

Trauma Care Advisory Council

Trauma Care in Tennessee

2018 Report to the 111th General Assembly

Tennessee Department of Health

Trauma Care Advisory Council

March 5, 2019

AUTHORSHIP

Oscar Guillamondegui, MD, MPH, FACS
Professor of Surgery
Vanderbilt University Medical Center
Chair, Trauma Care Advisory Council
Chair, Tennessee Committee on Trauma

Robert E. Seesholtz, BSN, RN, EMT-P
Trauma System Manager
Tennessee Department of Health

Britnei Outland
Data Manager
Tennessee Department of Health

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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

March 5, 2019

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,

Oscar Guillamondegui, MD, MPH, FACS
Professor of Surgery
Vanderbilt University Medical Center
Chair, Trauma Care Advisory Council
Chair, Tennessee Committee on Trauma

2018 EXECUTIVE SUMMARY

Last year, 35,513 patients received care in a state designated trauma center or a Comprehensive Regional Pediatric Center (CRPC) due to trauma-related injury. This exceeded last year's number of patients, 31,878 by 3635. 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 that the patients (and their families, along with the community) are managing as associated with the traumatic event. The Trauma Care Advisory Council believes there is a large percentage of injuries to the citizens of Tennessee that may be avoidable or preventable with education and public awareness campaigns. 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 center excellence 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, 4 level III centers, and 1 provisional Level III center, for 13 total adult centers. One previously designated level III trauma center has elected not to pursue continued trauma center designation. There are an associated 4 CRPC's, two of which have been verified by the ACS as Level 1 Pediatric Trauma Centers (Le Bonheur in Memphis and Monroe Carrell in Nashville) treating those injured under the age of 16. This year, we have sent the updated 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 as well as designation guidelines and this update is before the Attorney General's office for review, currently. We believe that a 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.

As 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 we have moved to improve this process in pediatric trauma centers with the help of CoPEC (Council on Pediatric Emergency Care). 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 trauma system provides a safety net across the entire state – with the added ability of increasing the readiness for other medical emergencies

at the same institutions, such as: stroke and acute myocardial infarctions (heart attacks). This increased service to the community cannot be overstated. The trauma registry, initiated in 2007, has added over 270,000 trauma patients along with data available from hospital billing information identified in the last nine years. This year, at least one citizen from every county in Tennessee was treated at a Tennessee trauma center. We have an epidemic across the nation and Tennessee, as well, with ground level falls as the number one cause of trauma admission and mortality. The admission and death rate continues to climb as our population ages. Unfortunately, motor vehicle crashes (MVCs) remain lethal and are the second highest cause fatality rate in the state. Gun violence is a major topic of national discourse but, the rate of gun-related suicide death continues to overshadow homicide at both the state and national level, with little attention paid to the mental health struggles surrounding this issue.

This report provides information on injury patterns across the state, referral patterns, and financial statistics. Other key aspects of this report include Injury Prevention actions 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 also 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 council are paramount to maintain and improve the outcomes of our citizens across the entire state and with this in mind, we are aware that 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 hospital centers as Level I, II, III or IV to allow capture of all injured patients and maintain the highest possible level of care for all Tennesseans. This would require dedicated funding to preserve 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. Guillaumondegui, 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**.

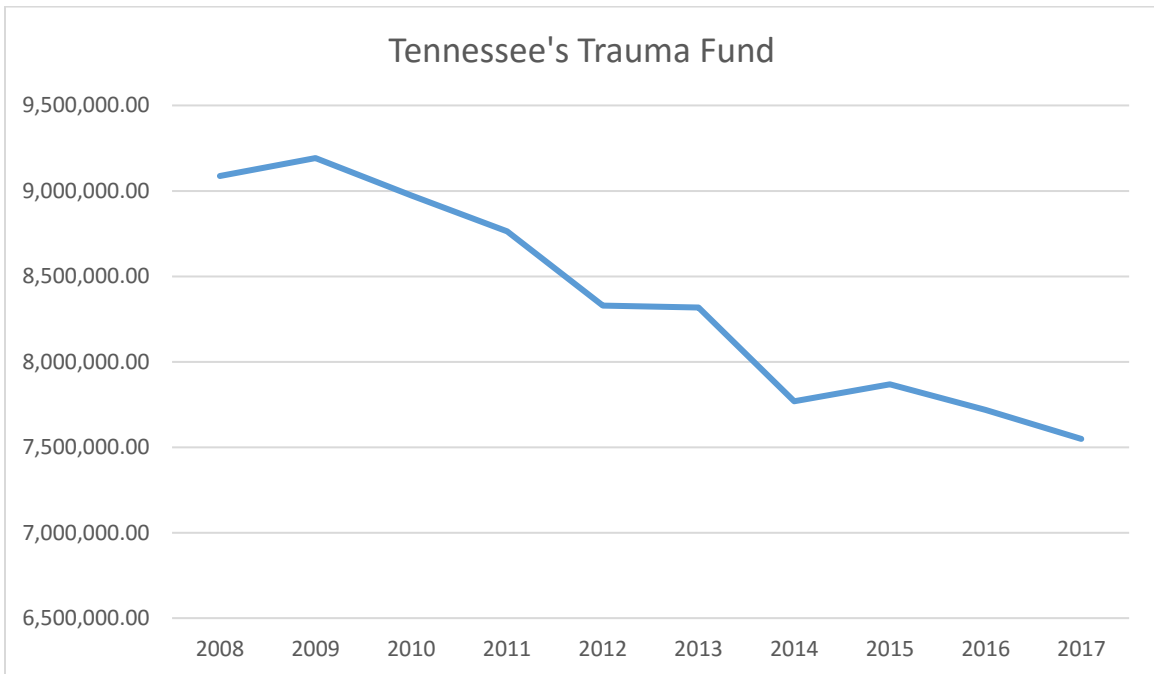
3. Money for **uncompensated care**:
 - The trauma funding law provides for uncompensated care funding to be distributed to: 1) designated trauma centers 2) comprehensive regional pediatric centers and 3) other acute care hospitals functioning as a part of the trauma system.
 - Distribution to eligible 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 2017 this portion of the fund was approximately \$7,548,708.50. **Appendix III** shows quarterly payments made to eligible hospitals for calendar year 2017.

Trauma Fund disbursement totals have seen a steady decline since the funds inception. Since then, the trauma fund has decreased over \$1,500,000.00 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
	2017	\$7,548,708.50

\$1,538,114.07 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. This report is based on patient abstractions completed through 2017. The registry reports represents views of the injuries sustained and related hospital admissions in 2017 with additional trend reporting that includes the 8 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 a sample of these state wide research publication efforts.

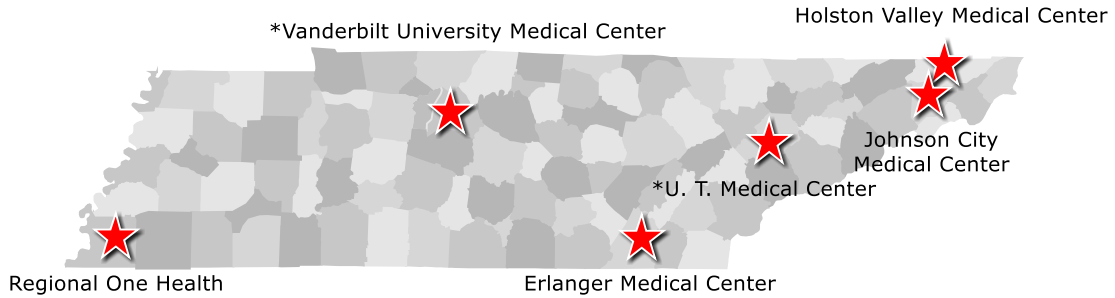
OUTREACH & INJURY PREVENTION EFFORTS

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.



Appendix I:
Current Trauma Center Location & Level Designation

Level I Tennessee Trauma Centers

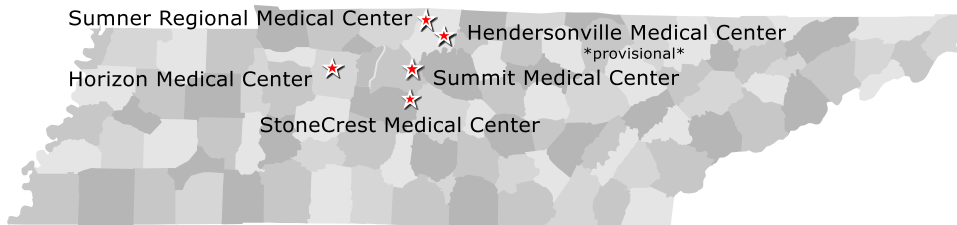


In addition to state designation "*" indicates verification as an American College of Surgeons Trauma Center

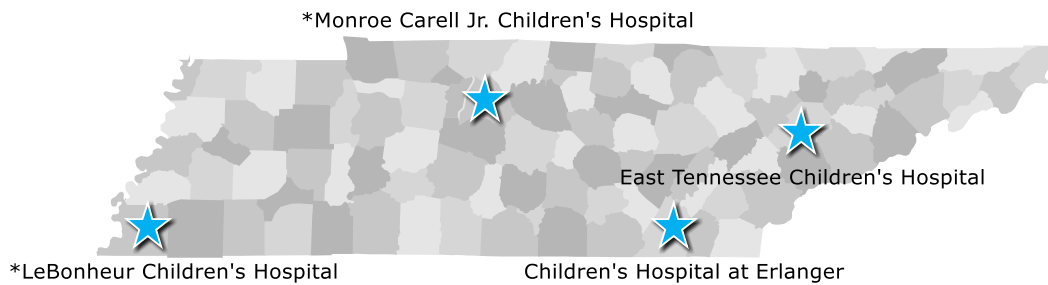
Level II Tennessee Trauma Centers



Level III Tennessee Trauma Centers



Comprehensive Regional Pediatric Centers



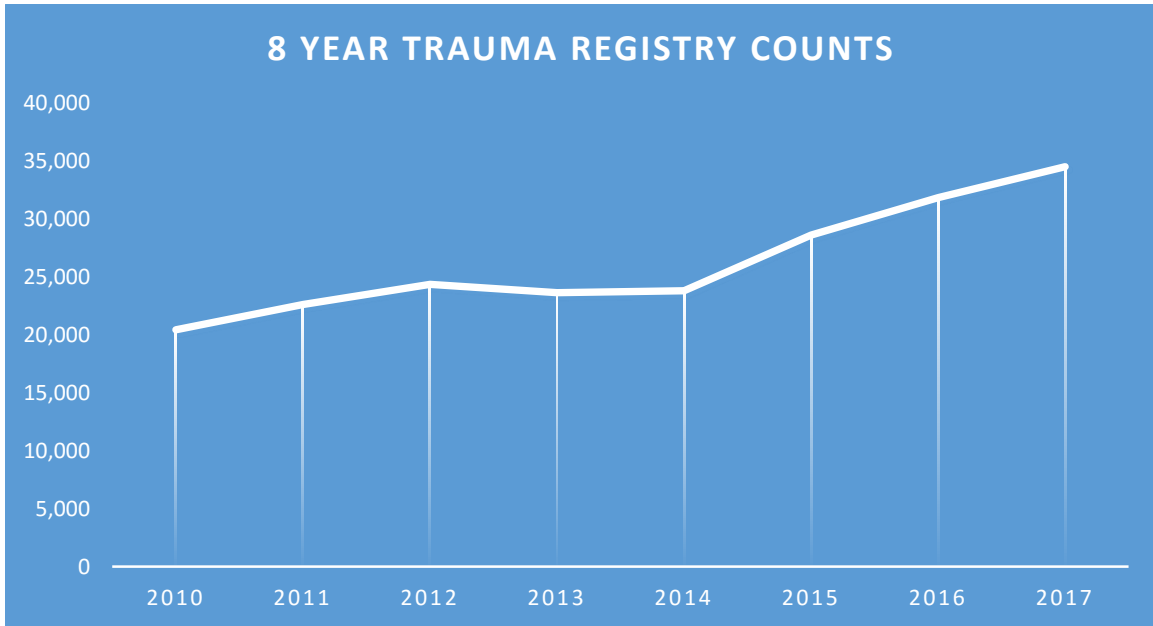
*Indicates verification as an American College of Surgeons Pediatric Trauma Center

Appendix II:

2017 Trauma Registry Reports

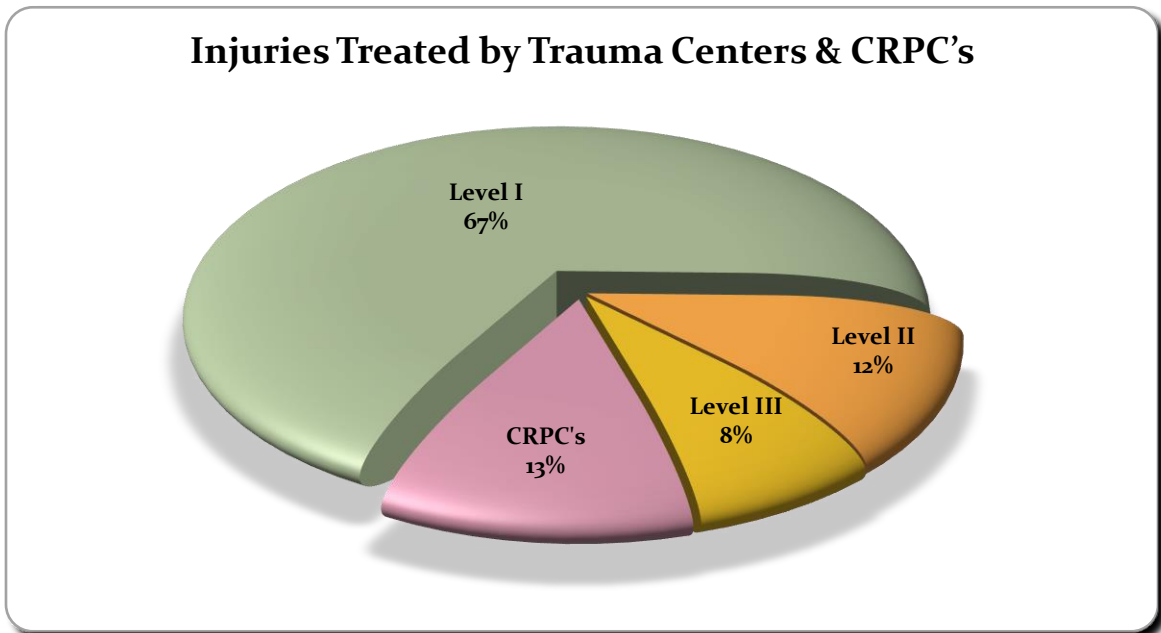
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Figure 1a:



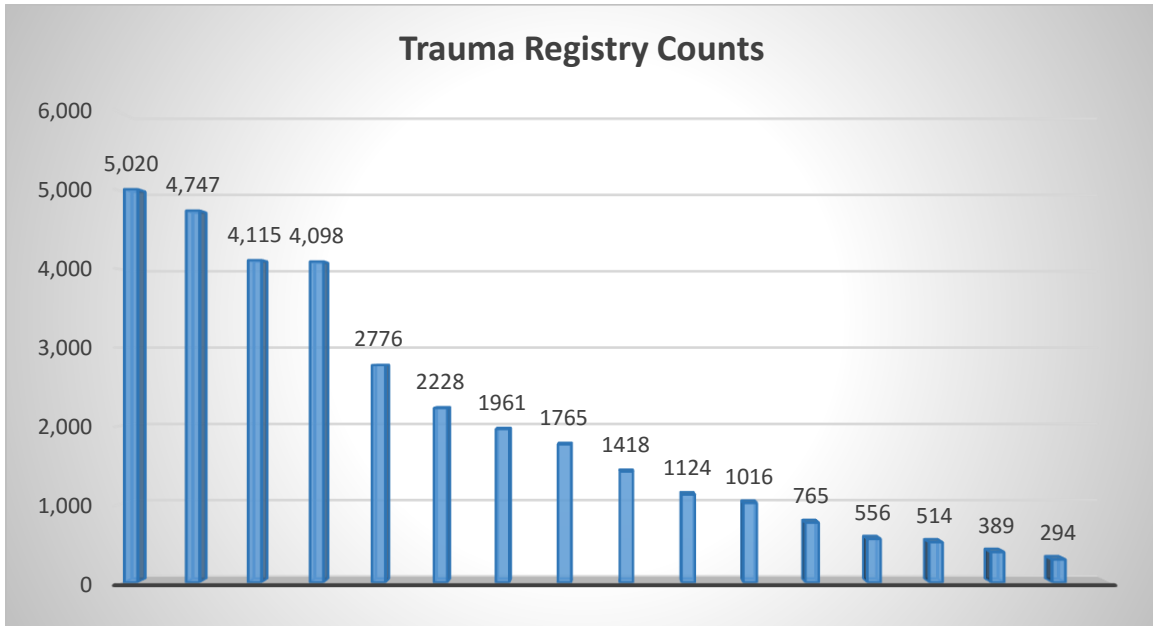
In 2017, 35,513 patients were entered in the state trauma registry as a result of meeting inclusion criteria related to traumatic injury. The overall growth pattern of patient totals recorded in the registry since 2010 is shown above.

Figure 1b:



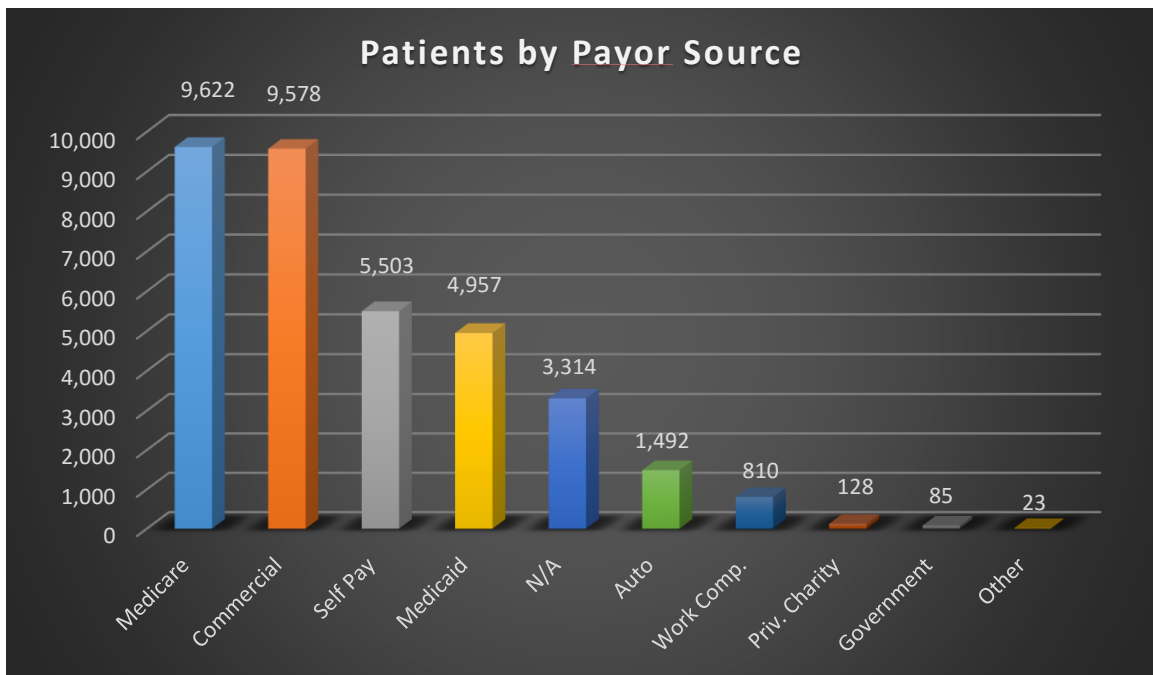
As might be expected, over two thirds of all trauma patients for 2017 were treated at a Level 1 trauma facility.

Figure 2a:



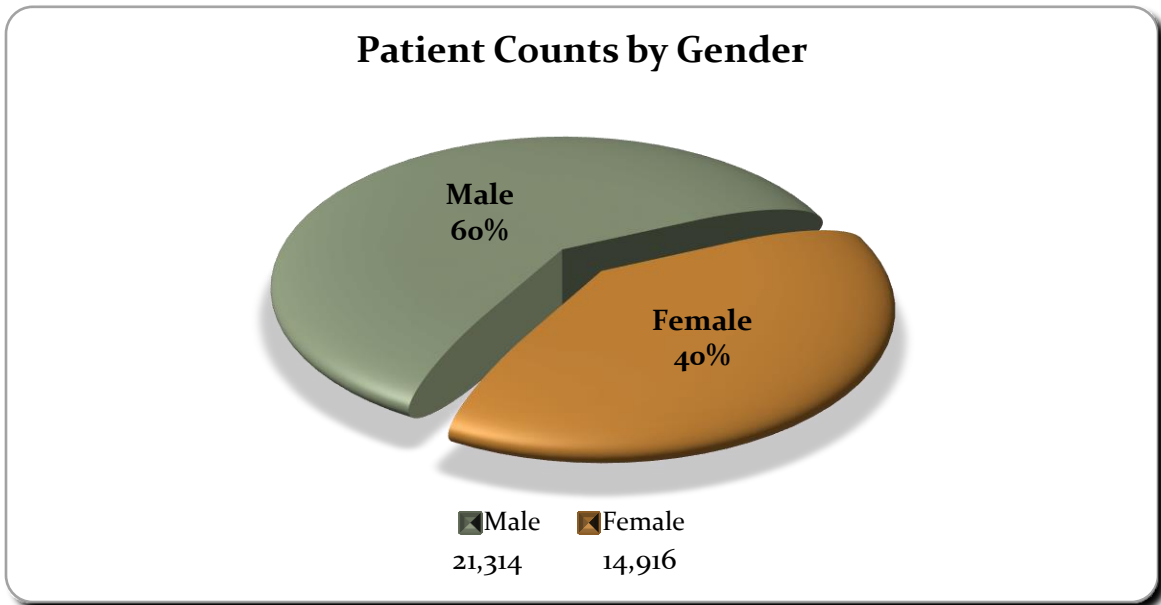
2017 Trauma registry submission counts are shown above in order of maximum patient counts to minimum for all trauma centers and CRPC's

Figure 2b:



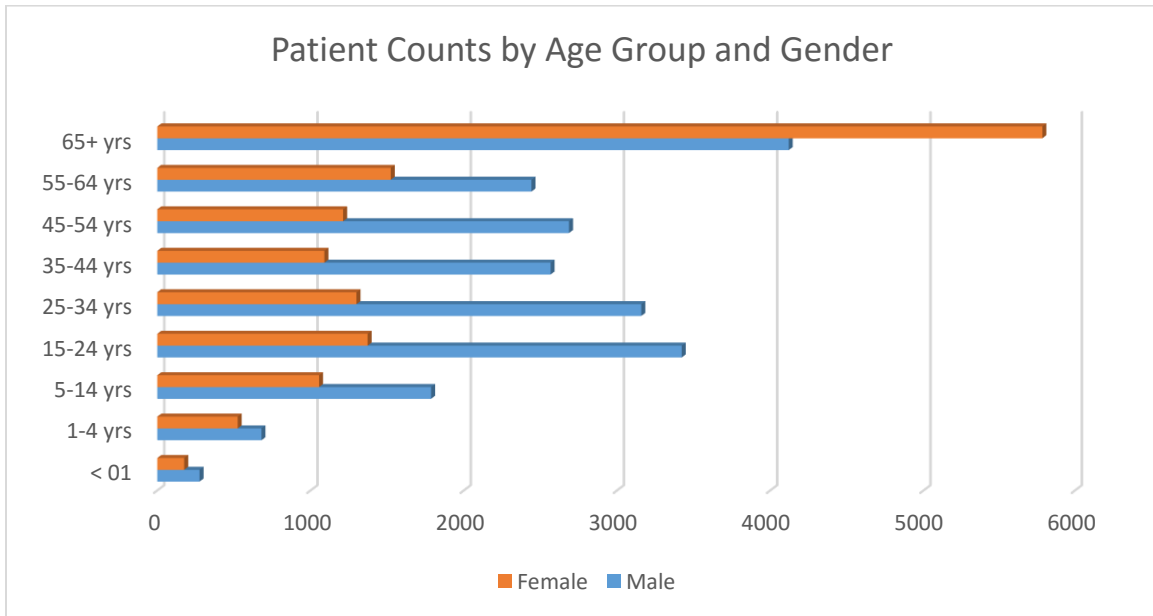
Medicare overtook commercial insurance as the number one payor source for those seeking treatment at a trauma center or CRPC in 2017.

Figure 3a:



60% of all patients treated at a Tennessee trauma center or CRPC were male. This 2017 data reflects a 1% percentage point increase in male trauma patients and a one percentage point decrease in female trauma patients seeking treatment at trauma centers and CRPC's.

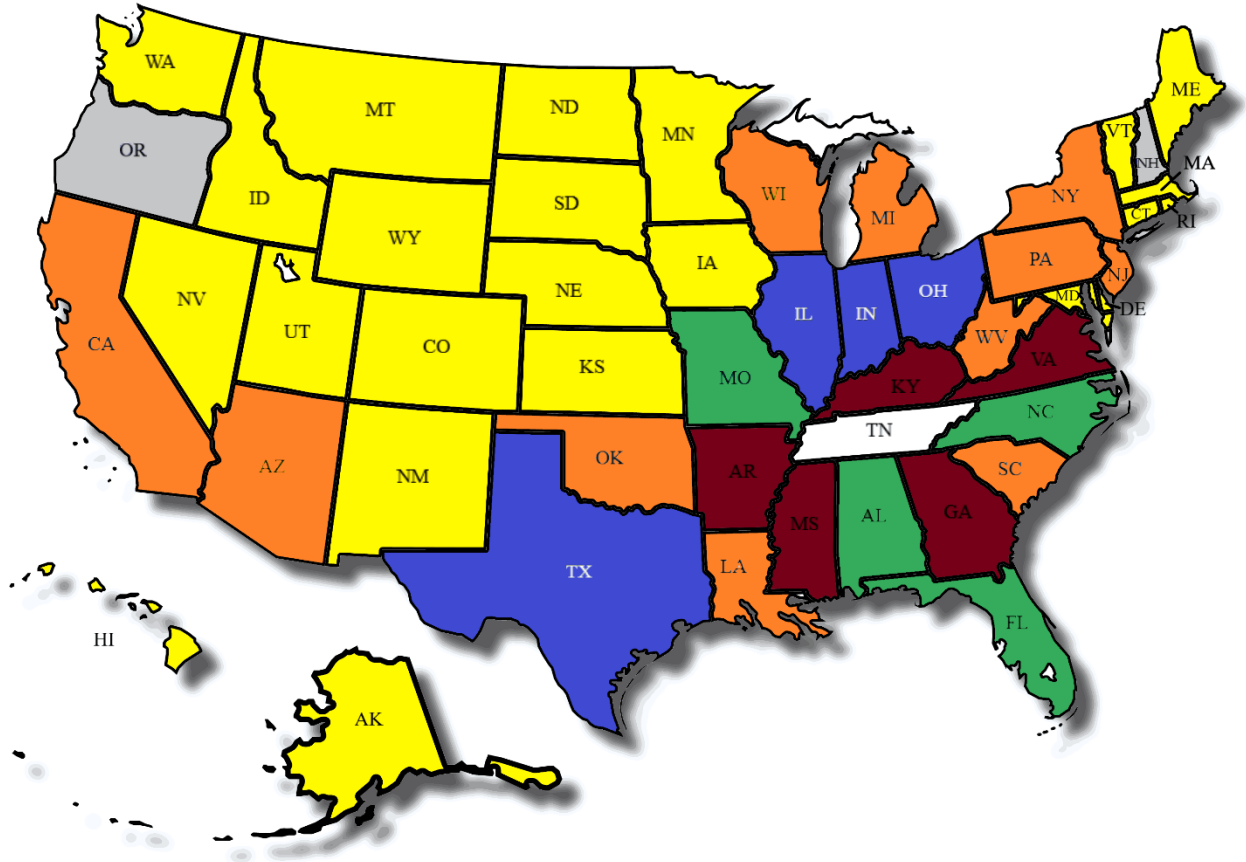
Figure 3b



The information above is reflective of trauma patients by age and gender. Females in the 65+ age category made up 58 percent of the total in that age category.

Figure 4:

Trauma Patients Treated in Tennessee Trauma Centers and CRPC's by State of Residence in 2017

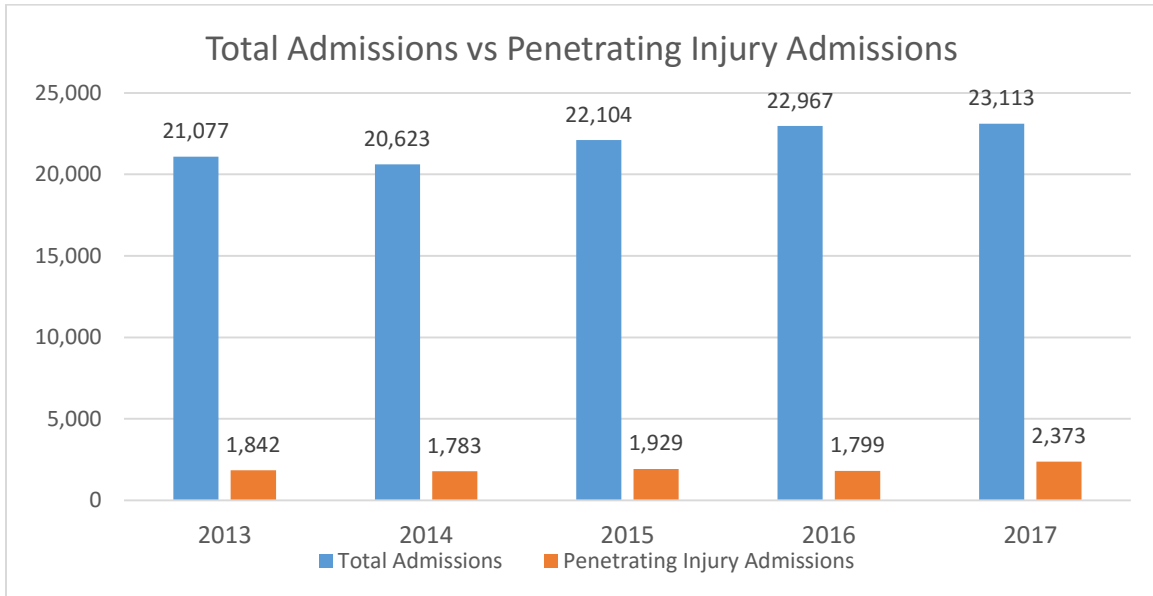


Legend

- over 500 patients – 5 States
- 100 to 500 patients – 4 States
- 51 to 99 patients – 4 States
- 11 to 49 patients – 11 States
- 1 to 10 patients – 23 States
- 0 patients – 2 States

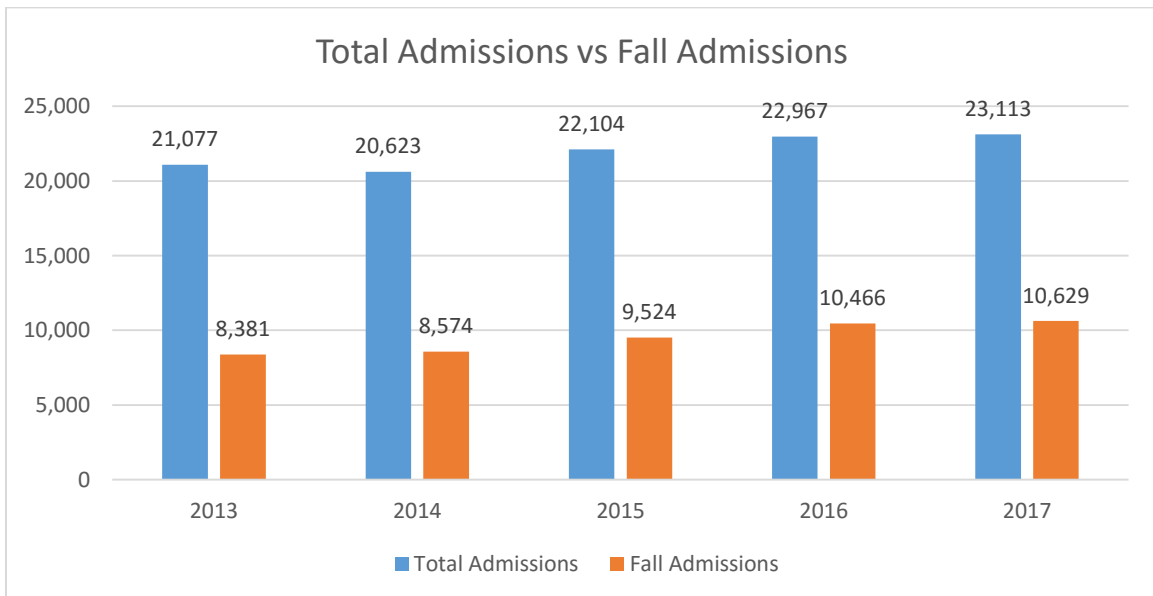
74% of all trauma cases treated in Tennessee trauma centers or CRPC's were Tennesseans (26,138); 26% of all cases (9,316) were residents of other states.

Figure 5a:



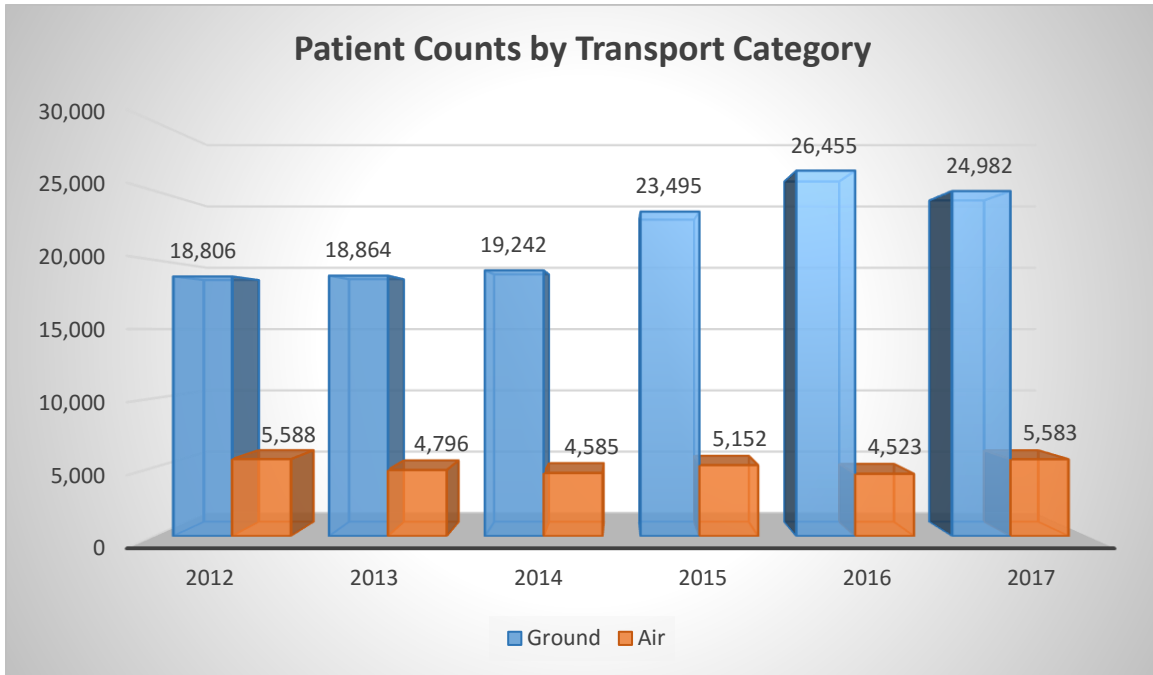
The graph above reflects patients that were admitted with penetrating injuries in relation to total hospital admissions from other traumatic causes.

Figure 5b:



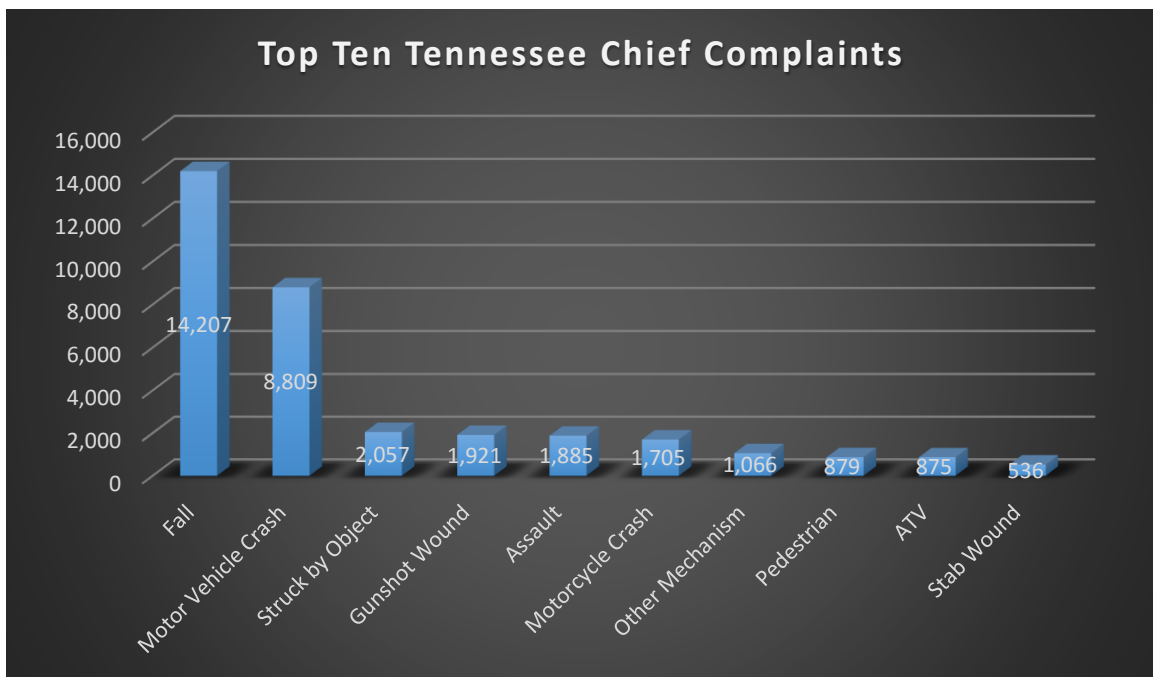
The graph above reflects patients that were admitted with penetrating injuries in relation to total hospital admissions from other traumatic causes.

Figure 6a:



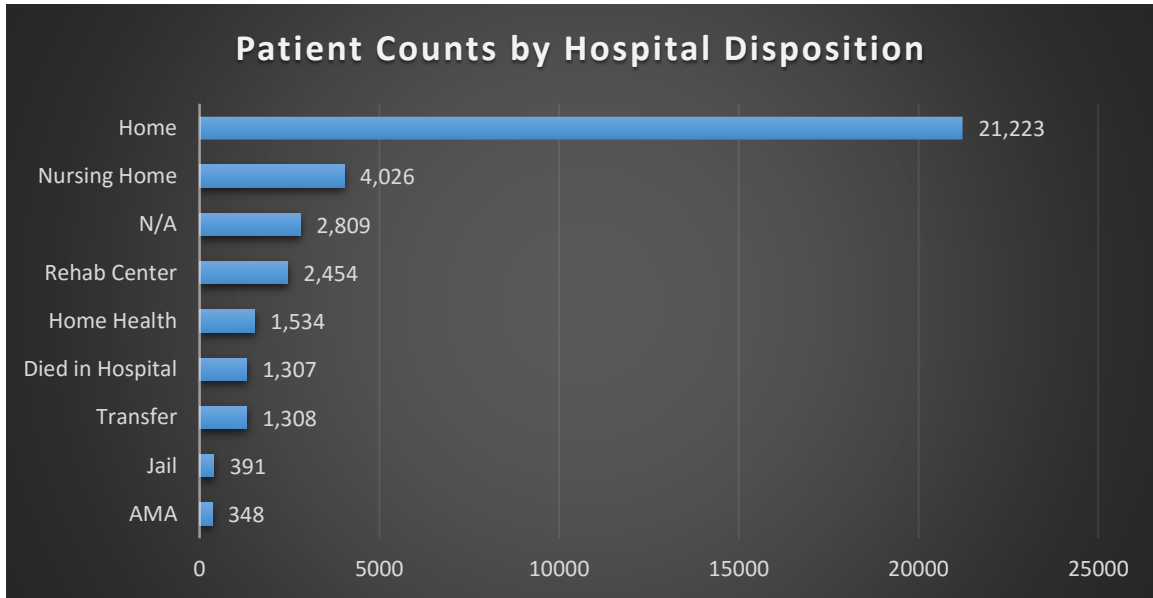
Patient transports by ground travel to a trauma center or CRPC has shown its first decrease since 2012.

Figure 6b:



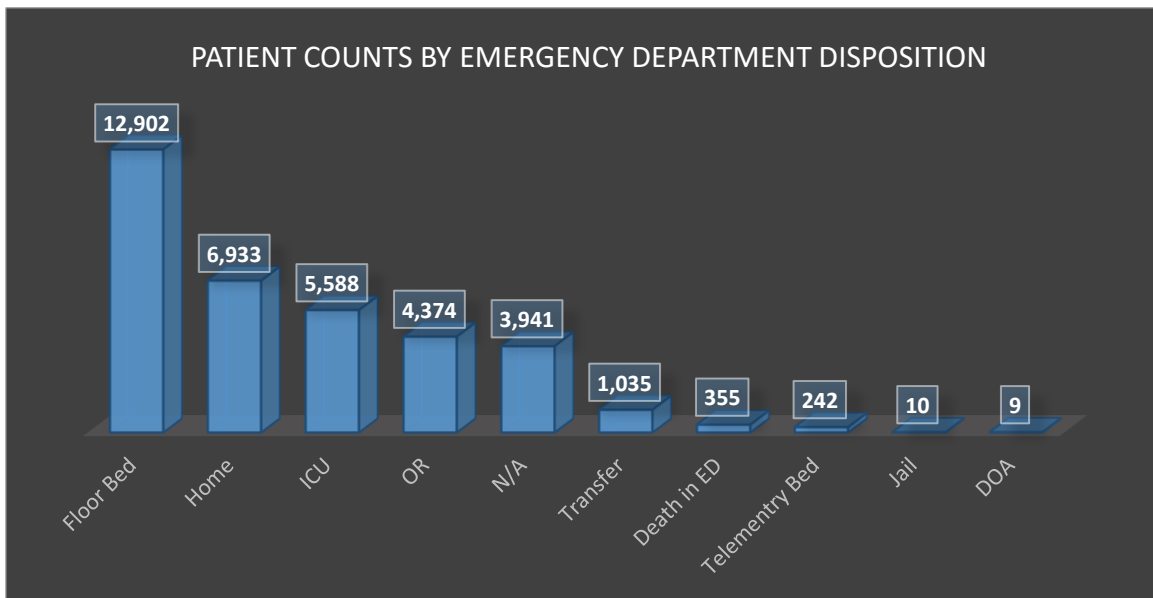
The graph above reflects the top ten chief complaints for seeking treatment at a trauma center or CRPC.

Figure 7a:



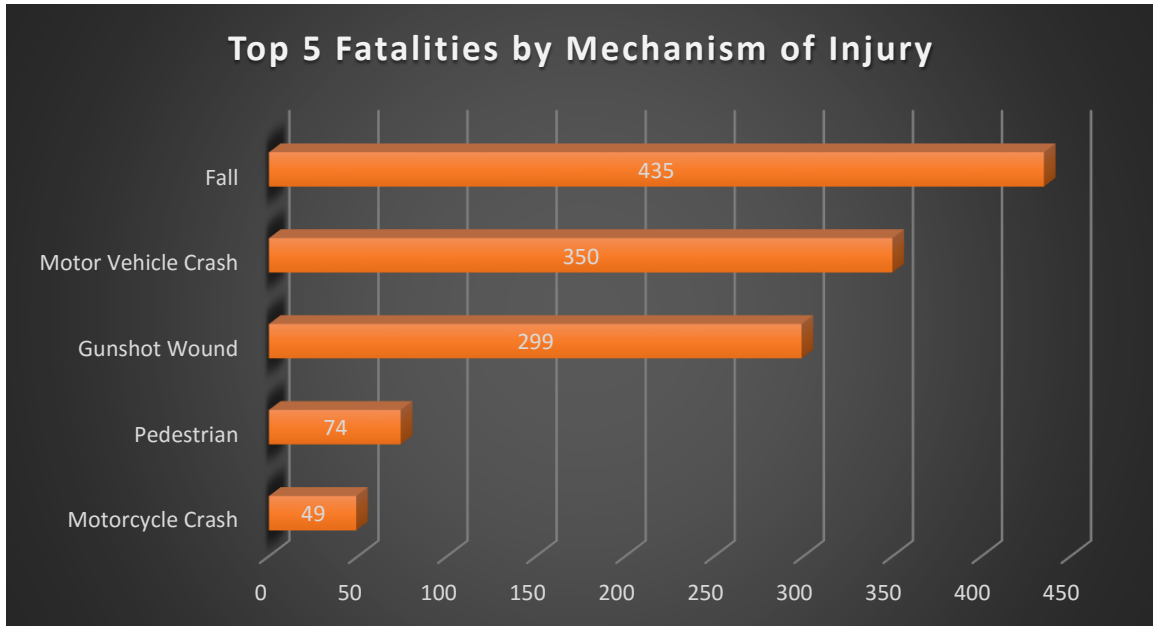
60% percent of patients seeking care from a trauma facility in 2017 were released back to their home while 11% were admitted into a nursing home upon hospital discharge. Approximately 6% of patients had an outcome of death.

Figure 7b:



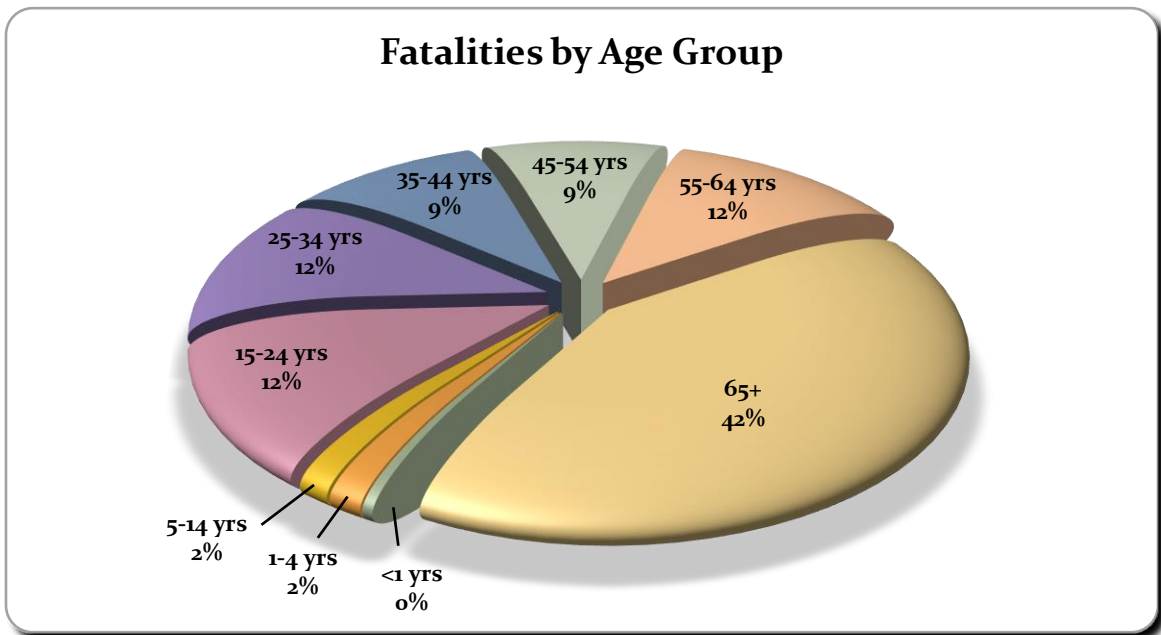
The majority of patients who met inclusion criteria for trauma registry submissions for 2017 were admitted to a floor bed based on their disposition from the Emergency Department. 20% were discharged home, which is a 3% decrease from the prior year.

Figure 8a:



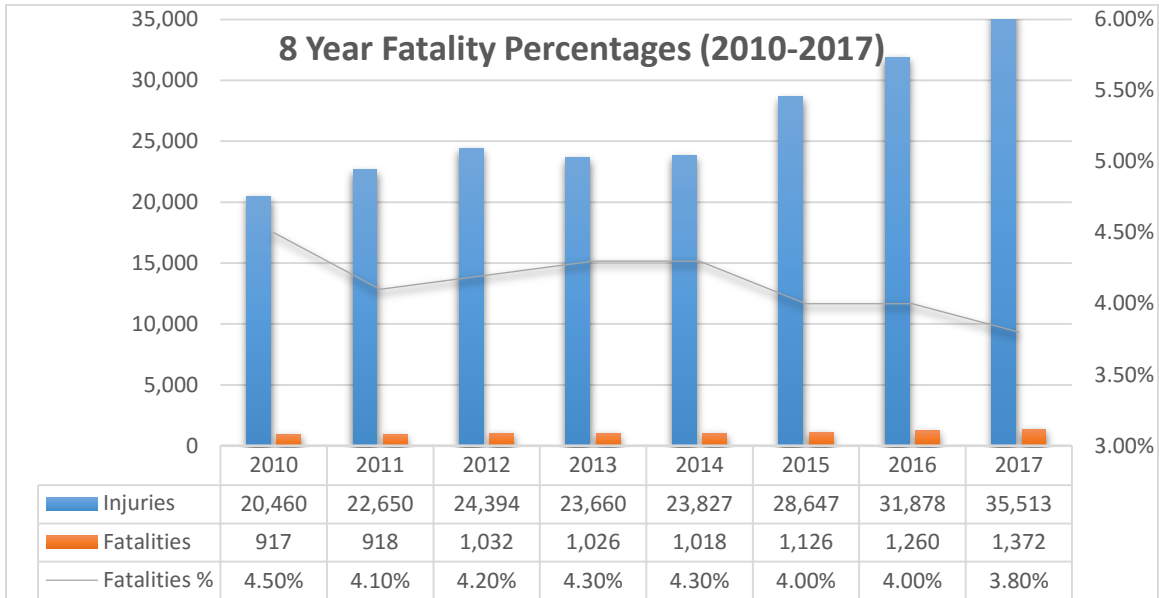
The number of fatalities from falls increased by 282 patient counts from the previous year's total of 153. Fatalities involving motor vehicle crashes, gunshot wounds, and pedestrians have also increased.

Figure 8b:



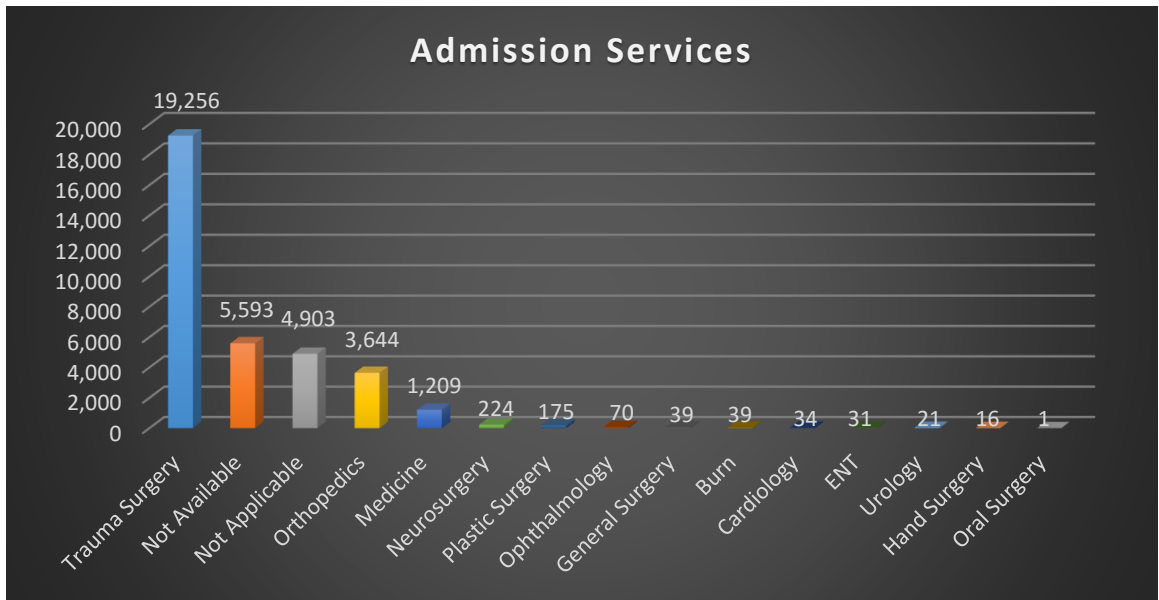
As the 65+ age group shows the largest percentage of injuries (27% in 2016 to 39% in 2017), it similarly experiences the largest percentage of fatal outcomes at approximately (42%).

Figure 9a:



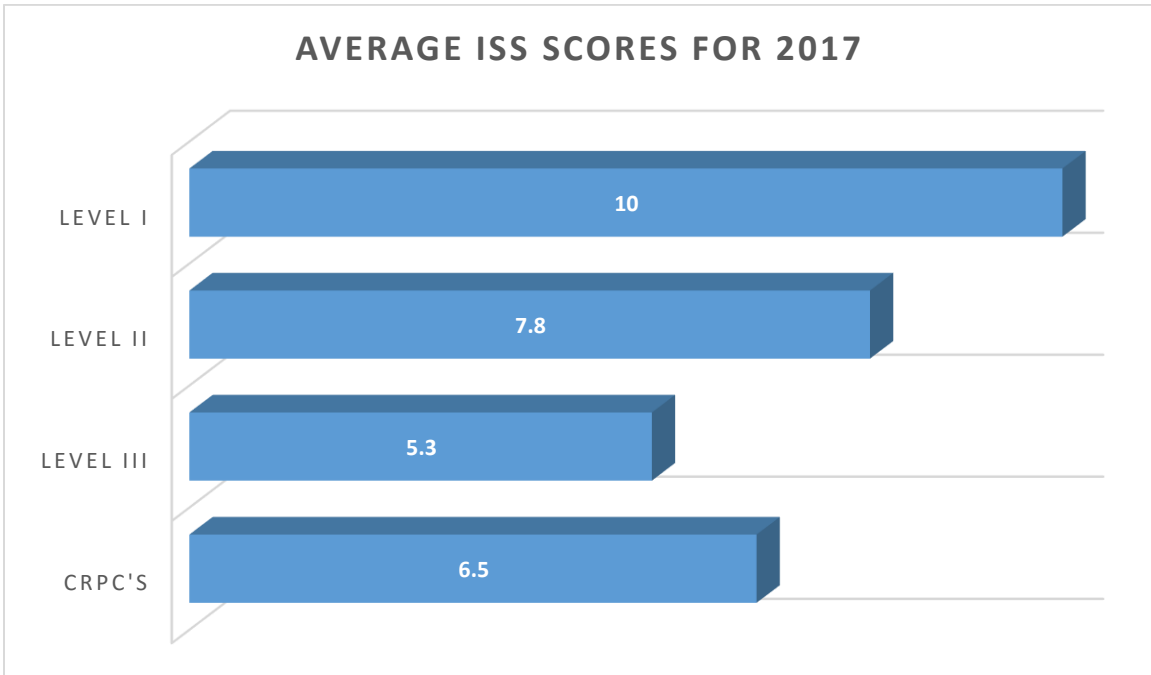
Fatality percentages continue their trend downward even with the increase in trauma volume.

Figure 9b:



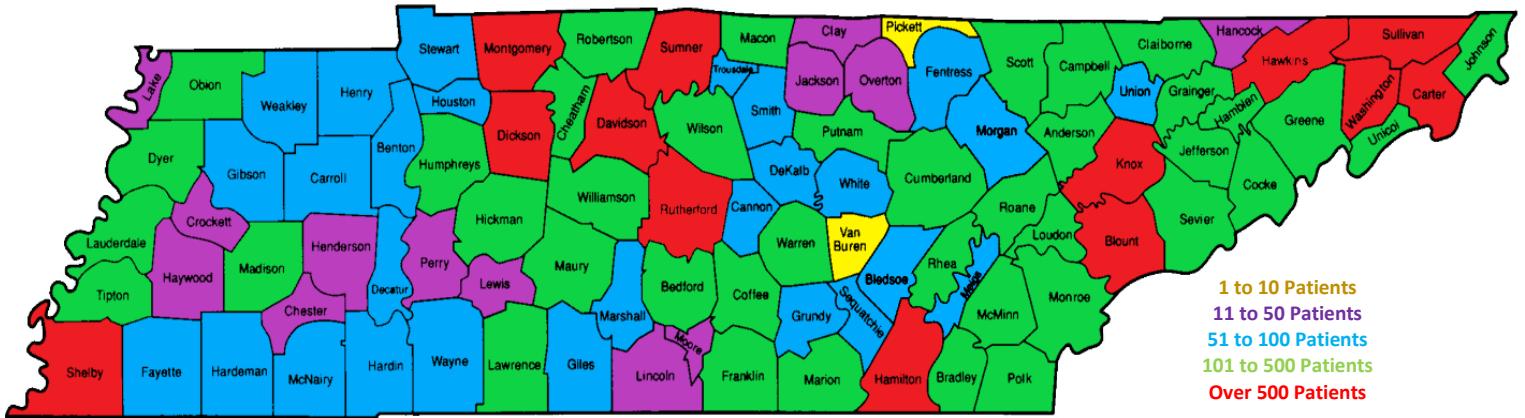
The graph above reflects the surgical/medical services that patients were admitted to when being admitted for a traumatic injury.

Figure 10:



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. Major trauma is commonly defined using an ISS of 15. In 2017, the average reported ISS for all hospitals submitting to the registry was 7.4. The average ISS has decreased from the previous year when the average ISS was 8.7 in 2016.

Figure 11



The map above and corresponding chart below reflects the number of traumatic incidences per county of residence

Patient County	Population	Incident Totals	Patient County	Population	Incident Totals	Patient County	Population	Incident Totals
Anderson	76,262	213	Hamilton	361,613	1,793	Morgan	21,630	70
Bedford	48,117	121	Hancock	6,579	36	Obion	30,376	139
Benton	15,991	51	Hardeman	25,449	66	Overton	22,003	49
Bledsoe	14,722	70	Hardin	25,846	81	Perry	7,984	48
Blount	129,933	894	Hawkins	56,463	675	Pickett	5,060	6
Bradley	105,563	366	Haywood	17,567	37	Polk	16,754	108
Campbell	39,647	212	Henderson	27,751	48	Putnam	77,676	148
Cannon	14,222	52	Henry	32,454	75	Roane	53,032	239
Carroll	27,859	75	Hickman	24,863	203	Robertson	70,177	275
Carter	56,479	548	Houston	8,219	64	Rutherford	317,165	859
Cheatham	40,334	175	Humphreys	18,491	200	Scott	21,985	101
Chester	17,126	24	Jackson	11,683	26	Sequatchie	14,736	98
Claiborne	31,621	167	Jefferson	53,810	223	Sevier	97,629	404
Clay	7,714	23	Johnson	17,680	123	Shelby	936,954	2,840
Cocke	35,556	165	Knox	461,860	2,050	Smith	19,634	58
Coffee	55,027	144	Lake	7,470	24	Stewart	13,347	53
Crockett	14,476	18	Lauderdale	25,271	107	Sullivan	157,161	1,102
Cumberland	59,074	190	Lawrence	43,399	109	Sumner	183,546	816
Davidson	691,239	2,734	Lewis	12,026	30	Tipton	61,374	184
Decatur	11,751	52	Lincoln	33,747	49	Trousdale	10,077	52
DeKalb	19,836	66	Loudon	52,158	224	Unicoi	17,753	123
Dickson	52,854	679	Macon	24,074	104	Union	19,430	71
Dyer	37,460	131	Madison	97,646	138	Van Buren	5,711	8
Fayette	40,042	60	Marion	28,429	112	Warren	40,655	115
Fentress	18,129	82	Marshall	32,933	73	Washington	127,800	516
Franklin	41,655	139	Maury	92,162	210	Wayne	16,563	52
Gibson	49,110	95	McMinn	52,884	279	Weakley	33,336	68
Giles	29,401	70	Montgomery	200,177	504	White	26,767	70
Grainger	23,148	123	Moore	6,377	11	Williamson	226,249	345
Greene	68,800	363				Wilson	136,436	466
Grundy	13,370	67				Grand Total	6,715,862	26,096
Hamblen	64,267	205				Total Incidents:		35,513
						Non-resident Incidents:		9,375

Appendix III:

2017 Trauma Fund Distribution

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2017 – 1st QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,119,420.12	\$857,250.00	\$1,976,670.12
Lev I	Regional One Health	\$407,047.29	\$97,250.00	\$504,297.29
Lev I	Vanderbilt University Hospital	\$291,801.36	\$153,250.00	\$445,051.36
Lev I	Erlanger Medical Center - Baroness	\$126,006.50	\$153,250.00	\$279,256.50
Lev I	The University of Tennessee Med. Cntr.	\$122,167.49	\$102,250.00	\$224,417.49
Lev I	Johnson City Medical Center	\$34,882.72	\$72,500.00	\$107,382.72
Lev I	Wellmont Holston Valley Medical Ctr.	\$17,766.01	\$72,500.00	\$90,266.01
Lev II	TriStar Skyline Medical Center	\$40,374.93	\$37,750.00	\$78,124.93
PED	LeBonheur Children Medical Center	\$7,533.46	\$64,250.00	\$71,783.46
PED	East Tennessee Childrens Hospital		\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$12,132.36	\$37,750.00	\$49,882.36
Lev III	Blount Memorial Hospital	\$3,423.05	\$15,500.00	\$18,923.05
	Methodist Healthcare-Memphis Hospitals	\$18,417.09		\$18,417.09
	Jackson-Madison Cnty. General Hospital	\$13,162.33		\$13,162.33
	Tennova Healthcare Physicians Regional M C	\$4,756.98		\$4,756.98
	Baptist Memorial Hospital-Memphis	\$4,706.65		\$4,706.65
	Saint Thomas West Hospital	\$4,177.91		\$4,177.91
	Parkwest Medical Center	\$3,788.41		\$3,788.41
	Methodist Medical Center of Oak Ridge	\$3,751.74		\$3,751.74
	Maury Regional Medical Center	\$3,523.84		\$3,523.84

2017 Trauma Fund Distribution

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2017 – 2nd QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$986,902.83	\$857,250.00	\$1,844,152.83
Lev I	Regional One Health	\$323,367.28	\$97,250.00	\$420,617.28
Lev I	Vanderbilt University Hospital	\$227,007.50	\$153,250.00	\$380,257.50
Lev I	Erlanger Medical Center - Baroness	\$140,228.55	\$153,250.00	\$293,478.55
Lev I	The University of Tennessee Med. Cntr.	\$101,748.25	\$102,250.00	\$203,998.25
Lev I	Johnson City Medical Center	\$38,666.99	\$72,500.00	\$111,166.99
Lev I	Wellmont Holston Valley Medical Ctr.	\$32,411.57	\$72,500.00	\$104,911.57
Lev II	TriStar Skyline Medical Center	\$47,567.62	\$37,750.00	\$85,317.62
PED	LeBonheur Children Medical Center	\$18,087.04	\$64,250.00	\$82,337.04
PED	East Tennessee Childrens Hospital		\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$12,719.97	\$37,750.00	\$50,469.97
Lev III	Blount Memorial Hospital	\$2,260.96	\$15,500.00	\$17,760.96
	Methodist Healthcare-Memphis Hospitals	\$17,760.96		\$17,760.96
	Jackson-Madison Cnty. General Hospital	\$10,228.57		\$10,228.57
	Baptist Memorial Hospital-Memphis	\$6,316.42		\$6,316.42
	Tennova Healthcare Physicians Regional M C	\$3,605.88		\$3,605.88
	Saint Thomas West Hospital	\$2,777.12		\$2,777.12
	Parkwest Medical Center	\$2,148.15		\$2,148.15

2017 Trauma Fund Distribution

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2017 – 3rd QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$892,038.93	\$857,250.00	\$1,749,288.93
Lev I	Vanderbilt University Hospital	\$279,967.49	\$153,250.00	\$433,217.49
Lev I	Regional One Health	\$284,850.96	\$97,250.00	\$382,100.96
Lev I	Erlanger Medical Center - Baroness	\$82,319.89	\$153,250.00	\$235,569.89
Lev I	The University of Tennessee Med. Cntr.	\$109,296.40	\$102,250.00	\$211,546.40
Lev I	Johnson City Medical Center	\$33,391.80	\$72,500.00	\$105,891.80
Lev I	Wellmont Holston Valley Medical Ctr.	\$9,911.85	\$72,500.00	\$82,411.85
Lev II	TriStar Skyline Medical Center	\$40,552.75	\$37,750.00	\$78,302.75
PED	LeBonheur Children Medical Center	\$10,448.55	\$64,250.00	\$74,698.55
PED	East Tennessee Childrens Hospital		\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$6,257.56	\$37,750.00	\$44,007.56
Lev III	Blount Memorial Hospital	\$2,888.34	\$15,500.00	\$18,388.34
	Methodist Healthcare-Memphis Hospitals	\$12,324.65		\$12,324.65
	TriStar Summit Medical Center	\$5,669.84		\$5,669.84
	Jackson-Madison Cnty. General Hospital	\$4,055.72		\$4,055.72
	Methodist Medical Center of Oak Ridge	\$3,886.55		\$3,886.55
	Baptist Memorial Hospital-Memphis	\$2,284.21		\$2,284.21
	Parkwest Medical Center	\$1,359.23		\$1,359.23
	CHI Memorial Hospital Chattanooga	\$1,207.76		\$1,207.76
	Tennova Healthcare Physicians Regional M C	\$714.85		\$714.85
	Saint Thomas West Hospital	\$650.56		\$650.56

2017 Trauma Fund Distribution

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2017 – 4th QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,105,846.62	\$872,750.00	\$1,978,596.62
Lev I	Regional One Health	\$429,471.80	\$97,250.00	\$526,721.80
Lev I	Vanderbilt University Hospital	\$313,998.41	\$153,250.00	\$467,248.41
Lev I	Erlanger Medical Center - Baroness	\$99,251.44	\$153,250.00	\$252,501.44
Lev I	The University of Tennessee Med. Cntr.	\$75,136.75	\$102,250.00	\$177,386.75
Lev I	Johnson City Medical Center	\$32,553.06	\$72,500.00	\$105,053.06
Lev I	Wellmont Holston Valley Medical Ctr.	\$22,928.52	\$72,500.00	\$95,428.52
Lev II	TriStar Skyline Medical Center	\$47,492.39	\$37,750.00	\$85,242.39
PED	LeBonheur Children Medical Center	\$13,488.65	\$64,250.00	\$77,738.65
PED	East Tennessee Childrens Hospital	\$112.27	\$51,000.00	\$51,112.27
Lev II	Wellmont Bristol Regional Med. Ctr.	\$6,208.07	\$37,750.00	\$43,958.07
Lev III	Blount Memorial Hospital	\$1,187.10	\$15,500.00	\$16,687.10
Lev III	TriStar Horizon Medical Center	\$1,012.21	\$15,500.00	\$16,512.21
	Methodist Healthcare-Memphis Hospitals	\$16,512.21		\$16,512.21
	Jackson-Madison Cnty. General Hospital	\$12,380.64		\$12,380.64
	Baptist Memorial Hospital-Memphis	\$5,728.28		\$5,728.28
	TriStar Summit Medical Center	\$4,914.23		\$4,914.23
	TriStar Southern Hills Medical Center	\$3,352.21		\$3,352.21
	Methodist Hospital-North	\$2,713.16		\$2,713.16
	Tenova Healthcare Physicians Regional M C	\$2,690.78		\$2,690.78
	CHI Memorial Hospital Chattanooga	\$2,521.28		\$2,521.28
	Williamson Medical Center	\$2,310.14		\$2,310.14
	Maury Regional Medical Center	\$2,167.25		\$2,167.25
	Tenova Healthcre - Lebanon	\$2,148.73		\$2,148.73
	Parkwest Medical Center	\$1,812.71		\$1,812.71
	Methodist Medical Center of Oak Ridge	\$1,525.22		\$1,525.22
	Saint Thomas West Hospital	\$686.89		\$686.89
	Parkridge Medical Center	\$536.37		\$536.37
	Henry County Medical Center	\$495.19		\$495.19
	LeConte Medical Center	\$336.91		\$336.91
	Tenova Healthcare-Regional Jackson	\$173.78		\$173.78

Appendix IV:

Research Publications

1. Notrica DM, Sayrs LW, Bhatia A, Letton RW, Alder A, St Peter S, Ponsky TA, Eubanks JW 3rd, Lawson KA, Ostlie DJ, Tuggle DW, Garcia NM, Maxson RT, Leys C, Greenwell C. The incidence of delayed splenic bleeding in pediatric blunt trauma. *JPedsSurg*. 2017.10.005. Epub 2017 Oct8.
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