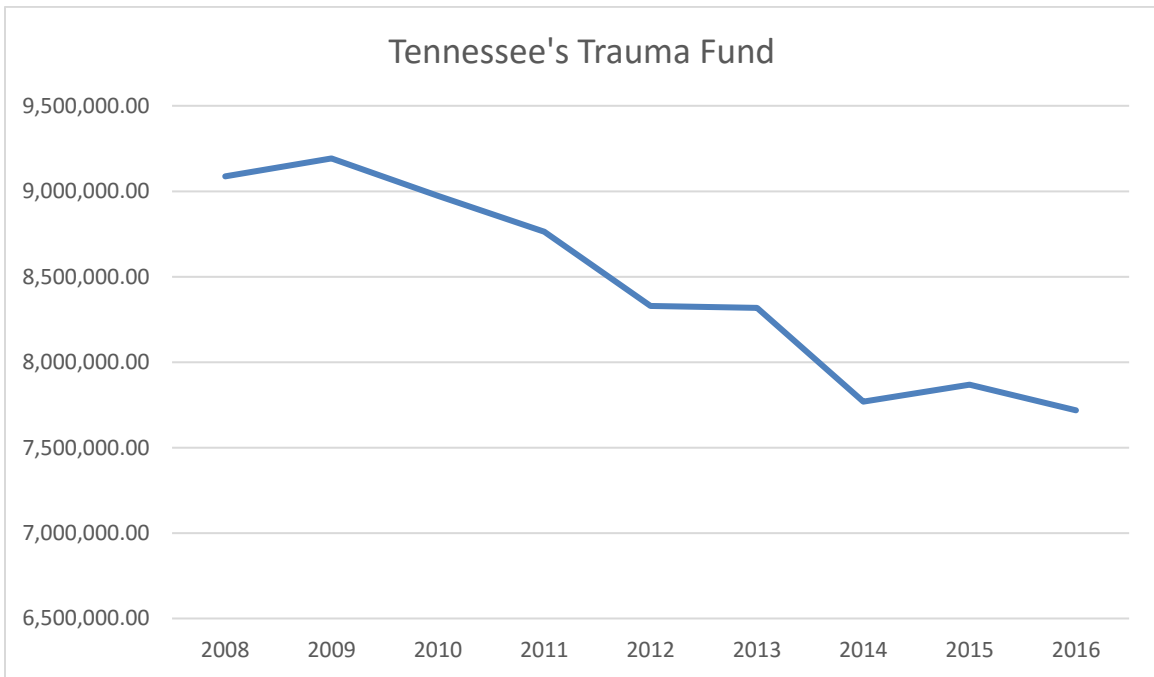
3. Money for **uncompensated care**:
 - The trauma funding law provides for uncompensated care funding to be distributed to: 1) designated trauma centers 2) comprehensive regional pediatric centers and 3) other acute care hospitals functioning as a part of the trauma system.
 - Distribution to eligible 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 2016 this portion of the fund was approximately \$7,717,970.86. **Appendix III** shows quarterly payments made to eligible hospitals for calendar year 2016.

Trauma Fund disbursement totals have seen a steady decline for the past three years. Since its inception, the trauma fund has decreased over \$1,300,000.00 dollars making finding alternative sources of funding a priority to ensure the viability of Tennessee's Trauma System.

Trauma Fund Disbursement Totals Since Inception

	Calendar Year	Trauma Fund Disbursement Totals
*Start of Trauma Fund	2008	\$9,086,822.57
	2009	\$9,192,013.69
	2010	\$8,973,548.13
	2011	\$8,762,345.31
	2012	\$8,328,132.57
	2013	\$8,316,610.13
	2014	\$7,768,758.15
	2015	\$7,867,741.77
	2016	\$7,717,970.86

\$1,368,851.71 below initial disbursement when trauma fund started



TRAUMA REGISTRY

The Tennessee Trauma Registry is the data repository for patients treated at Tennessee's 13 participating trauma centers and 4 CRPC's. Reporting to the registry is primarily based on patient abstractions completed through 2016. The registry reports represents views of the injuries sustained and related hospital admissions in 2016 with additional trend reporting that includes the 5 years prior.

RESEARCH

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

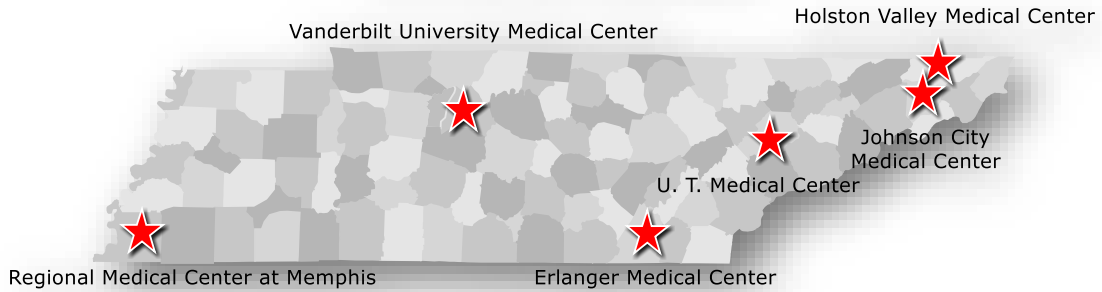
OUTREACH & INJURY PREVENTION EFFORTS

Tennessee's trauma centers and CRPC's provide many different outreach and injury prevention opportunities for both the public and for those who are responsible for the specialized care of injured Tennesseans and visitors in our state. These outreach and injury prevention efforts are in part targeted to injury trends seen by trauma centers and CRPC's with the ultimate goal of reducing the incidence of traumatic injury through targeted outreach and education. The diagram below demonstrates how outreach and injury prevention efforts are the hub for these opportunities statewide.

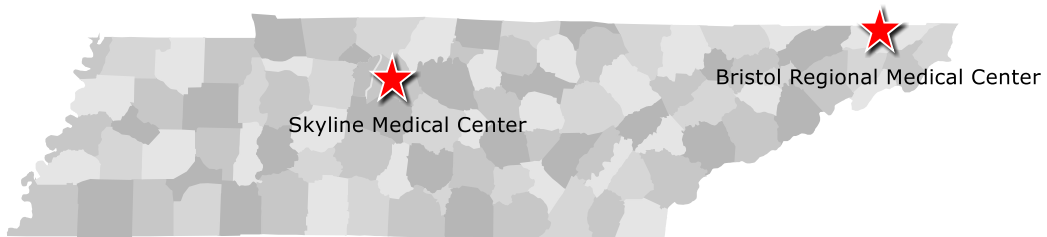


Appendix I:
Trauma Center Location & Level Designation

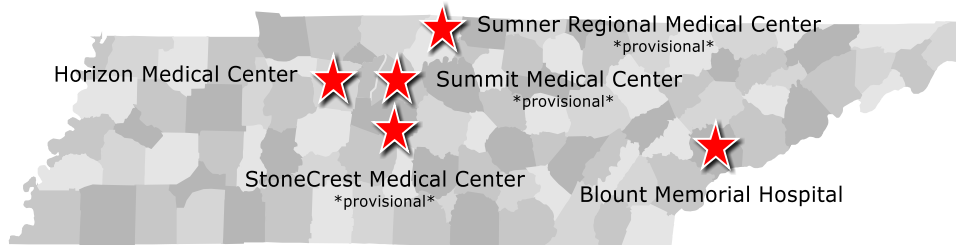
Level I Tennessee Trauma Centers



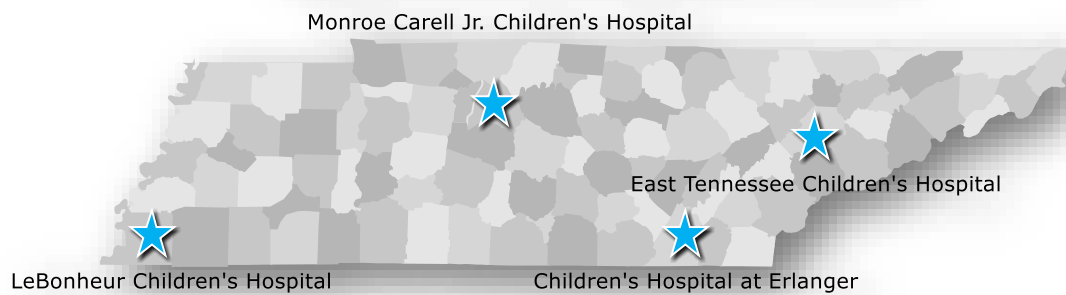
Level II Tennessee Trauma Centers



Level III Tennessee Trauma Centers



Tennessee Comprehensive Regional Pediatric Centers

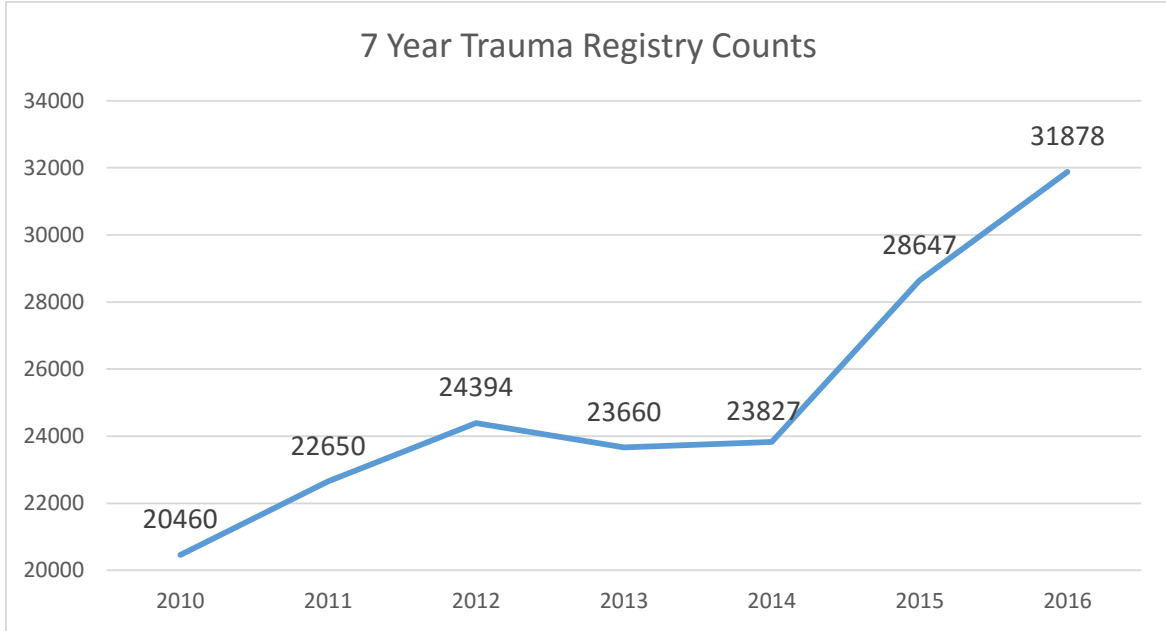


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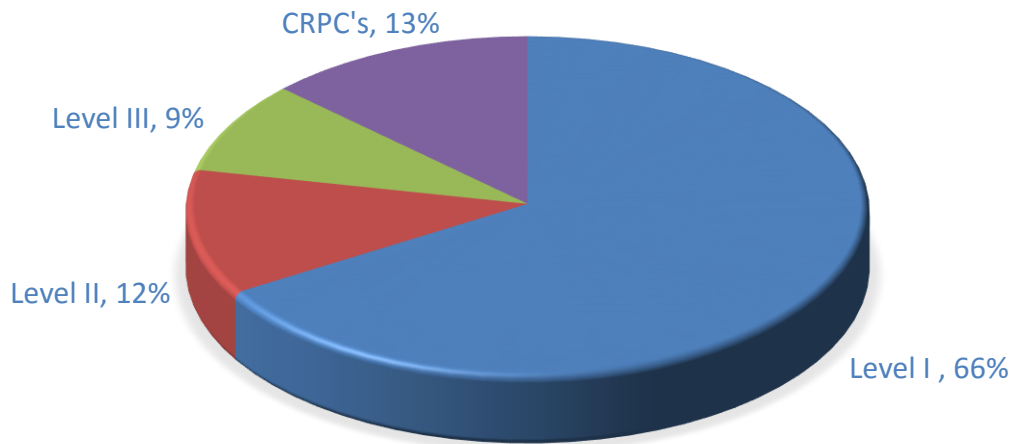
Figure 1a:



In 2016, 31,878 patients were entered in the state trauma registry as a result of meeting inclusion criteria related to traumatic injury. The overall growth pattern of patient totals recorded in the registry since 2010 is shown above.

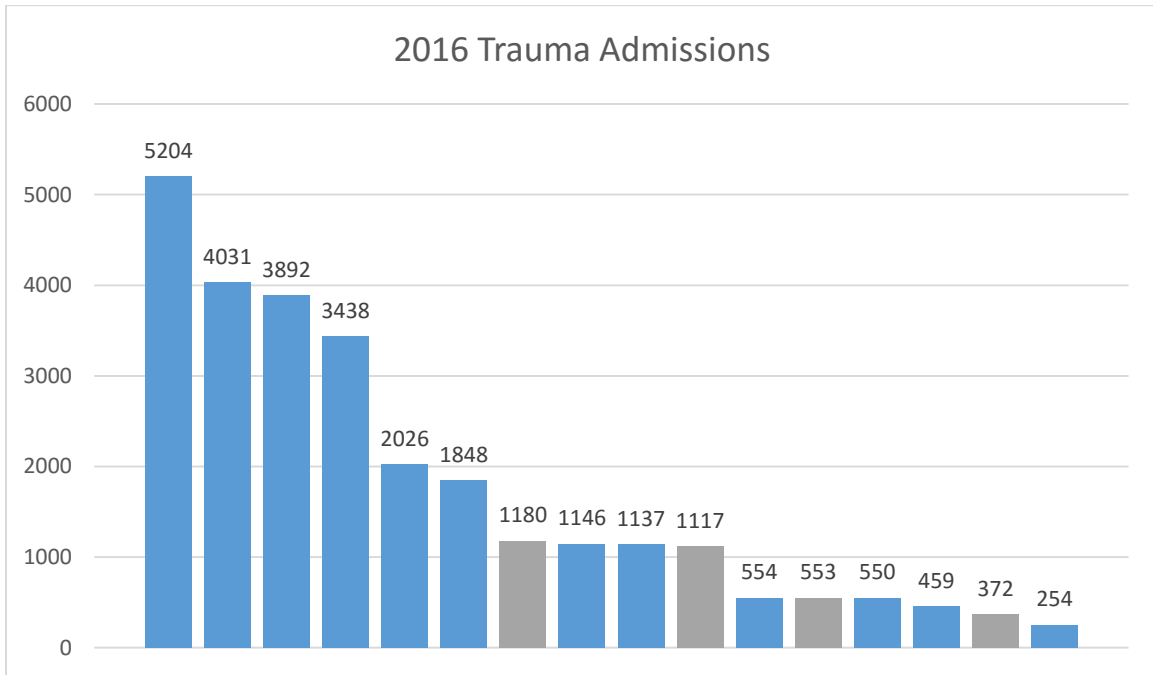
Figure 1b:

2016 INJURIES TREATED BY TRAUMA CENTERS & CRPC'S



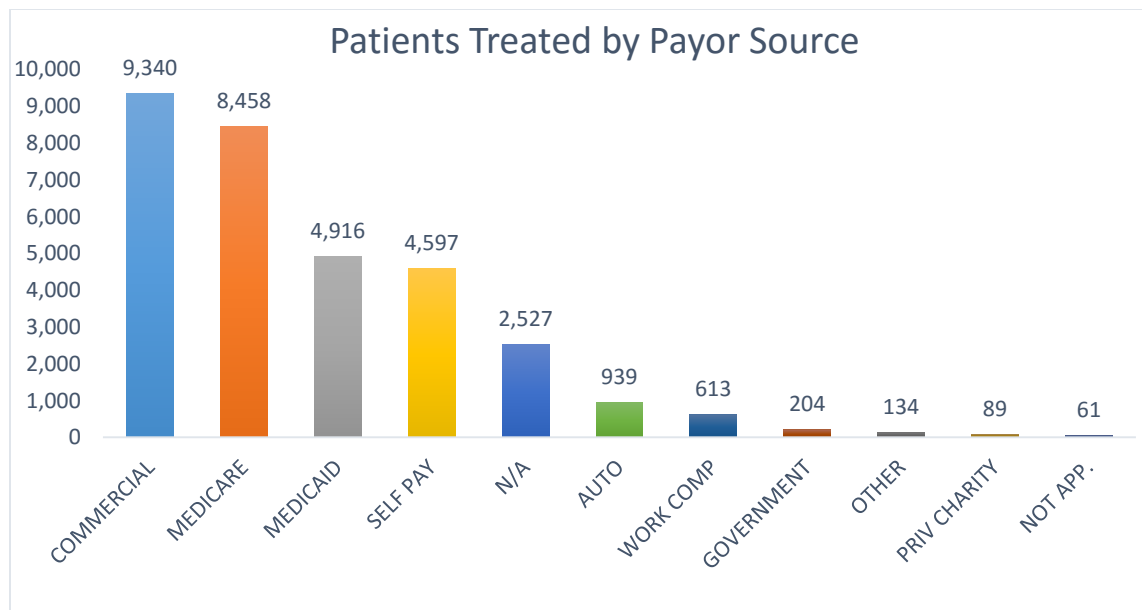
As might be expected over two thirds of all trauma patients were treated at a Level 1 trauma facility.

Figure 2a:



Trauma admissions are shown above in order of maximum patient counts to minimum. Comprehensive Regional Pediatric Centers are indicated by the gray colored bar: ■

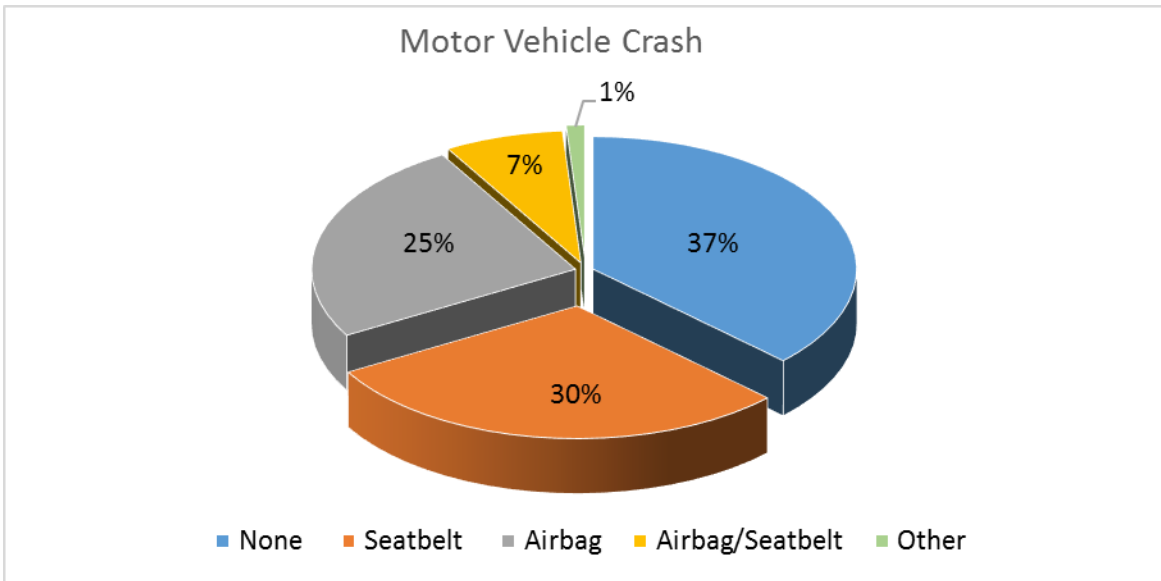
Figure 2b:



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

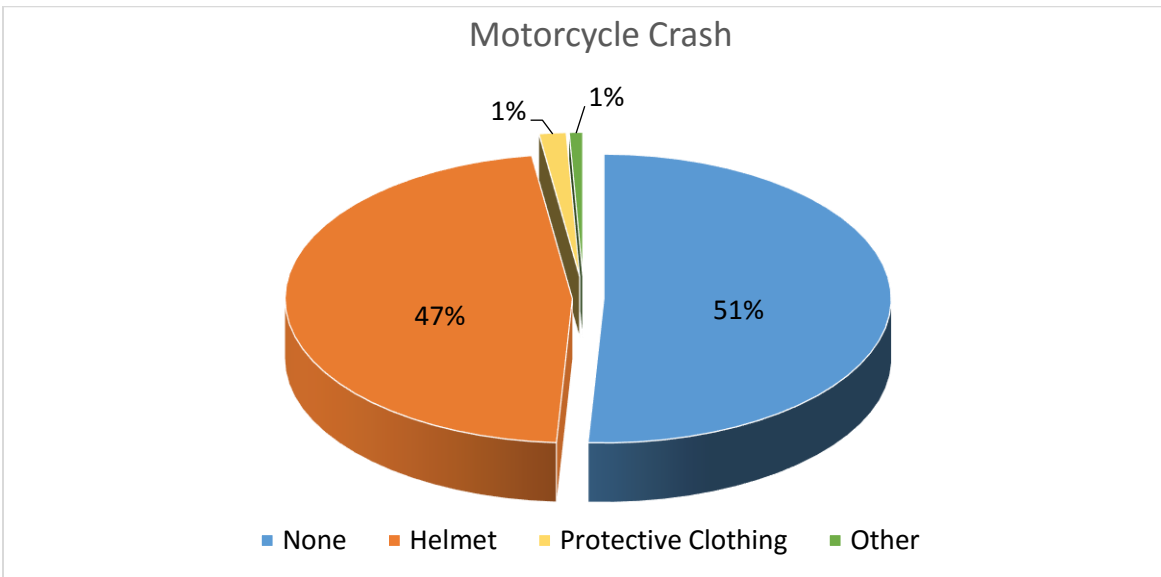
Figure 3a:

2016 Motor Vehicle, Motorcycle, and ATV Primary Safety Equipment Reported



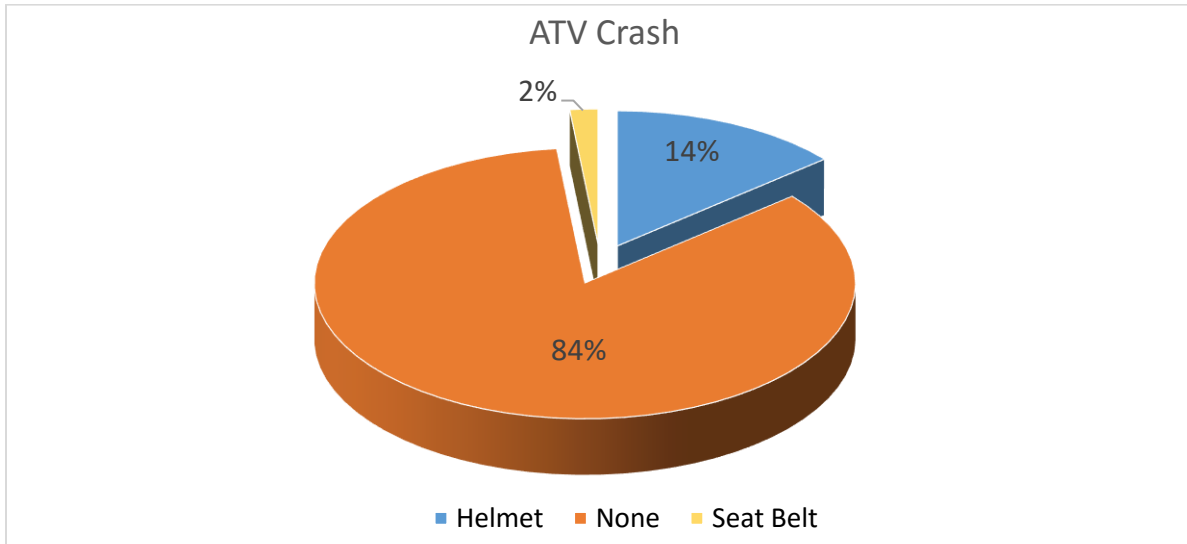
Total injuries = 6,104; Primary safety measure not available = 2,016

Figure 3b



Total injuries = 1,202; Primary safety measure not available = 408

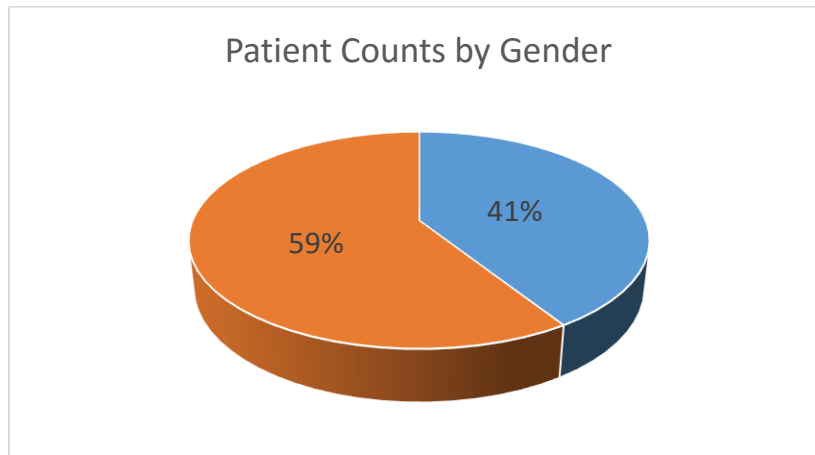
Figure 3c:



Total injuries = 285; Primary safety measure not available = 105

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. These data points are not applicable to the entire 2016 trauma population, but instead to the total injuries for that MVC group. The injuries total for Motor Vehicle Collision was 6,104, Motorcycle crash was 1,202, and ATV injuries were 285.

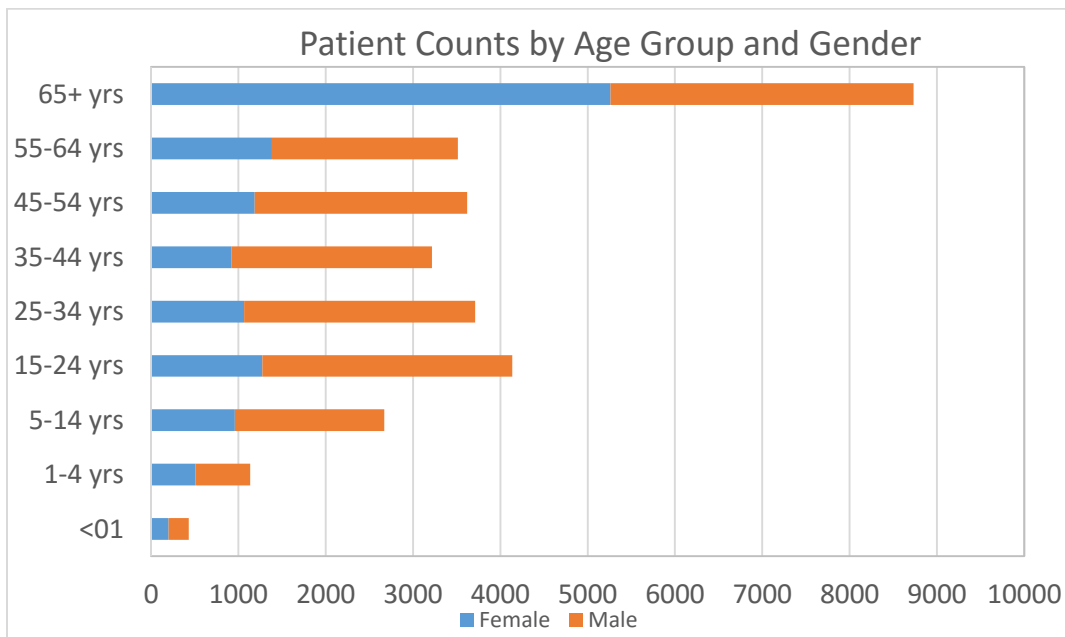
Figure 4a:



Male	Female
18,800	13,074

59% of all patients treated at a Tennessee trauma center or CRPC were male. This 2016 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.

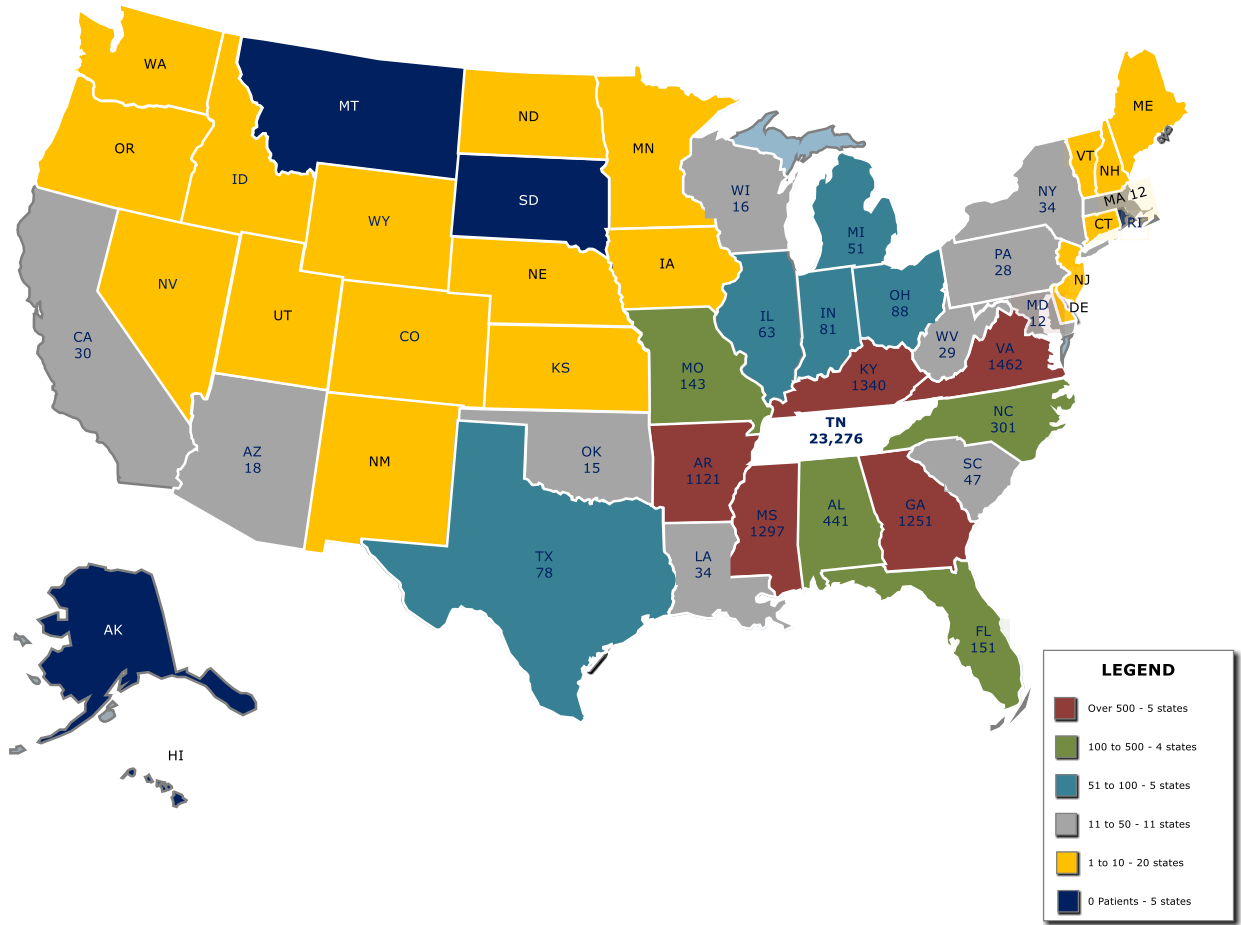
Figure 4b:



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.

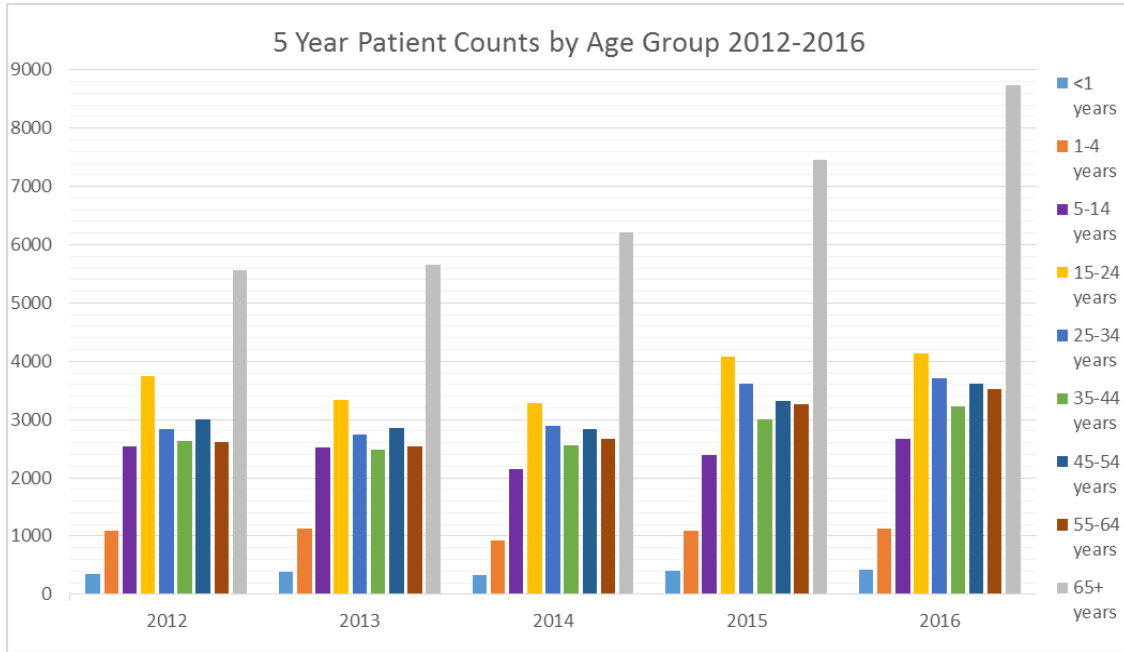
Figure 5:

**2016 Trauma Patients Treated in Tennessee Trauma Centers and CRPC's
by State of Residence**



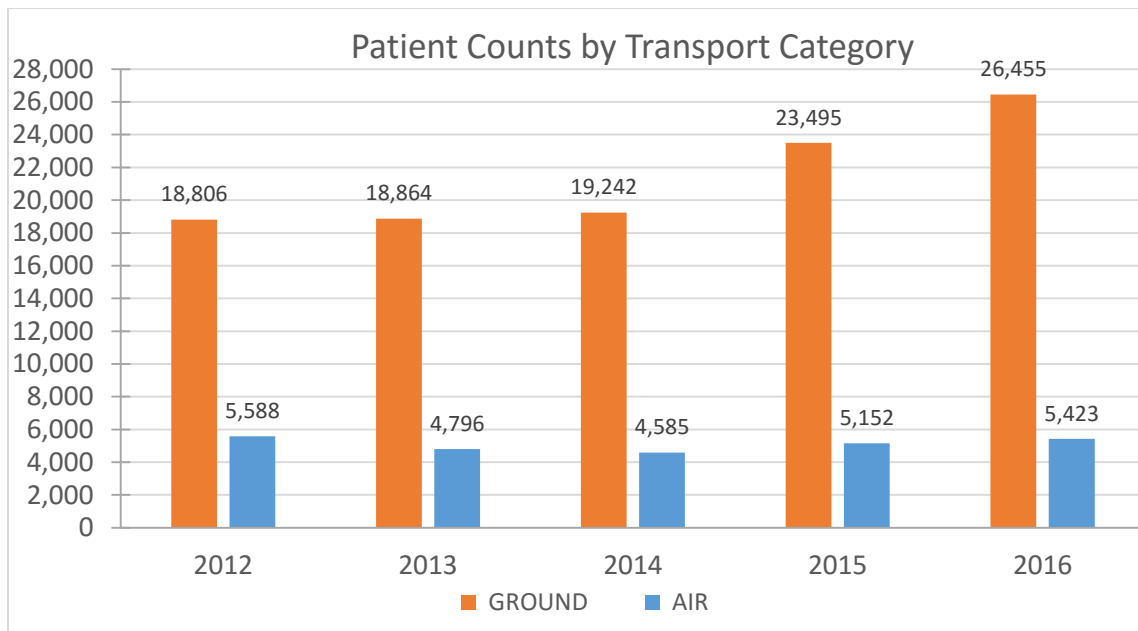
73% of all trauma cases treated in Tennessee trauma facilities were Tennesseans (23,276); 27% of all cases (8,602) were residents of other states.

Figure 6a:



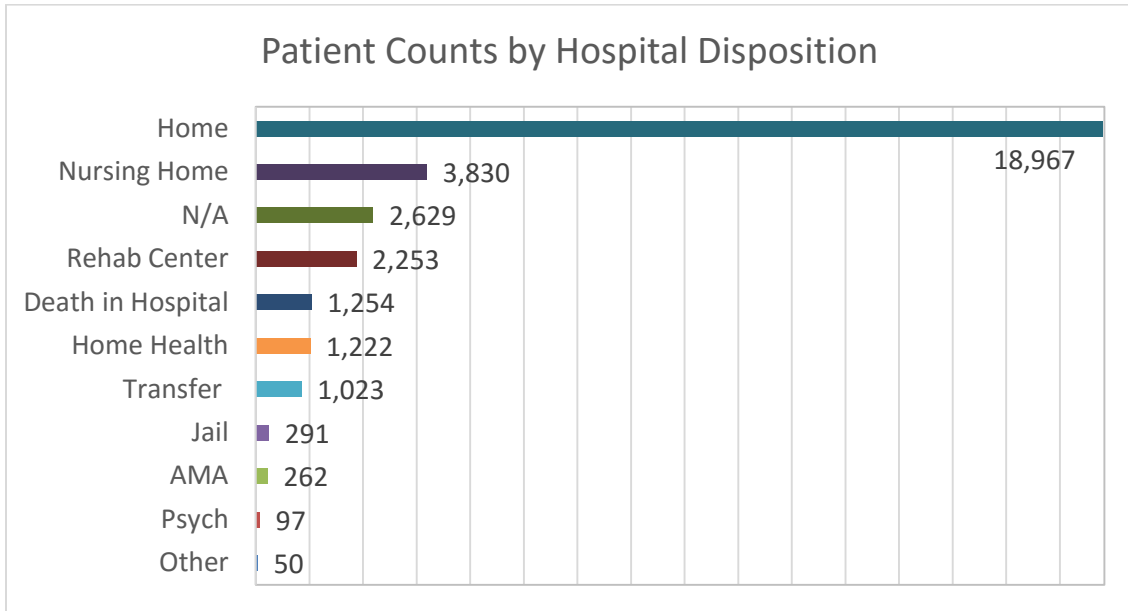
The 65+ age group continues to be the fastest growing group of patients receiving care at a trauma center.

Figure 6b:



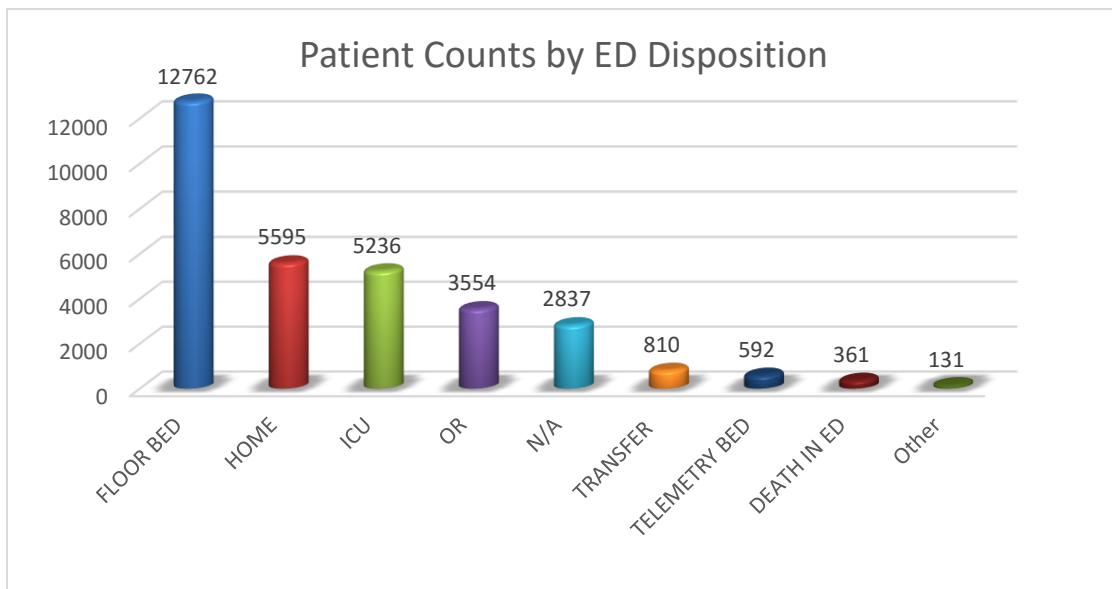
Patient transport by ground travel has shown on an upward trend for the past 5 years. Since 2007 patients are increasingly arriving to the trauma facilities using ground transportation.

Figure 7a:



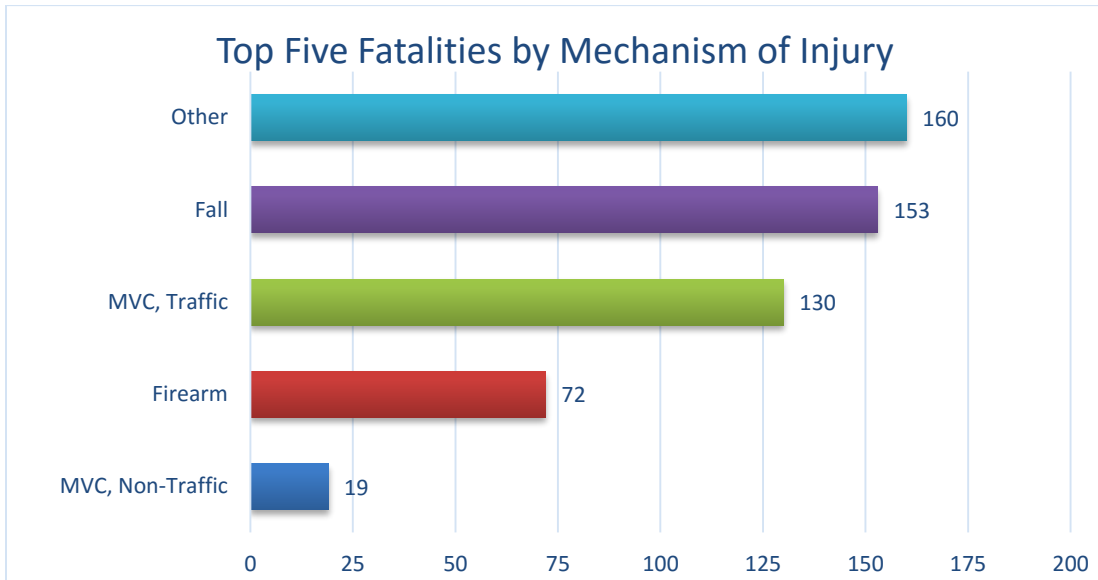
60% percent of patients seeking care from a trauma facility in 2016 were released back to their home while 12% were admitted into a nursing home upon hospital discharge. Approximately 4% of patients had an outcome of death.

Figure 7b:



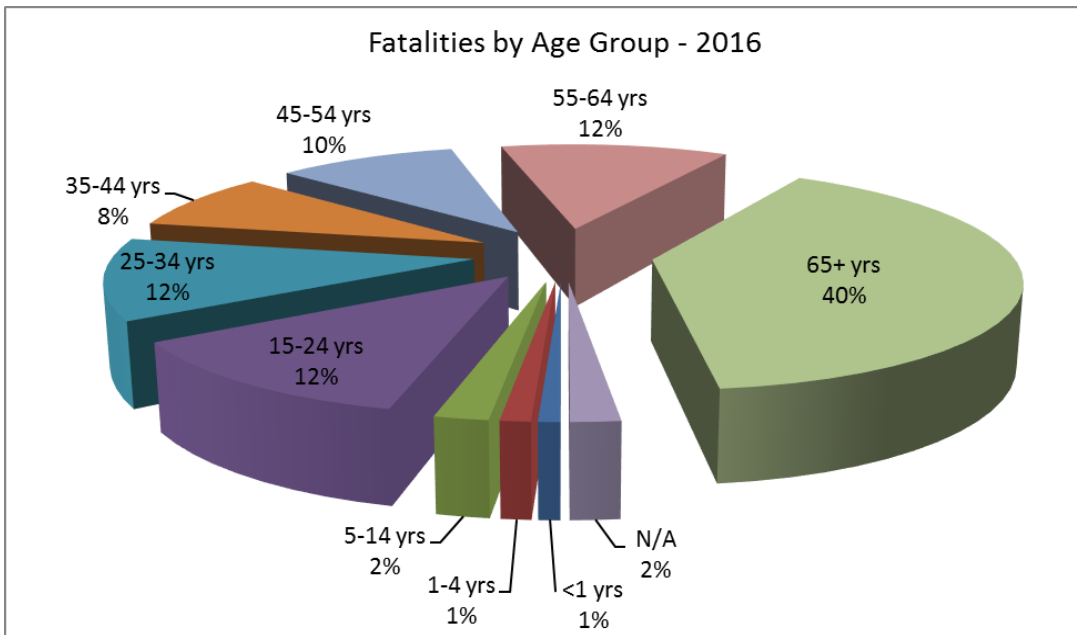
The majority of patients who met inclusion criteria for trauma registry submissions by ED Disposition were admitted to a floor bed. 17.55% were discharged home, which is a 3% increase from prior year.

Figure 8a:



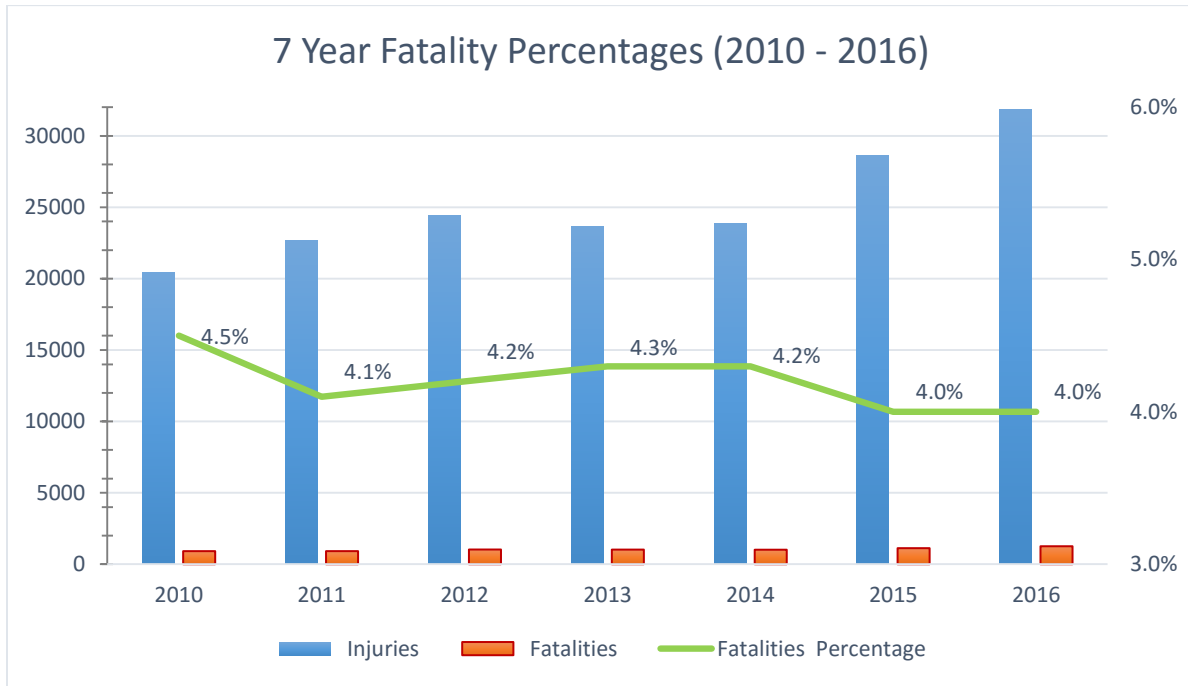
The number of fatalities from falls decreased 180 (54%) from the previous year. Motor vehicle crashes decreased in rank with 252 (34%) less fatalities than the previous year.

Figure 8b:



As the 65+ age group shows the largest percentage of injuries (27%), it similarly experiences the largest percentage of fatal outcomes at approximately (40%).

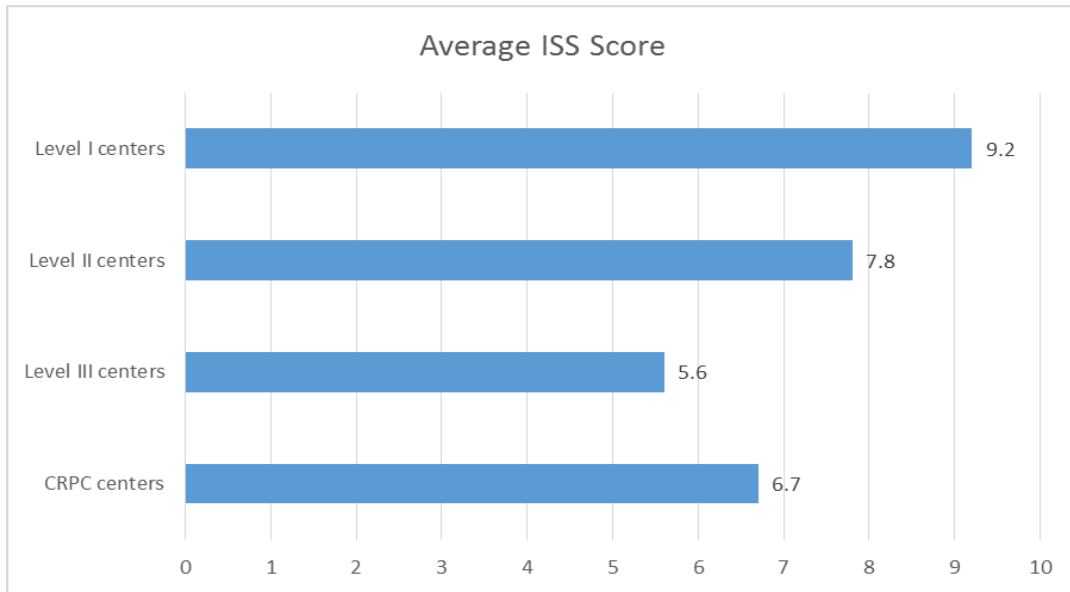
Figure 9:



	2010	2011	2012	2013	2014	2015	2016
Injuries	20,460	22,650	24,394	23,660	23,827	28,647	31,878
Fatalities	917	918	1,032	1,026	1,018	1,126	1,260
Fatalities Percentage	4.5%	4.1%	4.2%	4.3%	4.3%	4.0%	4.0%

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

Figure 10a:



Injury Severity Score (ISS) is a score used to assess trauma severity. The higher the number, the more severe the injuries. As indicated by the graph above, the more critically injured patients are receiving care at the higher level trauma centers.

Figure 10b:

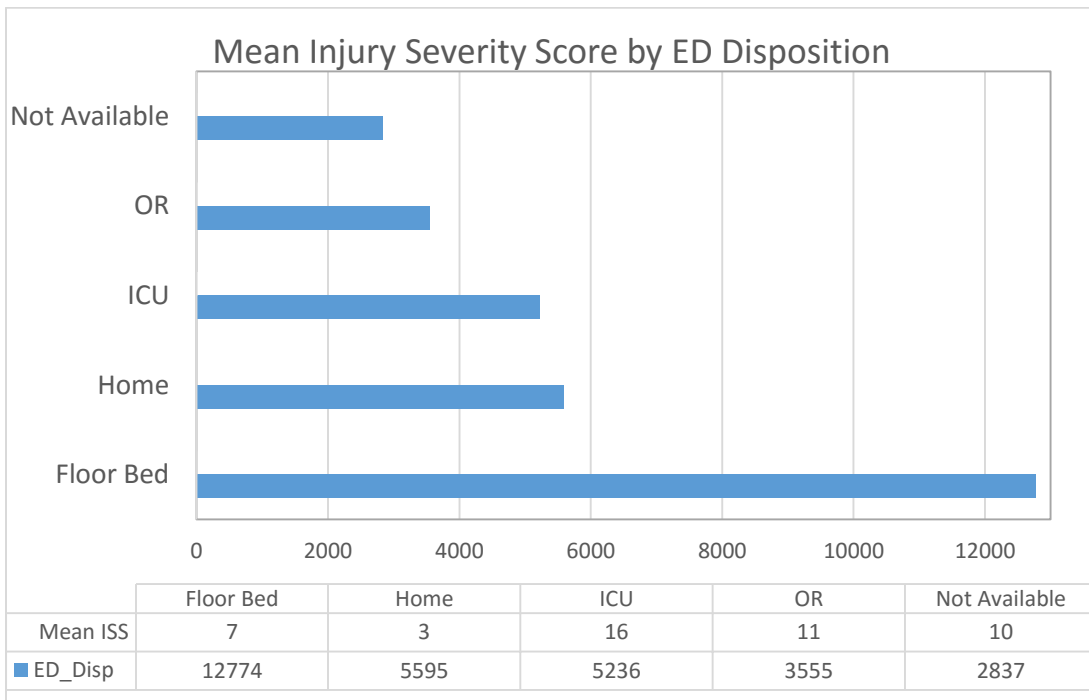
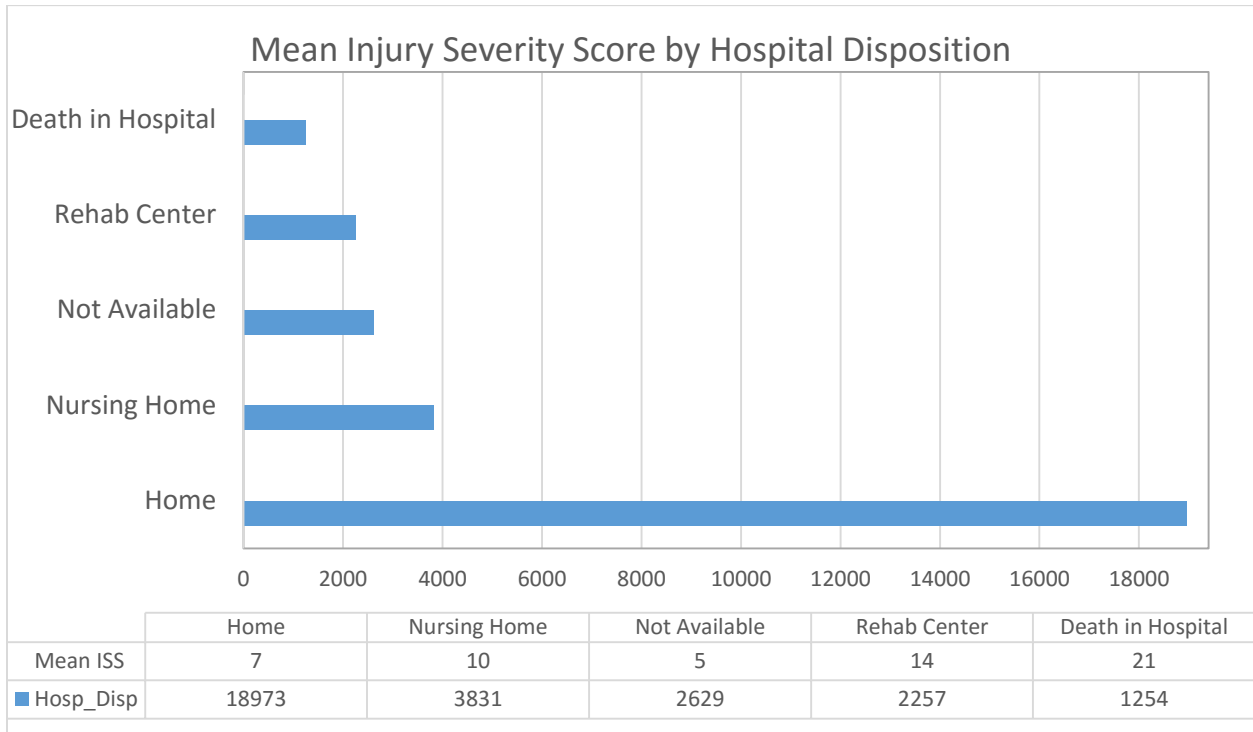


Figure 11:



Major trauma is commonly defined using an Injury Severity Score (ISS) of 15. In 2016, the average reported ISS for all hospitals submitting to the registry was 8.7. The average ISS has decreased from the previous year when the average ISS was 11 in 2015.

Appendix III:

2016 Trauma Fund Distribution

FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS FROM TENNESSEE TRAUMA FUND - FY2016 – 1st QUARTER DISTRIBUTION				
Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,138,544.19	\$835,000.00	\$1,973,544.19
Lev I	Regional One Health	\$396,966.50	\$97,250.00	\$494,216.50
Lev I	Vanderbilt University Hospital	\$329,836.56	\$153,250.00	\$483,086.56
Lev I	Erlanger Medical Center-Baroness Hospital	\$117,068.22	\$153,250.00	\$270,318.22
Lev I	University of Tennessee Medical Center	\$85,298.47	\$102,250.00	\$187,548.47
Lev I	Johnson City Medical Center	\$43,466.15	\$72,500.00	\$115,966.15
Lev I	Wellmont Holston Valley Medical Center	\$29,925.81	\$72,500.00	\$102,425.81
PED	LeBonheur Children Hospital	\$11,162.80	\$64,250.00	\$75,412.80
PED	East Tennessee Childrens Hospital	\$0.00	\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Medical Center	\$9,527.46	\$37,750.00	\$47,277.46
Lev III	Blount Memorial Hospital	\$3,444.73	\$15,500.00	\$18,944.73
Lev III	Starr Regional Medical Center	\$353.92	\$15,500.00	\$15,853.92
	TriStar Skyline Medical Center	\$15,853.92		\$15,853.92
	Jackson-Madison Cnty. General Hospital	\$15,853.92		\$15,853.92
	Methodist University Hospital	\$15,853.92		\$15,853.92
	TriStar Summit Medical Center	\$7,812.79		\$7,812.79
	Saint Thomas West Hospital	\$6,096.52		\$6,096.52
	Nashville General Hospital	\$4,474.25		\$4,474.25
	Maury Regional Medical Center	\$4,412.89		\$4,412.89
	Methodist North Hospital	\$3,890.97		\$3,890.97
	St. Thomas Rutherford Hospital	\$3,484.06		\$3,484.06
	Baptist Memorial Hospital-Memphis	\$3,267.30		\$3,267.30
	Cookeville Regional Medical Center	\$2,859.07		\$2,859.07
	Henry County Medical Center	\$2,826.43		\$2,826.43
	TriStar Southern Hills Medical Center	\$2,599.27		\$2,599.27
	CHI Memorial Health Care System	\$2,090.67		\$2,090.67
	University Medical Center	\$1,843.81		\$1,843.81
	Cumberland Medical Center	\$1,629.97		\$1,629.97
	Indian Path Medical Center	\$1,579.63		\$1,579.63
	Roane Medical Center	\$1,551.57		\$1,551.57
	Saint Francis Hospital-Bartlett	\$1,519.21		\$1,519.21
	Harton Regional Medical Center	\$1,473.71		\$1,473.71
	Physicians Regional Medical Center	\$1,357.97		\$1,357.97
	LeConte Medical Center	\$1,116.74		\$1,116.74
	Parkwest Medical Center	\$1,093.99		\$1,093.99
	Morristown-Hamblen Healthcare System	\$1,022.22		\$1,022.22
	River Park Hospital	\$960.41		\$960.41
	Southern TN Reg. Health Sys.- Winchester	\$889.50		\$889.50
	TriStar Horizon Medical Center	\$858.06		\$858.06

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2016 – 2nd QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,063,850.37	\$835,000.00	\$1,898,850.37
Lev I	Vanderbilt University Hospital	\$349,335.84	\$153,250.00	\$502,585.84
Lev I	Regional One Health	\$356,922.46	\$97,250.00	\$454,172.46
Lev I	Erlanger Health Center-Baroness Hospital	\$116,334.67	\$153,250.00	\$269,584.67
Lev I	The University of Tennessee Med. Cntr.	\$94,907.45	\$102,250.00	\$197,157.45
Lev I	Johnson City Medical Center	\$38,481.21	\$72,500.00	\$110,981.21
Lev I	Wellmont Holston Valley Medical Ctr.	\$19,141.69	\$72,500.00	\$91,641.69
PED	LeBonheur Children Hospital	\$13,336.12	\$64,250.00	\$77,586.12
PED	East Tennessee Childrens Hospital	\$0.00	\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$10,416.37	\$37,750.00	\$48,166.37
Lev III	Blount Memorial Hospital	\$2,778.35	\$15,500.00	\$18,278.35
Lev III	Starr Regional Medical Center-Athens	\$894.59	\$15,500.00	\$16,394.59
	TriStar Skyline Medical Center	\$16,394.59		\$16,394.59
	Jackson-Madison Cnty. General Hospital	\$10,806.80		\$10,806.80
	TriStar Southern Hills Medical Center	\$7,109.45		\$7,109.45
	Maury Regional Medical Center	\$5,288.65		\$5,288.65
	Methodist Medical Center of Oak Ridge	\$3,333.54		\$3,333.54
	Saint Thomas West Hospital	\$2,654.80		\$2,654.80
	TriStar Summit Medical Center	\$2,619.31		\$2,619.31
	Physicians Regional Medical Center	\$2,595.73		\$2,595.73
	Henry County Medical Center	\$2,354.20		\$2,354.20
	Southern TN Reg. Health Sys. - Winchester	\$1,452.36		\$1,452.36
	LeConte Medical Center	\$1,356.17		\$1,356.17
	University Medical Center	\$1,165.05		\$1,165.05
	Williamson Medical Center	\$940.38		\$940.38
	Regional Hospital of Jackson	\$723.64		\$723.64
	Baptist Memorial Hospital-Collierville	\$705.68		\$705.68
	CHI Memorial Hospital Hixon	\$693.71		\$693.71
	Parkwest Medical Center	\$591.90		\$591.90
	NorthCrest Medical Center	\$276.08		\$276.08
	Cumberland Medical Center	\$239.58		\$239.58

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2016 – 3rd QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$949,728.69	\$872,750.00	\$1,822,478.69
Lev I	Vanderbilt University Hospital	\$284,838.87	\$153,250.00	\$438,088.87
Lev I	Regional One Health	\$293,221.07	\$97,250.00	\$390,471.07
Lev I	Erlanger Health Center-Baroness Hospital	\$100,987.26	\$153,250.00	\$254,237.26
Lev I	The University of Tennessee Med. Cntr.	\$81,488.20	\$102,250.00	\$183,738.20
Lev I	Johnson City Medical Center	\$55,633.77	\$72,500.00	\$128,133.77
Lev I	Wellmont Holston Valley Medical Ctr.	\$14,667.44	\$72,500.00	\$87,167.44
PED	LeBonheur Children Hospital	\$6,173.21	\$64,250.00	\$70,423.21
Lev II	TriStar Skyline Medical Center	\$32,656.80	\$37,750.00	\$70,406.80
PED	East Tennessee Childrens Hospital	\$1,399.03	\$51,000.00	\$52,399.03
Lev II	Wellmont Bristol Regional Med. Ctr.	\$8,169.51	\$37,750.00	\$45,919.51
Lev III	Blount Memorial Hospital	\$1,109.56	\$15,500.00	\$16,609.56
Lev III	Starr Regional Medical Center-Athens	\$0.00	\$15,500.00	\$15,500.00
	Jackson-Madison Cnty. General Hospital	\$15,500.00		\$15,500.00
	Methodist University Hospital	\$15,500.00		\$15,500.00
	Baptist Memorial Hospital-Memphis	\$7,205.25		\$7,205.25
	Methodist North Hospital	\$3,486.08		\$3,486.08
	TriStar Summit Medical Center	\$3,116.24		\$3,116.24
	TriStar Southern Hills Medical Center	\$2,928.22		\$2,928.22
	Parkwest Medical Center	\$2,472.91		\$2,472.91
	Mauzy Regional Medical Center	\$2,341.53		\$2,341.53
	Methodist Medical Center of Oak Ridge	\$2,220.35		\$2,220.35
	LeConte Medical Center	\$2,178.72		\$2,178.72
	Physicians Regional Medicl Center	\$2,001.54		\$2,001.54
	Williamson Medical Center	\$1,612.23		\$1,612.23
	Cookeville Regional Medical Center	\$1,511.67		\$1,511.67
	Henry County Medical Center	\$1,482.84		\$1,482.84
	Harton Regional Medical Center	\$1,279.81		\$1,279.81
	NorthCrest Medical Center	\$1,168.36		\$1,168.36
	Cumberland Medical Center	\$1,037.78		\$1,037.78
	University Medical Center	\$897.42		\$897.42
	Saint Thomas West Hospital	\$874.51		\$874.51
	Saint Thomas River Park Hospital	\$250.14		\$250.14
	CHI Memorial Hospital Hixon	\$99.84		\$99.84
	Saint Francis Hospital-Bartlett	\$97.37		\$97.37
	Hardin Medical Center	\$95.88		\$95.88
	Sweetwater Hospital Association	\$25.30		\$25.30

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2016 – 4th QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,165,847.61	\$857,250.00	\$2,023,097.61
Lev I	Regional One Health	\$447,251.53	\$97,250.00	\$544,501.53
Lev I	Vanderbilt University Hospital	\$320,860.48	\$153,250.00	\$474,110.48
Lev I	Erlanger Medical Center - Baroness	\$128,941.24	\$153,250.00	\$282,191.24
Lev I	The University of Tennessee Med. Cntr.	\$90,816.23	\$102,250.00	\$193,066.23
Lev I	Johnson City Medical Center	\$31,737.89	\$72,500.00	\$104,237.89
Lev I	Wellmont Holston Valley Medical Ctr.	\$23,506.27	\$72,500.00	\$96,006.27
PED	LeBonheur Children Medical Center	\$15,699.05	\$64,250.00	\$79,949.05
Lev II	TriStar Skyline Medical Center	\$38,324.02	\$37,750.00	\$76,074.02
PED	East Tennessee Childrens Hospital	\$0.00	\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$8,321.83	\$37,750.00	\$46,071.83
Lev III	Blount Memorial Hospital	\$3,506.65	\$15,500.00	\$19,006.65
	Methodist Healthcare-Memphis Hospitals	\$19,006.65		\$19,006.65
	Jackson-Madison Cnty. General Hospital	\$13,139.83		\$13,139.83
	TriStar Summit Medical Center	\$6,737.50		\$6,737.50
	Baptist Memorial Hospital-Memphis	\$6,029.07		\$6,029.07
	Methodist Medical Center of Oak Ridge	\$3,815.62		\$3,815.62
	Tennova Healthcare Physicians Regional M C	\$2,469.65		\$2,469.65
	Parkwest Medical Center	\$2,461.53		\$2,461.53
	CHI Memorial Hospital Chattanooga	\$1,615.54		\$1,615.54
	Saint Thomas West Hospital	\$1,607.02		\$1,607.02

Appendix IV:

Research Publications

1. Miller BT, Du L, Krzyzaniak MJ, Gunter OL, Nunez TC. Blood transfusion: In the air tonight? *J Trauma Acute Care Surg* 2016 Mar 25.
2. Maxwell CA, Mion LC, Mukherjee K, Dietrich MS, Minnick A, May A, et al. Preinjury physical frailty and cognitive impairment among geriatric trauma patients determine postinjury functional recovery and survival. *J Trauma Acute Care Surg* 2016 Feb;80(2):195-203.
3. Dennis BM, Vella MA, Gunter OL, Smith MD, Wilson CS, Patel MB, et al. Rural Trauma Team Development Course decreases time to transfer for trauma patients. *J Trauma Acute Care Surg* 2016 Oct;81(4):632-7.
4. What's New in Shock October 2017 (Commentary). Collier JJ, Burke SJ, and MD Karlstad. *Shock*. 2017 Nov;48(5):501-503
PMID: 29036030
5. Pancreatic Islet Responses to Metabolic Trauma. Burke SJ, Karlstad MD, Collier JJ. *Shock*. 46(3):230-8, 2016. PMID: 26974425
6. Pancreatic β -Cell production of CXCR3 ligands precedes diabetes onset. Burke SJ, Karlstad MD, Eder AE, Regal KM, Lu D, Burk DH, Collier JJ. *Biofactors* 12;42(6):703-715, 2016. PMID: 27325565
7. Jeffcoach DR1, Gallegos JJ, Jesty SA, Coan PN, Chen J, Heidel RE, Daley BJ. "Utility of CPR in hemorrhagic shock, a dog model". *J Trauma Acute Care Surg*. 2016 Feb 18. [Epub ahead of print] PMID: 26895089; *J Trauma Acute Care Surg*. 2016 Jul;81(1):27-33. doi: 10.1097/TA.0000000000001001.
8. Daley BJ, Cecil W, Cofer JB, Clarke PC, Guillaumondegui O. "Up Close and Personal: A Statewide Collaborative's Effort to Get Individual Surgeon Quality Improvement Data to the Practitioner." *Am Surg*. 2016 Mar;82(3):192-8. PMID: 27099053
9. Rumberger LK, Vittetoe D, Cathey L, Bennett H, Heidel RE and Daley BJ. "Improving outcomes in elective colorectal surgery: A single institution retrospective review. *Am Surg* 2016 Apr;82(4):325-30. PMID: 27097625
10. O'Lynnger TM, Shannon CN, Le TM, Greeno A, Chung D, Lamb FS, Wellons JC. "Standardizing ICU management of pediatric traumatic brain injury is associated with improved outcomes at discharge." *J NSGY: Ped* 2016; 17(1): 19-26
11. Ramo BA, Martus JE, Tareen N, Hooe BS, Snoddy MC, Jo CH. "Intramedullary Nailing Compared with Spica Casts for Isolated Femoral Fractures in Four and Five-Year-Old Children." *J Bone Joint Surg Am*, 2016 Feb 17; 98 (4): 267 -275
12. Akinpelu BJ, Zuckerman SL, Gannon SR, Westrick A, Shannon C, Naftel RP. "Pediatric isolated thoracic and/or lumbar transverse and spinous process fractures." *J NSGY: Ped* 2016; 17(6): 639-644
13. Zuckerman SL, Prather CT, Yengo-Kahn AM, Solomon GS, Sills AK. "Sport-related structural brain injury associated with arachnoid cysts: a systematic review and quantitative analysis." *Neurosurgical Focus* 2016; 40(4): E9
14. Dewan MC, Mummareddy N, Wellons JC, Bonfield CM. "The epidemiology of global pediatric traumatic brain injury: a qualitative review." *World NSGY* 2016; 497-509.e1

15. Ravindra VM, Bollo RJ, Walavan S, Hassan A, Naftel RP, Limbrick DD, Jea A, Gannon S, Shannon CN, Birkas Y, Yang GL, Prather CT, Kestle JR, Riva-Cambrin J. "Predicting Blunt Cerebrovascular Injury in Pediatric Trauma: Validation of the 'Utah Score'." *J Neurotrauma* 2016; ahead of print. doi:10.1089/neu.2016.4415.
16. Martus JE, Hilmes MA, Grice JV, Stutz CM, Schoenecker JG, Lovejoy SA, Mencio GA. "Radiation Exposure During Operative Fixation of Pediatric Supracondylar Humerus Fractures: Is Lead Shielding Necessary?" *J Ped Ortho* 2016
17. Martus JE. "Rigid Intramedullary Nailing of Femoral Shaft Fractures for Patients Age 12 and Younger: Indications and Technique." *J Ped Ortho* 2016; 36:S35-40
18. Daldrup-Link HE, Sammet C, Hernanz-Schulman M, Barsness KA, Cahill AM, Chung E, Doria AS, Darge K, Krishnamurthy R, Lungren MP, Moore S. "White Paper on P4 Concepts for Pediatric Imaging." *J Amer College of Rad* 2016; 13(5):590-597
19. Reynolds JK, Butler KM, Mejia VA. Modern management of medieval injury – cardiac trauma sustained by crossbow. *Am Surg.* 2016 Aug;82(8):198-9. PMID: 27657566.
20. Bell CM, Domingo F, Miller AD, Smith JS, Headrick JR Jr. Traumatic rupture of a posterior mediastinal teratoma following motor vehicle accident. *Case Rep Surg* 2016;2016:7172062.doi: 10.1155/2016/7172062. Epub 2016 Aug 31. PMID: 27660731
21. Domingo F, Dale E, Gao C, Groves C, Stanley JD, Maxwell RA, Waldrop JL. A single-center retrospective review of post-operative infectious complications in the surgical management of mandibular fractures: Post-operative antibiotics add no benefit. *J Trauma Acute Care Surg.* 2016 Aug 18. PMID 27537516
22. Katsuura Y, Osborn JM, Cason GW. The epidemiology of thoracolumbar trauma: a meta-analysis. *J Orthop.* 2016 Jul 21;13(4):383-8. Doi: 10.1016/j.jor.2016.06.019. eCollection 2016 Dec. PMID: 27504058
23. Doty J, Smith BW, Vosseller JT, Cooper MT, Brigido SA. Management of peroneal tendon issues. *Foot Ankle Spec.* 2016 Oct;9(5):429-31. PMID: 27634499
24. Cunningham BA, Ficco RP, Swafford RE, Nowotarski PJ. Modified iliac oblique-outlet view: a novel radiographic technique for antegrade anterior column screw placement. *J Orthop Trauma.* 2016 Sep;30(9):e325-30. Doi: 10.1097/BOT.0000000000000628. PMID 27164493.
25. Barton DJ, Tift FW, Coumoyer LE, Vieth JT, Hudson KB. Acute alcohol use and injury patterns in young adult prehospital patients. *Prehosp Emerg Care.* 2016;20(2):206-11. Doi: 10.3109/10903127.2015.1076101. PMID: 27002348
26. Dickerson RN, Van Cleve JR, Swanson JM, Maish GO 3rd, Minard G, Croce MA, Brown RO. Vitamin D deficiency in critically ill patients with traumatic injuries. *Burns Trauma.* 2016 Oct 17;4:28. eCollection 2016. PubMed PMID:27833924; PubMed Central PMCID: PMC5066285.
27. Napolitano LM, Biester TW, Jurkovich GJ, Buyske J, Malangoni MA, Lewis FR Jr;Members of the Trauma, Burns and Critical Care Board of the American Board of Surgery. General surgery resident rotations in surgical critical care, trauma, and burns: what is optimal for residency training? *Am J Surg.* 2016 Oct;212(4):629-637. doi: 10.1016/j.amjsurg.2016.07.016. Epub 2016 Aug 13. PubMed PMID: 27634425.
28. Hendrick LE, Schroepel TJ, Sharpe JP, Alsbrook D, Magnotti LJ, Weinberg JA, Johnson BP, Lewis RH, Clement LP, Croce MA, Fabian TC. Impact of Beta-Blockers on

- Nonhead Injured Trauma Patients. *Am Surg.* 2016 Jul;82(7):575-9. PubMed PMID: 27457854.
30. Shahan CP, Weinberg JA, Magnotti LJ, Fabian TC, Croce MA. Trauma health literacy: In need of remediation. *J Trauma Acute Care Surg.* 2016 Dec;81(6):1167-1170. PubMed PMID: 27244580.
 31. Weinberg JA, Moore AH, Magnotti LJ, Teague RJ, Ward TA, Wasmund JB, Lamb EM, Schroepfel TJ, Savage SA, Minard G, Maish GO 3rd, Croce MA, Fabian TC. Contemporary management of civilian penetrating cervicothoracic arterial injuries. *J Trauma Acute Care Surg.* 2016 Aug;81(2):302-6. doi: 10.1097/TA.0000000000001103. PubMed PMID: 27192470.
 32. Savage SA, Cibulas GA 2nd, Ward TA, Davis CA, Croce MA, Zarzaur BL. Suction evacuation of hemothorax: A prospective study. *J Trauma Acute Care Surg.* 2016 Jul;81(1):58-62. doi: 10.1097/TA.0000000000001099. PubMed PMID: 27120322.
 33. Shahan CP, Magnotti LJ, McBeth PB, Weinberg JA, Croce MA, Fabian TC. Early antithrombotic therapy is safe and effective in patients with blunt cerebrovascular injury and solid organ injury or traumatic brain injury. *J Trauma Acute Care Surg.* 2016 Jul;81(1):173-7. doi: 10.1097/TA.0000000000001058. PubMed PMID: 27027559.
 34. Shahan CP, Magnotti LJ, Stickley SM, Weinberg JA, Hendrick LE, Uhlmann RA, Schroepfel TJ, Hoit DA, Croce MA, Fabian TC. A safe and effective management strategy for blunt cerebrovascular injury: Avoiding unnecessary anticoagulation and eliminating stroke. *J Trauma Acute Care Surg.* 2016 Jun;80(6):915-22. doi: 10.1097/TA.0000000000001041. PubMed PMID: 27015579.
 35. Ramsey MT, Fabian TC, Shahan CP, Sharpe JP, Mabry SE, Weinberg JA, Croce MA, Jennings LK. A prospective study of platelet function in trauma patients. *J Trauma Acute Care Surg.* 2016 May;80(5):726-32; discussion 732-3. doi: 10.1097/TA.0000000000001017. PubMed PMID: 26895088.