Annual Trauma Report

2023

Tristate Trauma Coalition Annual Report 2023

The Tristate Trauma Coalition (TSTC) is a group of multidisciplinary agencies and organizations which collaborate to serve the community by improving patient outcomes and providing a forum for health care facilities and systems, emergency medical services, and community partners to work together to improve the care of the injured patient. The mission to enhance the care of the injured patient is achieved through collection and analysis of data from hospitals in the region, providing quality professional trauma education, and convening stakeholders to collaborate. The TSTC receives trauma data from 25 hospital members. The Health Collaborative (THC) is the convener, Regional Trauma Organization, and trauma education program manager for the TSTC.

The 2023 Annual Report of the Tristate Trauma Coalition contains data from local trauma centers and hospitals that treat trauma-related injuries in the Tristate Region of southwest Ohio, northern Kentucky, and southeast Indiana. The data were reported in the 2023 calendar year (CY2023). All trauma facilities in the State of Ohio are required to submit trauma patient data to the State of Ohio EMS/Trauma Data Registry on a quarterly basis. As the Regional Trauma Organization for the TSTC, THC submits quarterly data to the State on behalf of certified trauma centers. This report is reflective of aggregate trauma data and covers 13,115 records of patients treated across the region for CY2023. Current and historical data presented in this report were extracted from ESO TraumaBase system in April 2024. The accuracy of these data is reliant on manual entry at the facility delivering care. The visuals included in this report represent the aggregated regional data as queried, without statistical analysis performed. Duplicates occur in the data set when patients are transferred between trauma facilities. These duplicates are not removed from the data used in this report. Unless otherwise indicated, figures and tables in this report represent data reported in CY2023.

Data collected in the trauma registry must meet certain ICD-10 rules to be considered a traumatic injury. The Ohio Trauma Registry defines the trauma population as injured patients who are admitted to a facility, transferred to a higher level of care, or expired. Some variation in this definition will depend on inclusion criteria from the region, state or national dictionary. The mechanism of injury or cause code indicates how the patient became injured, such as a motor vehicle accident, fall, or assault. The cause code is captured for each patient which then defines the classification for the type of injury. The types of traumatic injury with brief examples include:

- Blunt –falls, vehicular impact with impalement, blunt for trauma with non-sharp object (e.g., fist, bat)
- Penetrating –gunshot wounds, stab wounds, dog bites, impalement, punch/fall through glass resulting in deep penetration
- Thermal –thermal burns, chemical burns, hypothermia
- Asphyxial – smoke inhalation, suffocation, drowning
- NA/Other – envenomation, human bites, overexertion resulting in injury

Each state has a Data Dictionary that outlines which data fields are required to be completed for state submission. The State of Ohio requires the following fields:

Hospital Code
Unique Admission Number
Trauma Tracking Number
Facility Type
Transport Agency
EMS Dispatch Date
EMS Dispatch Time
EMS Unit Arrival Date at Scene or Transferring Facility
EMS Unit Arrival Time at Scene or Transferring Facility
EMS Unit Departure Date From Scene or Transferring Facility
EMS Unit Departure Time From Scene or Transferring Facility
Initial Field Systolic Blood Pressure
Initial Field Pulse Rate
Initial Field Respiratory Rate
Initial Field Oxygen Saturation
Initial Field GCS Eye
Initial Field GCS Verbal
Initial Field GCS Motor
Initial Field GCS Total
Initial Field GCS Qualifier
Scene Interventions
Transferring Hospital Code
ED Discharge Order Written Date
ED Discharge Order Written Time
ED Transfer to Hospital
Procedure Episode
DNR Status
Injury Severity Score
Hospital Discharge Order Written Date
Hospital Discharge Order Written Time
Inpatient Transfer To Hospital
Discharge Status
Date of Death
Autopsy Performed

Acronym Guide

DNR: Do Not Resuscitate
ED: Emergency Department
EMS: Emergency Medical Service
GCS: Glasgow Coma Scale
ICD-10: International Classification of Diseases, Tenth Revision
ICU: Intensive Care Unit
ISS: Injury Severity Score
NA: Not Applicable
OR: Operating Room

Level 1 Trauma Centers
UC Health – University of Cincinnati Medical Center
Cincinnati Children's Hospital Medical Center

Level 3 Trauma Centers
Atrium Medical Center
Kettering Ft. Hamilton Hospital
Tri-Health Bethesda North Hospital
UC Health – West Chester Hospital

TSTC Non-Trauma Facilities	
Adams County Regional Medical Center	The Christ Hospital
Cincinnati Children's Hospital Medical Center – Liberty Campus	The Christ Hospital Liberty
Clinton Memorial Hospital	TriHealth Bethesda Arrow Springs
Mercy Health Anderson Hospital	TriHealth Bethesda Butler
Mercy Health Clermont Hospital	TriHealth Good Samarian Hospital
Mercy Health Fairfield Hospital	TriHealth Good Samaritan Western Ridge
Mercy Health Harrison Hospital	TriHealth McCullough-Hyde Hospital
Mercy Health Jewish Hospital	
Mercy Health Mt. Orb Medical Center	
Mercy Health Rookwood Medical Center	
Mercy Health Queen City Medical Center	
Mercy Health West Hospital	

Observations

The population of the Tristate is approximately 2.27 million based upon the 2022 census[1]. Over the past 5 years, reported traumatic injuries continue to rise. The data indicate that most traumatic injuries consistently occur between the months of May and October. The top five causes for traumatic injury, after falls, are motor vehicle crash, struck by or against, gunshot, motorcycle crash, and organized sport. The top five causes of death from traumatic injury are suffocation, gunshot, near drowning, motor vehicle crash, and burn. Patients 60 years of age or older represent 48% of traumatic injuries as well as 51.2% of fatalities. The percentage of trauma patients by gender has remained relatively stable and balanced. Most trauma patients that present to the emergency department were either admitted to the floor, held for observation or in a step-down unit. For the past 5 years, the injury severity scores (ISS) have remained consistently under 10. The data illustrates that most traumatic injuries presenting to the hospital are minor. The wait time to transfer an ED patient to another facility is noted as greater than 4 hours and rose 3% over the past three years.

Regional Opportunities for Improvement

The data queried for CY2023 identify an opportunity. Falls continue to lead traumatic injuries at 61%. With patients 64 years and older having the most traumatic injuries, these data indicate that investigation of interventions, such as fall prevention programs could have benefit in the region. Gun shot wounds and motor vehicle crashes are listed as one of the top 5 causes for traumatic injury. Although Falls leads the percentage of traumatic injury, gun shot wounds (14.%) and motor vehicle crashes (4.9%) have a higher incident of death as an outcome.

Acknowledgements

This report would not be possible without the expertise and hard work of the TSTC hospitals' registrars.

1- https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-metro-and-micro-statistical-areas.html

TRAUMA CASES PER 100,000 POPULATION BY INJURY ZIP CODE

Only Zip Codes >10 Trauma Cases displayed.

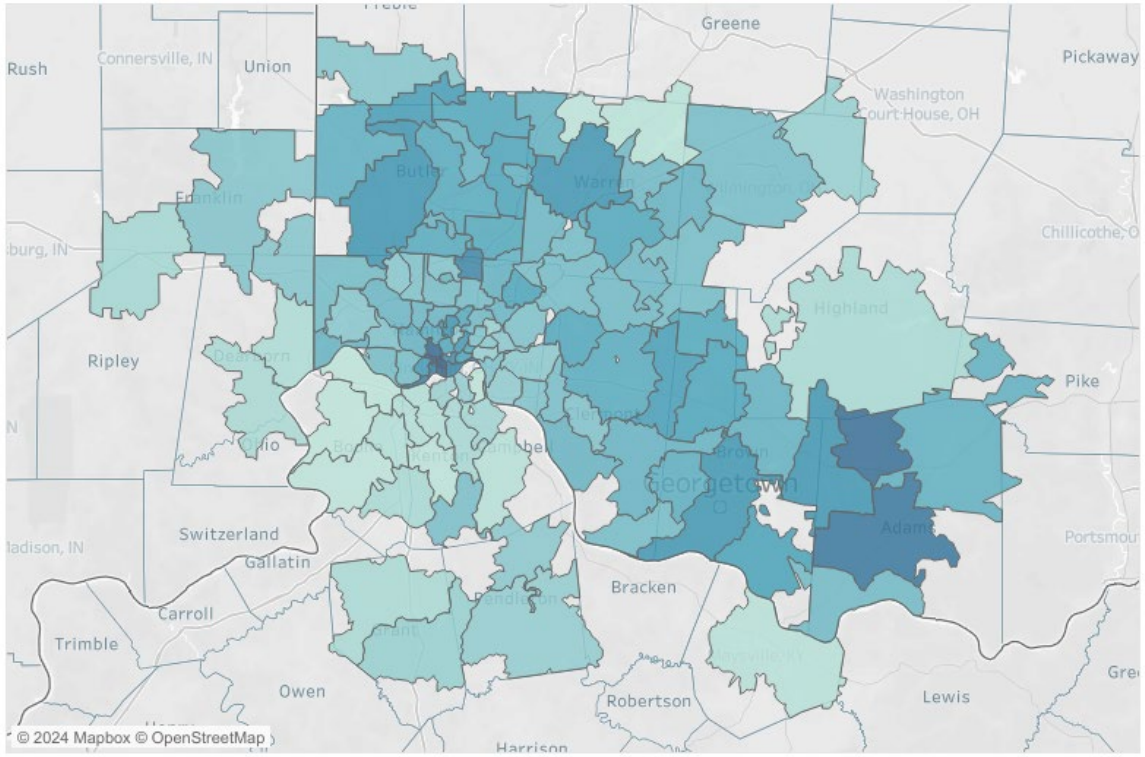


Figure 1: **TRAUMA CASES PER PER 100,000 POPULATION BY INJURY ZIP CODE** displays a map of reported trauma cases in the Tristate Trauma Coalition by the reported zip code where the injury occured. The color of the shaded zip codes changes from lighter to darker as the rate or trauma cases per 100,000 population increases for 2023.

In addition to serving patients within Adams, Butler, Clermont, Hamilton, and Warren counties, TSTC hospitals frequently treat individuals injured outside these regions. This map shows significant patient inflow from areas such as the City of Cincinnati and Adams County, highlighting the critical role TSTC hospitals play in addressing traumatic injuries across a broader geographic area.

TRAUMA PATIENT VOLUME BY CALENDAR YEAR

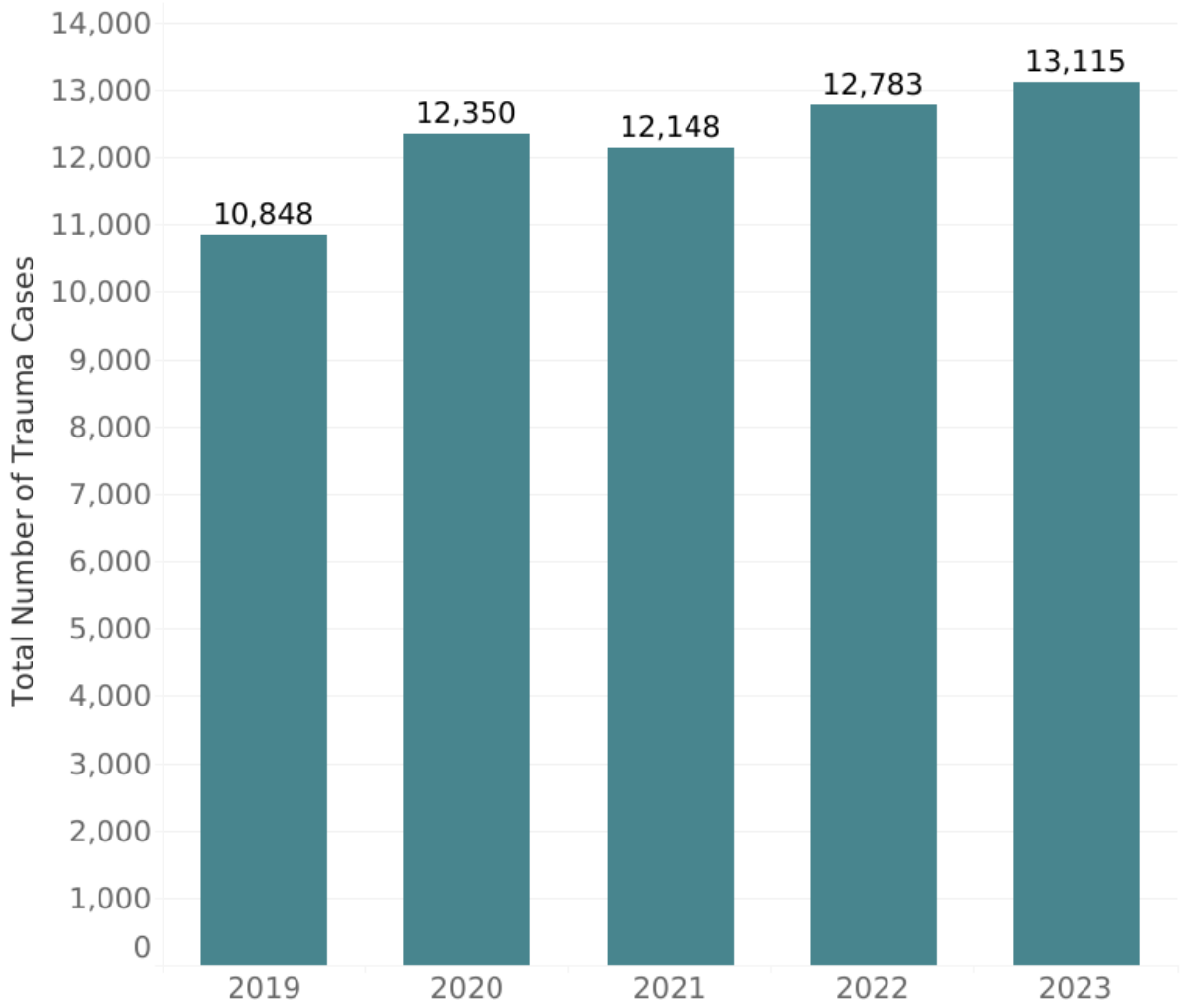
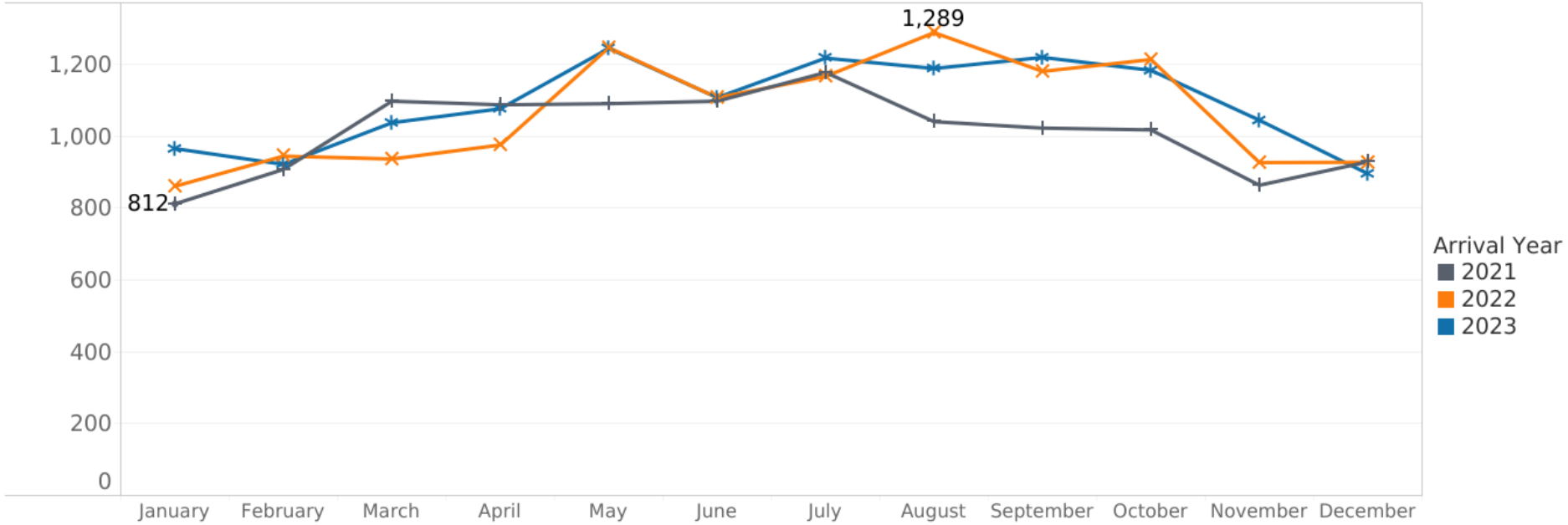


Figure 2: **TRAUMA PATIENT VOLUME BY CALENDAR YEAR** displays the total number of reported trauma cases in the Tristate Trauma Coalition from January 1, 2019 to December 31, 2023.

Trauma patient volume has increased over the past five years as illustrated in Figure 2. This increase aligns with the Cincinnati-KY-IN Metropolitan area's population growth from 2.24 million in 2020 to 2.27 million in 2023.[1]

TRAUMA VOLUMES BY ARRIVAL MONTH

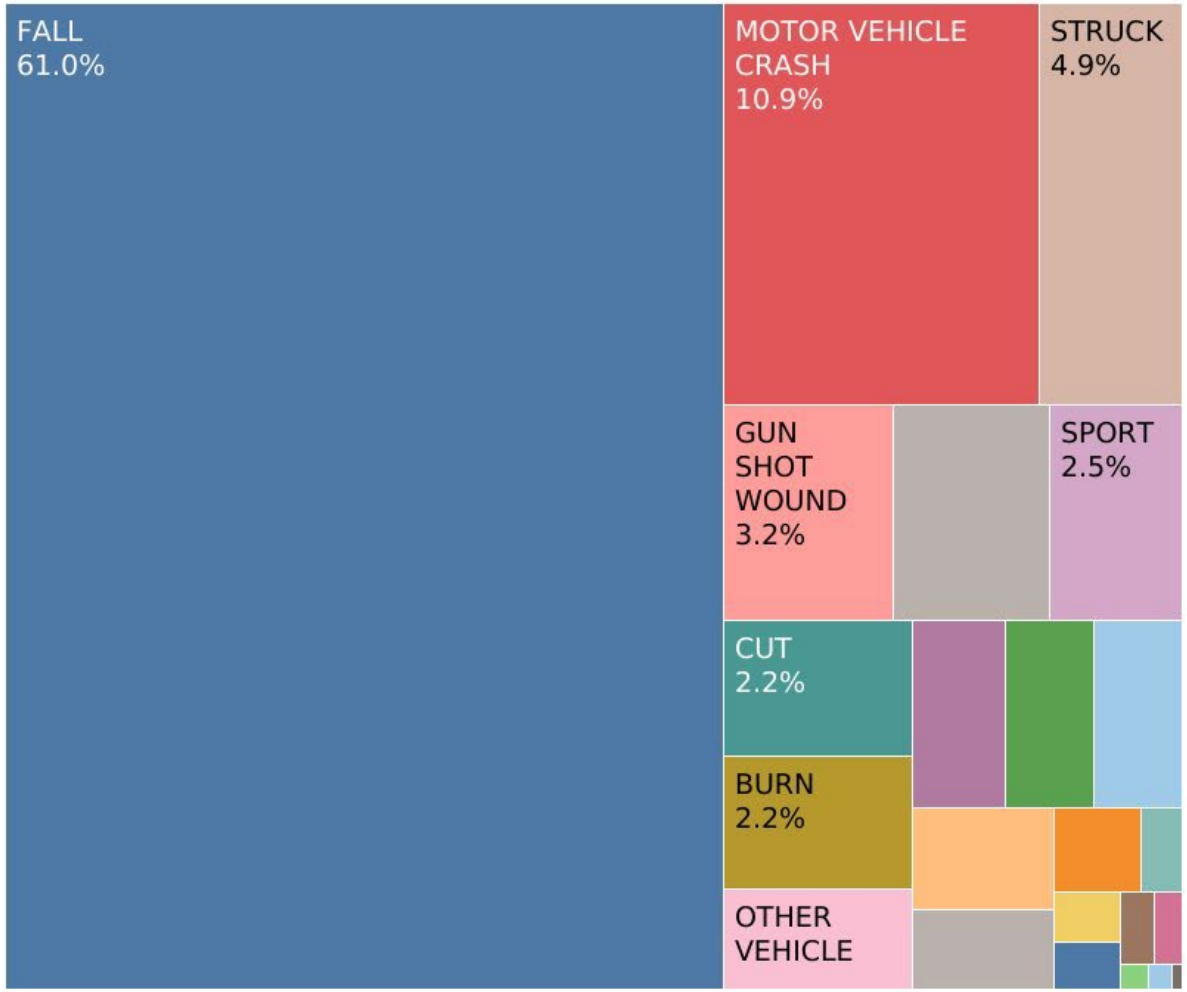


	January	February	March	April	May	June	July	August	Septemb..	October	November	December
2021	812	908	1,098	1,088	1,091	1,098	1,178	1,041	1,023	1,018	864	929
2022	861	945	937	976	1,247	1,108	1,167	1,289	1,181	1,214	927	928
2023	966	922	1,038	1,077	1,245	1,108	1,218	1,189	1,220	1,184	1,045	896

Figure 3: **TRAUMA VOLUMES BY ARRIVAL MONTH** displays line graphs of reported trauma cases in the Tristate Trauma Coalition by month for years 2021 through 2023. The highest and lowest volumes during the three year period are labeled on the chart. The bottom of the chart displays a table with the values listed in the line graphs.

As shown in Figure 3, May through October continues to have the highest number of traumatic injuries.

PERCENT OF TRAUMA CASES BY CAUSE IN 2023



FALL	61.0%
MOTOR VEHICLE CRASH	10.9%
STRUCK	4.9%
GUN SHOT WOUND	3.2%
MOTORCYCLE CRASH	2.9%
SPORT	2.5%
CUT	2.2%
BURN	2.2%
OTHER VEHICLE	1.6%
PEDESTRIAN	1.5%
BICYCLE	1.4%
ANIMAL	1.4%
ASSAULT	1.3%
NOT DEFINED	1.0%
MACHINE	0.6%
DROWNING	0.3%
CRUSH	0.3%
SUFFOCATION	0.3%
STAB	0.2%
OTHER	0.2%
BITING	0.1%
INHAL	0.0%

Figure 4: **PERCENT OF TRAUMA CASES BY CAUSE IN 2023** visualizes the relative volume of trauma cases in the Tristate Trauma Coalition by cause in a tree map for calendar year 2023. The table to the left of the tree map displays the percentage of trauma cases by cause.

Figure 4 indicates Fall is the highest leading cause for traumatic injury at 61% for the TSTC area followed by Motor Vehicle Crashes at 10.9%.

FIVE TRAUMA CAUSES MOST LIKELY TO HAVE DEATH AS THE OUTCOME

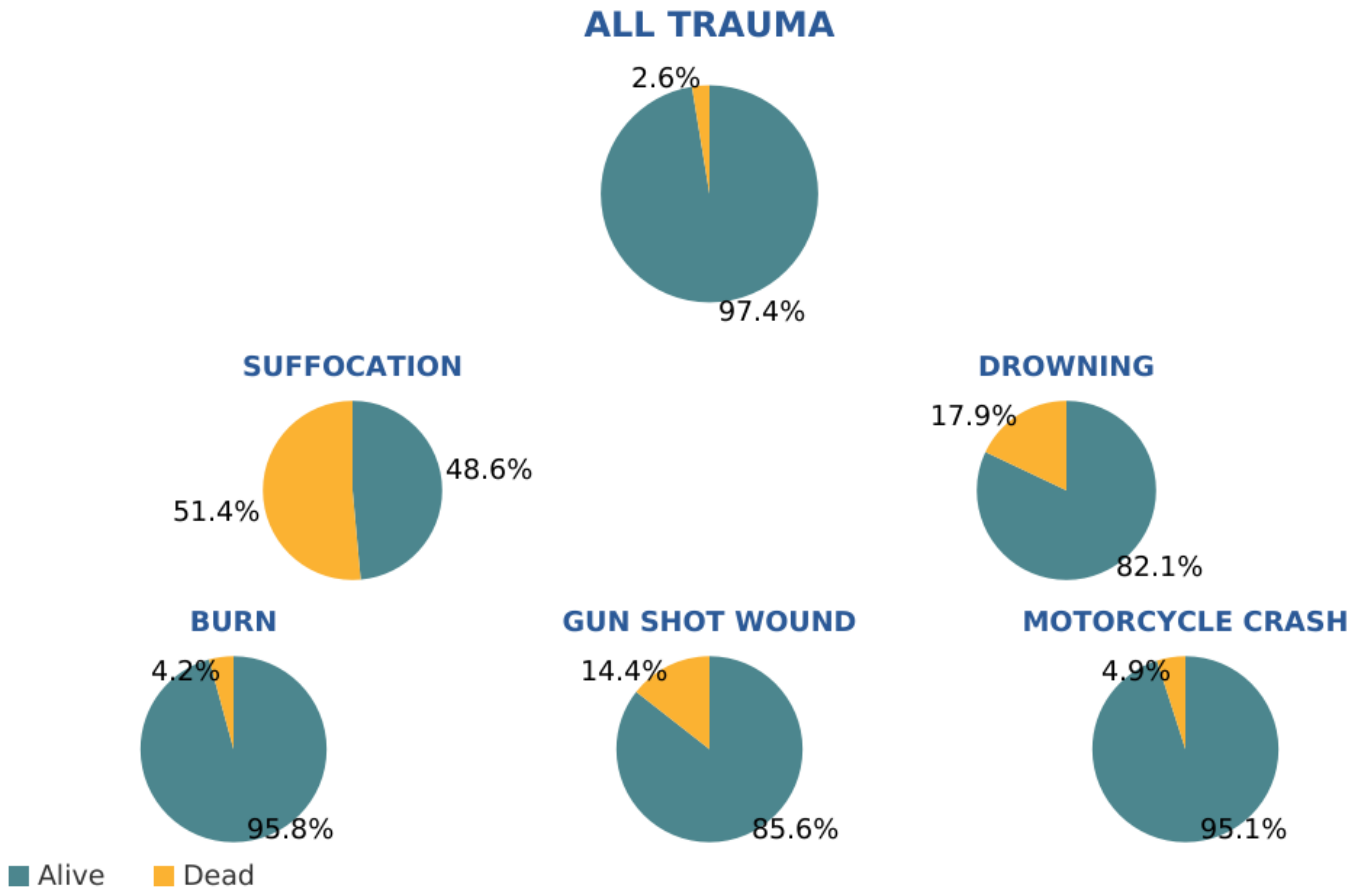


Figure 5: **FIVE TRAUMA CAUSES MOST LIKELY TO HAVE DEATH AS THE OUTCOME** displays a pie chart with the percentages of Alive or Dead outcomes for the top five causes of trauma related deaths for calendar year 2023.

Although falls account for 61% of trauma cases (Figure 4), they are not among the top 5 causes of death (Figure 5). In contrast, suffocation, drowning, gun shot wound, motor vehicle crash, and burns, which each constitute less than 2% of trauma cases, have a higher likelihood of resulting in death compared to falls.

AVERAGE ISS SCORE

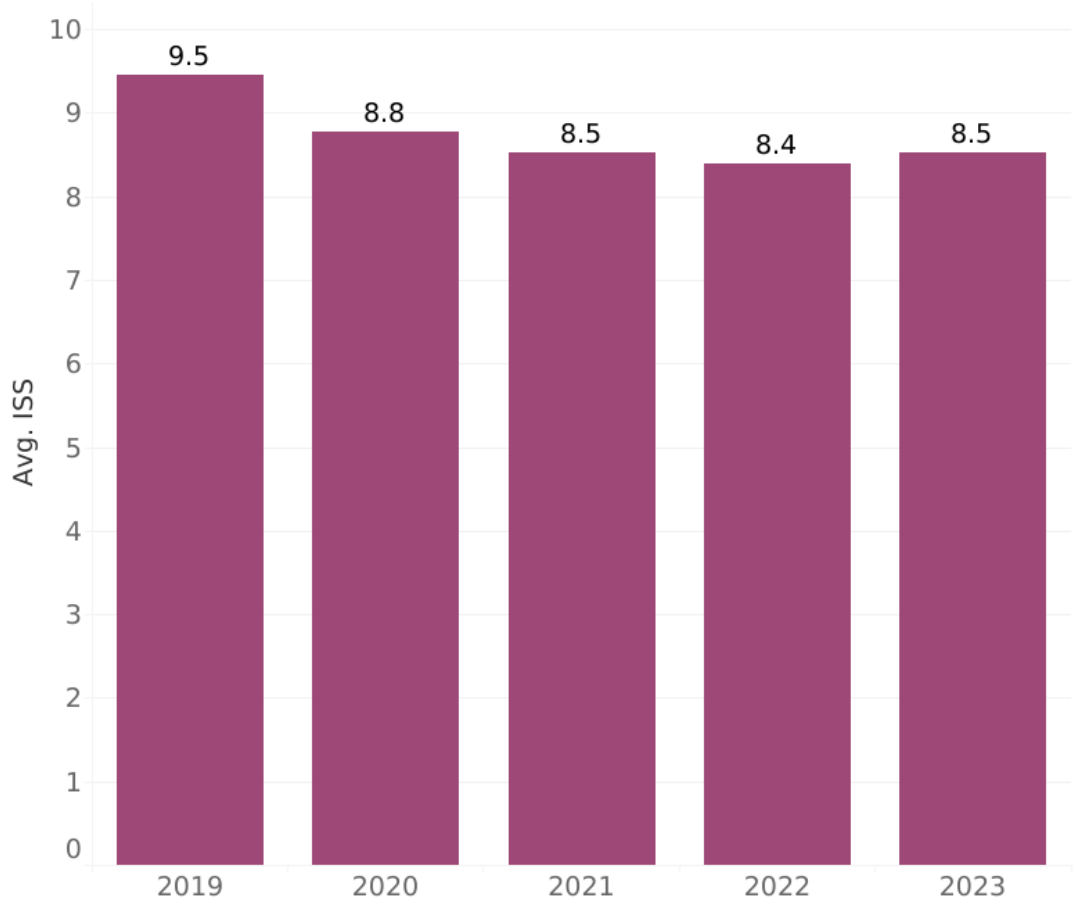


Figure 6: **AVERAGE ISS** displays a line graph of the average ISS scores for reported trauma cases in the Tristate Trauma Coalition for years 2019 through 2023.

AVERAGE ISS SCORE BY CAUSE

Cause Code Description	2019	2020	2021	2022	2023
SUFFOCATION	18	19	20	15	16
PEDESTRIAN	14	16	17	16	16
MOTORCYCLE CRASH	14	15	15	14	15
GUN SHOT WOUND	15	14	14	13	14
DROWNING	11	16	12	16	13
MOTOR VEHICLE CRASH	13	13	13	13	13
OTHER VEHICLE	9	9	11	10	9
INHAL				1	11
BICYCLE	8	8	8	10	8
ASSAULT			17	9	8
FALL	9	8	8	8	8
NOT DEFINED			18	7	7
STRUCK	8	7	6	5	6
MACHINE	9	5	5	6	6
CRUSH			3	5	6
OTHER	6	5	5	5	4
BURN	4	5	4	4	3
CUT	5	4	4	4	4
SPORT				4	4
STAB				4	3
ANIMAL			1	2	3
BITING				2	2

Table 1: **AVERAGE ISS SCORE BY CAUSE** shows a table of the average ISS scores for reported trauma cases in the Tristate Trauma Coalition for years 2019 through 2023 with the highest average ISS scores listed at the top of the table.

The ISS score is the Injury Severity Score. ISS standardizes severity of traumatic injury based on worst injury of 6 body systems. The higher the ISS Score, the more severe the injury. Figure 6 shows the average ISS score for the Tristate Trauma Coalition is consistently under 10. Table 1 displays the average ISS score by cause over the past five years.

PERCENT (%) OF TRAUMA FATALITIES BY AGE GROUP

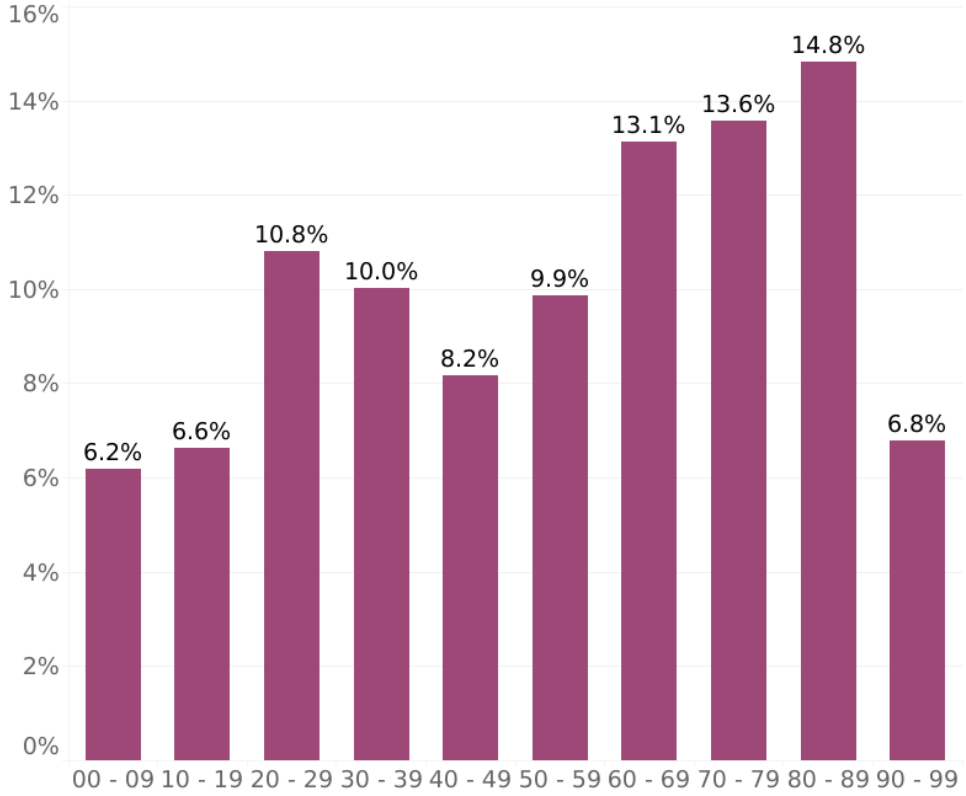


Figure 7: **% OF TRAUMA FATALITIES BY AGE GROUP** displays the percentage of reported trauma cases in the Tristate Trauma Coalition with death as the outcome by 10-year age categories for calendar year 2023.

PERCENT (%) OF TOTAL TRAUMA BY AGE GROUP

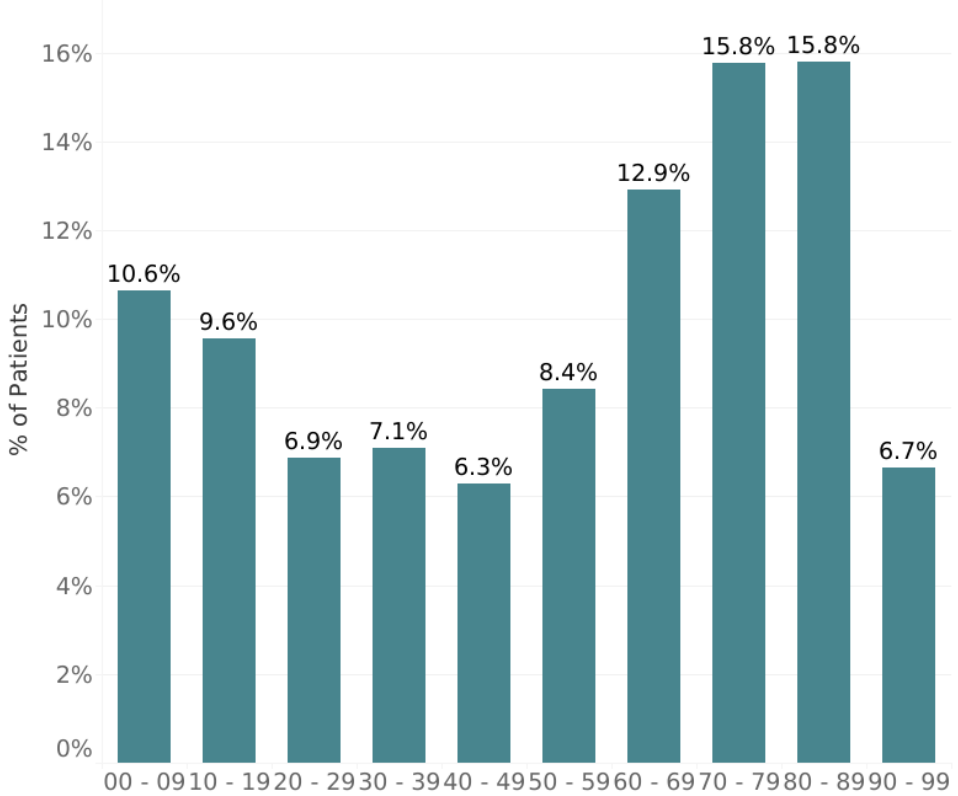


Figure 8: **% OF TOTAL TRAUMA BY AGE GROUP** displays the percentage of the total reported trauma cases in the Tristate Trauma Coalition by 10-year age categories for calendar year 2023.

Figures 7 and 8 illustrate there is a higher percentage of traumatic injuries in patients over 60 years of age resulting in fatalities.

TRAUMA BY SEX

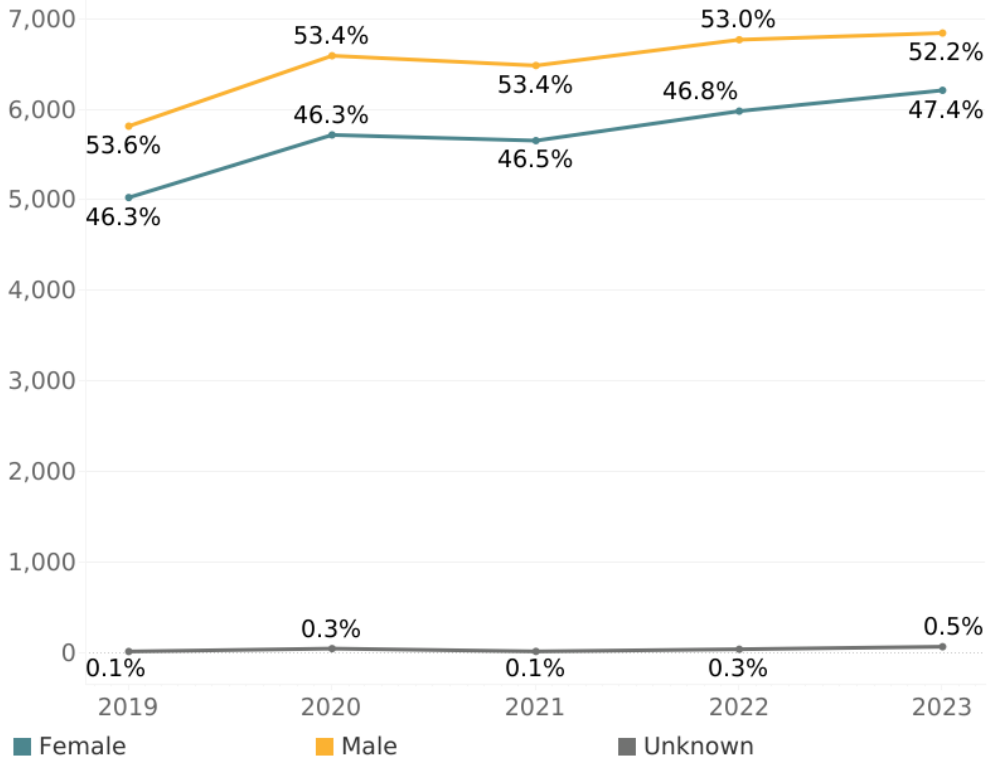


Figure 9: **TRAUMA BY SEX** displays trend lines of total reported trauma cases in the Tristate Trauma Coalition by sex for years 2019 to 2023. The left axis displays the volume of trauma cases and the year is identified along the bottom axis. Labels within the graph represent the percentage of cases by sex per calendar year.

PERCENT (%) OF TRAUMA PATIENTS BY RACE AND SEX

Race Description	Sex Description	
Black or African American	**Female**	4.5%
	Male	8.1%
	Unknown	0.0%
	Total	12.6%
White	**Female**	41.4%
	Male	41.2%
	Unknown	0.3%
	Total	83.0%
All Other Races	**Female**	1.5%
	Male	2.8%
	Unknown	0.1%
	Total	4.4%
Grand Total		100.0%

Table 2: **PERCENT OF TRAUMA PATIENTS BY RACE AND SEX** displays a table of percentages of reported trauma cases in the Tristate Trauma Coalition by race and sex for calendar year 2023. Race Descriptions for 'Black or African American' and 'White' are displayed. All other races have been combined into a single description, 'All Other Races.'

The overall trauma rates by gender have remained stable over the past five years, with only minor fluctuations as shown in Figure 9. Table 2 indicates that among Black individuals, males experience a higher incidence of traumatic injuries compared to females. In contrast, among White individuals, both females and males have similar rates of traumatic injuries.

COUNT OF PATIENTS BY DISPOSITION UPON DISCHARGE

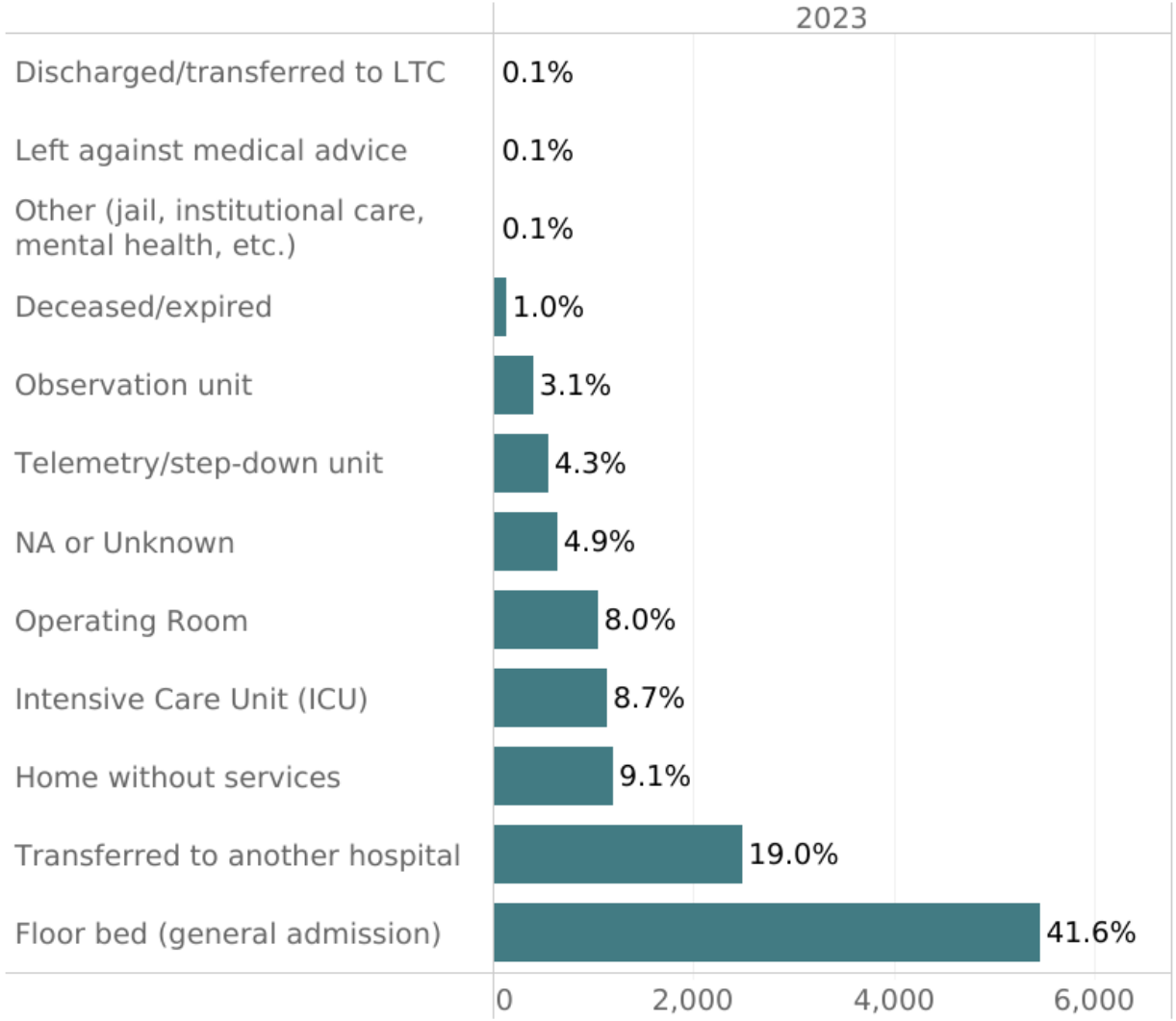


Figure 10: **COUNT OF PATIENTS BY DISPOSITION UPON DISCHARGE** displays a bar chart of reported trauma cases in the Tristate Trauma Coalition by discharge disposition for 2023.

As shown in Figure 10, most trauma patients, upon discharge from the emergency room, are transferred to a hospital bed while 19% are transferred to another hospital.

TRAUMA CASES ADMITTED TO A HOSPITAL

*Non-admitted Emergency Department discharge dispositions are excluded from this display.

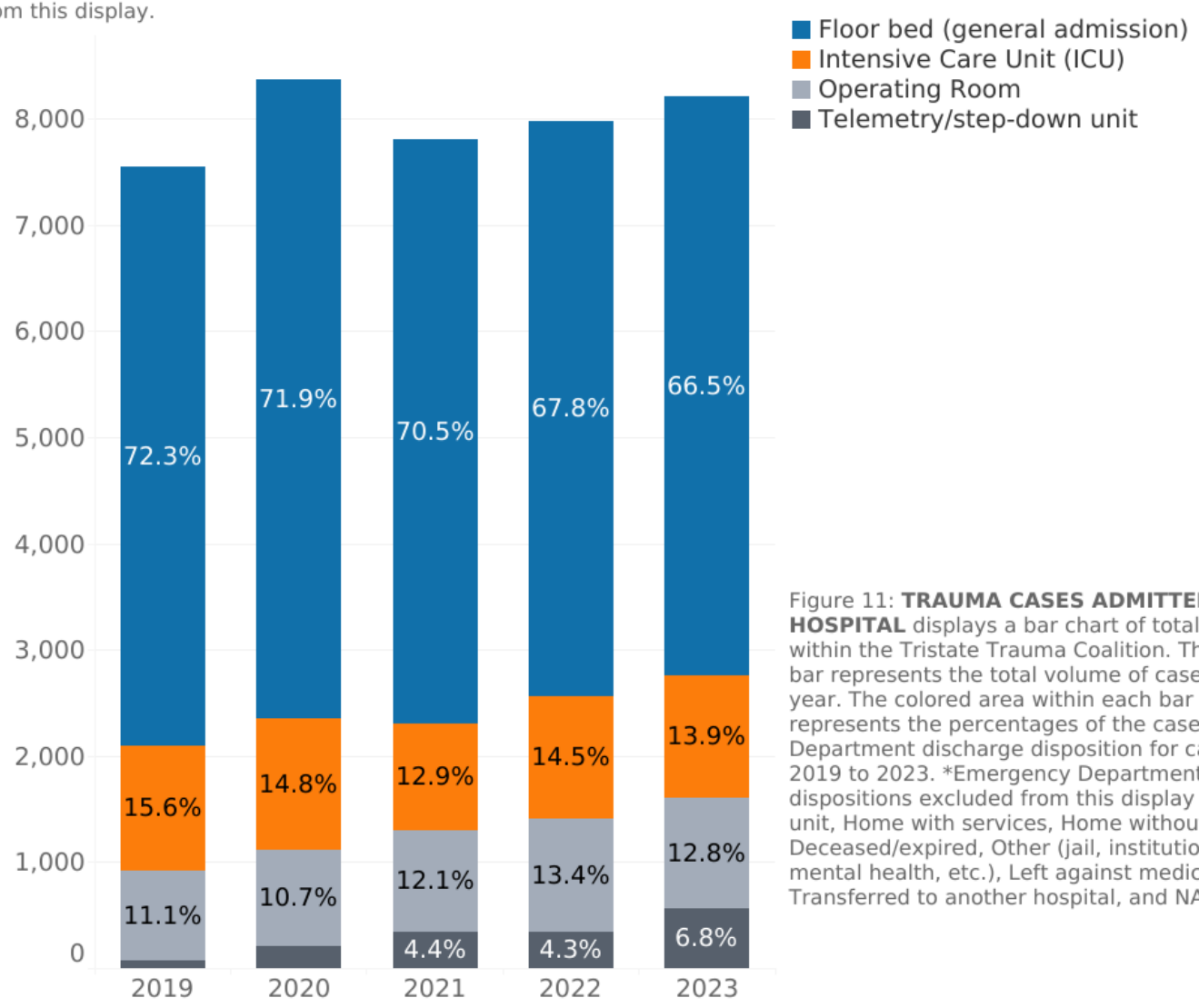


Figure 11: **TRAUMA CASES ADMITTED TO A HOSPITAL** displays a bar chart of total trauma cases within the Tristate Trauma Coalition. The height of the bar represents the total volume of cases per calendar year. The colored area within each bar chart represents the percentages of the cases by Emergency Department discharge disposition for calendar years 2019 to 2023. *Emergency Department discharge dispositions excluded from this display are Observation unit, Home with services, Home without services, Deceased/expired, Other (jail, institutional care, mental health, etc.), Left against medical advice, Transferred to another hospital, and NA or unknown.

As shown in Figure 9, most trauma patients admitted for the past 5 years to the hospital from the emergency room are transferred to the floor for general admission. An average of 14% are taken to intensive care, and an average of 12% are taken to the operating room.

LENGTH OF TIME IN THE EMERGENCY DEPARTMENT PRIOR TO TRANSFER TO A DIFFERENT HOSPITAL

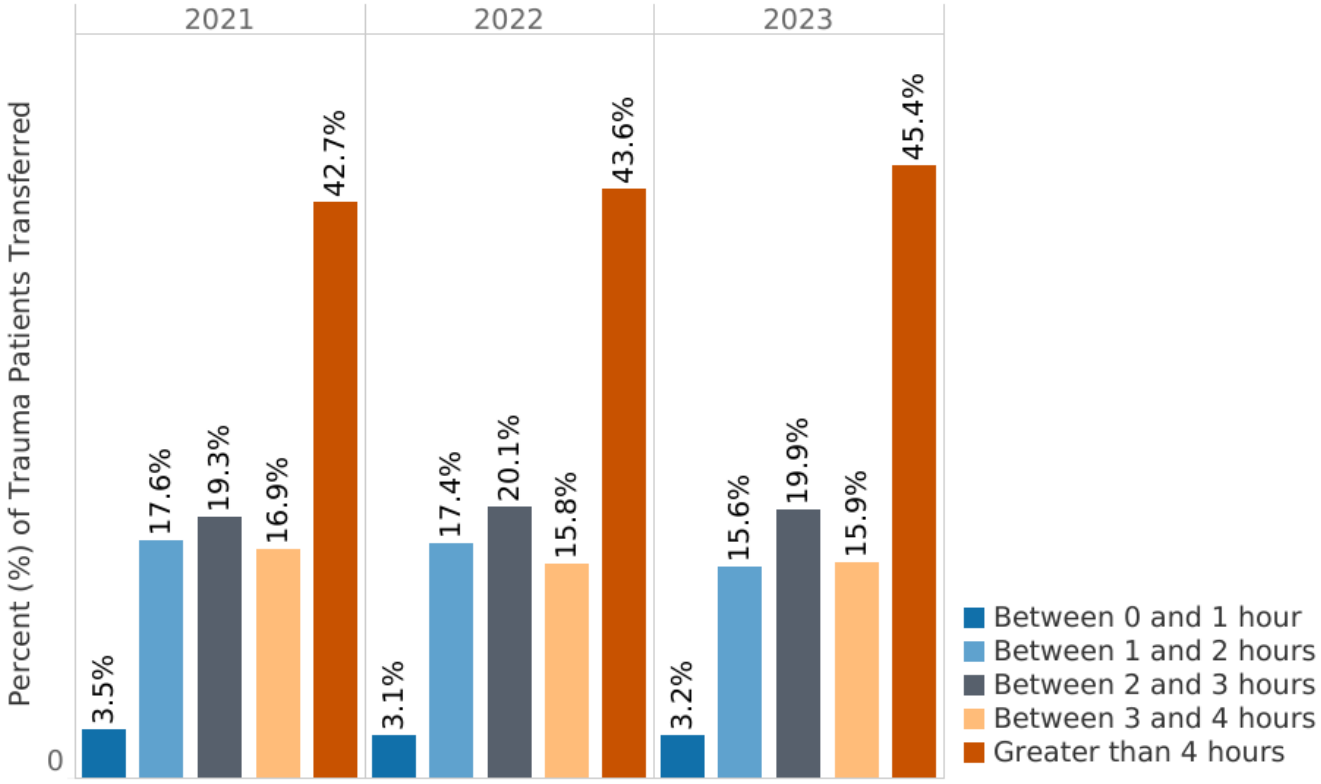


Figure 12: **LENGTH OF TIME IN THE EMERGENCY DEPARTMENT PRIOR TO TRANSFER TO A DIFFERENT HOSPITAL** categorizes the percentage of patients by wait time waited before being transferred from the Emergency Department to a different facility for years 2021 through 2023. Transfers to different facilities are often to a higher level of care.

Over the past three years, the emergency room wait time for transfers to higher levels of care has increased. As shown in Figure 10, 19% of trauma patients were transferred to a higher level of care, of that, the 45.4% waited more than 4 hours for that transfer in 2023.

Trauma Education

The Health Collaborative partners with the regional trauma centers and hospitals to provide comprehensive clinical continuing education for emergency and critical care staff. Trauma education courses include Advanced Trauma Life Support (ATLS), Emergency Nursing Pediatric Course (ENPC), and Trauma Nursing Core Course (TNCC). Each of these courses are taught by seasoned nurse educators and physicians from regional trauma centers and hospitals. Courses are held at Cincinnati Children's Simulation Lab at Vernon Place and Mercy Health Fairfield HealthPlex.

The Health Collaborative provided education to attending physicians, nurses, physician assistants, resident physicians, respiratory therapists, and transportation staff from Atrium Medical Center, Cincinnati Children's Hospital Medical Center, Bethesda North, Good Samaritan Hospital, Mercy Health Hospitals, UC Health, St. Elizabeth, Team Health, Davis Health System, University of Louisville, Preferred Physicians, Riley's Children's Hospital, Edward Hospital, Tennova, Indiana University, SCP Health, Duke's Memorial Hospital, Wright Patterson AFB, and KG Physicians.

In 2023, there were a total of 338 medical professionals educated in 12 classes. Of those, 156 received TNCC, 134 received ATLS training, and 48 received ENPC.