

Trauma Care Advisory Council

Trauma Care in Tennessee

2019 Report to the 111th General Assembly

Tennessee Department of Health

Trauma Care Advisory Council

March 31, 2020

AUTHORSHIP

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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 31, 2020

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
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Chair, Trauma Care Advisory Council
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2019 EXECUTIVE SUMMARY

Over calendar year 2018, 35,712 patients received care in a state designated or American College of Surgeons (ACS)-verified adult and/or pediatric trauma center or a Comprehensive Regional Pediatric Center (CRPC) due to trauma-related injury. The total number of patients managed in centers designed to improve the care of the injured has risen by approximately 1200 patients over previous years 34, 544. The effect of the care in these institutions has been to reduce the potential years of life lost, increase the potential return to family, work, and community in the best possible condition.

Along with managing patients affected by trauma, a mandate of every trauma center is outreach and prevention. Raising awareness around both pediatric and adult causes of trauma from teen suicide and seatbelt use to helmet use in all possible situations along with fall prevention in the elderly has been paramount for the Trauma Care Advisory Council (TCAC) with the help of the Tennessee Committee on Trauma. 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 5 Level I trauma centers, 2 Level II centers, 5 level III centers, and 2 provisional Level III center, for 14 total adult centers. 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, 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 was passed. TCAC has also provided support to the Council on Pediatric Emergency Care (CoPEC) to update the rules for pediatric trauma.

There is an ongoing epidemic across Tennessee (and the nation) with elderly ground level falls as the number one cause of trauma admission and mortality. The admissions and death rates continue to climb as our population ages, accounting for greater than 50% of admissions in several trauma centers. Unfortunately, motor vehicle crashes (MVCs) remain lethal and are the second highest cause fatality rate in the state. Gun -related suicide death continues to overshadow homicide at a rate of 2 to 1 for 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 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. The latest initiative that has been rolled out by all trauma centers and will be the focus of May 21, 2020 is the ‘Stop the Bleed’ campaign-ensuring as many first responders, bystanders and others are prepared in any situation to stop active hemorrhage in a trauma patient. So far, the efforts of the trauma programs have led to educating over 5000 individuals across the state. This includes school nurses, first responders and many members of congress.

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 important 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 to designate all hospital centers as Level I, II, III or IV, ensuring capture of all injured patients and maintaining the highest possible level of trauma 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. Of note, this is my sixth and final year chairing the TCAC and TN CoT, working alongside Rob Seesholtz and members of the state team, and it has been an honor and a privilege.

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:

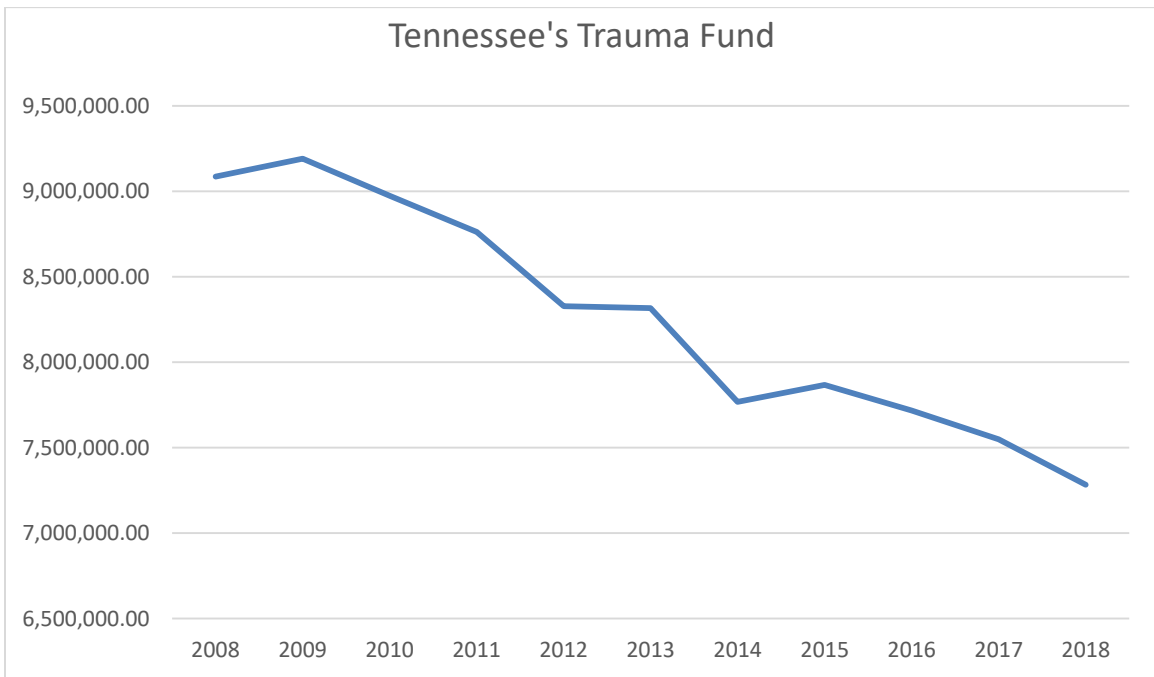
1. Money to support the **trauma system infrastructure** at the state level:
 - The State Trauma System Manager is responsible for providing general oversight for Tennessee's Trauma Care System. Responsibilities include oversight of Tennessee's trauma fund, trauma registry, administrative support to 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 2018 this portion of the fund was approximately \$7,283,384.96 **Appendix III** shows quarterly payments made to eligible hospitals for calendar year 2018.

Trauma Fund disbursement totals have seen a steady decline since the funds inception. Since then, the trauma fund has decreased over \$1,800,000.00 dollars making finding alternative sources of funding a priority to ensure the viability of Tennessee's Trauma System.

Trauma Fund Disbursement Totals Since Inception

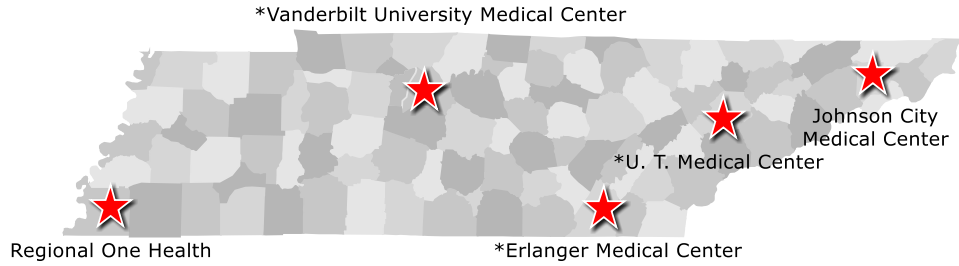
	Calendar Year	Trauma Fund Disbursement Totals
*Start of Trauma Fund	2008	\$9,086,822.57
	2009	\$9,192,013.69
	2010	\$8,973,548.13
	2011	\$8,762,345.31
	2012	\$8,328,132.57
	2013	\$8,316,610.13
	2014	\$7,768,758.15
	2015	\$7,867,741.77
	2016	\$7,717,970.86
	2017	\$7,548,708.50
	2018	\$7,283,384.96

\$1,803,437.61 below initial disbursement when trauma fund started



Appendix I:
Current Trauma Center Location & Level Designation

Level I Tennessee Trauma Centers

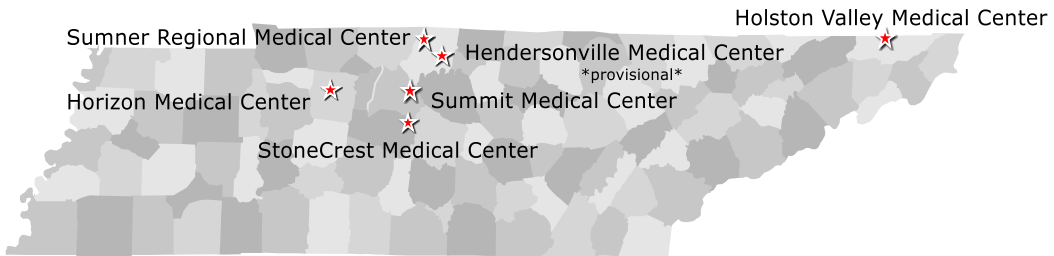


In addition to state designation "*" indicates verification as an American College of Surgeons Trauma Center

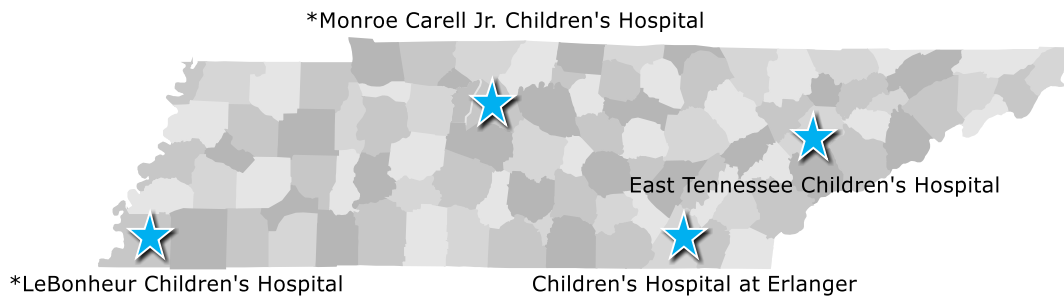
Level II Tennessee Trauma Centers



Level III Tennessee Trauma Centers



Comprehensive Regional Pediatric Centers



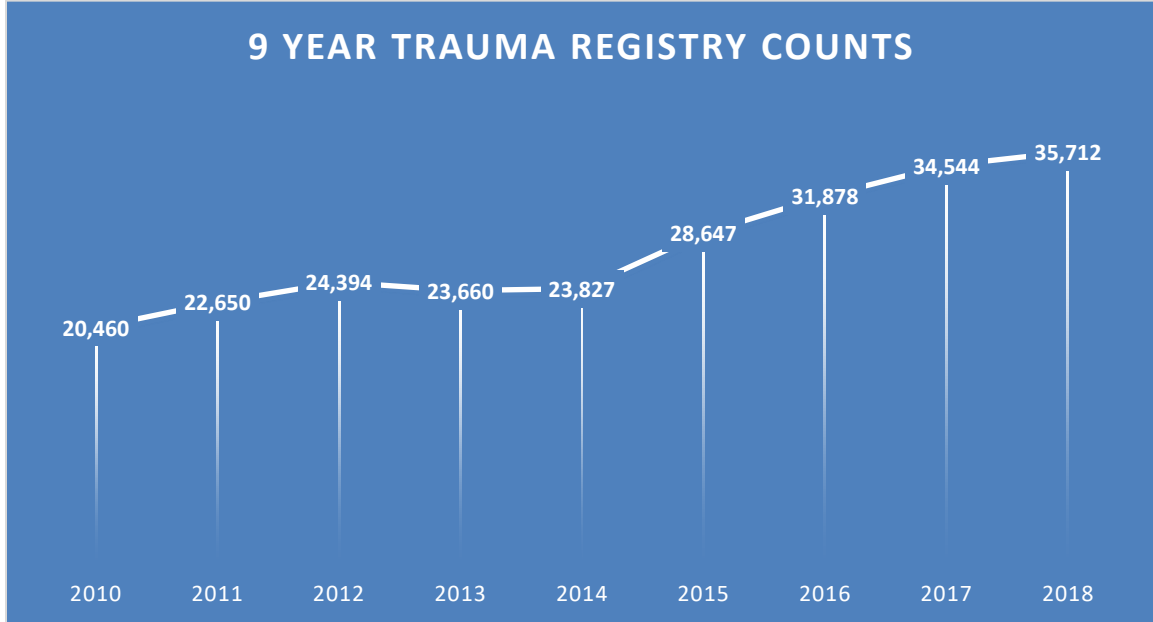
*Indicates verification as an American College of Surgeons Pediatric Trauma Center

Appendix II:

2018 Trauma Registry Reports

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Figure 7a:	Top Five Fatalities by Mechanism	18
7b:	Fatalities by Age Group	

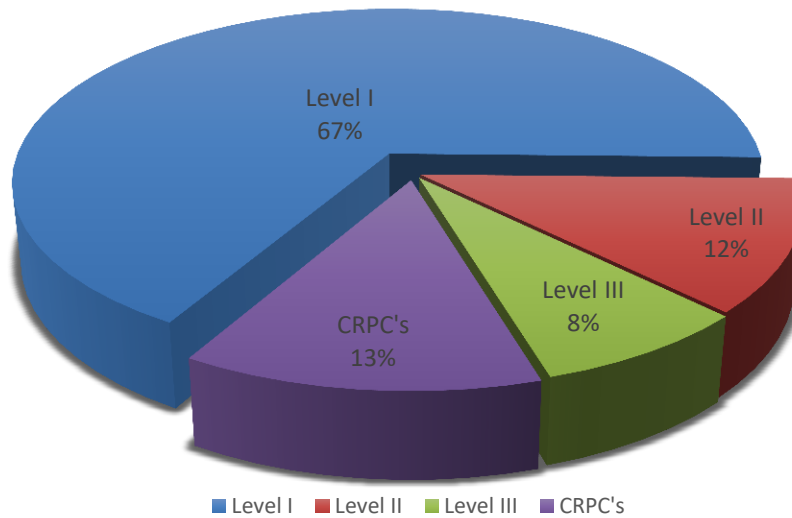
Figure 1a:



In 2018, 35,712 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.

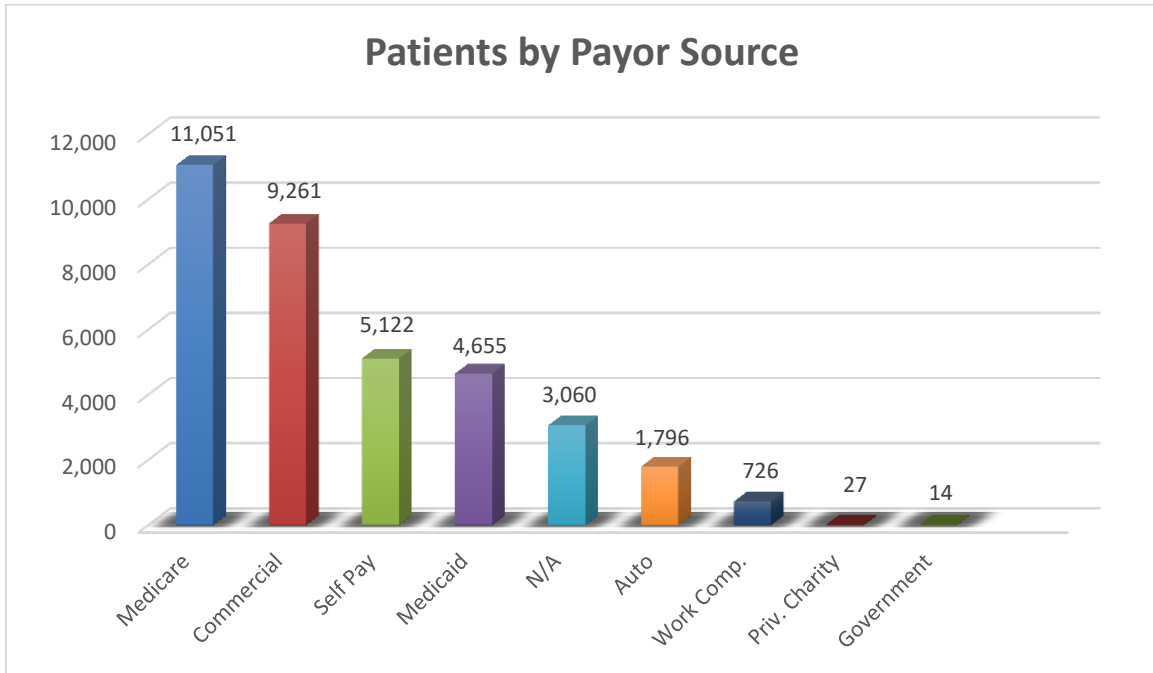
Figure 1b:

Injuries Treated by Trauma Centers & CRPC's



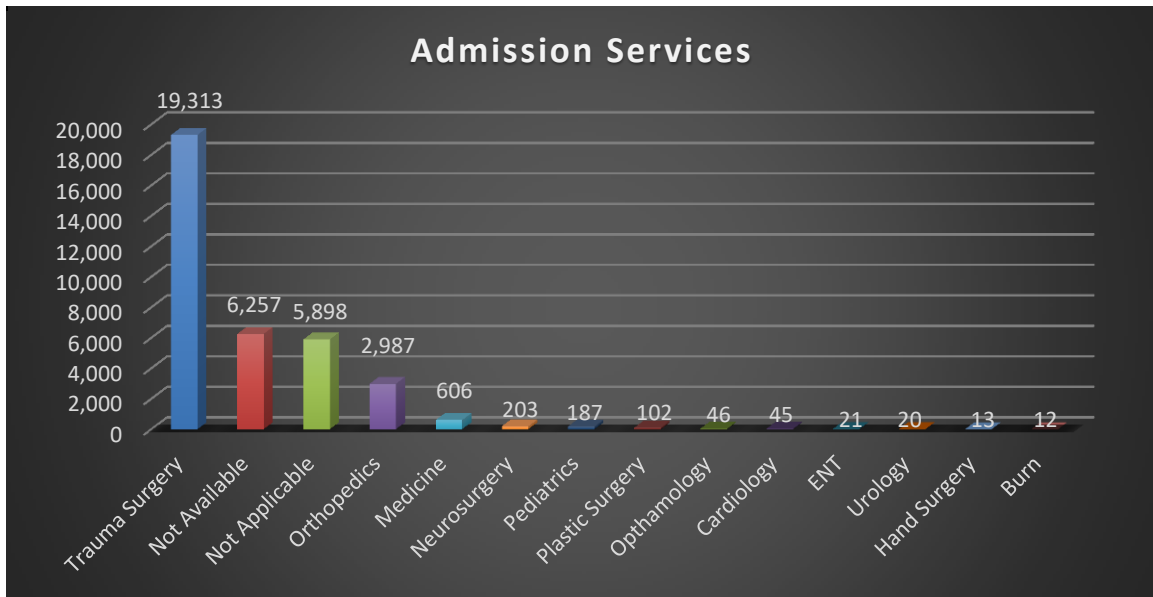
As might be expected, over two thirds of all trauma patients for 2018 were treated at a Level 1 trauma center.

Figure 2a:



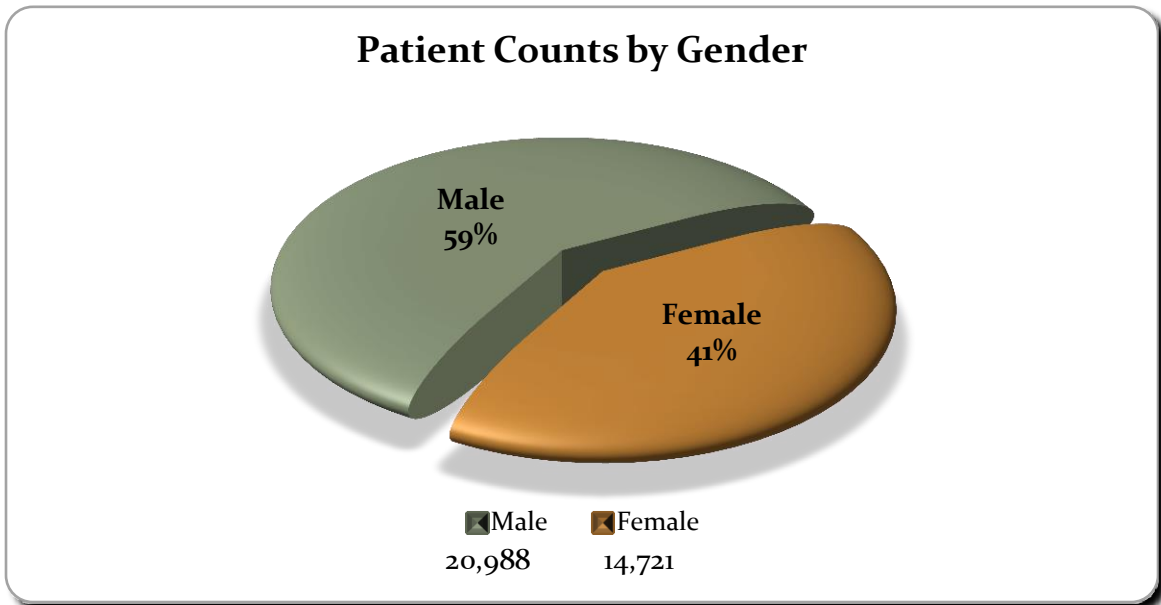
Medicare is currently the number one payor source for those receiving treatment at a trauma center or CRPC in 2018.

Figure 2b:



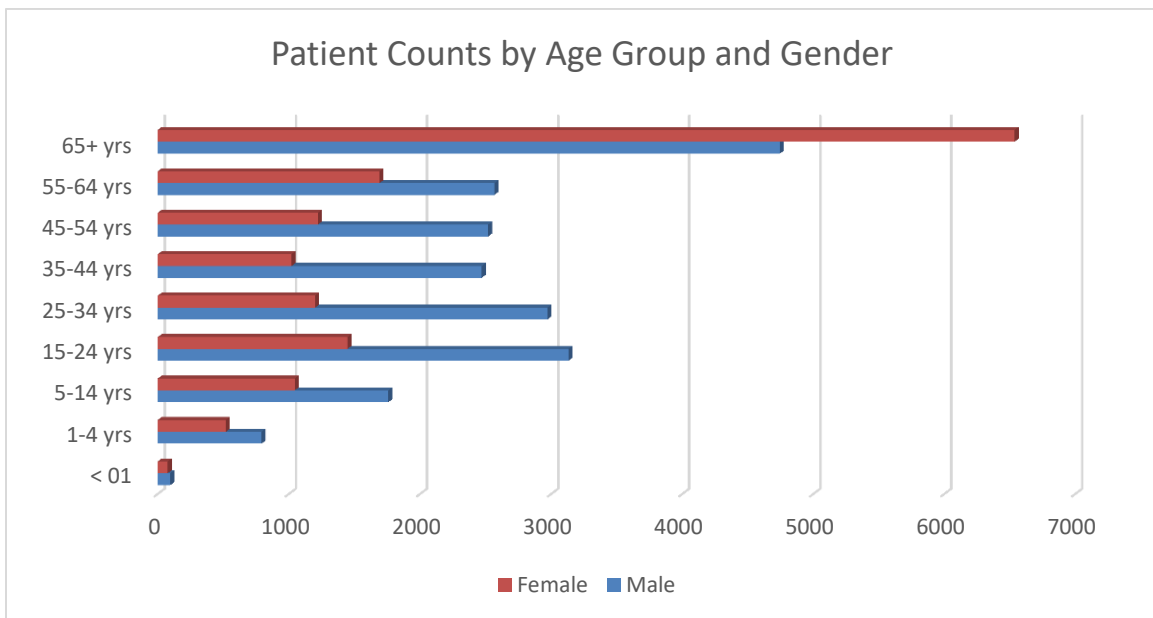
The graph above reflects the surgical/medical admission services when being admitted for a traumatic injury.

Figure 3a:



59% of all patients treated at a Tennessee trauma center or CRPC were male. This 2018 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.

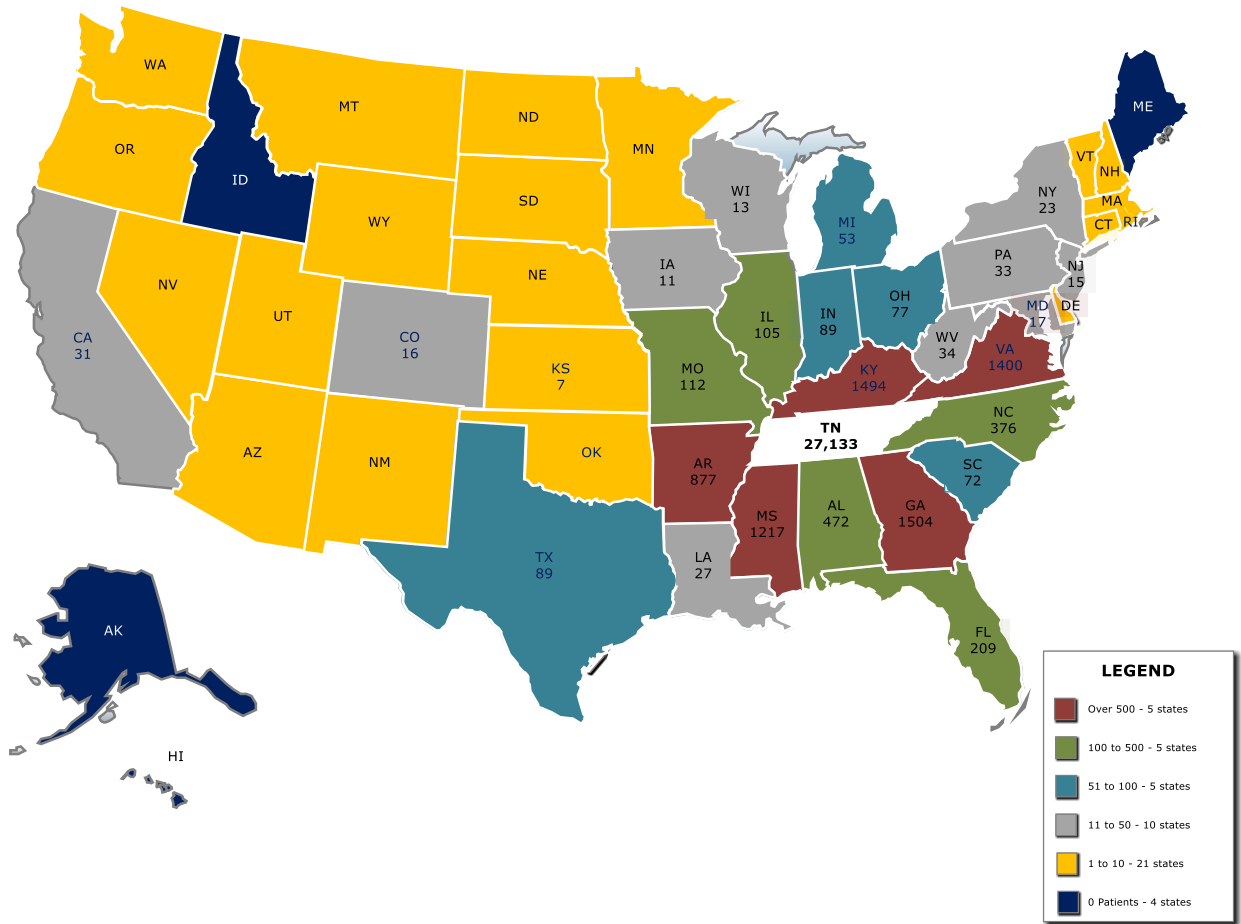
Figure 3b



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.

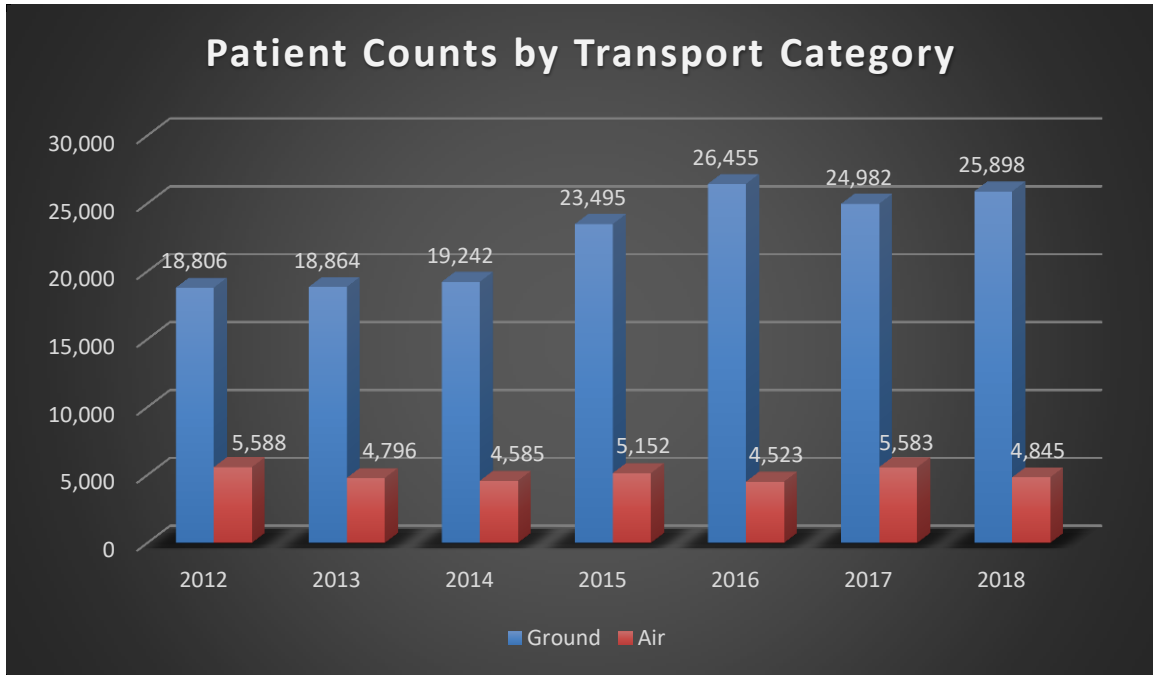
Figure 4:

Trauma Patients Treated in Tennessee Trauma Centers and CRPC's by State of Residence in 2018



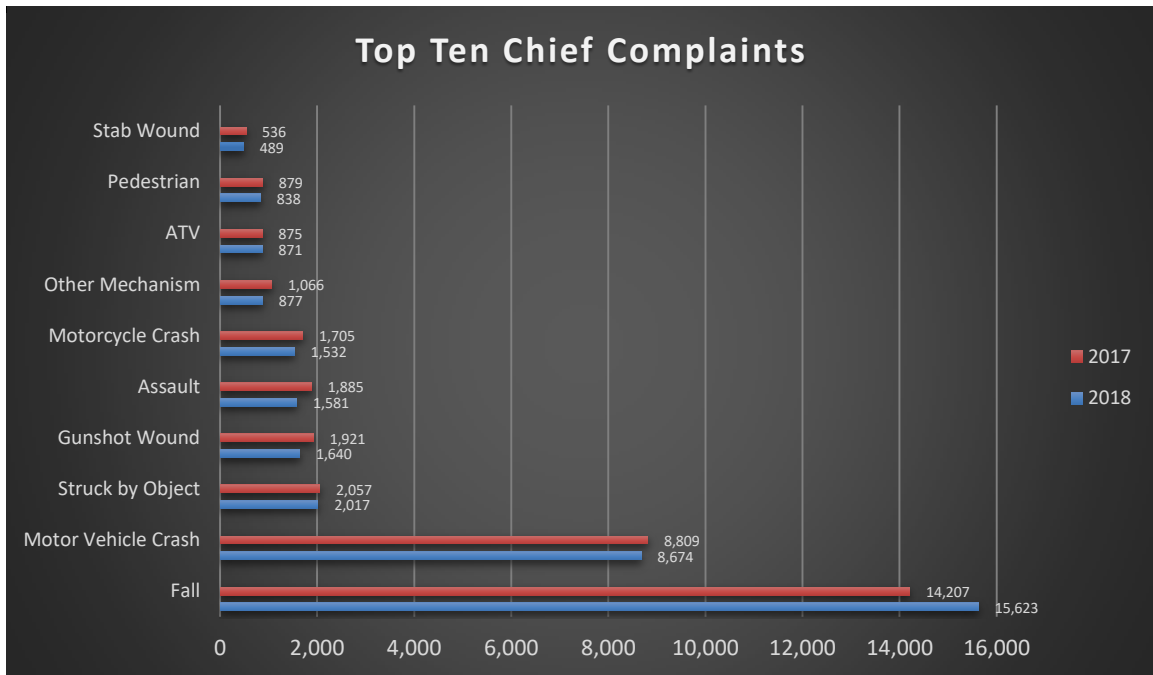
76% of all trauma cases treated in Tennessee trauma centers or CRPC's were Tennesseans (27,133); 24% of all cases (8,579) were residents of other states.

Figure 5a:



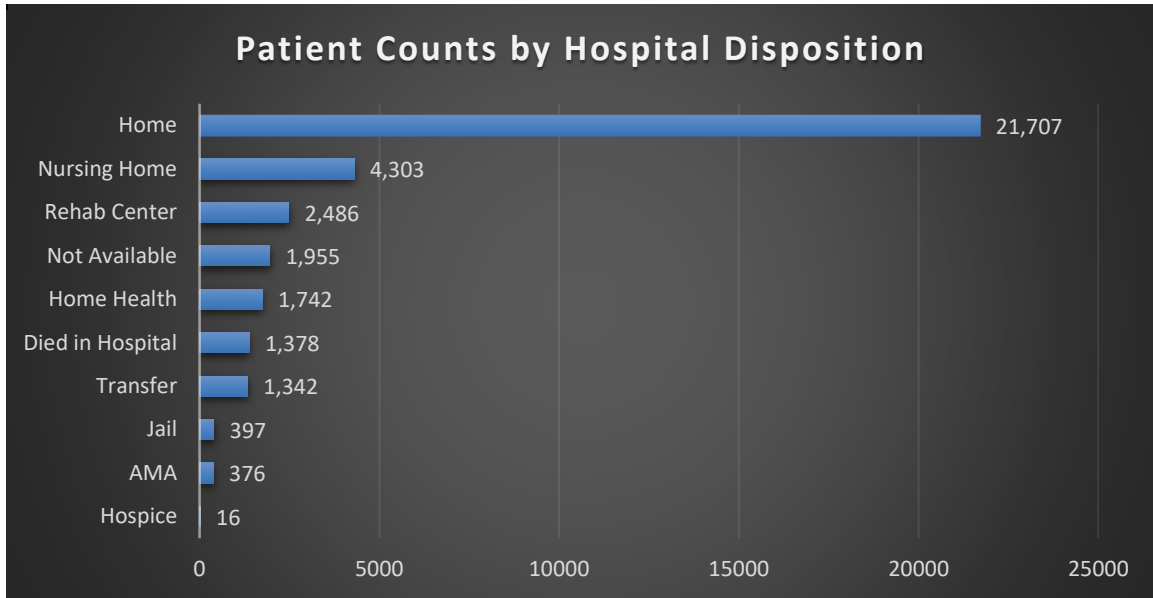
Patient transports by air travel to a trauma center or CRPC has shown a decrease compared to 2017.

Figure 5b:



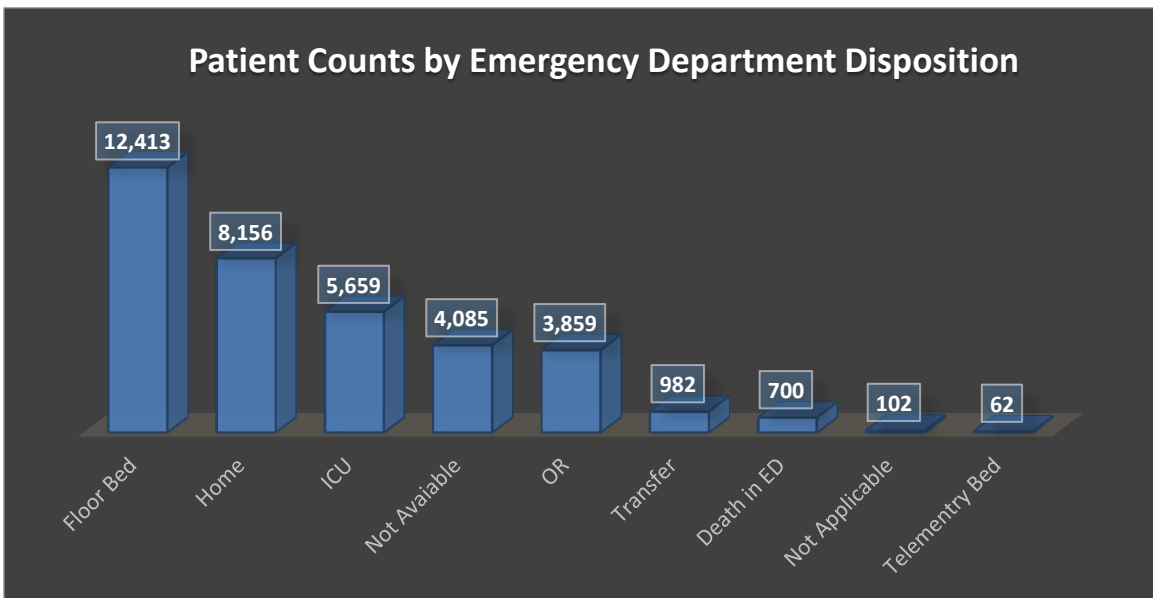
The graph above reflects a two year comparison of the top ten chief complaints for seeking treatment at a trauma center or CRPC.

Figure 6a:



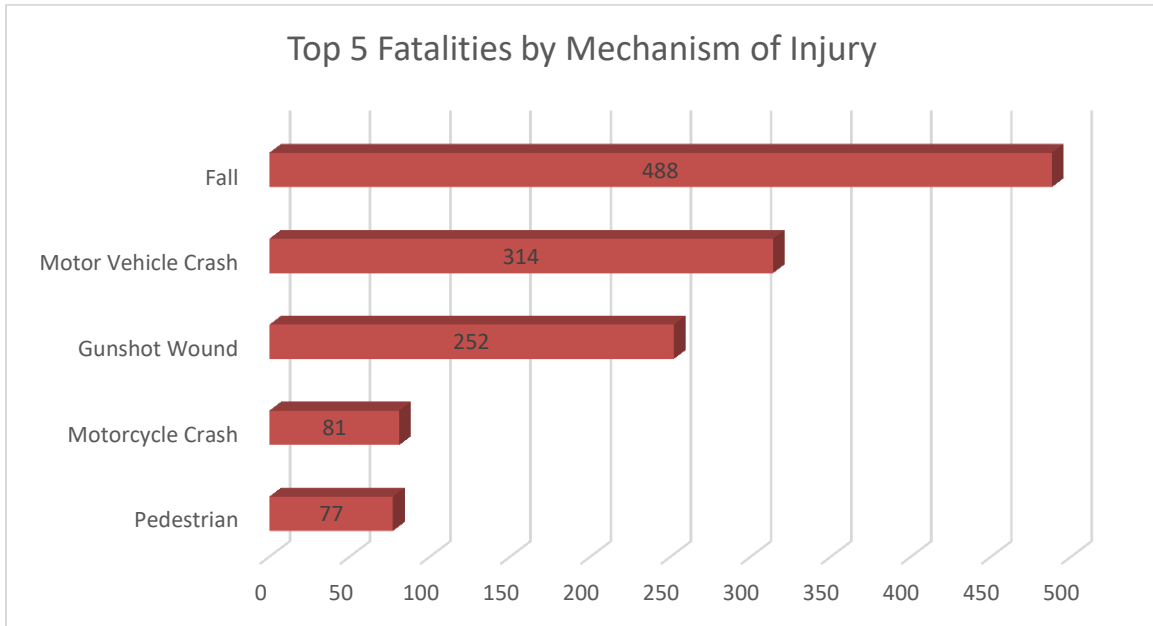
60% percent of patients seeking care from a trauma facility in 2018 were released back to their home while 12% were admitted into a nursing home upon hospital discharge. Approximately 4% of patients had an outcome of death.

Figure 6b:



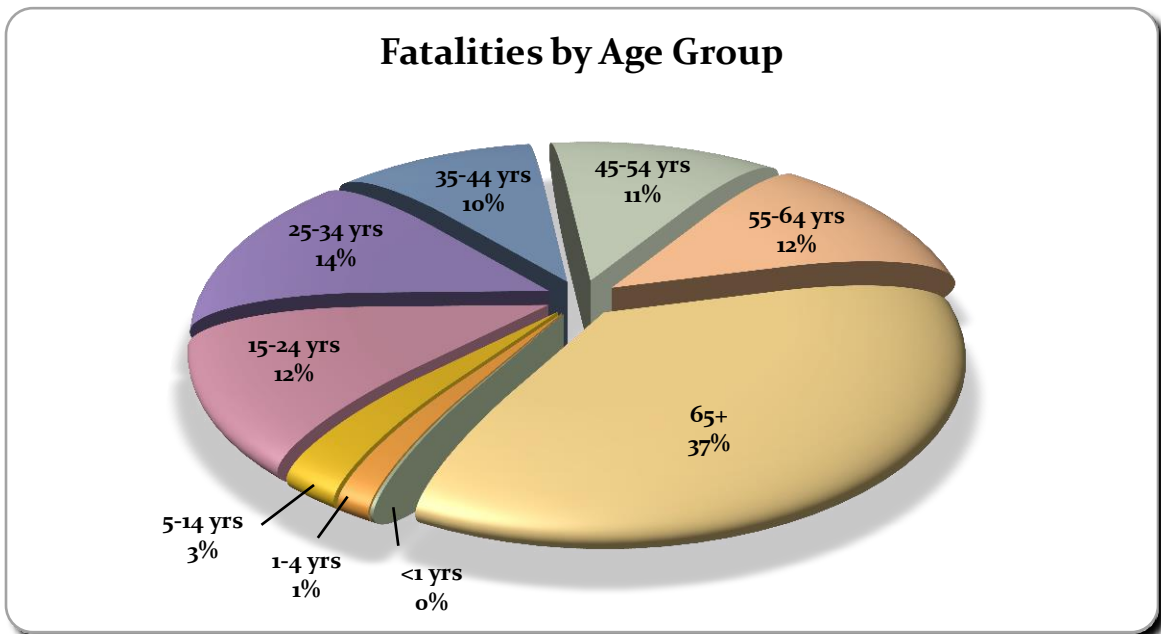
The majority of patients who met inclusion criteria for trauma registry submissions for 2018 were admitted to a floor bed based on their disposition from the Emergency Department.

Figure 7a:



Fatalities from falls, motorcycle and pedestrian injuries have increased from the previous year's totals. Fatalities involving motor vehicle crashes and gunshot wounds have decreased.

Figure 7b:



As the 65+ age group shows the largest percentage of injuries, it similarly experiences the largest percentage of fatal outcomes at approximately (37%).

Appendix III:
2018 Trauma Fund Distribution

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2018 – 1st QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,155,549.77	\$857,250.00	\$2,012,799.77
Lev I	Regional One Health	\$467,539.72	\$97,250.00	\$564,789.72
Lev I	Vanderbilt University Hospital	\$253,845.94	\$153,250.00	\$407,095.94
Lev I	Erlanger Medical Center - Baroness	\$119,652.17	\$153,250.00	\$272,902.17
Lev I	The University of Tennessee Med. Cntr.	\$110,599.02	\$102,250.00	\$212,849.02
Lev I	Johnson City Medical Center	\$42,626.54	\$72,500.00	\$115,126.54
Lev I	Wellmont Holston Valley Medical Ctr.	\$25,131.20	\$72,500.00	\$97,631.20
Lev II	TriStar Skyline Medical Center	\$45,405.19	\$37,750.00	\$83,155.19
PED	LeBonheur Children Medical Center	\$9,251.75	\$64,250.00	\$73,501.75
PED	East Tennessee Childrens Hospital	\$394.04	\$51,000.00	\$51,394.04
Lev II	Wellmont Bristol Regional Med. Ctr.	\$12,076.18	\$37,750.00	\$49,826.18
Lev III	TriStar Horizon Medical Center	\$4,852.93	\$15,500.00	\$20,352.93
	Methodist Healthcare-Memphis Hospitals	\$20,352.93		\$20,352.93
	Erlanger North Hospital	\$10,049.05		\$10,049.05
	Jackson-Madison Cnty. General Hospital	\$9,857.04		\$9,857.04
	Saint Thomas West Hospital	\$4,610.66		\$4,610.66
	TriStar Summit Medical Center	\$3,510.02		\$3,510.02
	TriStar Southern Hills Medical Center	\$3,435.32		\$3,435.32
	Tennova Healthcre - Lebanon	\$2,669.70		\$2,669.70
	Maury Regional Medical Center	\$2,351.47		\$2,351.47
	Tennova Healthcare Physicians Regional M C	\$2,111.31		\$2,111.31
	Williamson Medical Center	\$1,769.63		\$1,769.63
	Methodist Medical Center of Oak Ridge	\$1,681.23		\$1,681.23
	Sumner Regional Medical Center	\$1,026.01		\$1,026.01
	CHI Memorial Hospital Hixon	\$677.62		\$677.62
	Tennova Healthcare Harton Medical Center	\$73.12		\$73.12

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2018 – 2nd QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$844,417.03	\$857,250.00	\$1,701,667.03
Lev I	Regional One Health	\$309,509.47	\$97,250.00	\$406,759.47
Lev I	Vanderbilt University Hospital	\$215,536.01	\$153,250.00	\$368,786.01
Lev I	Erlanger Medical Center - Baroness	\$81,494.41	\$153,250.00	\$234,744.41
Lev I	The University of Tennessee Med. Cntr.	\$80,974.75	\$102,250.00	\$183,224.75
Lev I	Wellmont Holston Valley Medical Ctr.	\$22,667.72	\$72,500.00	\$95,167.72
Lev II	TriStar Skyline Medical Center	\$54,247.22	\$37,750.00	\$91,997.22
Lev I	Johnson City Medical Center	\$17,317.22	\$72,500.00	\$89,817.22
PED	LeBonheur Children Medical Center	\$10,134.94	\$64,250.00	\$74,384.94
PED	East Tennessee Childrens Hospital	\$332.95	\$51,000.00	\$51,332.95
Lev II	Wellmont Bristol Regional Med. Ctr.	\$7,012.86	\$37,750.00	\$44,762.86
Lev III	TriStar Horizon Medical Center	\$1,278.90	\$15,500.00	\$16,778.90
	Methodist Healthcare-Memphis Hospitals	\$16,778.90		\$16,778.90
	Erlanger North Hospital	\$8,301.61		\$8,301.61
	TriStar Summit Medical Center	\$4,805.70		\$4,805.70
	Baptist Memorial Hospital-Memphis	\$3,679.96		\$3,679.96
	LeConte Medical Center	\$2,693.45		\$2,693.45
	Maury Regional Medical Center	\$2,385.73		\$2,385.73
	Tennova Healthcare Physicians Regional M C	\$1,981.79		\$1,981.79
	Methodist Medical Center of Oak Ridge	\$1,753.12		\$1,753.12
	Saint Thomas West Hospital	\$1,530.32		\$1,530.32

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2018 – 3rd QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$799,768.26	\$857,250.00	\$1,657,018.26
Lev I	Regional One Health	\$307,064.98	\$97,250.00	\$404,314.98
Lev I	Vanderbilt University Hospital	\$214,403.62	\$153,250.00	\$367,653.62
Lev I	Erlanger Medical Center - Baroness	\$67,920.22	\$153,250.00	\$221,170.22
Lev I	The University of Tennessee Med. Cntr.	\$83,142.02	\$102,250.00	\$185,392.02
Lev I	Johnson City Medical Center	\$32,170.22	\$72,500.00	\$104,670.22
Lev I	Wellmont Holston Valley Medical Ctr.	\$26,632.36	\$72,500.00	\$99,132.36
Lev II	TriStar Skyline Medical Center	\$44,575.92	\$37,750.00	\$82,325.92
PED	LeBonheur Children Medical Center	\$4,941.01	\$64,250.00	\$69,191.01
PED	East Tennessee Childrens Hospital		\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$10,116.95	\$37,750.00	\$47,866.95
Lev III	TriStar Horizon Medical Center	\$2,143.49	\$15,500.00	\$17,643.49
	TriStar Summit Medical Center	\$5,652.56		\$5,652.56
	Methodist Medical Center of Oak Ridge	\$1,004.91		\$1,004.91

**FUNDS DISTRIBUTED TO TRAUMA CENTERS AND NON-TRAUMA CENTERS
FROM TENNESSEE TRAUMA FUND - FY2018 – 4th QUARTER DISTRIBUTION**

Level	Hospital Name	Hospital Specific Pool Payment	Readiness Costs	Total Hospital Distribution Payment
	TOTAL	\$1,023,649.90	\$888,250.00	\$1,911,899.90
Lev I	Vanderbilt University Hospital	\$328,222.12	\$153,250.00	\$477,316.85
Lev I	Regional One Health	\$349,028.60	\$97,250.00	\$440,327.49
Lev I	The University of Tennessee Med. Cntr.	\$108,950.93	\$102,250.00	\$209,589.58
Lev I	Erlanger Medical Center - Baroness	\$25,805.68	\$153,250.00	\$177,739.34
Lev II	TriStar Skyline Medical Center	\$77,770.31	\$37,750.00	\$114,656.40
Lev I	Wellmont Holston Valley Medical Ctr.	\$23,353.69	\$72,500.00	\$95,337.53
Lev I	Johnson City Medical Center	\$19,432.07	\$72,500.00	\$91,308.59
PED	LeBonheur Children Medical Center	\$6,423.25	\$64,250.00	\$70,577.49
PED	East Tennessee Childrens Hospital		\$51,000.00	\$51,000.00
Lev II	Wellmont Bristol Regional Med. Ctr.	\$8,458.12	\$37,750.00	\$46,012.04
Lev III	TriStar Summit Medical Center	\$3,292.76	\$15,500.00	\$34,183.21
Lev III	TriStar Horizon Medical Center	\$2,663.67	\$15,500.00	\$18,122.12
Lev III	TriStar Stonecrest Medical Center	\$1,102.78	\$15,500.00	\$16,602.78
	Methodist Healthcare-Memphis Hospitals	\$16,602.78		\$16,602.78
	Jackson-Madison Cnty. General Hospital	\$6,648.14		\$6,648.14
	Methodist Hospital-North	\$6,417.43		\$6,417.43
	Baptist Memorial Hospital-Memphis	\$5,970.10		\$5,970.10
	Saint Thomas West Hospital	\$4,658.43		\$4,658.43
	Tennova Healthcare Physicians Regional M C	\$4,084.05		\$4,084.05
	Maury Regional Medical Center	\$3,893.97		\$3,893.97
	Methodist Medical Center of Oak Ridge	\$3,474.40		\$3,454.92
	TriStar Southern Hills Medical Center	\$3,072.93		\$3,072.93
	Cookeville Regional Medical Center	\$2,285.01		\$2,285.01
	CHI Memorial Hospital Chattanooga	\$2,213.72		\$2,213.72
	Henry County Medical Center	\$2,086.61		\$2,086.61
	LeConte Medical Center	\$1,643.93		\$1,643.93
	Parkwest Medical Center	\$1,461.24		\$1,461.24
	Erlanger North Hospital	\$1,426.38		\$1,426.38
	Morristown-Hamblen Healthcare System	\$1,389.60		\$1,389.60
	Williamson Medical Center	\$608.55		\$608.55
	Blount Memorial Hospital	\$608.37		\$608.37
	Parkridge Medical Center	\$528.52		\$528.52
	Saint Francis Hospital-Bartlett	\$49.30		\$49.30
	Indian Path Medical Center	\$22.47		\$22.47

Appendix IV:

Research Publications

1. Katsuura Y, Lorenz E, Gardner W 2nd. Anatomic parameters of the sacral lamina for osteosynthesis in transverse sacral fractures. *Surg Radiol Anat.* 2018 May;40(5):521-8. doi: 10.1007/s00276-017-1955-3. Epub 2017
2. Moses RA, Selph JP, Voelzke BB, Piotrowski J, Eswara JR, Erickson BA, Gupta S, Dmochowski RR, Johnsen NV, Shridharani A, et al; from the Trauma and Urologic Reconstruction Network of Surgeons (TURNS). An American Association for the Surgery of Trauma (AAST) prospective multi-center research protocol: outcomes of urethral realignment versus suprapubic cystostomy after pelvic fracture urethral injury. *Transl Androl Urol.* 2018 Aug;7(4):512-520. doi: 10.21037/tau.2017.11.07. PMID: 30211041
3. Burlew CC, Sumislowski JJ, Behnfield CD, McNutt MK, McCarthy J, Sharpe JP, Croce MA, Bala M, Kashuk J, Spalding MC, Beery PR, John S, Hunt DJ, et al. Time to stroke: A WTA multicenter study of blunt cerebrovascular injuries. *J Trauma Acute Care Surg.* 2018 Nov;85(5):858-866. Doi:10.1097/TA0000000000001989. PMID: 29847537.
4. Katsuura Y, Chang E, Sabri SA, Gardner WE, Doty JF. Anatomic parameters for instrumentation of the sacrum and pelvis: a systematic review of the literature. *J Am Acad Orthop Surg Glob Res Rev.* 2018 Aug 2;2(8):e034. doi: 10.5435/JAAOSGlobal-D-18-0003. PMID: 30631829. PMCID: PMC6286901.
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