



ARIZONA DEPARTMENT
OF HEALTH SERVICES

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BUREAU OF EMERGENCY MEDICAL SERVICES AND TRAUMA SYSTEM

STATE TRAUMA ADVISORY BOARD

2021 ANNUAL REPORT



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The Arizona Department of Health Services' Bureau of Emergency Medical Services and Trauma System (BEMSTS) wishes to acknowledge the continued hard work and dedication of all the individuals involved in working to understand, prevent, and treat traumatic injury.

Special thanks are extended to the members of the State Trauma Advisory Board, Trauma and EMS Performance Improvement Committee, participating trauma centers, medical directors, program managers, and registrars. Their dedication to continuously improving data collection makes it possible to fully evaluate and advance Arizona's trauma system.

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Listed below are the dedicated professionals and citizens who serve the State of Arizona as members of the State Trauma Advisory Board and the Trauma and EMS Performance Improvement Standing Committee by giving their time, expertise, and invaluable guidance to the Arizona trauma system. On behalf of the Arizona Department of Health Services and the citizens of Arizona, we thank them for their many contributions.

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Arizona's Trauma System has grown and improved remarkably since the first trauma center was designated in 2007. The state has also experienced significant population growth during the time period. Currently, there are forty-seven state designated trauma centers that have improved timely access to trauma care statewide, including thirteen level I trauma centers, one level I pediatric trauma center, six level III trauma centers, and twenty-seven level IV trauma centers. Over the last year, as the COVID-19 pandemic impacted the entire healthcare system, a level III and a level IV trauma center relinquished their designation. The Bureau will continue to strongly encourage hospitals to formally participate in the Arizona Trauma System and conduct ongoing trauma system evaluation to assure the highest level of care in Arizona.

The 2021 Annual Report illustrates how Arizona's Trauma System has evolved since 2006 when facilities were self-designating and continued to remain resilient throughout the COVID-19 pandemic from January 1, 2020 to December 31, 2020. Over the course of 2020, there were significant changes in behavior observed due to the Stay-Home-Stay Healthy campaign and executive orders. Several pivotal actions early in the pandemic impacted how individuals accessed healthcare and the 911 system, and appeared to result in changes in health seeking behaviors and trauma rates overall. Despite these major events and behavior changes in 2020, traumatic injury remains a growing health concern and major economic impact.

To help prepare the hospitals to respond to the COVID-19 pandemic in early 2020, the Bureau recommended and the Director approved a number of rule waivers to allow trauma centers to operate with as few non-essential regulatory barriers as possible.

Rule waivers benefited trauma centers in several ways:

- Due to decreased emergency department and in-patient volumes, many facilities furloughed both clinical and support staff, which negatively impacted some trauma centers' ability to submit data to the Arizona Trauma Registry. The Bureau was able to accommodate hospitals while patient volumes normalized and staff were brought back into service. All hospitals are compliant with 2020 data reporting requirements.
- The Stay-Home-Stay Healthy campaign resulted in a dramatic decrease in motor vehicle related trauma and subsequent trauma center case volumes. Normally, a reduction in patient volume would have resulted in the Bureau requiring corrective action plans, however, the rule waiver made it possible for the facility to focus on other pressing clinical issues.
- Eighteen of Arizona's designated trauma centers use the services of the American College of Surgeons (ACS) to perform the trauma program verification that is accepted by the Department in lieu of a state designation facility inspection. Early in the course of the pandemic, the ACS canceled all scheduled verification site visits, and implemented a one-year COVID-19 verification extension and postponement of site surveys. The rule waivers were intended to allow hospitals to focus resources on clinical and operational matters while ensuring trauma center designation status and funding remained intact.

As the pandemic continues to impact the health care system in 2021, the Bureau will remain focused on supporting Arizona's trauma centers to ensure that the population has access to timely, high quality trauma care. There are many talented and dedicated professionals that contribute to Arizona's Trauma System in addition to the multi-disciplinary leadership of the State Trauma Advisory Board and Trauma and EMS Performance Improvement Committee. Going forward, it will be important to continue to engage the trauma and EMS community to further evaluate trends and outcomes to develop recommendations to improve the trauma system. It will be critical to consider risk factors and protective measures to reduce trauma burden, as well as best practices for trauma centers to maintain a constant state of readiness during pandemic response and recovery.

Sincerely,



Gail Bradley, MD FACEP FAEMS, Medical Director



Rachel Zenuk Garcia, MPH, MCHES Bureau Chief

The 2021 Annual Report demonstrates how Arizona's Trauma System has evolved significantly and responded to trends and challenges during the beginning of the COVID-19 pandemic from January 1, 2020 to December 31, 2020. From 2010 to 2020, Arizona's population grew by almost one million and now exceeds seven million residents. The Arizona Trauma System formally began in 2007 with seven state designated trauma centers. Over the last decade, Arizona's Trauma System increased from nineteen trauma centers in 2010 to forty-seven trauma centers in 2020 reporting to the Arizona State Trauma Registry (ASTR), including a notable increase in the number of state designated level III and level IV trauma centers that have improved timely access to trauma care in rural areas.

Traumatic injury represents a tremendous and growing health concern in Arizona, as the rate of trauma incidents continues to increase. In 2020, Arizona's trauma centers treated 58,041 people (796 per 100,000 Arizona population). In the same year, the Arizona Hospital Discharge Database (HDD) showed 473,446 injury-related discharges in Arizona (6,490 per 100,000 Arizona population). In the last decade, trauma deaths increased nationally by 22.8%,¹ and are the leading cause of years of potential life lost.^{1,2} According to the Centers for Disease Control and Prevention, from 2009 to 2018, Arizona's age-adjusted injury mortality rate has increased from 70 to 83 per 100,000 (18.5% increase), while the national rate has increased from 56 to 70 per 100,000 (24% increase)². At a glance, it appears that 2020 trauma mortality rates reported in ASTR are higher by severity score compared to 2010 mortality rates by severity score, although it is difficult to directly compare these years. While comparison between years has limitations and challenges due to changes in the number of trauma centers reporting over time, it is important to continue to track statewide injury rates reported through the Hospital Discharge Database (HDD) in addition to national data sources to determine the true burden of traumatic injury which poses a significant health and economic threat to the state.

Geographically, injury location is associated with trauma rates and access to care. A HDD review suggests that injury rates are similar across all regions of the state, however ASTR data reports shows that traumatic injuries are highest in Arizona's Northern region at nearly twice the injury rate of the Central region. It is important to note that trauma mortality rates are similar across all regions, however severity is reported significantly higher in the Northern region compared to other regions. In 2010, level IV trauma centers were shown to increase access to care (injury-to-ED arrival time) by ensuring that more patients statewide had access to a trauma center within the golden hour (≤ 1 hour of injury). Last year in 2020, the median injury-to-ED arrival time for patients with Injury Severity Score > 15 was 52 minutes, including 48 minutes for urban locations vs. 79 minutes for rural locations. More analysis and complete injury time data is needed in order to further examine injury-to-ED arrival time for patients transferred to a level I trauma center and how that may or may not impact trauma care and outcomes.

As Arizona's population and number of trauma centers have increased over the last ten years, although it is difficult to make direct comparisons due to reporting changes, it is noteworthy that there have been shifts in the top mechanisms of traumatic injuries reported in the Arizona State Trauma Registry (ASTR). In 2010, the predominant mechanism of injury was motor vehicle traffic (MVT) including 41% (11,487) of trauma cases reported, whereas in 2020 only 17% (9,891) of trauma cases were reportedly due to MVTs. Between 2013 and 2015, the predominant mechanism of injury reported to ASTR transitioned from MVT to Falls. In 2020, the top three mechanisms of trauma were Falls (47.63%), MVT-Occupant (17.04%), and Struck by/Against (6.17%), which comprised 72% of all traumas in Arizona. Despite a statewide decrease in population mobility and MVT that led to a reduction in the number of trauma incidents overall, trauma severity increased in 2020 compared to the previous year.

1. Rhee P, Joseph B, Pandit V, et al. Increasing Trauma Deaths in the United States. *Ann Surg.* 2014;00(00):1-9. doi:10.1097/SLA.0000000000000600.

2. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2005) [cited 2017 Sep.]. Available from URL: www.cdc.gov/injury/wisqars

Additionally, Firearms and MVT-Pedestrian accounted for 5% of trauma individually, but both had a disproportionately higher mortality of 14.22% and 11.84% respectively compared to other traumas. However, when comparing the 2019 to 2020 trauma incidence and mortality data, child/adult abuse increased from 201 to 315 cases while mortality decreased from 2.98% to 1.26%; and firearm increased from 1,499 to 1,991 cases while mortality decreased from 16.67% to 14.22%. It is notable that trauma cases that were classified as suicide/self-harm were reported in ASTR at relatively the same rate over recent years from 2018 to 2020, and more reliable data on mortalities due to suicide may be found in the Database Application for Vital Events (DAVE) system.

Arizona has been recognized for the findings of the Excellence in Prehospital Injury Care (EPIC) Program that has resulted in improvement of traumatic brain injury (TBI) survival rates. In 2020, greater than 31% of trauma patients suffered from TBI. Among trauma patients, the incidence of TBI was highest in infants < 1 year of age (59%). TBIs were prevalent among trauma patients whose mechanism of injury was indicated Child/Adult abuse (50%), MVT-Pedestrian (50%) and MVT-Pedal cyclist (44%). One in ten patients (10%) with a major head injury died.

Although trauma affects everyone, males and individuals over the age of 65 years are disproportionately affected, as are American Indian/Alaskan Natives (AI/AN). Males are involved in three times as many assault-related traumas as females, and have a mortality rate over two times higher. Adults 65 years and older had the highest trauma rate as compared to any other age group. AI/AN continue to have the highest rate of trauma and trauma-related deaths when compared to other racial/ethnic groups.

It is critically important to consider risk factors and protective measures that can reduce the impact of traumatic injury. Alcohol and drug use vary by age and race, and are more prevalent risk factors among intentional trauma cases including assaults and self-inflicted injuries. In Arizona, 25% of patients were suspected or confirmed of being under the influence of drugs or alcohol when involved in a trauma. Among the younger population, especially 15-17 year olds, there were more trauma incidents involving drugs than alcohol. Overall, 67% of motor vehicle occupants were using some form of passenger restraint when involved in a trauma. Although seatbelt use has been shown to decrease mortality, it was least practiced among those between 15 and 17 years of age (62%). In the trauma patient population, 55% of motorcyclists, 41% of pedal-cyclists and less than a third of off-road vehicle occupants were wearing a helmet when involved in a trauma.

Furthermore, as Arizona's Trauma System evolves it continues to exact a significant financial burden on the state. For those who survive, trauma can lead to lifelong physical suffering and places a substantial economic burden on the health system. In Arizona for the year 2020, trauma centers reported a total of \$3 billion in charges, with a median charge per patient of \$29,742. Falls resulted in over one billion dollars in charges in 2020. Hospital reimbursement has remained consistently low, around 12%. Although comparison between years has limitations and challenges due to changes in ASTR reporting over time, it's important to highlight the significant increase in trauma charges and decrease in reimbursement percentage over the last decade. In 2010, trauma centers charges totaled \$1,203,824,903 and the total reimbursement was \$264,438,956, resulting in ~22% reimbursement percentage, which is 10% greater than 2020. While charges and reimbursement have a complex relationship and the amount of financial data collected in ASTR is limited, this trend illustrates that further significant financial burden on the state may increase over time. The Bureau will continue to monitor these trends on an annual basis and recognizes that it will be important to identify available funding sources to help offset increasing trauma burden in the state.

BACKGROUND

The Bureau of Emergency Medical Services and Trauma System (BEMSTS) is responsible for collecting, analyzing and reporting on data obtained from designated trauma centers and participating EMS agencies to enhance the EMS and Trauma System in Arizona. In 2020, there were 48 hospitals submitting data to the Arizona State Trauma Registry (ASTR) including thirteen (13) Level I trauma centers, seven (7) Level III trauma centers, twenty-seven (27) Level IV trauma centers, and one (1) Level 1 Pediatric trauma center. Appendix A contains a list of trauma centers reporting to ASTR as of 12/30/2020.

All trauma centers are required to report any injuries meeting the ASTR inclusion criteria (Appendix B). Level I, II and III trauma centers are required to submit the full ASTR data set while Level IV trauma centers and non-designated facilities have the option to submit either the full or reduced data set. The data in the ASTR is validated to meet more than 800 state and national rules. Validation is run at both the hospital and state levels. Any inconsistencies are flagged and returned to the hospitals for review or correction before the data is accepted.

All the Level I trauma centers in Arizona are located in urban areas of the state, including 10 in Maricopa County, one in Coconino County and one in Pima County. Due to Arizona's unique geography, the BEMSTS has divided the system into four distinct regions based on Arizona's 15 counties: Western (Mohave, La Paz and Yuma Counties), Northern (Yavapai, Coconino, Navajo and Apache Counties), Southeastern (Pima, Santa Cruz, Graham, Cochise and Greenlee Counties) and Central (Maricopa, Gila and Pinal Counties). Each region has its own community-based, non-profit organization dedicated to improving EMS and trauma care in the state.

Regional EMS Coordinating Systems

- Arizona Emergency Medical Services, Inc. (AEMS) - <https://www.aems.org/>
- Northern Arizona Emergency Medical Services (NAEMS) - <http://www.naems.org/>
- Southeastern Arizona EMS Council (SAEMS) - <http://saemscouncil.com/>
- Western Arizona Council of EMS (WACEMS) - <https://wacems.org/>

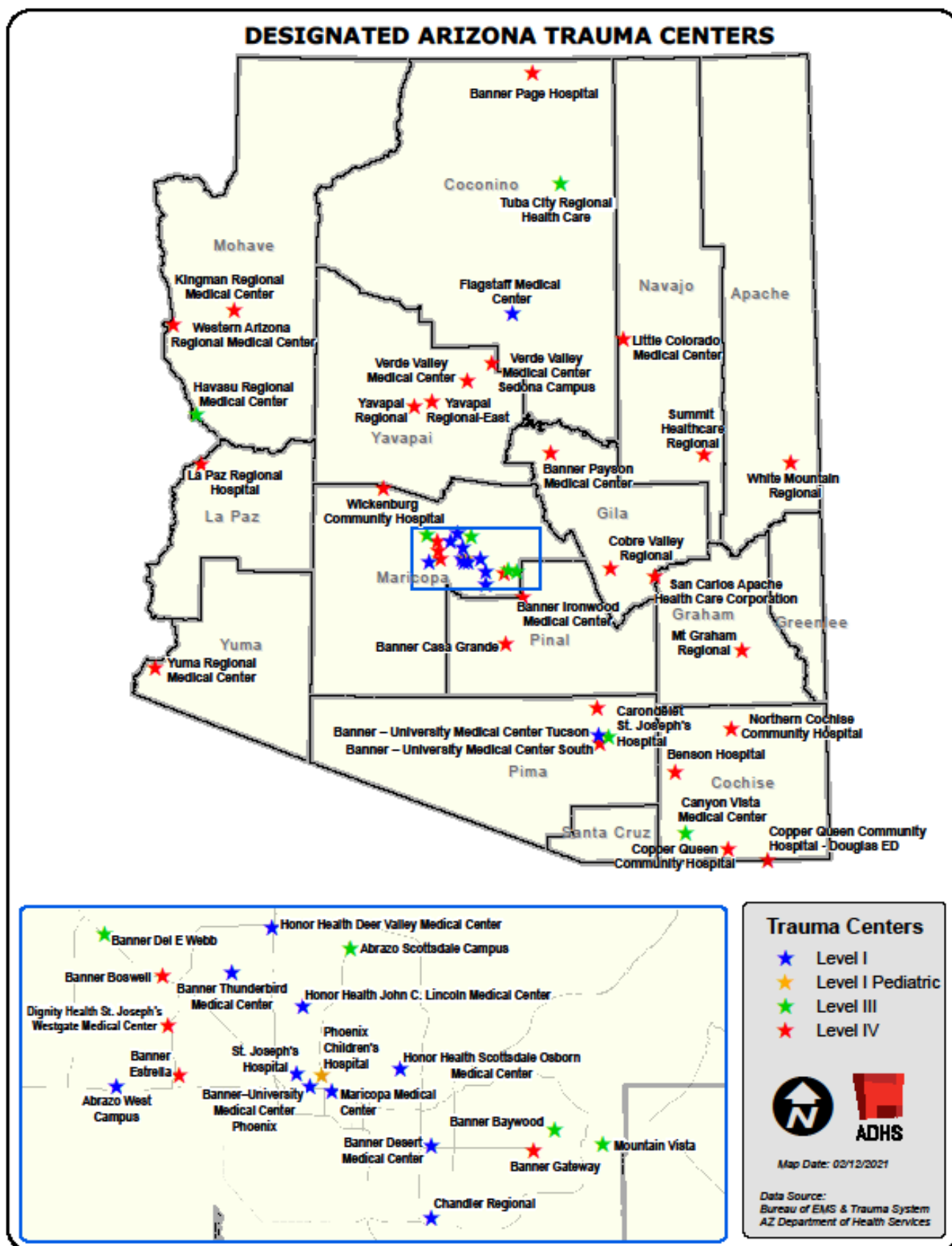
METHODS

This report analyzed incidents of traumatic injury reported to the ASTR with an Emergency Department Hospital Arrival Date between January 1, 2020 and December 31, 2020. The report gives an overview of trauma in the state by describing patient demographics, injury characteristics, trauma risk factors, regional differences and comparisons with national trauma data.

Descriptive statistics were used to depict the distribution of traumatic injury in Arizona as well as differences over time. When appropriate, rates and 95% confidence intervals (CIs) were calculated per 100,000 Arizona residents using 2020 population denominators from the Arizona Health Status and Vital Statistics database.⁴ If the CIs of two rates do not overlap, the difference between the rates is considered statistically significant (alpha 0.05). The 2020 data was compared with the 2018 and 2019 two-year median. The Vital Statistics Information Management System's Database Applications for Vital Events (DAVE) was used in order to show the complete picture of trauma mortality, including deaths that occurred outside of designated trauma centers.

Note: The 2018 National Trauma Data Bank (NTDB) Annual Report had not been released at the time this report was created; therefore, the section comparing ASTR to NTDB was removed.

4. Arizona Department of Health Services, Population Health and Vital Statistics. Population Denominators: 2020. <http://pub.azdhs.gov/health-stats/menu/info/pop/index.php>



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2020 Arizona Trauma System Snapshot

Trauma Centers

47

Total Number of Trauma Centers in Arizona

13

Level I Trauma Centers

1

Level I Pediatric Trauma Center

6

Level III Trauma Centers

27

Level IV Trauma Centers

Designated Arizona Trauma Centers



Trauma Incidents Reported

58,041

Number of Trauma Incidents Reported in Arizona State Trauma Registry*

473,446

Number of Injury-Related Discharges in Hospital Discharge Database*

1,442

(2.5% of total trauma incidents)
Total Deaths Reported in Arizona State Trauma Registry*

3,952

Total Traumatic Deaths Reported in Database Application for Vital Events*

Top 6 Mechanisms of Injury

Count (Percent of Total Trauma Cases)

1

Fall
27,649 (47.63%)

2

Motor Vehicle Trauma - Occupant
9,891 (17.04%)

3

Struck By/Against
3,584 (6.17%)

4

Motor Vehicle Non-Traffic
2,608 (4.49%)

5

Cut/Pierce
2,127 (3.66%)

6

Firearm
1,991 (3.43%)

Of the top 6 Mechanisms of Injury, **Firearms** had the highest mortality proportion, followed by **Motor Vehicle Trauma - Occupant**.



Firearms
14.22%



Motor Vehicle Trauma - Occupant
2.04%



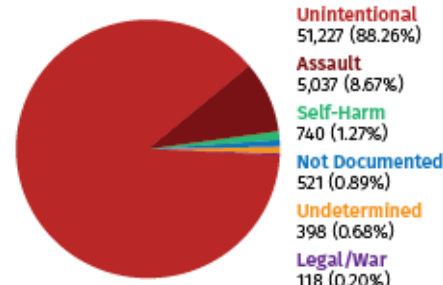
6,214 (10.7% of total trauma incidents) involved pediatric patients



Median Injury to Emergency Department Arrival Time
Urban 48 Minutes
Rural 79 Minutes

Intent of Injury

Count (Percent of Total Trauma Cases)



Risk and Protective Factors - Highlights

Males had a mortality rate over **two times** higher than females

Adults 65 years and older had the highest trauma rate compared to all other age groups



67% of MVT occupants were using a passenger restraint



25% of trauma patients were suspected or confirmed of being under the influence of drugs or alcohol

55% of motorcyclists, **41%** of pedal-cyclists, and **less than 1/3** of off-road vehicle occupants were wearing a helmet when involved in a trauma

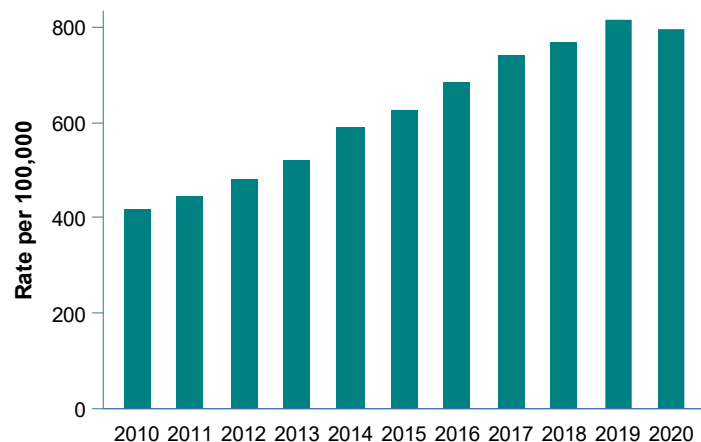


*The data included in this report includes incidents of traumatic injury with an Emergency Department Hospital Arrival Date between January 1, 2020 and December 31, 2020 reported from facilities participating in the Arizona State Trauma Registry (ASTR) only. Trauma injury and mortality reported in ASTR are compared to the Hospital Discharge Database (HDD) and Vital Statistics Information Management System's Database Applications for Vital Events (DAVE) to demonstrate the total impact of trauma injuries and deaths that occurred outside of designated trauma centers.

TRAUMA DEMOGRAPHICS (N = 58,041)

INCIDENCE & RATE

Figure 1: Trauma rate per 100,000 by year



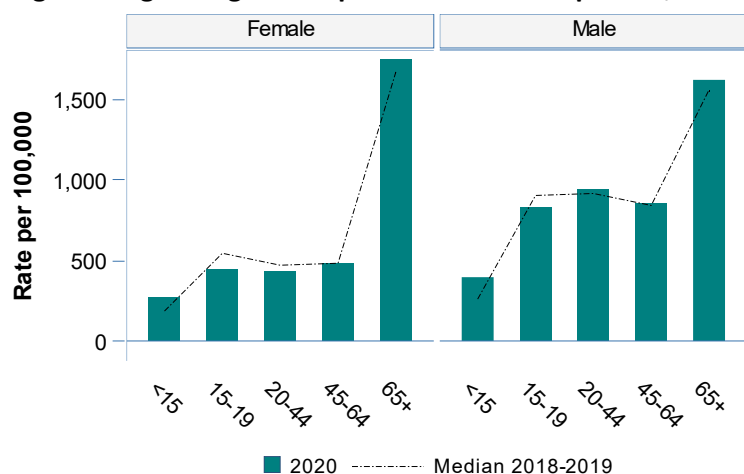
Data source: Arizona State Trauma Registry 2010-2020

Table 1: Trauma incidence and rate per 100,000 by year

Year	Total Trauma cases	Rate per 100,000 (95%CI)
2010	26,688	418 [413, 423]
2011	28,721	446 [441, 451]
2012	31,246	481 [475, 486]
2013	34,275	521 [515, 526]
2014	39,373	591 [585, 596]
2015	42,351	627 [621, 633]
2016	46,842	685 [679, 691]
2017	51,666	742 [735, 748]
2018	54,273	767 [761, 773]
2019	58,604	815 [809, 822]
2020	58,041	796 [789, 802]

AGE & GENDER

Figure 2: Age and gender-specific trauma rate per 100,000



Data source: Arizona State Trauma Registry 2018-2020

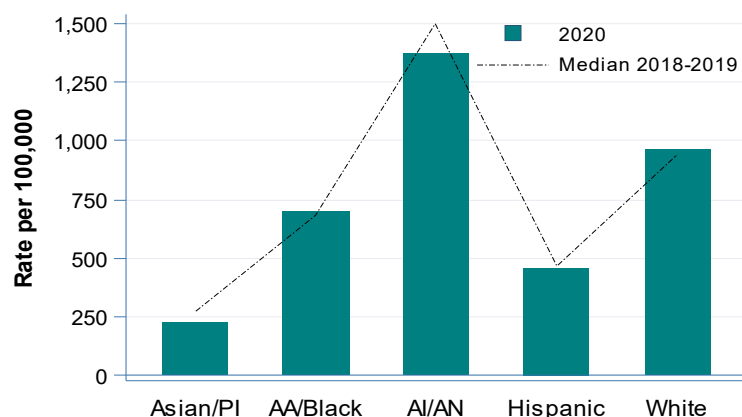
Table 2: Age and gender-specific trauma rate per 100,000

Gender	Age	Total Trauma Cases	Rate per 100,000 (95%CI)
Female	Total	24,569	670 [661, 678]
	<15	1,827	273 [261, 286]
	15-19	1,049	448 [421, 476]
	20-44	5,081	436 [424, 448]
	45-64	4,253	477 [463, 492]
	65+	12,359	1,742 [1,711, 1,773]
Male	Total	33,468	923 [913, 933]
	<15	2,761	397 [382, 412]
	15-19	2,039	832 [796, 868]
	20-44	11,611	940 [923, 957]
	45-64	7,230	856 [836, 876]
	65+	9,827	1,623 [1,591, 1,655]

CI = Confidence interval

RACE & ETHNICITY

Figure 3: Race-specific trauma rate per 100,000



Data source: Arizona State Trauma Registry 2018-2020 PI=Pacific Islander, AI/AN=American Indian/Alaska Native, AA=African American

Table 3: Race-specific trauma rate per 100,000

Race/ethnicity	Total Trauma Cases	Rate per 100,000 (95%CI)
AA/Black	2,561	701 [674, 728]
AI/AN	4,146	1,372 [1,330, 1,414]
Asian/PI	630	222 [205, 240]
Hispanic	10,583	455 [447, 464]
White	38,753	964 [955, 974]

CI= Confidence interval, PI=Pacific Islander, AI/AN=American Indian/Alaska

INCIDENCE & MORTALITY

Table 4: Trauma incidence and mortality proportion by mechanism of injury

Mechanism	Count	Percent	Deaths	Mortality Proportion
Overall	58,041	100.00%	1,442	2.48%
Fall	27,649	47.63%	529	1.91%
MVT-Occupant	9,891	17.04%	202	2.04%
Struck By/Against	3,584	6.17%	15	0.41%
MV Non-Traffic	2,608	4.49%	25	0.95%
Cut/Pierce	2,127	3.66%	26	1.22%
Firearm	1,991	3.43%	283	14.22%
MVT-Motorcyclist	1,926	3.31%	90	4.67%
Pedalcyclist,Other	1,233	2.12%	3	0.24%
MVT-Pedestrian	1,038	1.78%	123	11.84%
Other Land Transport	924	1.59%	7	0.75%
Other Specified,Classifiable	806	1.38%	8	0.99%
Not Documented	521	0.89%	6	1.19%
Bite And Stings-Nonvenomous	509	0.87%	3	0.58%
MVT-Pedalcyclist	457	0.78%	19	4.15%
Pedestrian,Other	397	0.68%	17	4.29%
Unspecified	326	0.56%	12	3.68%
Other Specified,Not Elsewhere Classifiable	319	0.54%	27	8.46%
Other Specified,Child/Adult Abuse	315	0.54%	4	1.26%
Other Transport	296	0.50%	7	2.36%
Machinery	267	0.46%	0	0.00%
Natural/Environmental, Other	251	0.43%	3	1.19%
Overexertion	183	0.31%	0	0.00%
Hot Object/Substance	171	0.29%	0	0.00%
Fire/Flame	103	0.17%	3	2.91%
Suffocation	74	0.12%	21	28.37%
Drowning/Submersion	32	0.05%	8	25.00%
MVT-Other	14	0.02%	0	0.00%
Bite And Stings-Venomous	12	0.02%	0	0.00%
Poisoning:Non-Drug	8	0.01%	1	12.50%
Other Specified,Foreign Body	5	0.00%	0	0.00%
MVT-Unspecified	2	0.00%	0	0.00%
Poisoning:Drug	2	0.00%	0	0.00%

Mechanisms of Injury are classified into various categories based on the tool provided by the Centers for Disease Control and Prevention categorizing injuries using ICD 10 codes . https://www.cdc.gov/nchs/injury/injury_tools.htm . MVT = Motor Vehicle Traffic

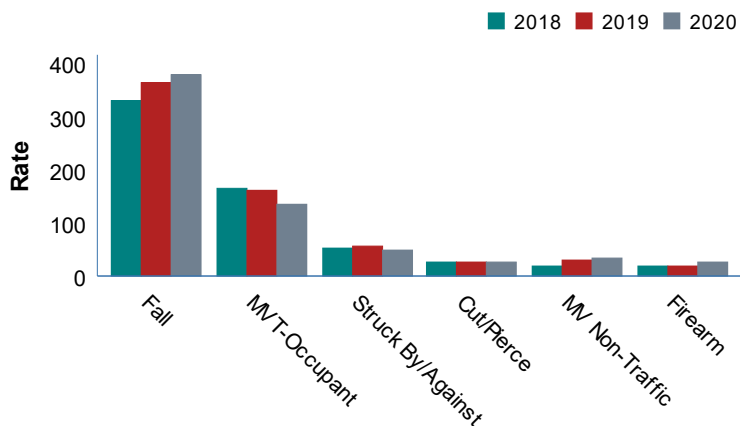
INCIDENCE & MORTALITY: INJURY SEVERITY SCORE (ISS) > 15

Table 5: Trauma incidence and mortality proportion by mechanism of injury among severely injured patients (ISS>15)

Mechanism	Count	Percent	Deaths	Mortality Proportion
Overall	6,017	100.00%	805	13.38%
Fall	2,743	45.58%	224	8.17%
MVT-Occupant	1,106	18.38%	136	12.29%
MVT-Motorcyclist	342	5.68%	68	19.88%
Firearm	310	5.15%	164	52.90%
MVT-Pedestrian	285	4.73%	88	30.87%
Struck By/Against	257	4.27%	11	4.28%
MV Non-Traffic	212	3.52%	18	8.49%
Pedalcyclist,Other	116	1.92%	2	1.72%
MVT-Pedalcyclist	99	1.64%	16	16.16%
Other Land Transport	88	1.46%	7	7.95%
Other Specified,Child/Adult Abuse	85	1.41%	4	4.70%
Cut/Pierce	58	0.96%	10	17.24%
Unspecified	55	0.91%	7	12.72%
Pedestrian,Other	54	0.89%	11	20.37%
Other Specified,Not Elsewhere Classifiable	52	0.86%	15	28.84%
Other Specified,Classifiable	48	0.79%	5	10.41%
Not Documented	31	0.51%	1	3.33%
Other Transport	30	0.49%	3	10.00%
Natural/Environmental, Other	16	0.26%	2	12.50%
Suffocation	13	0.21%	6	46.15%
Fire/Flame	5	0.08%	2	40.00%
Drowning/Submersion	4	0.06%	3	75.00%
Overexertion	4	0.06%	0	0.00%
Bite And Stings-Nonvenomous	2	0.03%	1	50.00%
Hot Object/Substance	1	0.01%	0	0.00%
Poisoning:Non-Drug	1	0.01%	1	100.00%

RATE BY YEAR

Figure 4: Trauma rate per 100,000 by top 6 mechanisms of injury



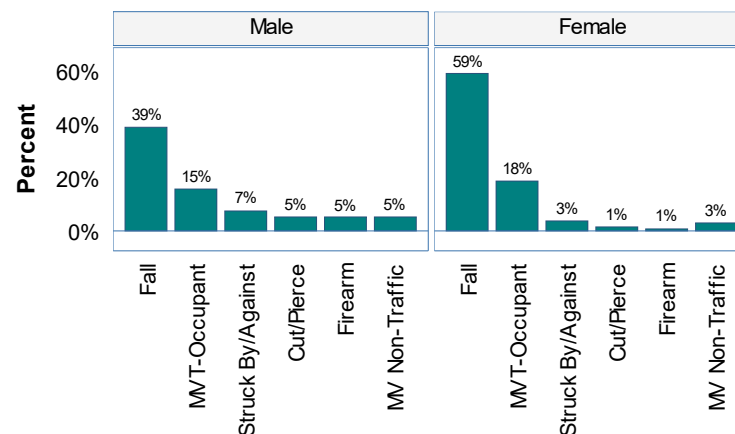
Data source: Arizona State Trauma Registry 2018-2020

Table 6: Trauma rate per 100,000 by top 6 mechanisms and year

Year	Mechanism of injury	Total Trauma Cases	Rate per 100,000 (95%CI)
2018	Fall	23,492	332 [328, 336]
	MVT-Occupant	11,793	167 [164, 170]
	Struck By/Against	3,757	53 [51, 55]
	Cut/Pierce	1,951	28 [26, 29]
	MV Non-Traffic	1,510	21 [20, 22]
	Firearm	1,367	19 [18, 20]
2019	Fall	26,386	367 [363, 371]
	MVT-Occupant	11,653	162 [159, 165]
	Struck By/Against	4,066	57 [55, 58]
	MV Non-Traffic	2,285	32 [30, 33]
	Cut/Pierce	2,066	29 [27, 30]
	Firearm	1,499	21 [20, 22]
2020	Fall	27,649	379 [375, 384]
	MVT-Occupant	9,891	136 [133, 138]
	Struck By/Against	3,584	49 [48, 51]
	MV Non-Traffic	2,608	36 [34, 37]
	Cut/Pierce	2,127	29 [28, 30]
	Firearm	1,991	27 [26, 28]

GENDER

Figure 5: Gender-specific trauma proportion by top 6 mechanisms of injury



Data source: Arizona State Trauma Registry 2020

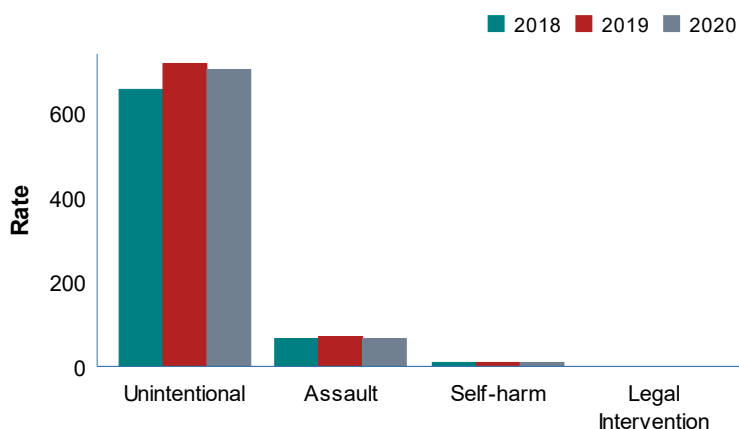
INCIDENCE & MORTALITY

Table 7: Trauma incidence and mortality proportion by intent of injury

Intent	Count	Percent	Deaths	Mortality Proportion
Overall	58,041	100.00%	1,442	2.48%
Unintentional	51,227	88.26%	1,069	2.08%
Assault	5,037	8.67%	189	3.75%
Self-harm	740	1.27%	127	17.16%
Not documented	521	0.89%	6	1.15%
Undetermined	398	0.68%	37	9.29%
Legal/war	118	0.20%	14	11.86%

INTENT RATE BY YEAR

Figure 6: Trauma rate per 100,000 by intent of injury and year



Data source: Arizona State Trauma Registry 2018-2020

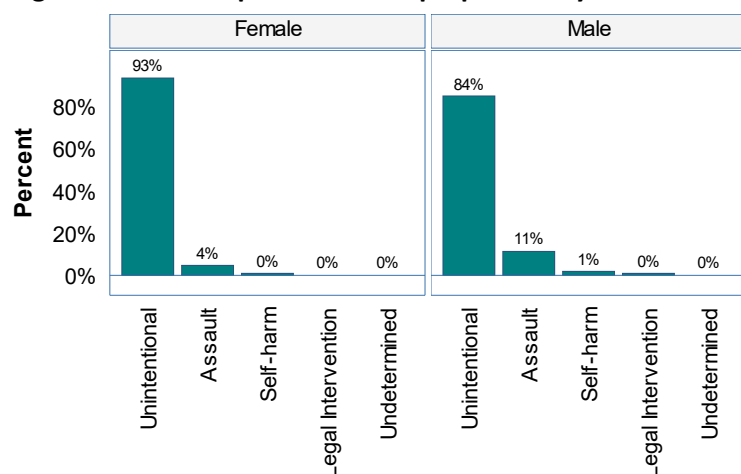
Table 8: Trauma rate per 100,000 by intent and year

Year	Intent of injury	Total Trauma Cases	Rate per 100,000 (95%CI)
2018	Unintentional	46,498	657 [651, 663]
	Assault	4,663	66 [64, 68]
	Self-harm	749	11 [10, 11]
	Legal Intervention	144	2 [2, 2]
2019	Unintentional	51,628	718 [712, 724]
	Assault	5,004	70 [68, 72]
	Self-harm	744	10 [10, 11]
	Legal Intervention	134	2 [2, 2]
2020	Unintentional	51,227	702 [696, 708]
	Assault	5,037	69 [67, 71]
	Self-harm	740	10 [9, 11]
	Legal Intervention	118	2 [1, 2]

CI= Confidence Interval

INTENT RATE BY GENDER

Figure 7: Gender-specific trauma proportion by intent



Data source: Arizona State Trauma Registry 2020

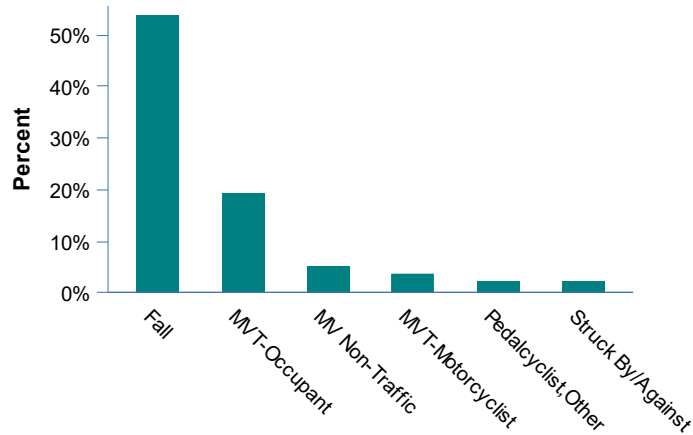
*Intent of Injury: Whether an injury was caused by an act carried out on purpose by oneself (Self-Harm) or by another person(s) (Assault), with the goal of injuring or killing; the injury was not inflicted by deliberate means (Unintentional) or; the injury was inflicted by the police or other legal authorities during law enforcement activities (Legal/War).

Centers for Disease Control and Prevention. Definitions for WISQARS Nonfatal. <https://www.cdc.gov/ncipc/wisqars/nonfatal/definitions.htm#nonfatalinjury>

INTENT OF INJURY

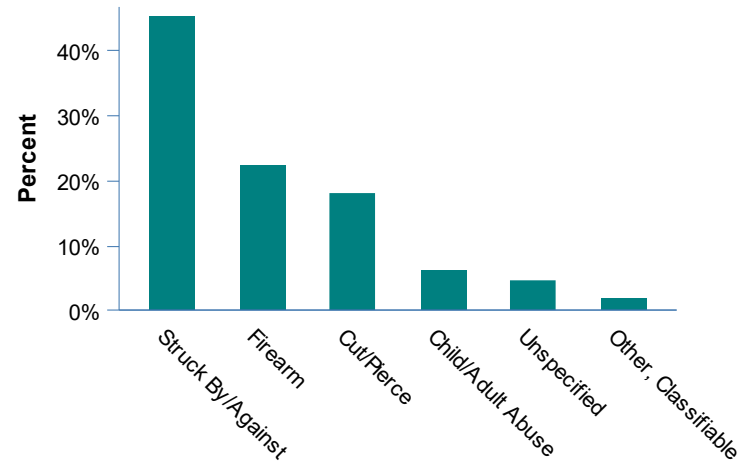
INTENT BY MECHANISM

Figure 8: Top six mechanisms of Unintentional trauma



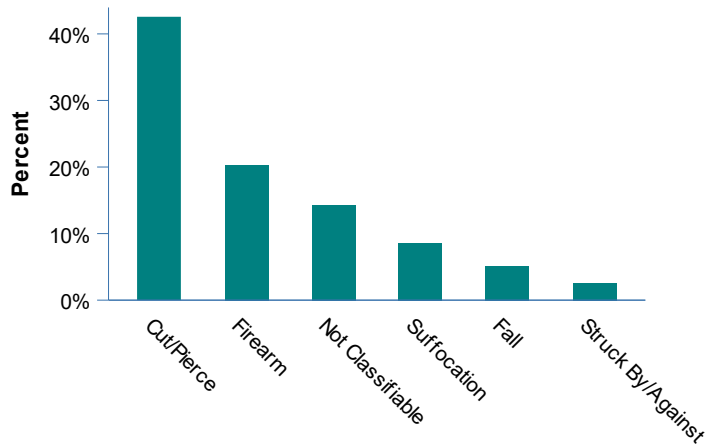
Data source: Arizona State Trauma Registry 2020

Figure 9: Top six mechanisms of Assault trauma



Data source: Arizona State Trauma Registry 2020

Figure 10: Top six mechanisms of Self-harm trauma

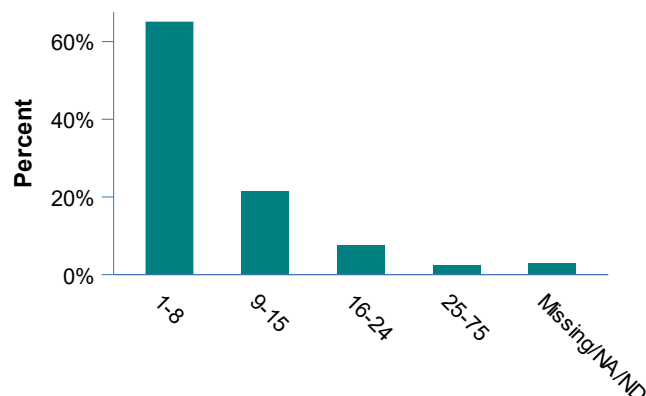


Data source: Arizona State Trauma Registry 2020

INJURY SEVERITY SCORE

INCIDENCE & MORTALITY

Figure 11: Trauma proportion by injury severity score



Data source: Arizona State Trauma Registry 2020

Table 9: Trauma incidence and mortality proportion by injury severity score

Injury Severity Score	Count	Percent	Deaths	Mortality Proportion
1-8	37,744	65.02%	307	0.81%
9-15	12,470	21.48%	290	2.32%
16-24	4,564	7.86%	228	4.99%
25-75	1,453	2.50%	577	39.71%
Missing/NA/ND	1,810	3.11%	40	2.20%

AGE-SPECIFIC MORTALITY

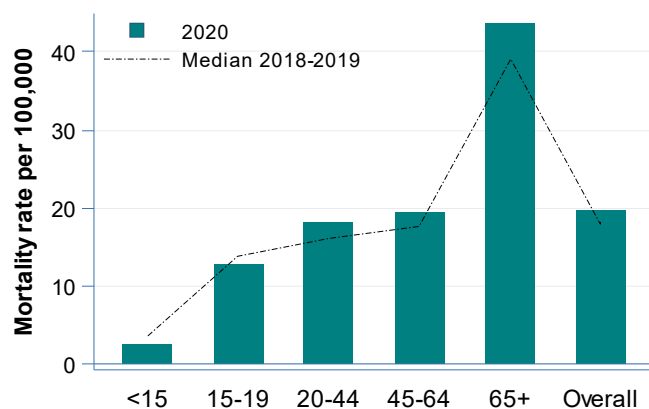
Table 10: Age-specific trauma incidence and mortality proportion

Age	Trauma Count	Trauma Percent	Percent of Arizona Population (n=7,294,587)*	Trauma Deaths	Trauma Mortality Proportion
Total	58,041	100.00%	100.00%	1,442	2.48%
<1	499	0.85%	1.13%	3	0.60%
1-4	1,251	2.15%	4.78%	11	0.88%
5-9	1,253	2.15%	6.23%	7	0.55%
10-14	1,584	2.72%	6.55%	13	0.82%
15-19	3,088	5.32%	6.57%	61	1.97%
20-24	3,801	6.54%	6.81%	101	2.65%
25-34	7,344	12.65%	13.82%	181	2.46%
35-44	5,537	9.53%	12.29%	144	2.60%
45-54	5,036	8.67%	11.69%	130	2.58%
55-64	6,447	11.10%	12.10%	208	3.23%
65-74	7,760	13.36%	10.35%	184	2.37%
75-84	8,340	14.36%	5.67%	220	2.64%
85+	6,088	10.48%	2.01%	170	2.80%

* SOURCE: Arizona Department of Health Services, Population Health and Vital Statistics. Population Denominators: 2019. <http://pub.azdhs.gov/health-stats/menu/info/pop/index.php>

AGE-SPECIFIC MORTALITY RATE

Figure 12: Age-specific trauma mortality rate per 100,000



Data source: Arizona State Trauma Registry 2018-2020

Table 11: Age-specific trauma mortality rate

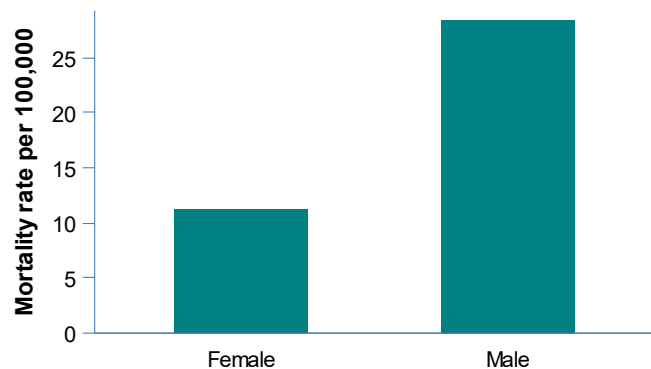
Age	Total Trauma Deaths	Rate per 100,000 (95%CI)
<15	35	3 [2, 3]
15-19	61	13 [10, 16]
20-44	433	18 [16, 20]
45-64	339	20 [17, 22]
65+	574	44 [40, 47]
Overall	1,442	20 [19, 21]

CI= Confidence interval

TRAUMA MORTALITY

GENDER-SPECIFIC MORTALITY RATE

Figure 13: Gender-specific trauma mortality rate per 100,000



Data source: Arizona State Trauma Registry 2020

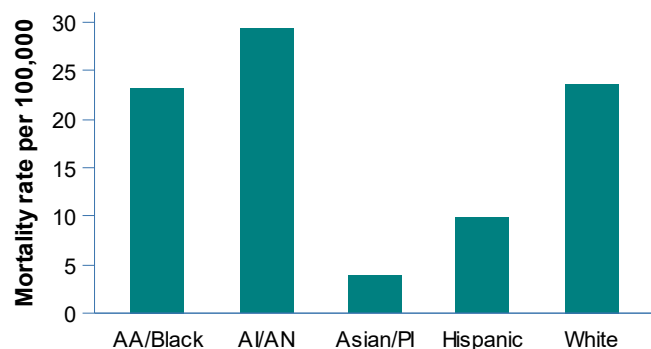
Table 12: Gender-specific trauma mortality rate per 100,000

Gender	Total trauma deaths	Rate per 100,000 (95%CI)
Female	412	11 [10, 12]
Male	1,029	28 [27, 30]

CI= Confidence interval

RACE-SPECIFIC MORTALITY RATE

Figure 14: Race-specific trauma mortality rate per 100,000



Data source: Arizona State Trauma Registry 2018-2020 PI=Pacific Islander, AI/AN=American Indian/Alaska Native, AA=African American

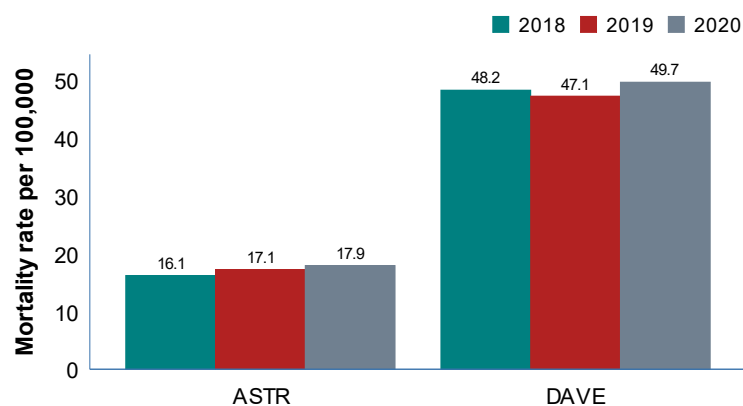
Table 13: Race-specific trauma mortality rate per 100,000

Race/ethnicity	Total trauma deaths	Rate per 100,000 (95%CI)
AA/Black	85	23 [18, 28]
AI/AN	89	29 [23, 36]
Asian/PI	11	4 [2, 6]
Hispanic	229	10 [9, 11]
White	950	24 [22, 25]

CI= Confidence interval

ASTR VS. STATEWIDE

Figure 15: Age-adjusted trauma mortality rate per 100,000: Trauma center deaths vs. Statewide trauma deaths



Data sources: Arizona State Trauma Registry 2018-2020 Database Application for Vital Events, 2018-2020

Table 14: Age-adjusted trauma mortality rate per 100,000 by year: Trauma Center vs. Statewide*

Data source	Year	Total Trauma Deaths	Rate per 100,000 (95%CI)
ASTR	2018	1,227	16.1 [15.2, 17.0]
	2019	1,335	17.1 [16.2, 18.0]
	2020	1,442	17.9 [17.0, 18.8]
DAVE	2018	3,723	48.2 [46.7, 49.8]
	2019	3,708	47.1 [45.6, 48.7]
	2020	3,952	49.7 [48.1, 51.2]

CI= Confidence interval

*Statewide data obtained from the Database Application for Vital Events (DAVE). Includes all trauma deaths including those that occurred outside of trauma centers.

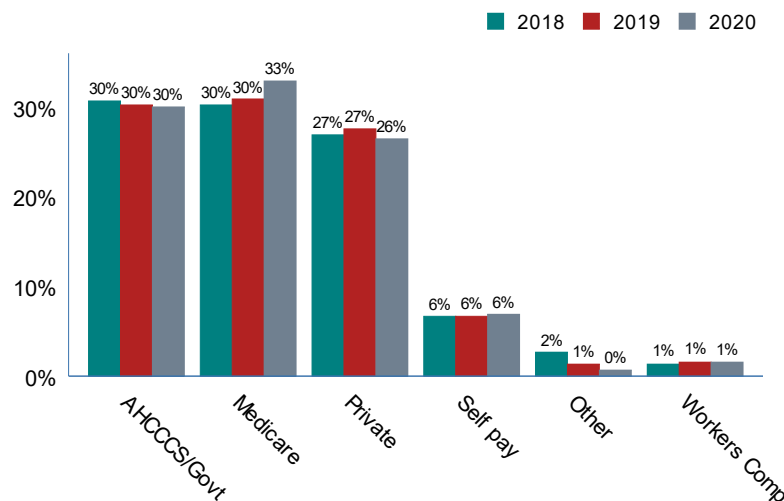
CHARGES & REIMBURSEMENT

Table 15: Total trauma charges and reimbursement by year

Year	Total Charges	Median Charges	Total Reimbursement	Reimbursement Percent
2018	\$2,611,324,694	\$28,068	\$375,754,016	14.3%
2019	\$3,031,698,529	\$28,931	\$404,109,995	13.3%
2020	\$3,060,770,081	\$29,742	\$360,522,125	11.7%

PRIMARY PAYER BY YEAR

Figure 16: Primary payment source of traumatic injuries by year



Data source: Arizona State Trauma Registry 2018-2020 Other includes: No fault auto, Not billed, and Other insurance

CHARGES & REIMBURSEMENT BY PAYER

Table 16: Total trauma charges and reimbursement by primary payer

Primary payer	Total Charges	Median Charges	Total Reimbursement	Reimbursement Percent
AHCCCS/Govt	\$1,002,280,781	\$29,161	\$77,460,047	7.7%
Medicare	\$984,995,019	\$32,025	\$109,349,910	11.1%
Private	\$842,666,529	\$30,266	\$150,511,256	17.8%
Self pay	\$144,470,579	\$24,434	\$6,135,675	4.2%
Workers Comp	\$58,095,080	\$29,056	\$13,063,656	22.4%
Other	\$22,895,918	\$20,368	\$3,640,925	15.9%
Not documented	\$5,366,175	\$19,355	\$360,657	6.7%
<i>Total</i>	<i>\$3,060,770,081</i>	<i>\$29,742</i>	<i>\$360,522,125</i>	<i>11.7%</i>

CHARGES & REIMBURSEMENT BY MECHANISM

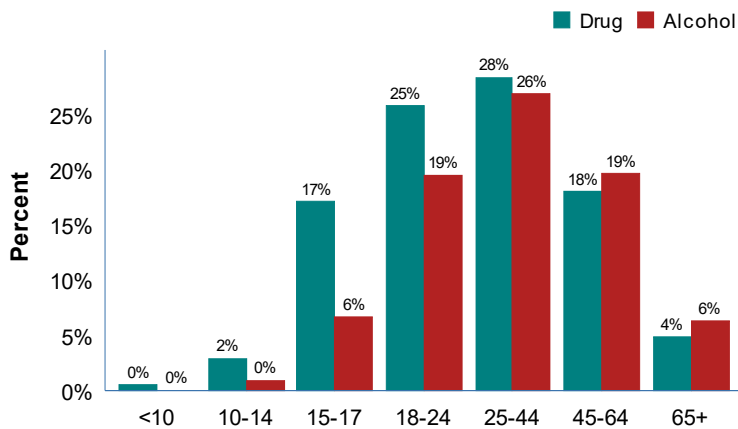
Table 17: Total trauma charges and reimbursement by mechanism of injury

Mechanism	Total Charges	Median Charges	Total Reimbursement	Reimbursement Percent
Bite And Stings-Nonvenomous	\$16,154,577	\$20,589	\$2,182,775	13.5%
Bite And Stings-Venomous	\$460,445	\$45,081	\$29,244	6.3%
Cut/Pierce	\$86,752,011	\$29,107	\$9,875,324	11.3%
Drowning/Submersion	\$1,230,238	\$24,083	\$144,167	11.7%
Fall	\$1,338,949,338	\$30,361	\$163,932,003	12.2%
Fire/Flame	\$3,831,894	\$16,199	\$999,261	26.0%
Firearm	\$168,682,990	\$35,686	\$18,987,611	11.2%
Hot Object/Substance	\$2,707,673	\$4,936	\$265,288	9.7%
MV Non-Traffic	\$144,230,952	\$25,717	\$17,648,067	12.2%
MVT-Motorcyclist	\$178,828,513	\$42,744	\$19,658,974	10.9%
MVT-Occupant	\$576,179,532	\$30,641	\$60,582,315	10.5%
MVT-Other	\$665,107	\$32,217	\$83,040	12.4%
MVT-Pedalcyclist	\$32,109,227	\$39,461	\$4,327,903	13.4%
MVT-Pedestrian	\$122,404,942	\$50,941	\$11,153,367	9.1%
MVT-Unspecified	\$55,005	\$27,503	\$12,077	21.9%
Machinery	\$11,557,016	\$27,814	\$1,690,105	14.6%
Natural/Environmental, Other	\$11,181,153	\$19,898	\$1,524,050	13.6%
Not Documented	\$12,200,239	\$17,644	\$1,590,522	13.0%
Other Land Transport	\$39,966,828	\$23,468	\$6,461,865	16.1%
Other Specified,Child/Adult Abuse	\$16,812,749	\$25,455	\$2,081,594	12.3%
Other Specified,Classifiable	\$35,117,179	\$24,725	\$5,618,105	15.9%
Other Specified,Foreign Body	\$116,429	\$5,191	\$5,102	4.3%
Other Specified,Not Elsewhere Classifiable	\$21,246,891	\$37,095	\$1,837,647	8.6%
Other Transport	\$17,415,487	\$30,883	\$1,603,818	9.2%
Overexertion	\$7,361,515	\$31,607	\$1,336,160	18.1%
Pedalcyclist,Other	\$52,161,296	\$27,772	\$8,304,777	15.9%
Pedestrian,Other	\$21,238,132	\$26,592	\$2,701,116	12.7%
Poisoning:Drug	\$35,756	\$17,878	\$7,168	20.0%
Poisoning:Non-Drug	\$396,036	\$17,632	\$193,870	48.9%
Struck By/Against	\$121,835,802	\$20,591	\$13,859,129	11.3%
Suffocation	\$3,863,039	\$31,777	\$394,124	10.2%
Unspecified	\$15,022,088	\$25,738	\$1,431,558	9.5%
<i>Total</i>	<i>\$3,060,770,081</i>	<i>\$29,742</i>	<i>\$360,522,125</i>	<i>11.7%</i>

DRUGS & ALCOHOL (SUSPECTED OR CONFIRMED USE) (N = 14,209, 25%)

AGE-SPECIFIC

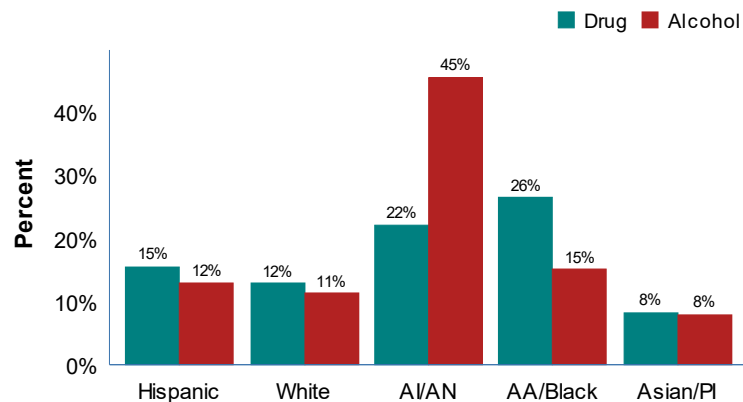
Figure 17: Age-specific trauma proportion by alcohol and drug use



Data source: Arizona State Trauma Registry 2020

RACE-SPECIFIC

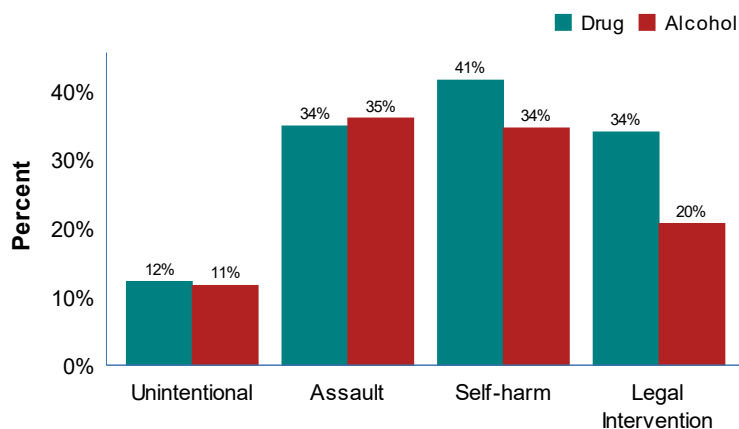
Figure 18: Race-specific trauma proportion by alcohol and drug use



Data source: Arizona State Trauma Registry 2020, PI=Pacific Islander, AI/AN=American Indian/Alaska Native, AA=African American

INTENT-SPECIFIC

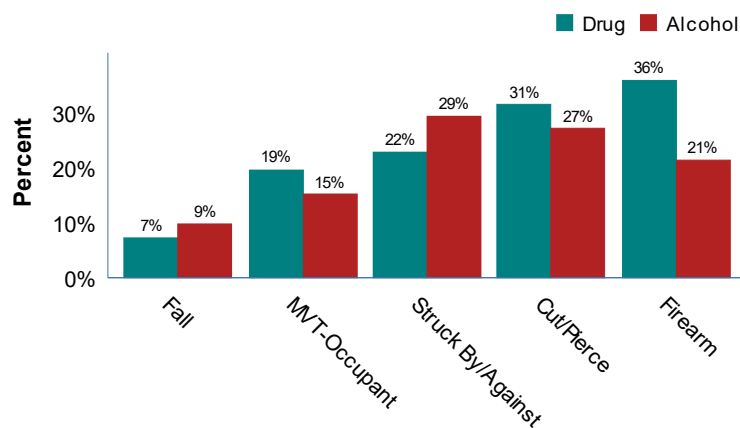
Figure 19: Intent-specific trauma proportion by alcohol and drug use



Data source: Arizona State Trauma Registry 2020

MECHANISM-SPECIFIC

Figure 20: Mechanism-specific trauma proportion by alcohol and drug use

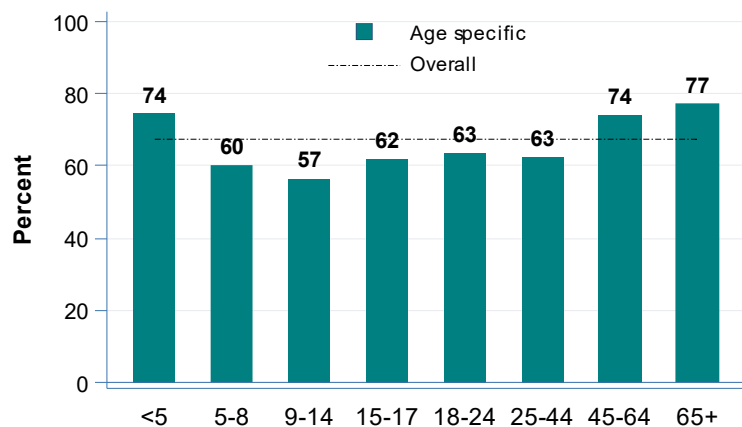


Data source: Arizona State Trauma Registry 2020

PROTECTIVE DEVICES

MVT-OCCUPANT (N = 9,891)

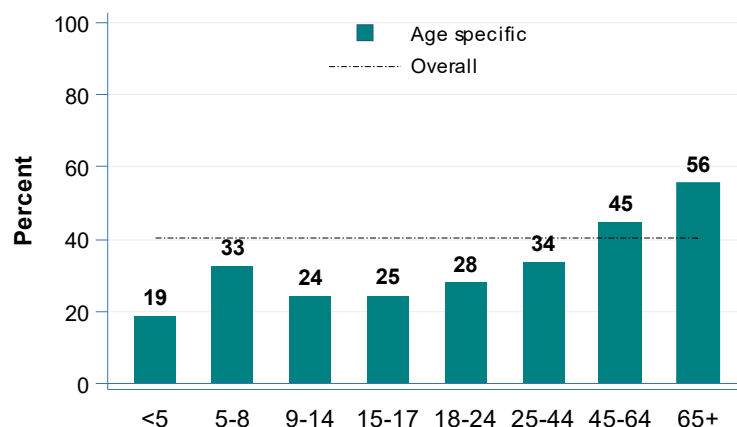
Figure 21: Age-specific proportion of restraint use among Motor Vehicle Traffic occupants



Data source: Arizona State Trauma Registry 2020

PEDAL CYCLIST (N = 1,690)

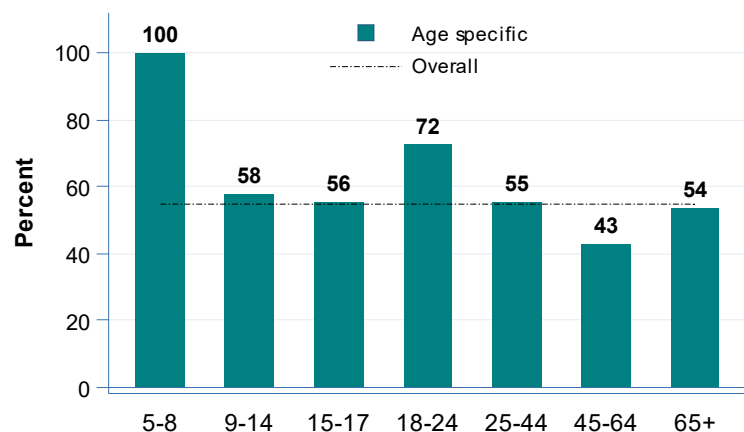
Figure 22: Age-specific proportion of helmet use among pedal-cyclists



Data source: Arizona State Trauma Registry 2020

MOTORCYCLIST (N = 1,926)

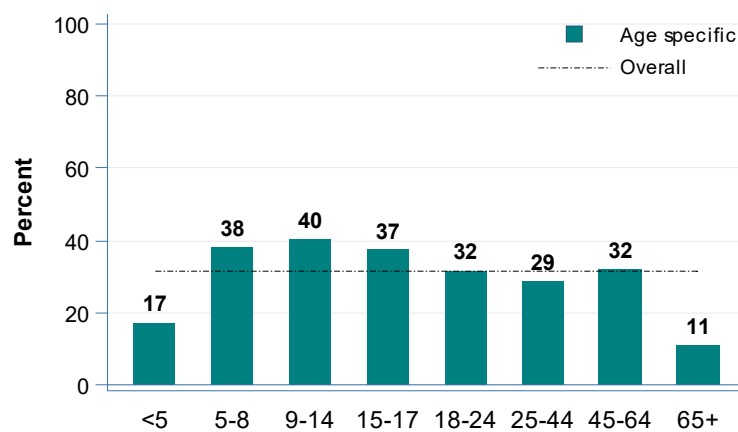
Figure 23: Age-specific proportion of helmet use among Motorcyclists



Data source: Arizona State Trauma Registry 2020

OFF-ROAD VEHICLE OCCUPANT (N = 2,285)

Figure 24: Age-specific proportion of helmet use among off-road vehicle occupants



Data source: Arizona State Trauma Registry 2020

* An age category may be missing in a graph if there are no cases available in that category.

INJURY TO ED ARRIVAL TIME

Table 18: Injury to ED arrival time for patient with an injury severity score > 15 by injury location

Injury location	ISS>15: Injury to ED Arrival Time (Minutes)				
	N	Median time	25th percentile*	75th percentile**	Injury time missing (n)
Rural	609	79	47	129	220
Urban	2,183	48	35	73	1,364
Statewide	2,792	52	36	87	1,584

*25% of the cohort had a median transport time at or below this value

** 75% of the cohort had a median transport time at or below this value

Table 19: Injury to ED arrival time for transferred patients with an injury severity score > 15 by injury location

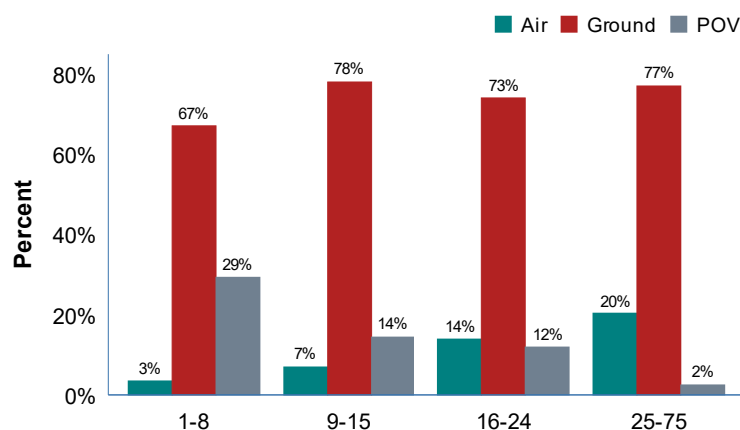
Injury location	ISS>15 and transferred to Level 1: Injury to Final ED Arrival Time (Minutes)				
	N	Median time	25th percentile*	75th percentile**	Injury time missing (n)
Rural	284	345	257	530	144
Urban	478	337	249	576	506
Statewide	762	339	253	562	650

*25% of the cohort had a median transport time at or below this value

** 75% of the cohort had a median transport time at or below this value

MODE OF TRANSPORT

Figure 25: Mode of transport to trauma center by Injury Severity Score

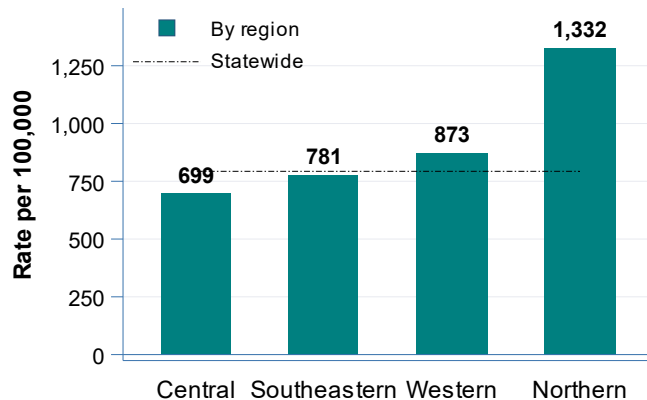


Data source: Arizona State Trauma Registry 2020

POV - Privately owned vehicle

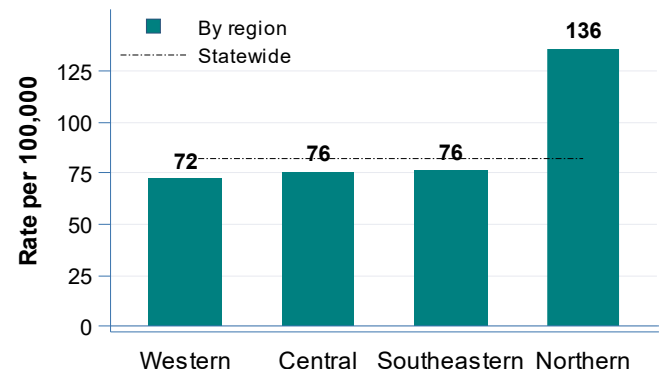
TRAUMA RATE

Figure 26a: Region-specific trauma rate per 100,000



Data source: Arizona State Trauma Registry 2020

Figure 26b: Region-specific severe trauma (ISS>15) rate per 100,000



Data source: Arizona State Trauma Registry 2020

Table 20: Region-specific trauma rate per 100,000

Injury Region	All Trauma Patients		Severe Trauma Patients (ISS >15)		Injury Cases *	
	Total Trauma Cases	Rate per 100,000 (95%CI)	Total Trauma Cases	Rate per 100,000 (95%CI)	Total Injury Cases	Rate per 100,000 (95%CI)
Western	4,169	873 [847, 900]	343	72 [64, 79]	29,975	6,278 [6,207, 6,349]
Southeastern**	10,057	781 [766, 797]	979	76 [71, 81]	79,887	6,207 [6,164, 6,250]
Northern	7,559	1,332 [1,302, 1,362]	771	136 [126, 145]	38,752	6,826 [6,759, 6,894]
Central	34,707	699 [692, 707]	3,749	76 [73, 78]	297,590	5,997 [5,975, 6,018]

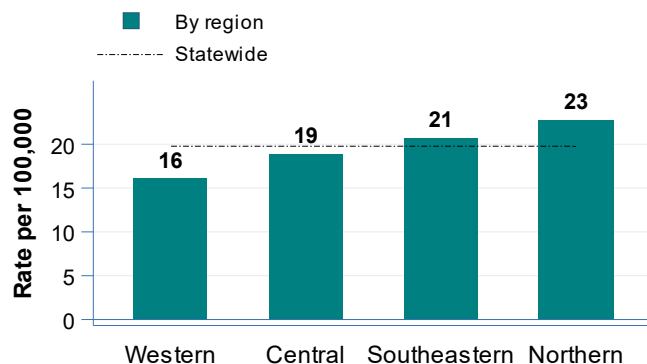
CI= Confidence interval

*The Arizona Hospital Discharge Database (HDD) 2020 was queried to calculate the injury rate by region (In HDD, region is defined based on the county of residence; while in ASTR, region is defined based on the county of injury).

** In the year 2020, there was a new Level 1 Trauma center in this region hence we see a increase in trauma rates and numbers for this region.

MORTALITY RATE

Figure 27: Region-specific trauma mortality rate per 100,000



Data source: Arizona State Trauma Registry 2020

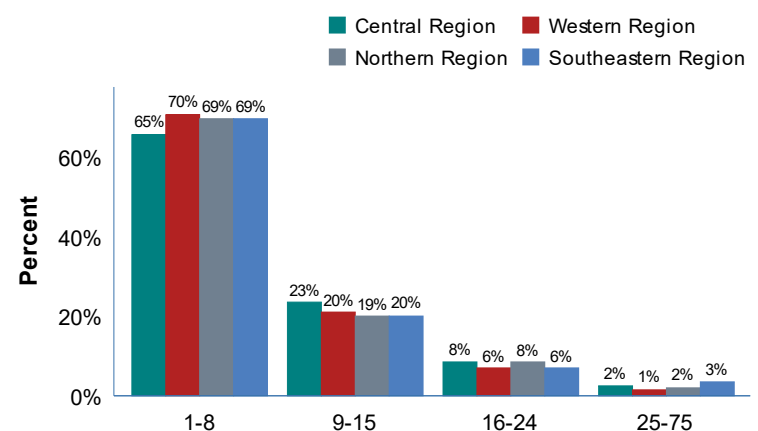
Table 21: Region-specific trauma mortality rate per 100,000

Injury Region	Total Trauma deaths	Rate per 100,000 (95%CI)
Western	77	16 [13, 20]
Northern	130	23 [19, 27]
Southeastern	268	21 [18, 23]
Central	942	19 [18, 20]

CI= Confidence interval

MORTALITY BY ISS

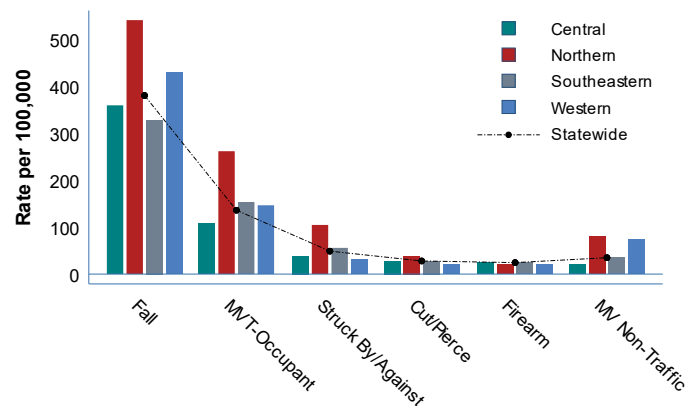
Figure 28: Region-specific trauma proportion by Injury Severity Score



Data source: Arizona State Trauma Registry 2020

MECHANISM OF INJURY

Figure 29: Region-specific trauma rate per 100,000 by top 6 mechanisms



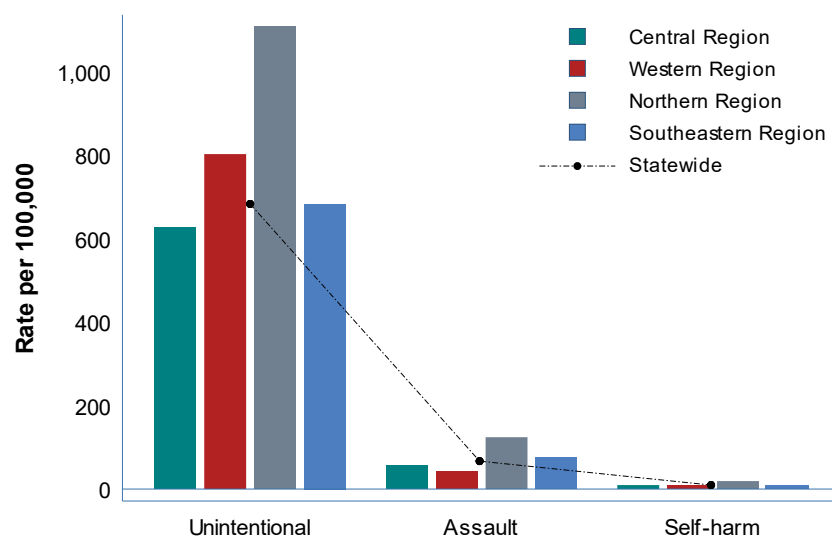
Data source: Arizona State Trauma Registry 2020

Table 22: Region-specific trauma rate per 100,000 by the top 6 mechanism of injury

Region	Mechanisms	Total Trauma Cases	Rate per 100,000 (95%CI)
Central	Fall	17,766	358 [353, 363]
	MVT-Occupant	5,470	110 [107, 113]
	Struck By/Against	1,928	39 [37, 41]
	Cut/Pierce	1,360	27 [26, 29]
	Firearm	1,352	27 [26, 29]
	MV Non-Traffic	1,138	23 [22, 24]
Northern	Fall	3,069	541 [522, 560]
	MVT-Occupant	1,481	261 [248, 274]
	Struck By/Against	592	104 [96, 113]
	Cut/Pierce	226	40 [35, 45]
	Firearm	124	22 [18, 26]
	MV Non-Traffic	458	81 [73, 88]
Southeastern	Fall	4,231	329 [319, 339]
	MVT-Occupant	2,005	156 [149, 163]
	Struck By/Against	754	59 [54, 63]
	Cut/Pierce	383	30 [27, 33]
	Firearm	347	27 [24, 30]
	MV Non-Traffic	485	38 [34, 41]
Western	Fall	2,053	430 [411, 449]
	MVT-Occupant	705	148 [137, 159]
	Struck By/Against	153	32 [27, 37]
	Cut/Pierce	106	22 [18, 26]
	Firearm	108	23 [18, 27]
	MV Non-Traffic	350	73 [66, 81]
Statewide	Fall	27,649	379 [375, 384]
	MVT-Occupant	9,891	136 [133, 138]
	Struck By/Against	3,584	49 [48, 51]
	Cut/Pierce	2,127	29 [28, 30]
	Firearm	1,991	27 [26, 28]
	MV Non-Traffic	2,608	36 [34, 37]

INTENT OF INJURY

Figure 30: Region-specific trauma rate per 100,000 by intent



Data source: Arizona State Trauma Registry 2020

Table 23: Region-specific trauma rate per 100,000 by intent of injury

Region	Intent	Total Trauma Cases	Rate per 100,000 (95%CI)
Central Region	Unintentional	30,995	625 [618, 632]
	Assault	2,901	58 [56, 61]
	Self-harm	434	9 [8, 10]
Northern Region	Unintentional	6,296	1,109 [1,082, 1,136]
	Assault	717	126 [117, 136]
	Self-harm	98	17 [14, 21]
Southeastern Region	Unintentional	8,806	684 [670, 699]
	Assault	996	77 [73, 82]
	Self-harm	152	12 [10, 14]
Western Region	Unintentional	3,838	804 [778, 829]
	Assault	218	46 [40, 52]
	Self-harm	52	11 [8, 14]
Statewide	Unintentional	49,935	685 [679, 691]
	Assault	4,832	66 [64, 68]
	Self-harm	736	10 [9, 11]

CI= Confidence interval

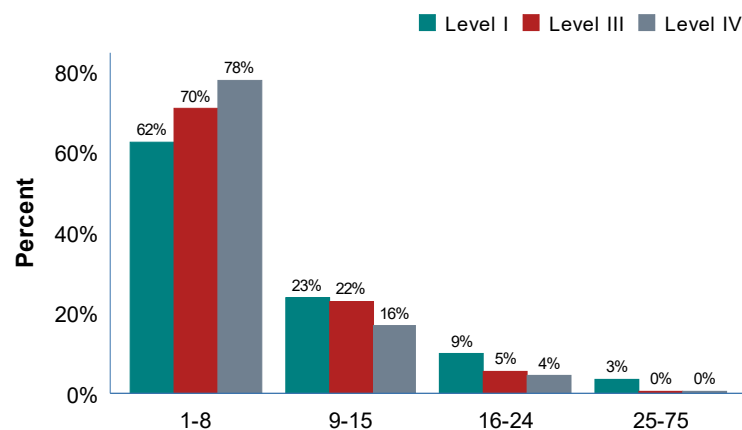
INCIDENCE & MORTALITY

Table 24: Trauma incidence and mortality proportion by trauma center designation

Trauma Center Designation	Count	Percent	Deaths	Mortality Proportion
Level I	37,573	65.02%	1,224	3.25%
Level III	7,876	13.63%	91	1.17%
Level IV	12,335	21.34%	126	1.02%

INJURY SEVERITY

Figure 31: Injury Severity Score by trauma center designation



Data source: Arizona State Trauma Registry 2020

CHARGES & REIMBURSEMENT

Table 25: Trauma charges and reimbursement by trauma center designation

Trauma Center Designation	Total Charges	Median Charges	Total Reimbursement	Reimbursement Percent
Level I	\$2,540,107,658	\$40,084	\$303,499,773	11.9%
Level III	\$262,758,015	\$19,006	\$26,244,972	9.9%
Level IV	\$255,074,148	\$13,205	\$30,219,038	11.8%
<i>Total</i>	<i>\$3,058,403,869</i>	<i>\$29,916</i>	<i>\$360,091,535</i>	<i>11.7%</i>

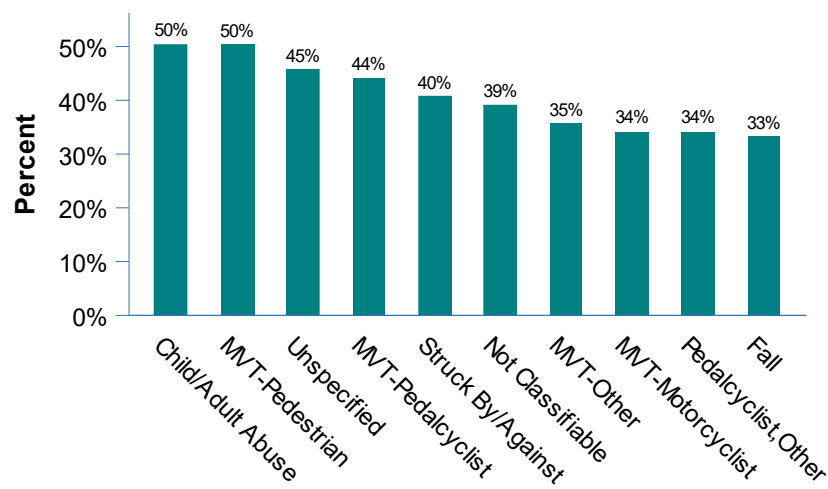
INCIDENCE & MORTALITY

Table 26: Traumatic brain injury incidence and mortality proportion by age and brain injury severity

Age	Total Trauma Cases	Major TBI				Minor TBI			
		N	Percent	Mortality	Mortality Percent	N	Percent	Mortality	Mortality Percent
Total	58,041	6,352	10.94%	653	10.28%	11,689	20.13%	156	1.33%
<1	499	179	35.87%	3	1.67%	117	23.44%	.	.
1-4	1,251	136	10.87%	10	7.35%	216	17.26%	1	0.46%
5-9	1,253	73	5.82%	5	6.84%	173	13.80%	1	0.57%
10-14	1,585	128	8.07%	8	6.25%	308	19.43%	2	0.64%
15-19	3,088	194	6.28%	25	12.88%	706	22.86%	9	1.27%
20-24	3,806	304	7.98%	54	17.76%	847	22.25%	7	0.82%
25-34	7,348	601	8.17%	85	14.14%	1,540	20.95%	16	1.03%
35-44	5,538	509	9.19%	68	13.35%	1,135	20.49%	15	1.32%
45-54	5,037	558	11.07%	62	11.11%	975	19.35%	9	0.92%
55-64	6,448	712	11.04%	116	16.29%	1,276	19.78%	28	2.19%
65-74	7,760	950	12.24%	69	7.26%	1,480	19.07%	26	1.75%
75-84	8,340	1,213	14.54%	86	7.08%	1,628	19.52%	27	1.65%
85+	6,088	795	13.05%	62	7.79%	1,288	21.15%	15	1.16%

MECHANISM OF INJURY (TOP 10)

Figure 32: Proportion of Traumatic Brain Injury by mechanism



Data source: Arizona State Trauma Registry 2020

GLASGOW COMA SCORE (GCS)

Table 27: Traumatic brain injury incidence and mortality proportion by age and GCS

Age	Total Trauma Cases	TBI- GCS<9				TBI- GCS 9-12				TBI- GCS 13-15			
		N	Percent	Mortality	Mortality Percent	N	Percent	Mortality	Mortality Percent	N	Percent	Mortality	Mortality Percent
Total	58,041	1,358	2.33%	600	44.18%	605	1.04%	40	6.61%	15,740	27.11%	158	1.00%
<1	499	13	2.60%	3	23.07%	10	2.00%	.	.	257	51.50%	.	.
1-4	1,251	22	1.75%	10	45.45%	16	1.27%	.	.	307	24.54%	1	0.32%
5-9	1,253	19	1.51%	6	31.57%	11	0.87%	.	.	208	16.60%	.	.
10-14	1,585	30	1.89%	10	33.33%	12	0.75%	.	.	391	24.66%	.	.
15-19	3,088	90	2.91%	33	36.66%	19	0.61%	.	.	786	25.45%	1	0.12%
20-24	3,806	151	3.96%	60	39.73%	31	0.81%	.	.	958	25.17%	.	.
25-34	7,348	252	3.42%	97	38.49%	88	1.19%	1	1.13%	1,767	24.04%	2	0.11%
35-44	5,538	185	3.34%	78	42.16%	69	1.24%	2	2.89%	1,366	24.66%	1	0.07%
45-54	5,037	142	2.81%	62	43.66%	59	1.17%	5	8.47%	1,314	26.08%	4	0.30%
55-64	6,448	178	2.76%	99	55.61%	72	1.11%	11	15.27%	1,718	26.64%	32	1.86%
65-74	7,760	127	1.63%	54	42.51%	71	0.91%	3	4.22%	2,178	28.06%	36	1.65%
75-84	8,340	94	1.12%	59	62.76%	86	1.03%	10	11.62%	2,586	31.00%	42	1.62%
85+	6,088	55	0.90%	29	52.72%	61	1.00%	8	13.11%	1,904	31.27%	39	2.04%

DISCHARGED TO REHAB BY PAYER

Table 28: Discharged to rehab by primary payer and Injury Severity Score

Primary Payer	Total Patient admitted		Discharged to Rehab		ISS <=15 and Discharged to Rehab		ISS >15 and Discharged to Rehab	
	N	%	N	%	N	%	N	%
AHCCCS	10,025	29.21%	596	5.94%	300	3.67%	293	17.74%
Medicare	12,584	36.66%	1,336	10.61%	1,064	9.94%	258	16.16%
Not Documented	59	0.17%	5	8.47%	3	6.25%	2	20.00%
Other	170	0.49%	3	1.76%	3	2.23%	.	.
Private	9,756	28.42%	794	8.13%	482	5.89%	309	21.41%
Self pay	1,723	5.02%	18	1.04%	11	0.73%	7	3.39%
Total	34,317	100.00%	2,752	8.01%	1,863	6.48%	869	17.61%

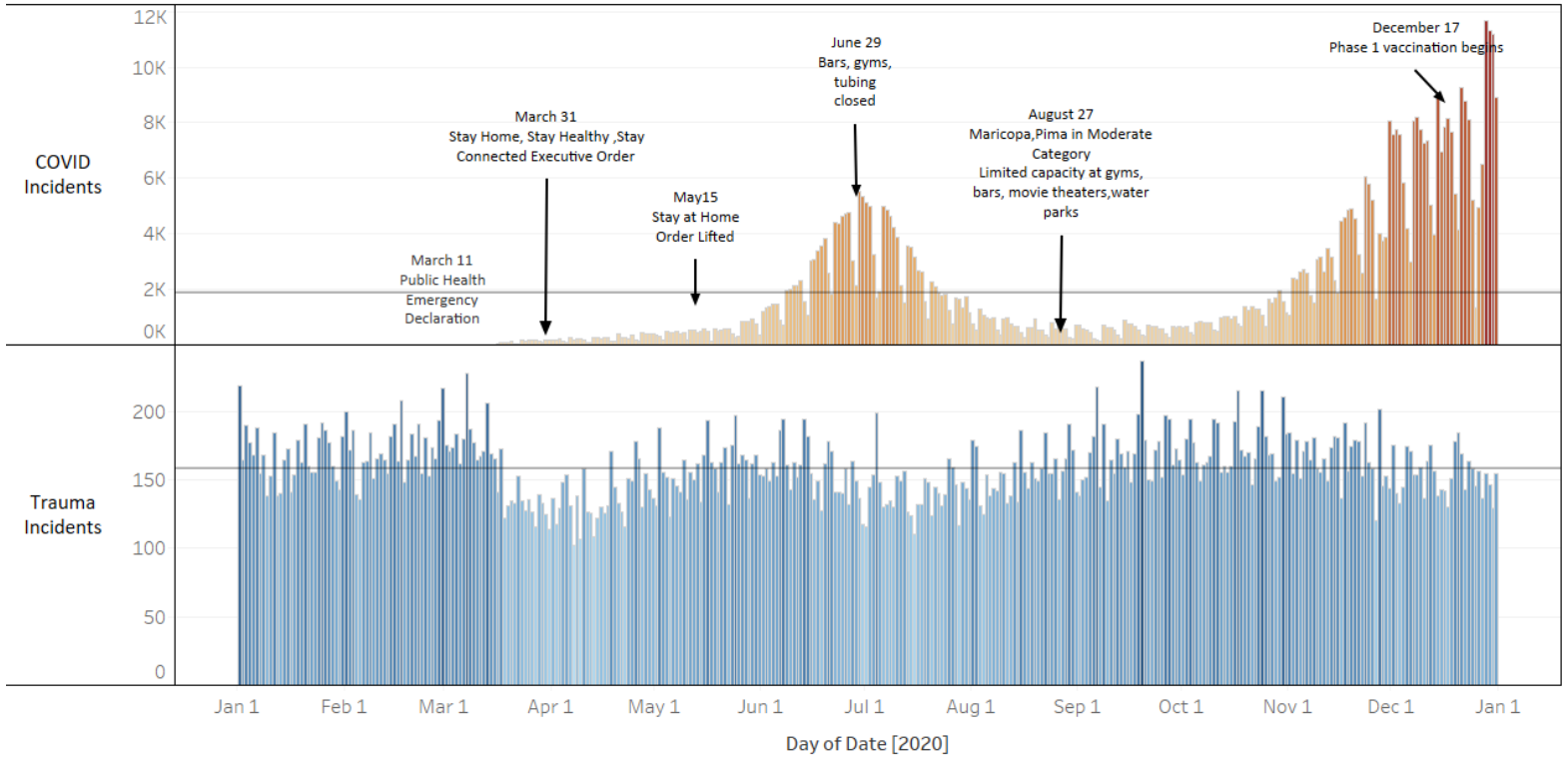
DISCHARGED TO REHAB BY REGION

Table 29: Discharged to rehab by region of injury

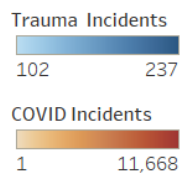
Region	Total Patient Admitted		Other		Discharged to Rehab	
	N	%	N	%	N	%
Missing Region	918	2.7%	859	93.5%	59	6.4%
Central Region	23,984	71.7%	22,256	92.7%	1,728	7.2%
Western Region	1,869	5.5%	1,685	90.1%	184	9.8%
Northern Region	3,388	10.1%	3,062	90.3%	326	9.6%
Southeastern Region	3,284	9.8%	2,933	89.3%	351	10.6%
Statewide	33,443	100.0%	30,795	92.0%	2,648	7.9%

COMPARISON OF TRAUMA AND COVID-19 INCIDENTS

Trauma Incidents and COVID Incidents by Day



Data Source : ASTR and AZDHS



APPENDIX A. LIST OF TRAUMA CENTERS BY LEVEL OF DESIGNATION

Health Care Institution	Address	Effective Date	Expiration Date
Level I Trauma Centers			
Abrazo West Campus	13677 W. McDowell Road, Goodyear, AZ 85395	06/30/18	**06/30/21
Banner - University Medical Center Phoenix	1111 E. McDowell Rd., Phoenix, AZ 85006	11/18/17	11/18/21
Banner Desert Medical Center	1400 South Dobson Rd., Meza, AZ 85202	04/23/19	**04/23/22
Banner Thunderbird Medical Center	5555 W. Thunderbird Rd, Glendale, AZ 85306	09/30/19	**09/30/22
Banner University Medical Center – Tucson Campus	1625 N. Campbell Ave, Tucson, AZ 85719	11/11/18	11/11/21
Carondelet St. Joseph's Hospital	350 N. Wilmot Rd., Tucson, AZ 85718	09/20/20	09/20/23
Dignity Health, dba Chandler Regional Medical Center	1955 W. Frye Rd., Chandler, AZ 85224	07/01/18	07/01/22
Flagstaff Medical Center	1200 N. Beaver St., Flagstaff, AZ 86001	05/27/21	05/27/24
HonorHealth Deer Valley Medical Center	19829 N. 27 th Ave., Phoenix, AZ 85027	06/01/19	**06/01/22
HonorHealth John C. Lincoln Medical Center	250 E. Dunlap Ave., Phoenix, AZ 85020	04/24/21	04/24/24
HonorHealth Scottsdale Osborn Medical Center	7400 E. Osborn, Scottsdale, AZ 85251	10/27/18	10/27/21
Maricopa County Special Health Care District, dba Valleywise Health Medical Center	2601 E. Roosevelt, Phoenix, AZ 85008	12/19/17	12/19/21
St. Joseph's Hospital & Medical Center	350 W. Thomas Rd., Phoenix, AZ 85013	11/20/19	11/20/23
Level I Pediatric Trauma Centers **			
Phoenix Children's Hospital	1919 E. Thomas Rd., Phoenix, AZ 85016	08/31/18	08/31/22
Level III Trauma Centers			
Banner Baywood Medical Center	6644 E. Baywood Ave., Mesa, AZ 85206	02/25/20	02/25/24
Banner Del E. Webb Medical Center	14502 W. Meeker Blvd, Sun City West, AZ 85375	01/25/19	01/25/22
Canyon Vista Medical Center	5700 E. Highway 90, Sierra Vista, AZ 85635	04/03/20	04/03/23
Havas Regional Medical Center	101 Civic Center Ln., Lake Havasu City, AZ 86403	04/26/21	02/28/24
Mountain Vista Medical Center	1301 S. Crismon Rd., Mesa, AZ 85209	07/26/20	* 07/26/21
Tuba City Regional Health Care Corp.	P.O. Box 600, 167 Main St., Tuba City, AZ 86045	12/10/18	12/10/21

***Application Pending:** In accordance with R9-25-1307D – If an owner submits for renewal of designation, the designation does not expire until the Department has made a final determination.

****** Due to the significant impacts of COVID-19 on public health The American College of Surgeons (ACS) has made the decision to grant an extension of 1 year for verified hospital programs with a verification expiration date falling between January 2020 and December 2023. The dates above represent state designation expiration dates, not ACS verification expiration dates.

**** Pediatric Level I Trauma Centers:** All Arizona Designated Trauma Centers are required to have the capabilities necessary to resuscitate, stabilize, and transfer pediatric patients. Pediatric Trauma Centers have a trauma service specifically intended to meet the needs of children requiring trauma care.

APPENDIX A. LIST OF TRAUMA CENTERS BY LEVEL OF DESIGNATION

Level IV Trauma Centers			
Banner Boswell Medical Center	10401 W. Thunderbird Blvd., Sun City, AZ 85351	12/17/18	12/17/21
Banner Casa Grande Medical Center	1800 E. Florence Blvd., Casa Grande, AZ 85122	10/01/19	*10/01/21
Banner Estrella Medical Center	9201 W. Thomas Road, Phoenix, AZ 85037	08/30/18	*08/30/21
Banner Gateway Medical Center	1900 N. Higley Road, Gilbert, AZ 85234	01/02/19	01/02/22
Banner Ironwood Medical Center	37000 N. Gantzel Rd., San Tan Valley, AZ 85140	10/11/18	10/11/21
Banner Page Hospital	501 N. Navajo, Page, AZ 86040	11/05/20	11/05/23
Banner Payson Medical Center	807 S. Ponderosa Street, Payson, AZ 85541	11/22/19	11/22/22
Banner University Medical Center – South Campus	2800 E. Ajo Way, Tucson, AZ 85713	08/13/20	08/13/22
Benson Hospital	450 S. Ocotillo Ave., Benson, AZ 85602	09/18/19	* 09/18/21
Cobre Valley Regional Medical Center	5880 S. Hospital Dr., Globe, AZ 85501	11/26/18	11/26/21
Copper Queen Community Hospital	101 Cole Ave., Bisbee, AZ 85603	12/01/19	12/01/21
Copper Queen Community Hospital – Douglas Emergency Department	100 E. 5 th Street, Douglas, AZ 85607	06/25/19	06/25/22
Dignity Health St. Joseph's – Westgate Medical Center	7300 N. 99th Ave, Glendale, AZ 85307	02/9/21	02/09/22
Kingman Regional Medical Center	3269 Stockton Hill Rd., Kingman, AZ 86409	10/15/18	10/15/21
La Paz Regional Hospital	1200 W. Mohave Rd., Parker, AZ 85344	06/02/21	06/02/24
Little Colorado Medical Center	1501 N. Williamson Ave, Winslow, AZ 86047	06/22/21	06/22/24
Mt. Graham Regional Medical Center	1600 S. 20 th Ave., Safford, AZ 85546	03/20/20	03/20/23
Northern Cochise Community Hospital	901 W. Rex Allen Dr., Willcox, AZ 85643	12/04/20	12/04/23
San Carlos Apache Health Care Corporation	103 Medicine Way Road, Peridot, AZ 85542	05/09/21	05/09/22
Summit Healthcare Regional Medical Center	2200 Show Low Lake Rd., Show Low, AZ 85901	08/12/20	08/12/23
Verde Valley Medical Center	269 S. Candy Ln., Cottonwood, AZ 86326	08/18/20	9/01/21
Verde Valley Medical Center – Sedona Campus	3700 W. Hwy 89A, Sedona, AZ 86336	05/08/19	05/08/22
Western Arizona Regional Medical Center	2735 Silver Creek Road, Bullhead City, AZ 86442	10/28/19	10/28/22
White Mountain Regional Medical Center	118 S. Mountain Ave., Springerville, AZ 85938	06/18/21	06/18/24
Wickenburg Community Hospital	520 Rose Ln., Wickenburg, AZ 85390	08/08/20	*08/08/21
Yavapai Regional Medical Center – West Campus	1003 Willow Creek Road, Prescott, AZ 86301	01/10/20	01/10/23
Yavapai Regional Medical Center – East Campus	7700 E. Florentine, Prescott Valley, AZ 86314	06/24/20	06/24/23
Yuma Regional Medical Center	2400 South Avenue A, Yuma, AZ 85364	10/28/20	10/28/22

*Application Pending: In accordance with R9-25-1303E – If an owner submits for renewal of designation, the designation does not expire until the Department has made a final determination.

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** Pediatric Level I Trauma Centers: All Arizona Designated Trauma Centers are required to have the capabilities necessary to resuscitate, stabilize, and transfer pediatric patients. Pediatric Trauma Centers have a trauma service specifically intended to meet the needs of children requiring trauma care.

ARIZONA STATE TRAUMA REGISTRY INCLUSION CRITERIA

TRAUMA PATIENT INCLUSION DEFINITION**ARIZONA STATE TRAUMA REGISTRY (ASTR)****Effective for records with ED/Hospital Arrival Dates January 1, 2018** – Current**

The owner of a trauma center shall ensure that:

1. The trauma registry, established according to subsection (B)(1), includes the information required in R9- 25-1309 for each patient with whom the trauma center had contact who meets one or more of the following criteria:
 - a. A patient with injury or suspected injury who is:
 - i. Transported from a scene to a trauma center or an emergency department based on the responding emergency medical services provider's or ambulance service's triage protocol required in R9-25- 201(E)(2)(b), or
 - ii. Transferred from one health care institution to another health care institution by an emergency medical services provider or ambulance service;
 - b. A patient with injury or suspected injury for whom a trauma team activation occurs; or
 - c. A patient with injury, who is admitted as a result of the injury or who dies as a result of the injury, and whose medical record includes one or more of specific ICD-codes indicating that:
 - i. At the initial encounter with the patient, the patient had:
 - (1) An injury or injuries to specific body parts - S00-S99 with 7th character modifiers of A, B, or C ONLY. (Injuries to specific body parts –initial encounter)
 - (2) Unspecified multiple injuries - T07 (unspecified multiple injuries)
 - (3) Injury of an unspecified body region - T14 (injury of unspecified body region)
 - (4) A burn or burns to specific body parts - T20-T28 with 7th character modifier of A ONLY (burns by specific body parts – initial encounter)
 - (5) Burns assessed through Total Body Surface Area percentages - T30-T32 (burn by TBSA percentages) or
 - (6) Traumatic Compartment Syndrome - T79.A1-T79.A9 with 7th character modifier of A ONLY (Traumatic Compartment Syndrome – initial encounter);

and

ii. The patient's injuries or burns were not only:

- (1) An isolated distal extremity fracture from a same-level fall,
- (2) An isolated femoral neck fracture from a same-level fall,
- (3) Effects resulting from an injury or burn that developed after the initial encounter – (Late effect codes, which are represented using the same range of injury diagnosis codes but with the 7th digit modifier code of D through S),
- (4) A superficial injury or contusion –
 - S00 (Superficial injuries of the head)
 - S10 (Superficial injuries of the neck)
 - S20 (Superficial injuries of the thorax)
 - S30 (Superficial injuries of the abdomen, pelvis, lower back and external genitals)
 - S40 (Superficial injuries of shoulder and upper arm)
 - S50 (Superficial injuries of elbow and forearm)
 - S60 (Superficial injuries of wrist, hand and fingers)
 - S70 (Superficial injuries of hip and thigh)
 - S80 (Superficial injuries of knee and lower leg) S90 (Superficial injuries of ankle, foot and toes)), or
- (5) A foreign body entering through an orifice;

*The inclusion criteria are in the trauma rules. This document is a guide and does not supercede the rules.