



State Trauma Advisory Board 2012 Annual Report



Arizona
Department of
Health Services

Arizona Department of Health Services
Will Humble, Director

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State Trauma Advisory Board
2012 Annual Report
&
2011 Trauma Registry Report

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State Trauma Advisory Board Membership

The following is a list of the talented professionals and citizens who serve the State of Arizona as members of the State Trauma Advisory Board by giving of their time and expertise and providing invaluable guidance for the Arizona trauma system. We thank them for their many contributions to the Arizona Department of Health Services and the citizens of Arizona.

Bentley J. Bobrow, M.D., Chairman

Medical Director
Bureau of EMS and Trauma System -- Phoenix, AZ

Bill Ashland, R.N.

Regional EMS Council – Northern Region Representative
Flagstaff Medical Center -- Flagstaff, AZ

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Show Low Fire Department – Show Low, AZ

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Statewide Neurosurgical Society Representative
Maricopa Medical Center – Phoenix, AZ

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Department of Public Safety -- Phoenix, AZ

Philip Johnson, M.D.

Rural Base Hospital not a Trauma Center - Representative
Summit Healthcare Regional Medical Center -- Show Low, AZ

Christina Kwasnica, M.D.

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St. Joseph's Neurorehabilitation, Phoenix, AZ

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Phoenix Children's Hospital -- Phoenix, AZ

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American College of Surgeons Representative
St. Joseph's Hospital and Medical Center -- Phoenix, AZ

Michael Pflieger, M.D.

National Organization of Emergency Physicians Representative
Scottsdale Healthcare/Osborn -- Scottsdale, AZ

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University of Arizona -- Tucson, AZ

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Sonoran Orthopaedic Trauma Surgeons -- Scottsdale, AZ

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Fire Department – County with a Population of Five Hundred
Thousand Persons or More – Representative - City of Tucson Fire
Department -- Tucson, AZ

Roy Ryals, Director of EMS

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Southwest Ambulance -- Mesa, AZ

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Trauma Center Representative
Banner Good Samaritan Regional Medical Center -- Phoenix, AZ

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Statewide Hospital Association Representative
Arizona Hospital and Healthcare Assoc. -- Phoenix, AZ

Tina L. Tessay

Tribal Health Organization Representative
White Mountain Apache Tribe, EMS -- Whiteriver, AZ

VACANT

National Association of Retired Persons Representative

Mark Venuti, CEP

Statewide Ambulance Association Representative
Guardian Medical Transport -- Flagstaff, AZ

Jonathan Walker, D.O.

Federal Indian Health Services Organization Representative
Phoenix Indian Medical Center -- Phoenix, AZ

Laurie Wood, R.N.

Urban Advanced Life Support Base Hospital not a Trauma
Center Representative
Banner Thunderbird Medical Center -- Glendale, AZ

Linda Worthy, R.N.

Society of Trauma Nurses Representative
John C. Lincoln North Mountain Hospital -- Phoenix, AZ

Michelle Ziemba, R.N., MSN

Regional EMS Council – Southeastern Region Representative
University Medical Center -- Tucson, AZ

Trauma and EMS Performance Improvement Standing Committee Membership

The following is a list of the talented professionals and citizens who serve the State of Arizona as members of the Trauma and EMS Performance Improvement Standing Committee by giving of their time and expertise and providing invaluable guidance for the Arizona trauma and EMS system. We thank them for their many contributions to the Arizona Department of Health Services and the citizens of Arizona.

Linda Worthy, R.N.

Chair
John C. Lincoln North Mountain Hospital
Phoenix, AZ

Bill Ashland, R.N., Program Manager
Vice Chair/State Designated Level I Trauma Center Trauma
Flagstaff Medical Center -- Flagstaff, AZ

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Tucson, AZ

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Rehabilitation Specialist
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Southeast Arizona Medical Center, Douglas, AZ

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EMS Researcher (AEMRC)
University Medical Center Base Hospital, Tucson, AZ

Garth Gemar, MD
EMS Medical Director of a Premier EMS Agency
Rural/Metro-Southwest Ambulance, Glendale Fire Dept.,
Surprise Fire Dept. and Banner Healthcare , AZ

Pamela Goslar, Ph.D.
IPAC Representative
St. Joseph's Hospital & Medical Center
Phoenix, AZ

Michelle Guadnola, R.N.
State Designated Level I Trauma Center Trauma Program
St. Joseph's Hospital & Medical Center, Phoenix, AZ

Rebecca Haro
EMS Council Liaison
Sun City West Fire District, Phoenix, AZ

Jill McAdoo

Ground Ambulance or First Responder Premier EMS
Agency – Quality Improvement Officer
(NAEMS/WACEMS), Life Line Ambulance Service, AZ

Mary McDonald
Pre-hospital EMS Coordinator – Base Hospital
(SAEMS/AEMS), University of Arizona Medical Center,

Eric Merrill
Ground Ambulance or First Responder Premier EMS
Agency, Rio Verde Fire Department, Rio Verde, AZ

Melissa Moyer
Representative of the Trauma Registry Users Group
John C. Lincoln North Mountain Hospital
Phoenix, AZ

David Notrica, MD
Pediatric Representative, Pediatric Surgeons of Phoenix
Phoenix Children's Hospital, Phoenix, AZ

Wade Patten
Air Ambulance Premier EMS Agency Quality Improvement
Officer, Guardian Air Transport, Flagstaff, AZ

Jim Prohaska, Program Manager
State Designated Level II or II Trauma Center Trauma,
Mountain Vista Medical Center, Mesa, AZ

Danielle Stello, R.N.
Pre-hospital EMS Coordinator – Base Hospital
Havasu Regional Medical Center, Havasu, AZ

Frank Walter, M.D., FACEP
Medical Direction Commission (MDC) Liaison
University of Arizona Department of Emergency Medicine
Tucson, AZ

Dale Woolridge, M.D.
Injury Researcher
University of Arizona Department of Emergency Medicine
Tucson, AZ

Michelle Ziemba, R.N., MSN,
ACS Verified Level I Trauma Program Rep/PI Coordinator
University Medical Center, Tucson, AZ

Annual Report to the Director

This annual report, developed by the Bureau of EMS and Trauma System (Bureau) on behalf of the State Trauma Advisory Board (STAB) is a synopsis of the work and achievements during the past year and describes challenges which lie ahead for the Arizona trauma system.

STAB is mandated by statute to: (1) make recommendations on the initial and long-term processes for the verification and designation of trauma center levels, including the evaluation of trauma center criteria; (2) make recommendations on the development and implementation of comprehensive regional emergency medical services and trauma system plans; (3) make recommendations on the state emergency medical services and trauma system quality improvement processes, including the state trauma registry; and (4) submit an annual report to the Director of ADHS on or before October 1 regarding the STAB's accomplishments and recommendations.

Mandate 1: Recommendations on Verification and Designation

Our staff takes notes on potential updates to our rules, policies and procedures for trauma center designation. We have identified some logic errors in our regulatory language about when a prospective trauma center must initiate PI tracking and trauma registry participation. The application process for level IV trauma centers makes it very difficult for the site visit team to have sufficient information about the prospective facility's capability. Finally, for our State criteria for level I, II and III trauma center designation will need to be updated as the ACS introduces the new version of the trauma center standards later in 2012 or early 2013. At this stage the Bureau has been able to update our policies and procedures to handle these issues.

Mandate 2: Recommendation on System Development

There has been continued growth in our trauma system this year. There are now a total of 26 designated trauma centers in Arizona (8-level one, 3-level three and 15- level four) up from seven when our efforts to improve access to trauma care began.

Changes in any system will require that the stakeholders periodically re-evaluate system activities. With this rapid growth in the number and location of trauma centers it is important that we take stock of our resources and update our trauma plan to take into account changes in the system. This past spring, the Director asked the Bureau to update the State's trauma plan. In addition he asked that we invite the ACS Trauma System Consultation team to return to Arizona and re-evaluate our system after 5 years of rapid growth. The ACS site visit is scheduled for November of this year.

Mandate 3: Recommendations on EMS and Trauma System Quality Improvement

This year marked the beginning of the re-designation visits for the level IV trauma centers. Our site visit teams were aided by the PRQ tool that was developed last year. It helped by aggregating the necessary information so that the site visit team could make an informed recommendation to the Bureau concerning re-designation. A common theme was quickly identified as the site visits progressed – the level IV facilities were having a difficult time implementing and documenting a performance improvement process for their facilities. Through the hard work of both the site visit teams and the trauma section staff we were able to help the facilities with their PI programs. In addition, the Bureau reached out to its partners at the University of Arizona Center for Rural Health and to experts among our trauma centers to develop a Performance Improvement Guide. This guide will be finalized this fall, distributed to all centers, and placed on the Bureau's website.

Arizona State Trauma Registry (ASTR)

The 2012 Arizona State Trauma Registry (ASTR) report includes trauma data from 27 reporting facilities: (8) Level I Trauma Centers, (15) Level IV Trauma Centers, and (4) non-designated hospitals¹. The volume of trauma records continues to increase as additional hospitals apply for designation. There are additional hospitals that have been designated or will soon be designated and it is expected they will begin reporting soon. The Data and Quality Assurance team has three main priorities; patient protection, the validity of the database, and using trauma data to measure and improve Arizona's Trauma System.

The ASTR is currently comprised of two datasets: A Full Data Set of 187 data elements (required or auto-calculated) and a Reduced Data Set of 70 data elements (required or auto-calculated). Levels I, II, and III Trauma Centers submit the Full Data Set while Level IV and non-designated hospitals have the option of submitting the full or reduced. Only Level I Trauma Centers are required to submit AIS 2005 injury codes; all hospitals submit ICD-9-CM injury diagnosis codes.

Data Validity Efforts: The ASTR data validation tool, developed collaboratively by ADHS staff and the trauma registry software vendor significantly increases the ASTR data quality. More than 800 data checks are performed per record for the full data set and more than 240 data checks are performed per record for the reduced data set. Data checks include warning flags for blank fields, invalid entries, date and time errors, and other data logic errors. The validation tool includes both state and national checks, thus assisting reporting hospitals with their data submission to both ASTR and the National Trauma Data Bank. The Data and Quality Assurance (DQA) staff run validation reports and the results are sent to the reporting hospitals so the data can be updated, confirmed, and re-submitted to the ASTR with changes. The DQA Section also performs statewide Inter-Rater Reliability (IRR) testing as a quality assurance tool to continuously improve on trauma data entry standardization and data reliability.

The Trauma Registry Users Group (TRUG) continues to meet quarterly to review quality assurance practices, provide data entry discussion and education, answer questions, and request feedback from participating hospitals. Data and Quality Assurance (DQA) staff meets with individual trauma registrars from newly designated trauma centers and is continuously available to provide assistance when requested by the registrars.

The American Trauma Society oversees a national trauma registrar certification process. Ten of Arizona's trauma registrars have passed the testing and training requirements necessary to achieve the designation of Certified Specialist in Trauma Registry (CSTR).

Arizona Pre-Hospital Information and EMS Registry System (AZ-PIERS)

The Bureau received one-time Hospital Preparedness Program funding in 2010 to implement Arizona's first electronic Patient Care Report (ePCR) system. The system, AZ-PIERS, serves as a pre-hospital care quality assurance initiative, and is available to all EMS agencies free of charge.

Special areas of emphasis include ST segment Myocardial Infarction (STEMI), Out of Hospital Cardiac Arrest (OHCA), Trauma, Stroke, and Traumatic Brain Injury (TBI) among others. AZ-PIERS

¹ Trauma centers that were designated in 2012 are not included in the 2011 data.

will also facilitate in data sharing with the Arizona Department of Transportation (ADOT) Crash Database.

Focus Areas for Upcoming Years

Collaboration efforts: The Bureau is collaborating with trauma facilities, universities, and other partners in the community to carry out research on emerging injury related public health issues. Data from both databases will be used to inform the areas of possible research. The DQA staff seeks out efforts to publish in peer-reviewed journals with the goal of moving trauma system knowledge forward.

Performance and Outcome Measures: While access to care is one measure of trauma system effectiveness, it does not describe the patient's clinical experience. Over the next few years the Bureau will be focusing on additional measures that provide a clearer clinical picture of our trauma system. Under consideration are analyses of patient outcomes, assessment of practitioner trauma education, and assessments of the timeliness of transfers between Trauma Centers.

Data Validity and Quality Improvements: With the advent of the AZ-PIERS registry, the Bureau believes that additional trauma data element capture will be facilitated. As demonstrated in the attached 2011 ASTR Data Report, while significant strides have been made, more work is needed to improve the quality and completeness of the trauma registry data capture. Many of these elements pertain to the pre-hospital component of care, while others pertain to care provided in the Trauma Centers. The BEMSTS will continue to work with TRUG and the soon to be developed EMS Registry Users Group (EMSRUG) to improve on the completeness of the data capture and the quality of the data captured to ensure the most accurate evaluation of trauma care in Arizona. And we intend to continue our Inter-rater Reliability Evaluations and look for ways to expand this important tool to the AZ-PIERS as well.

The Arizona Excellence in Pre-Hospital Injury Care (EPIC) Public Health Project

As reported nationally and exemplified in this state trauma report, traumatic brain injury (TBI) is a major public health problem in Arizona bringing upon an immense societal burden. There has been growing evidence that the management of TBI in the early minutes after injury profoundly impacts outcome. This has led to the promulgation of national evidence-based TBI treatment guidelines. However, no studies have evaluated their impact in the *pre-hospital* setting. With the goal of improving survival and neurologic outcome after TBI, the ADHS/ BEMST in collaboration with the University of Arizona Emergency Medicine Research Center (AEMRC) successfully acquired funding from the National Institutes of Health to carry out a statewide evaluation of the implementation of these pre-hospital TBI guidelines. The specific aim of EPIC is to implement the pre-hospital TBI guidelines in the 911 EMS systems across the state and reduce mortality and improve non-mortality outcomes in adults and children (EPIC4KIDS) with moderate or severe TBI. For more information visit www.epic.arizona.edu

The objectives of the EPIC Project are:

Objective #1: Implement the nationally-vetted TBI guidelines across a broad variety of EMS systems (urban, suburban and rural) throughout the State of Arizona. This is currently in progress and will be accomplished through the statewide collaboration between the University of Arizona, the Arizona Department of Health Services, and local EMS agencies responding to approximately 85% of the state's population. This will mirror the approach that has been

successfully employed to study and document a tripling of patient survival from out-of-hospital cardiac arrest in the state.

Objective #2: Collect pre-hospital EMS and trauma center data on cohorts of moderate and severe adult TBI patients cared for by participating EMS agencies to determine pre-implementation and post-implementation injury severity/risk adjustment measures and outcomes.

Objective #3: Evaluate the impact of pre-hospital guideline implementation on the following outcomes: 1) Overall mortality (primary outcome), 2) mortality among patients who are intubated prior to hospital arrival, 3) non-mortality outcomes such as hospital/intensive care unit length of stay, ventilator days, and patient disposition, 4) 12-month functional/neurological status, and 5) hospital healthcare costs.

EPIC Project Progress to Date:

Recruiting EMS agencies:

Participation: (Already)

- Over 100 agencies covering over 85 % of the state's TBIs
- Eight of the 10 largest Fire Departments are already officially involved
- Essentially all of the private ambulance companies
- 17 of the 20 largest agencies in the state
- Over two-thirds of the Air Medical Programs, representing over 90% of all air transports

Trauma Center Data:

- Using the ASTR, EPIC has already obtained trauma center treatment, risk adjustment, and outcome data:
- We have already obtained all of the State Trauma Registry data for all of 2007-2011. Thus, we are getting close to having all of the retrospective Trauma Center data and will soon be accessing the prospective data.

EMS Patient and System Data:

- This is also going very well. Due to the huge amount of retrospective data to be obtained (5 years), this process is voluminous. Large numbers of patient care reports are being obtained via the various mechanisms (e.g., some are mailing hard-copy directly to us, others are scanning and sending e-copies, some are able to allow the EPIC personnel to directly access their electronic data remotely from the Research Center, others will be providing us with discs with electronic data, in some agencies the EPIC Data Entry Specialists are going on-site to aid in obtaining the TBI cases.) As predicted, there are multiple different processes for accessing the data. In each case, we are being successful in obtaining the data.
- Linkage of EMS to ASTR data has gone remarkably well, with >95% of all cases in the ASTR meeting EPIC inclusion criteria having matching EMS data accessible.

Database Development:

- The EPIC Database is now up and running with EMS data being entered and linked to ASTR data.

Education/Training Material Development:

- EPIC training began in earnest in 2012 and the first agency was certified in February. We have already gotten to the point where ~40% of the TBI cases are cared for by an EPIC-Certified agency.

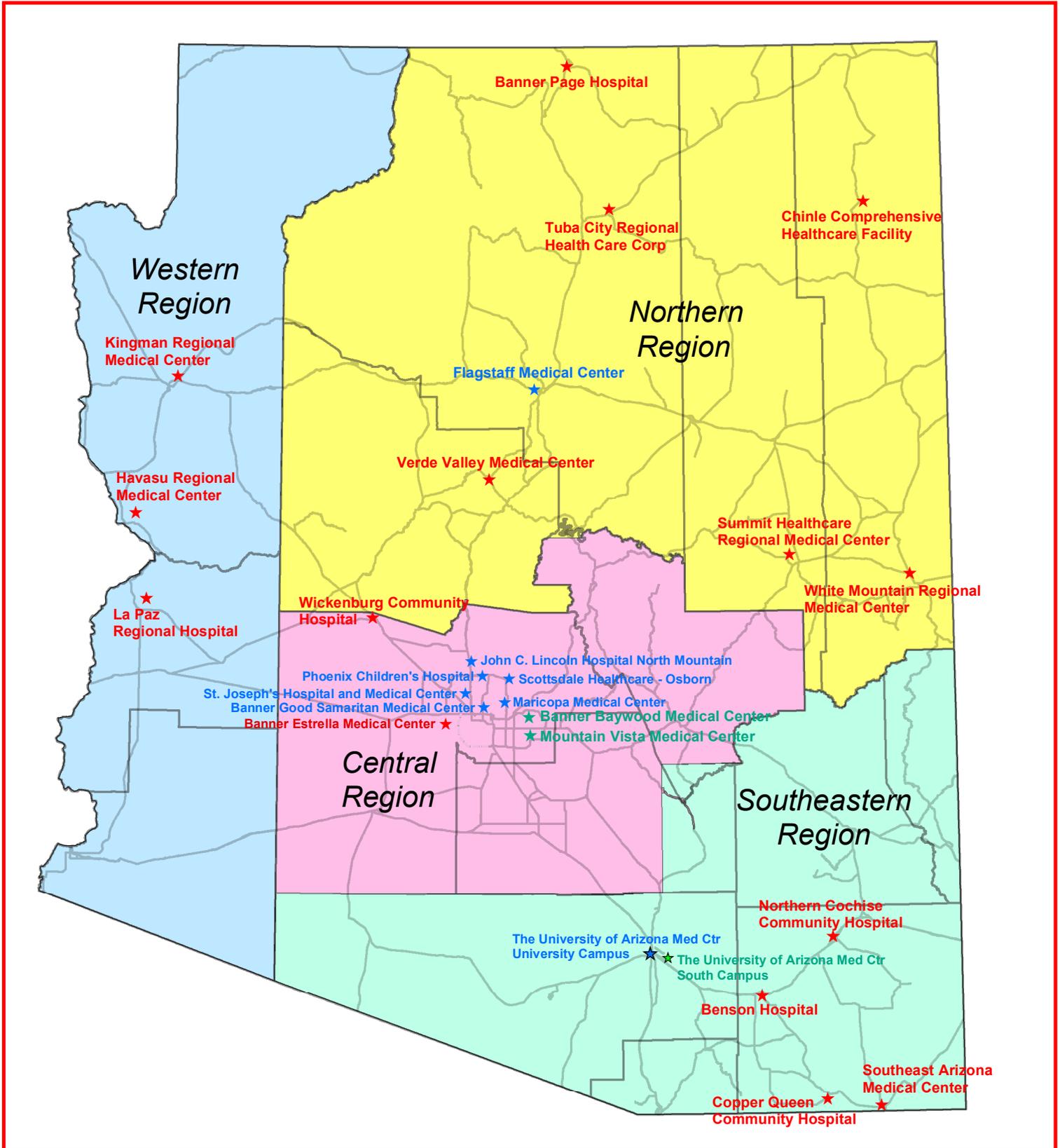
Conclusion

Over the past few years Arizona's trauma system has grown and improved significantly. The outlook for the next few years includes more growth, so our efforts to re-assess our system and update our trauma plan are vital. Our system for caring for injured Arizonans will continue to mature and improve. The steady leadership of the multi-disciplinary State Trauma Advisory Board and the Trauma and EMS Performance Improvement Standing Committee will continue to ensure progress towards the goal of ensuring timely, consistent high-level trauma care for all injured citizens in Arizona. The BEMSTS is grateful to the STAB members for their expertise and dedication to improving the care of trauma patients in Arizona.

Arizona State Designated Trauma Centers Appendix A

Health Care Institution	Address	Effective Date	Expiration Date
Level I Trauma Centers			
Banner Good Samaritan Medical Center	925 E. McDowell Rd., Phoenix, AZ 85006	11/19/11	11/19/14
Flagstaff Medical Center	1200 N. Beaver St., Flagstaff, AZ 86001	05/27/11	05/27/14
John C. Lincoln - North Mountain	250 E. Dunlap Ave., Phoenix, AZ 85020	04/23/11	04/23/14
Maricopa Medical Center	2601 E. Roosevelt, Phoenix, AZ 85008	12/20/11	12/20/14
Phoenix Children's Hospital	1919 E. Thomas Rd., Phoenix, AZ 85016	08/31/09	08/31/12
St. Joseph's Hospital & Medical Center	350 W. Thomas Rd., Phoenix, AZ 85013	11/20/10	11/20/13
Scottsdale Healthcare – Osborn	7400 E. Osborn, Scottsdale, AZ 85251	10/25/11	10/25/14
The University of Arizona Medical Center – University Campus	1501 N. Campbell Ave., Tucson, AZ 85724	11/12/11	11/12/14
Level III Trauma Centers			
Banner Baywood Medical Center (Provisional Designation)	6644 E. Baywood Ave., Mesa, AZ 85206	07/30/12	01/30/14
Mountain Vista Medical Center (Provisional Designation)	1301 S. Crismon Rd., Mesa, AZ 85209	02/24/12	08/24/13
The University of Arizona Medical Center South Campus (Provisional Designation)	2800 East Ajo Way, Tucson, AZ 85713	02/13/12	08/13/13
Level IV Trauma Centers			
Banner Estrella Medical Center	9201 West Thomas Road, Phoenix, AZ 85037	08/30/12	08/30/15
Banner Page Hospital	501 N. Navajo, Page, AZ 86040	11/05/11	11/05/14
Benson Hospital	450 S. Ocotillo Ave., Benson, AZ 85602	03/03/11	03/03/14
Chinle Comprehensive Health Care Facility	P.O. Drawer PH, Chinle, AZ 86503	09/09/10	09/09/13
Copper Queen Community Hospital	101 Cole Ave., Bisbee, AZ 85603	12/01/09	12/01/12
Havasu Regional Medical Center	101 Civic Center Ln., Lake Havasu City, AZ 86403	01/20/11	01/20/14
Kingman Regional Medical Center	3269 Stockton Hill Rd., Kingman, AZ 86409	10/15/09	10/15/12
La Paz Regional Hospital	1200 W. Mohave Rd., Parker, AZ 85344	06/02/12	06/02/15
Northern Cochise Community Hospital	901 W. Rex Allen Dr., Willcox, AZ 85643	12/04/11	12/04/14
Southeast Arizona Medical Center	2174 W. Oak Ave., Douglas, AZ 85607	08/18/11	08/18/14
Summit Healthcare Regional Medical Center	2200 Show Low Lake Rd., Show Low, AZ 85901	08/12/11	08/12/14
Tuba City Regional Health Care Corp.	POB 600, Tuba City, AZ 86045	05/06/12	05/06/15
Verde Valley Medical Center	269 S. Candy Ln., Cottonwood, AZ 86326	08/18/11	08/18/14
White Mountain Regional Medical Center	118 South Mountain Ave., Springerville, AZ 85938	06/18/12	06/18/15
Wickenburg Community Hospital	520 Rose Ln., Wickenburg, AZ 85390	08/08/11	08/08/14

September 4, 2012



Level I Trauma Center

Level III Trauma Center (Provisional)

Level IV Trauma Center

**ARIZONA STATE TRAUMA REGISTRY (ASTR)
2011 TRAUMA DATA SUBMISSION - FINAL STATUS**

LEVEL I TRAUMA CENTERS (Full Data Set)	Reporting Quarter	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Hospital YTD Totals
	ED/Hosp Arrival Dates	JAN-MAR 2011	APR-JUN 2011	JUL-SEP 2011	OCT-DEC 2011	
	ASTR Due Date	7/1/11	10/3/11	1/3/12	4/2/12	
Total Records from Level I Trauma Centers by Qtr:		5763	6068	6034	5744	
Banner Good Samaritan Medical Center	Number of Records	702	718	666	681	2767
	Date Received	7/1/11	9/27/11	9/27/11	3/30/12	
Flagstaff Medical Center	Number of Records	316	407	503	303	1529
	Date Received	6/29/11	10/3/11	12/30/11	4/2/12	
John C. Lincoln North Mountain Hospital	Number of Records	748	757	776	790	3071
	Date Received	7/1/11	9/30/11	12/30/11	3/29/12	
Maricopa Medical Center	Number of Records	593	580	566	540	2279
	Date Received	7/1/11	10/5/11	1/3/12	3/23/12	
Phoenix Children's Hospital	Number of Records	371	477	595	553	1996
	Date Received	7/6/11	10/5/11	1/10/12	4/3/12	
Scottsdale Healthcare-Osborn	Number of Records	801	864	786	839	3290
	Date Received	6/30/11	9/27/11	12/27/11	4/2/12	
St. Joseph's Hospital & Medical Center	Number of Records	1010	982	797	840	3629
	Date Received	6/30/11	9/26/11	12/20/11	3/20/12	
University of AZ Medical Center- UNIVERSITY CAMPUS (was UMC)	Number of Records	1222	1283	1345	1198	5048
	Date Received	7/1/11	9/19/11	1/3/12	4/2/12	

LEVEL IV TRAUMA CENTERS (Full or Reduced Data Set)	Reporting Quarter	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Hospital YTD Totals
	Total Records from Level IV Trauma Centers by Qtr:		976	709	925	
Banner Page Hospital (Reduced Data Set)	Number of Records	12	14	26	14	66
	Date Received	6/28/11	9/30/11	1/3/12	3/28/12	
Benson Hospital (Reduced Data Set)	Number of Records	29	33	13	10	85
	Date Received	5/23/11	9/29/11	12/22/11	3/8/12	
Chinle Comprehensive Health Care (Reduced Data Set)	Number of Records	45	47	53	70	215
	Date Received	6/28/11	9/29/11	1/2/12	4/2/12	
Copper Queen Community Hospital (Reduced Data Set)	Number of Records	58	39	63	61	221
	Date Received	6/29/11	9/20/11	12/22/11	3/29/12	
Havasu Regional Medical Center (Reduced Data Set)	Number of Records	453	137	44	59	693
	Date Received	6/15/11	9/26/11	12/16/11	3/26/12	
Kingman Regional Medical Center (Full Data Set)	Number of Records	90	116	134	86	426
	Date Received	7/18/11	9/27/11	12/30/11	3/6/12	
La Paz Regional Hospital (Reduced Data Set)	Number of Records	39	29	19	20	107
	Date Received	7/7/11	10/21/11	2/2/12	4/5/12	

Little Colorado Medical Center (Reduced Data Set)	Number of Records	48	39	48	33	168
	Date Received	6/6/11	9/26/11	11/14/11	1/9/12	
Mountain Vista Medical Center (Reduced Data Set)	Number of Records	37	69	80	67	253
	Date Received	6/27/11	12/19/11	2/22/11	2/22/11	
Northern Cochise Hospital (Reduced Data Set)	Number of Records	29	35	28	34	126
	Date Received	6/16/11	11/29/11	2/6/12	3/25/12	
Southeast Arizona Medical Center (Reduced Data Set)	Number of Records	0	0	87	62	149
	Date Received	New reporting hospital		12/28/11	3/22/12	
Summit Healthcare Regional Medical Ctr (Full Data Set)	Number of Records	49	73	67	76	265
	Date Received	7/6/11	10/11/11	1/9/12	4/2/12	
Tuba City Regional Health Care (Full Data Set)	Number of Records	47	52	167	186	452
	Date Received	7/28/11	10/3/11	1/3/12	3/29/12	
Verde Valley Medical Center (Full Data Set)	Number of Records	0	0	71	46	117
	Date Received	New reporting hospital		1/3/12	4/2/12	
Wickenburg Community Hospital (Reduced Data Set)	Number of Records	40	26	25	23	114
	Date Received	6/30/11	8/23/11	11/11/11	1/18/12	

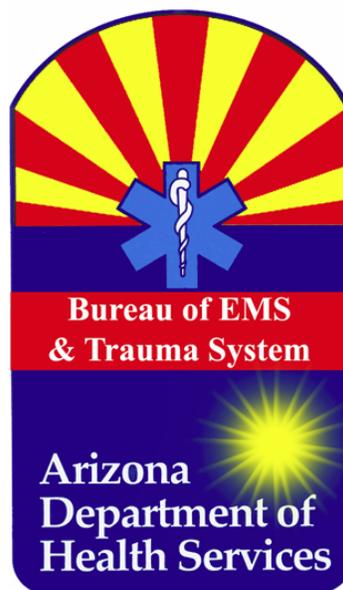
NON-DESIGNATED HOSPITALS	Reporting Quarter	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
Total Records from Non-Designated Hospitals by Qtr:		841	629	586	755	Hospital YTD Totals
Sierra Vista Regional Medical Center (Full Data Set)	Number of Records	0	0	0	27	27
	Date Received	New reporting hospital				
University of AZ Medical Center-SOUTH CAMPUS (was UPH) (Full Data Set)	Number of Records	0	0	0	86	86
	Date Received	New reporting hospital				
Yavapai Regional Medical Center-West (Full Data Set)	Number of Records	52	52	56	32	192
	Date Received	6/16/11	10/17/11	1/3/12	3/21/12	
Yuma Regional Medical Center (Full Data Set)	Number of Records	789	577	530	610	2506
	Date Received	8/10/11	1/4/12	2/7/12	5/15/12	

Total Reporting Hospitals = 27	Total ASTR 2011 Records by Quarter:				29,877
	7580	7406	7545	7346	

Notes: The ASTR Trauma Patient Inclusion Criteria were changed, effective for ED/Hospital Arrival Dates January 1, 2008 forward. Designated Level I, II and III Trauma Centers are required to submit the full ASTR data set. Level IV and non-designated hospitals may choose to submit either the full or reduced ASTR data set.

**Arizona Department of Health Services
Bureau of Emergency Medical Services and Trauma System**

Arizona State Trauma Registry 2011 Data Report



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2011 ARIZONA STATE TRAUMA REGISTRY ANNUAL REPORT

Purpose:

The purpose of this report is to accurately describe the incidence and outcomes of trauma patients across Arizona using the Arizona State Trauma Registry (ASTR). The various mechanisms of injury, location, and demographics of traumatic injuries are presented and key case fatality rates were compared with data from the National Trauma Data Bank (NTDB) when available ¹.

Methods:

In 2011, the Arizona State Trauma Registry (ASTR) received data from 23 state-designated trauma centers. Four additional healthcare institutions participated in the registry but were not designated. The Arizona EMS and Trauma System has eight Level I trauma centers - six located in the central county of Maricopa with 60% of the state's population; the remaining two Level I trauma centers are respectively located in the northern-most county of Coconino and the southern county of Pima. For the 2011 reporting year, there were 15 designated Level IV trauma centers dispersed primarily in the rural areas of the state. Please refer to Appendix C for a list of 2011 reporting hospitals, their designation level and type of data set collected.

Arizona's Levels I - III trauma centers are required to submit the Full ASTR Data Set. Level IV and non-designated facilities have the option to choose the Full or Reduced Data Set. Full Data Set hospitals enter their data into customized Trauma One[®] hospital databases and export the state required data elements to ASTR on a quarterly basis. Reduced Data Set hospitals use state VPN resources to enter data directly into the state trauma database. In cooperation with the software vendor, a comprehensive state validation tool was created and distributed with more than 800 state and national data checks included. Hospitals are asked to run the validation tool before submitting their quarterly data, and validation is run again at the state level with any remaining items forwarded to the hospital for review.

For the purposes of this report, the comprehensive validation process was completed for ED/Hospital Arrival Dates January 1-December 31, 2011 and state trauma data was exported to Excel for analysis in SAS (Version 9.2).

The NTDB inclusion criteria differ from the ASTR. Whenever ASTR data were compared to NTDB, state data were restricted on admission status, transfer status and outcome status to match as close as possible to the national data.

The Arizona State Trauma Registry received 29,877 records from 27 participating health care institutions in 2011. These data presented are derived from the ASTR which has evolved and grown in size since its inception in 2005, but has yet to capture all traumatic injuries in Arizona.

Geo-Population:

Arizona is 400 miles long and 310 miles wide for a total area of 114,006 square miles. The topography of the state is 364 square miles of water and a blend of deserts, mountains, and plateaus. The highest elevation is Humphrey's Peak (12,633 feet above sea level), the lowest elevation is the Colorado River (70 feet above sea level), and the mean elevation is 4,100 feet. Arizona shares contiguous borders with the states of California, Colorado, Nevada, New Mexico, and Utah. Internationally, the Mexican states of Sonora, Chihuahua, and Baja California Norte share a border with Arizona.

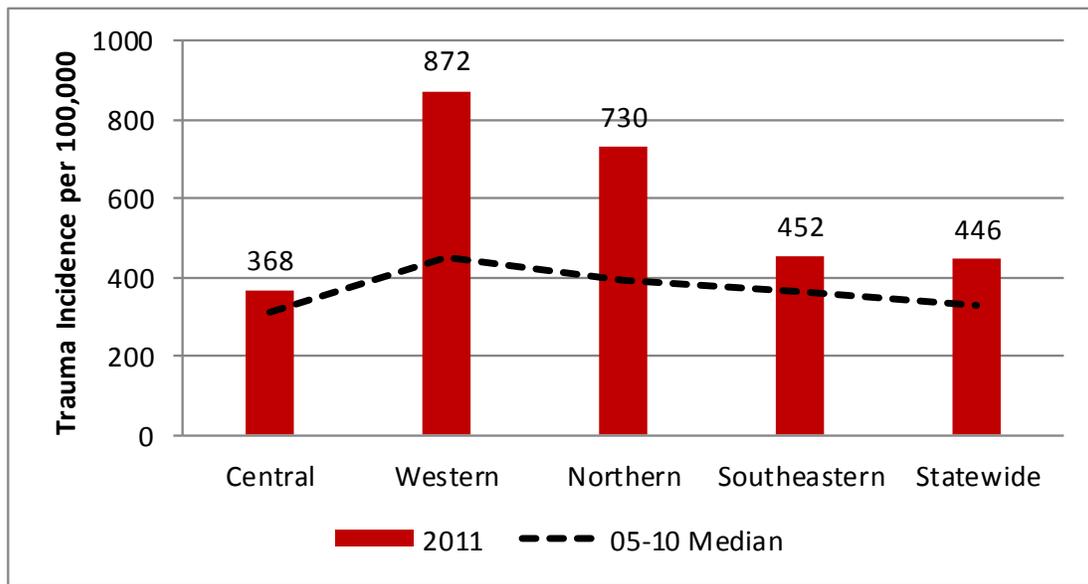
The total reported population in 2011 was 6,438,178; this was up from the 2010 reported number of 6,392,017 residents ². In 2011, 84.1% of the population lived in urban counties (Maricopa, Pima, Pinal, and Yuma). The remaining counties (Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Mohave, Navajo, Santa Cruz, and Yavapai) were home to 15.9% of the population.

Coconino County is the largest county with an area of 18,617 square miles. Maricopa has the largest population of 3.8 million and the state government resides in Phoenix.

¹ <http://www.facs.org/trauma/ntdb/pdf/ntdb-annual-report-2012.pdf>

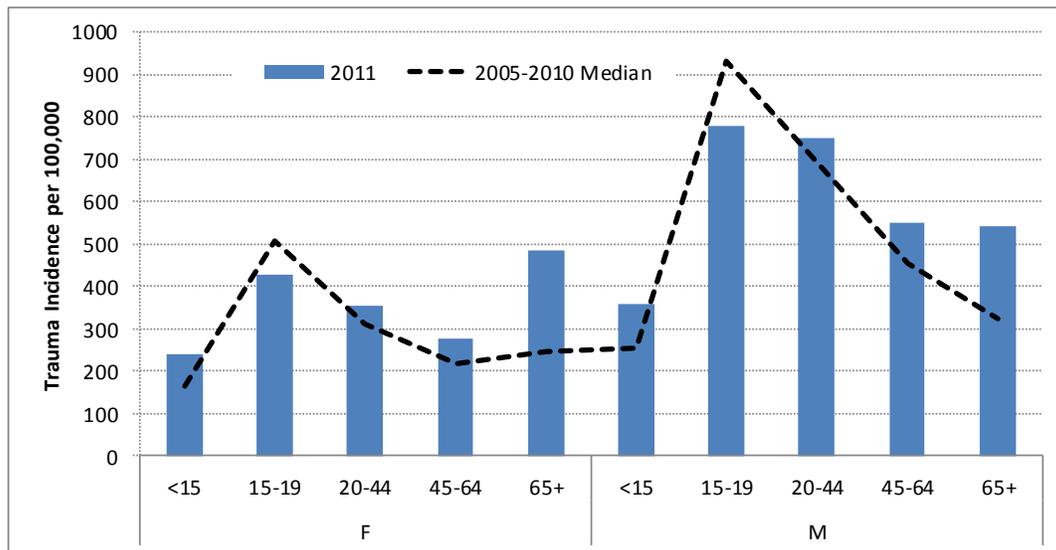
² <http://www.azdhs.gov/plan/menu/info/pop/pop11/pd11.htm>

Figure 1: Region-specific trauma rates per 100,000 Arizona residents, ASTR 2005-2011



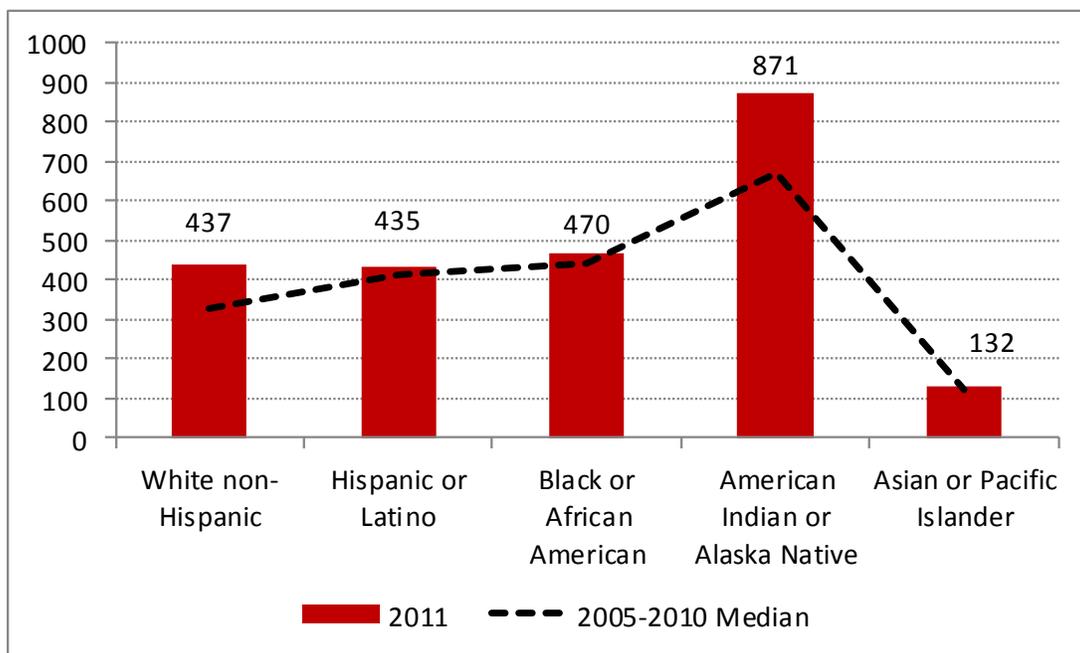
Although the Central region is the most densely populated and has the highest volume of trauma, it has the lowest trauma rate per 100,000 residents as compared to all other regions (Figure 1).

Figure 2: Gender & age-specific trauma rates per 100,000 Arizona residents, ASTR 2005-2011



Across all the age groups, Males have a higher trauma rate than Females. The 15-19 year old age group has the highest trauma rate for Males in both the 2011 and the 2005-2010 six-year median. For Females, the 65+ year old age group has the highest trauma rate followed by 15-19 year old age group in 2011. Increase in trauma rates for pediatric and geriatric population may be due to changes in inclusion criteria or an increase in the number of reporting hospitals (Figure 2).

Figure 3: Race-specific trauma rates per 100,000 Arizona residents, ASTR 2005-2011



Although White non-Hispanic had the highest volume of trauma, American Indian/Alaska Native has the highest trauma rates per 100,000 residents followed by Black/African American (Figure 3).

Table 1: Age-specific trauma rates and case fatality rates, ASTR 2011

INCIDENTS AND CASE FATALITY RATE BY AGE				
Age	Count	Percent	Deaths	Case Fatality Rate
<1	362	1.21%	7	1.93%
1-4	1,159	3.87%	13	1.12%
5-9	1,212	4.05%	8	0.66%
10-14	1,397	4.67%	4	0.28%
15-19	2,828	9.46%	45	1.59%
20-24	3,430	11.48%	88	2.56%
25-34	4,811	16.10%	125	2.59%
35-44	3,675	12.30%	87	2.36%
45-54	3,637	12.17%	102	2.80%
55-64	2,819	9.43%	98	3.47%
65-74	1,916	6.41%	68	3.54%
75-84	1,601	5.35%	82	5.12%
≥ 85	1,029	3.44%	46	4.47%
Missing	1			
Total	29,877	100.00%	773	2.58%

Trauma affects people of all ages and is the leading cause of death among persons 1-44 years of age³. Of the reported 29,877 trauma patients, the overall mortality rate was 2.58%. The highest case fatality rate was observed among the geriatric population, especially within the 75-84 age group (5.12%) (Table 1). The case fatality rate in 2011 has decreased across all age groups as compared to 2005-2010 median (Figure 4). Figure 5 depicts trauma mortality rates per 100,000 Arizona residents by age. Arizona's highest trauma mortality rate per 100,000 was in the 65+ age group. The mortality rate for 15-19 year age group has decreased in 2011 as compared to the 2005-2010 median rate.

³ <http://www.cdc.gov/Traumacare/pdfs/TraumaCentersFactsheet20090921-a.pdf>

Figure 4: Age-specific trauma related mortality rates, ASTR 2005-2011

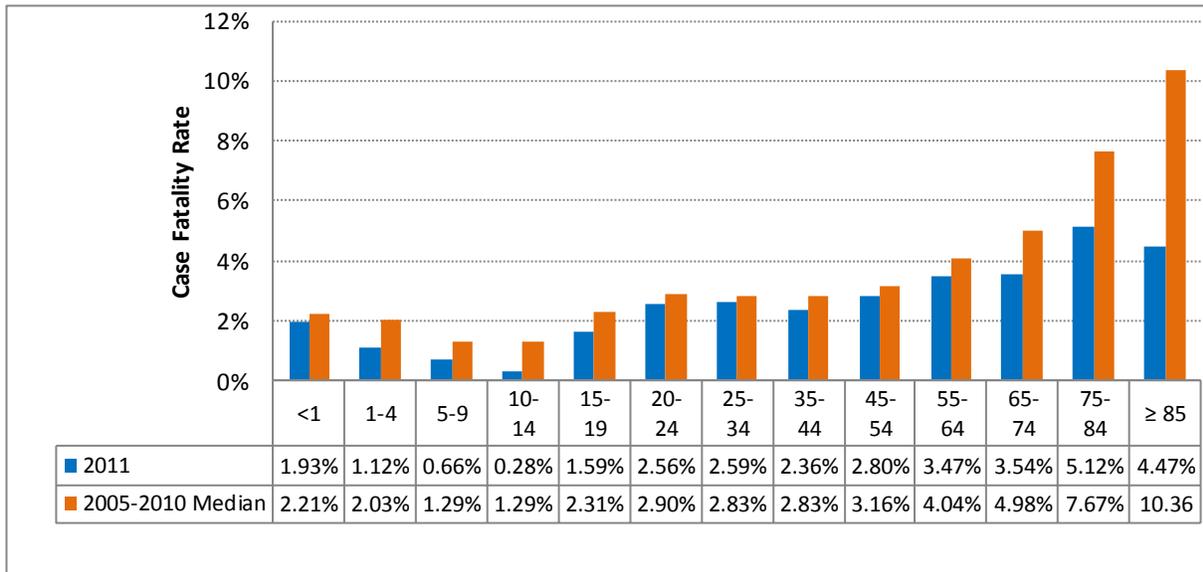
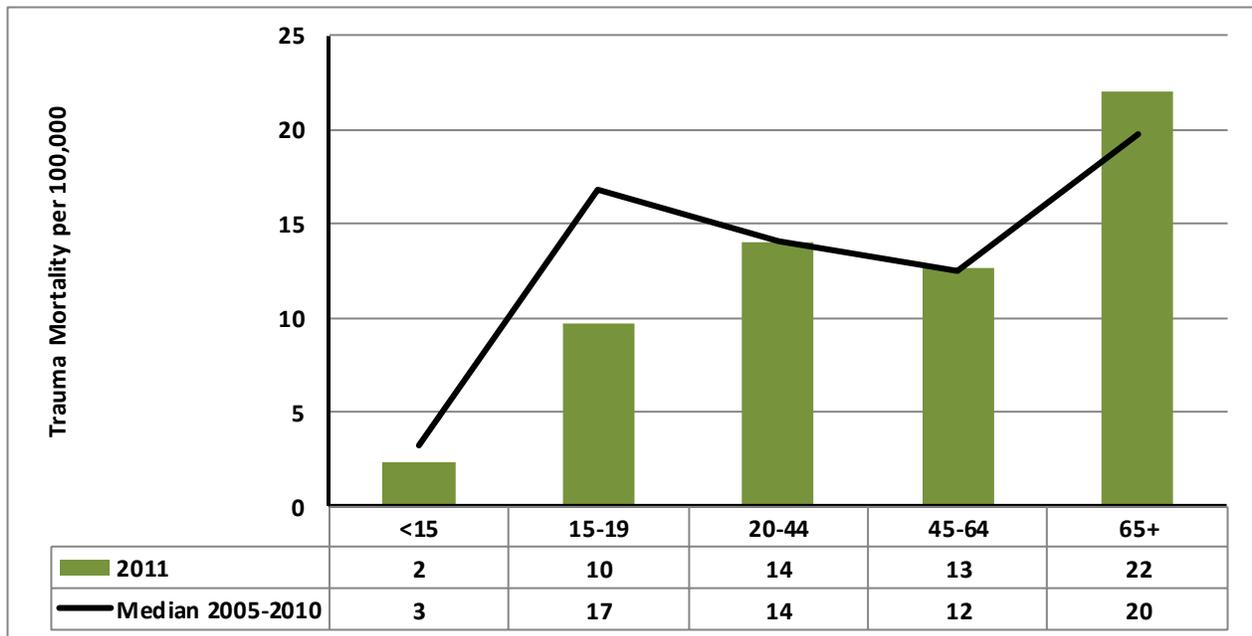


Figure 5: Age-specific trauma related mortality rates per 100,000 Arizona residents, ASTR 2005-2011



INJURY CHARACTERISTICS: MECHANISM OF INJURY

Figure 6: Top Mechanisms of injury rate per 100,000 Arizona residents by region, ASTR 2011

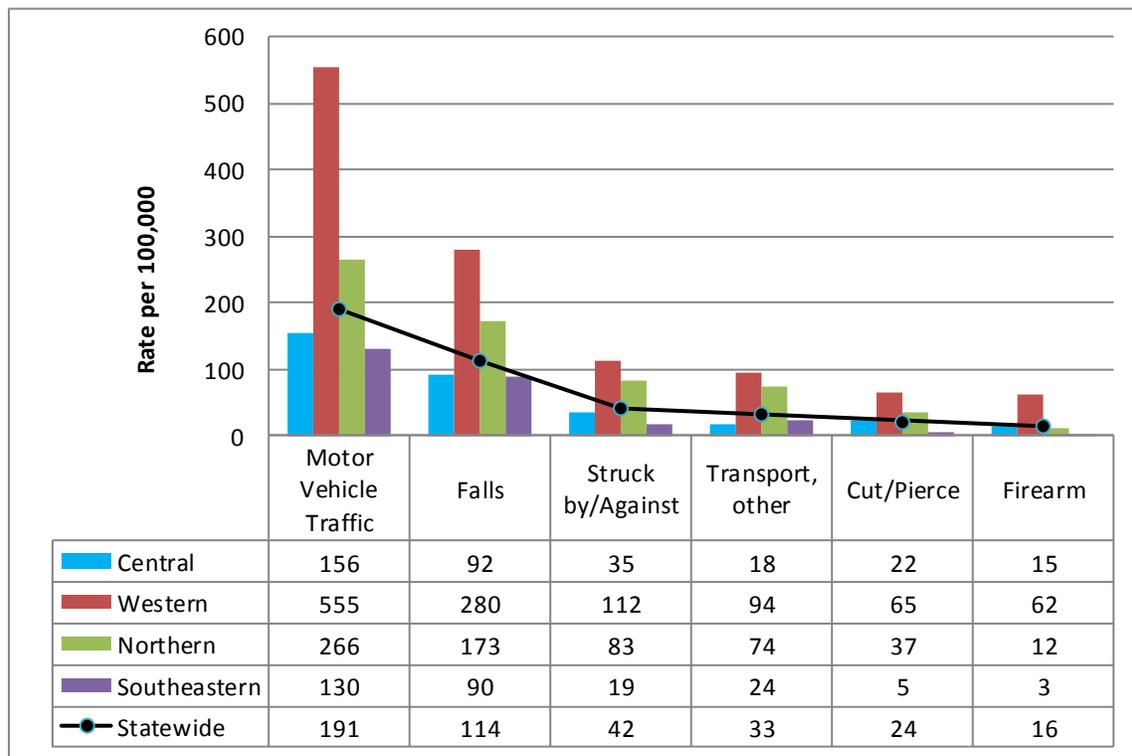


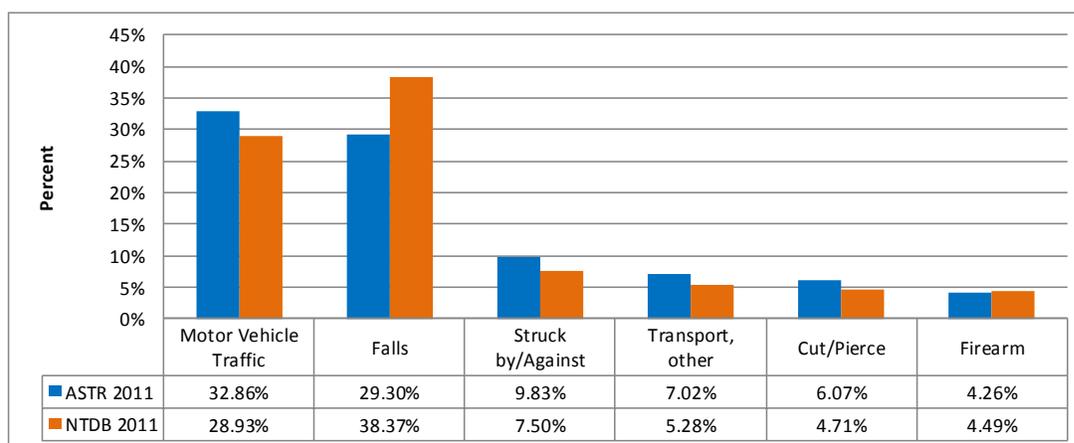
Figure 6 shows Top Mechanisms of Injury rate per 100,000 Arizona residents by Region for the year 2011. The Western Region has the highest rate for the six top mechanisms of injury as compared to other regions. The Southeastern Region has the lowest injury rate for five out of the six top mechanisms of injury. The MVT category only includes motor vehicles traveling on a public road or highway. Transport Other includes various other types of vehicles such as railway, off-road, water craft, and air craft. Struck by/Against includes being struck by objects or people, intentionally or unintentionally.

Table 2: Mechanism of injury and case fatality rate, ASTR 2011

INCIDENCE AND CASE FATALITY RATE BY MECHANISM OF INJURY				
MECHANISM	COUNT	PERCENT	DEATHS	CASE FATALITY RATE
Motor Vehicle Traffic	12,320	41.23%	322	2.61%
Falls	7,332	24.54%	155	2.11%
Struck by/Against	2,688	8.99%	5	0.18%
Transport, other	2,138	7.15%	20	0.93%
Cut/Pierce	1,518	5.08%	26	1.71%
Firearm	1,003	3.35%	177	17.64%
Pedal Cyclist, other	690	2.30%	4	0.57%
Other Specified	589	1.97%	11	1.86%
Unspecified	479	1.60%	22	4.59%
Natural/Environmental	285	0.95%	3	1.05%
Not elsewhere classifiable	186	0.62%	1	0.53%
Machinery	177	0.59%	1	0.56%
Pedestrian, other	131	0.43%	3	2.29%
Fire/Burn	135	0.45%	3	2.22%
Suffocation	69	0.23%	14	20.28%
Overexertion	79	0.26%	.	.
Drowning	35	0.11%	5	14.28%
Poisoning	14	0.04%	1	7.14%
*Missing	9	0.03%	.	.
Total	29,877	100.00%	773	2.58%

Table 2 describes the trauma incidents and fatality rate by mechanism of injury for 2011 ASTR data. MVT related trauma is the most common mechanism of injury (41.23%), followed by Falls (24.54%), Struck by/Against (8.99%), Transport Other (7.15%), Cut/Pierce (5.08%), and Firearm (3.35%). Of these top six injuries, Firearm has the highest case fatality rate (17.6%), followed by MVT (2.6%).

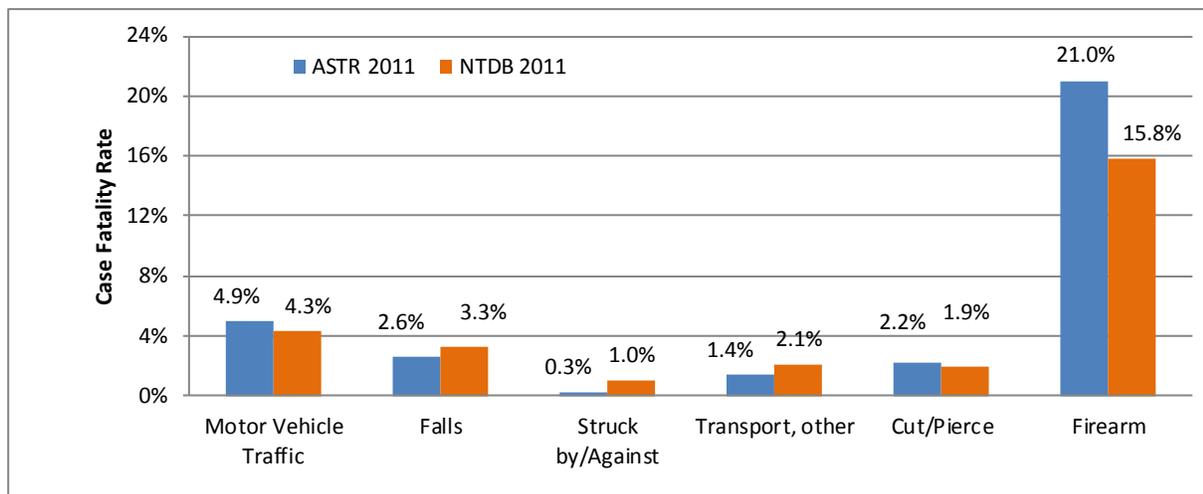
Figure 7: Top six mechanisms of injury rate - ASTR* vs. NTDB 2011



* For comparison purposes, ASTR inclusion criteria is matched to NTDB inclusion criteria .

Arizona has a higher MVT related trauma rate as compared to the national average. Although Arizona’s rate of Falls is lower, state inclusion criteria restrict the type of falls that are submitted to the registry (Figure 7).

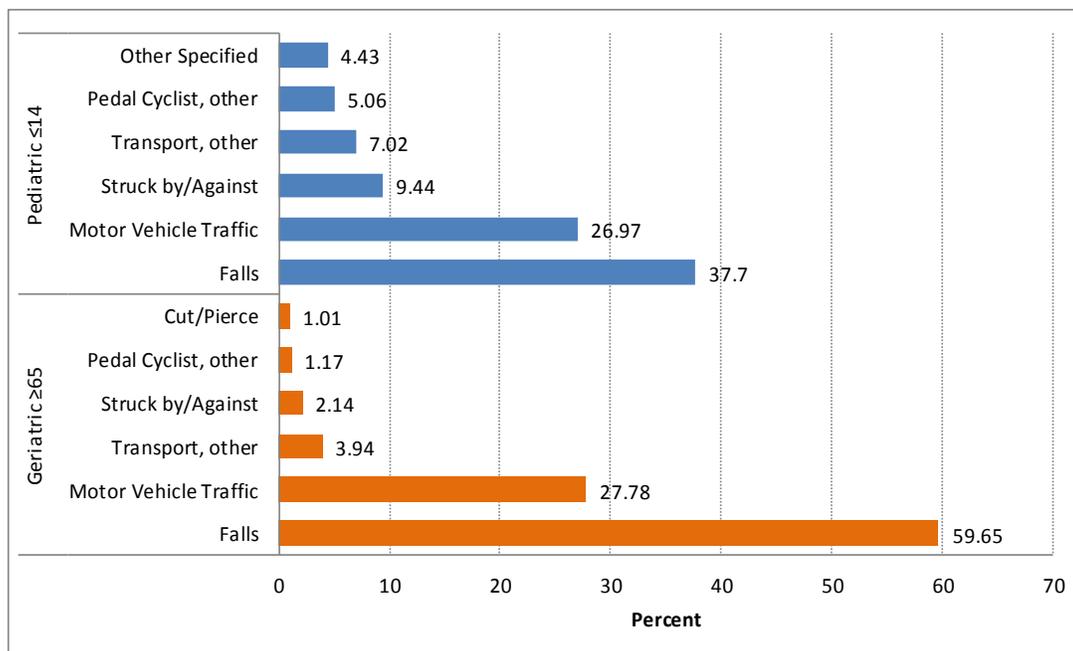
Figure 8: Top six mechanisms of injury case fatality rate - ASTR* vs. NTDB, 2011



* For comparison purposes, ASTR inclusion criteria is matched to NTDB inclusion criteria .

Arizona has a higher case fatality rate for firearm related traumas as compared to the national firearm fatalities (21.0% vs. 15.8%). (Figure 8).

Figure 9: Selected mechanisms of injury in pediatric and geriatric population, ASTR 2011



The highest rate of mechanism of injury in both geriatric and pediatric populations are Falls, followed by Motor Vehicle Traffic (Figure 9). Pedal Cyclist, Other does not appear as one of the top six mechanisms of injury for aggregate data (Figure 7), but is one of the top six mechanisms of injury for both the pediatric (5.06%) and geriatric (1.17%) populations.

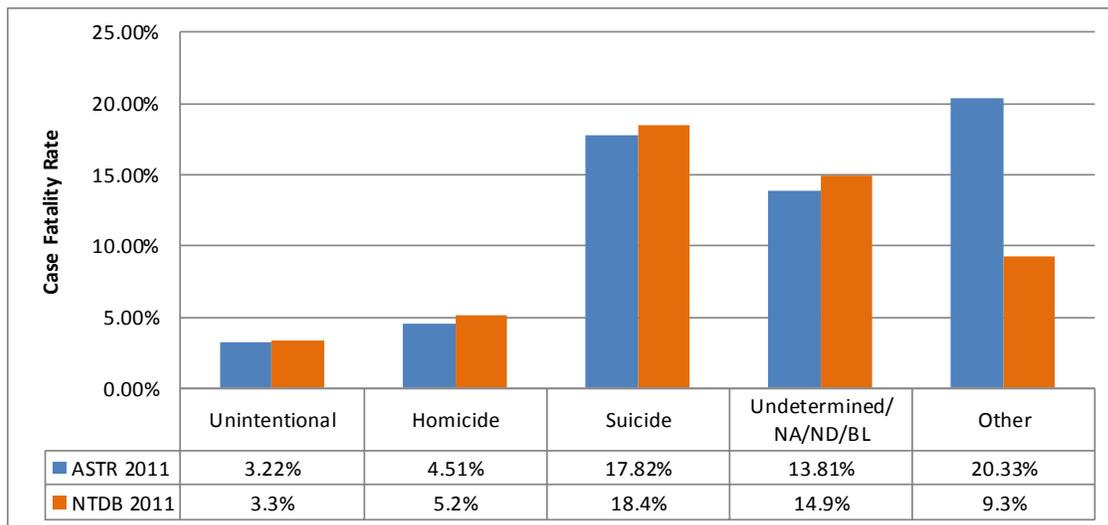
INJURY CHARACTERISTICS: INTENT OF INJURY

Table 3: Trauma incidents and case fatality rate by intent and gender, ASTR 2011

TRAUMA INCIDENTS AND CASE FATALITY RATE BY INTENT AND GENDER								
	Overall		Deaths		Male		Female	
	Count	Percent	Count	Case Fatality Rate	Count	Percent	Count	Percent
Unintentional	25,333	84.79%	530	2.09%	15,241	51.01%	10,091	33.78%
Homicide	3,737	12.50%	127	3.39%	3,124	10.46%	613	2.05%
Suicide	527	1.76%	82	15.55%	401	1.34%	126	0.42%
Undetermined	203	0.67%	22	10.83%	160	0.54%	43	0.14%
Other	70	0.23%	12	17.14%	66	0.22%	4	0.01%
NA/ND/BL	7	0.02%	.	.	4	0.01%	3	0.01%
Total	29,877	100.00%	773	2.58%	18,996	63.58%	10,880	36.42%

Overall, 84.79% of all 2011 trauma records were unintentional injuries, with a case fatality rate of 2.09%. Suicide (suicide and attempted suicide) accounts for 1.76% of overall traumatic injury, but a case fatality rate of 15.55% (Table 3). Among males, the rate of homicide/assault is five times that of females. Injury intent of “Other” is defined as injury by legal intervention.

Figure 10: Trauma mortality rates by intent - ASTR * vs. NTDB, 2011



* For comparison purposes, ASTR inclusion criteria is matched to NTDB inclusion criteria.

Top Six Mechanisms of Injury by Intent

Figure 11: Unintentional trauma injury rates, ASTR 2011

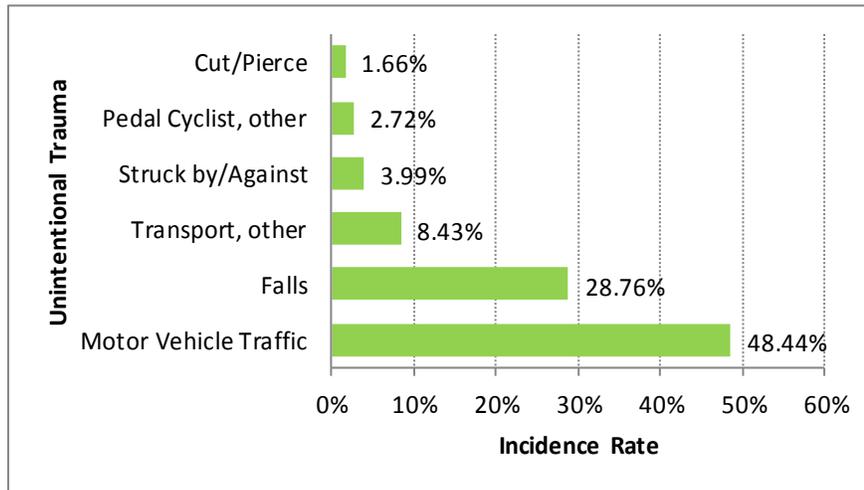


Figure 12: Homicide/Assault related trauma injury rates, ASTR 2011

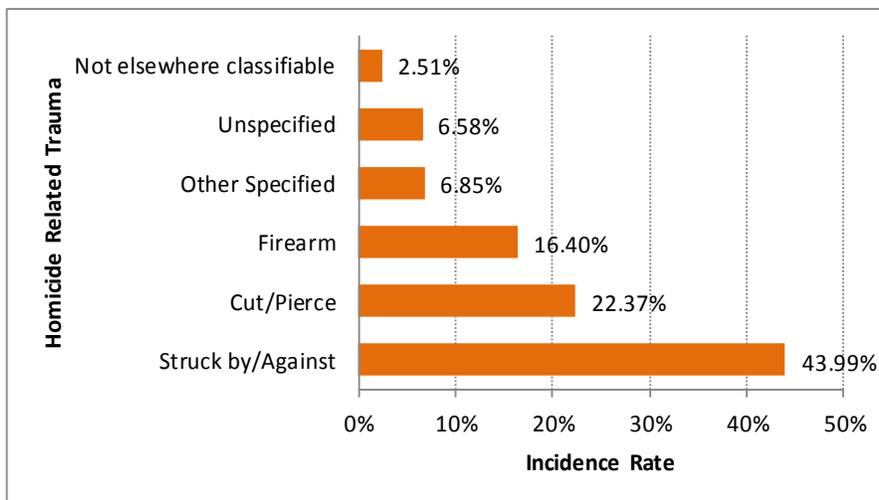
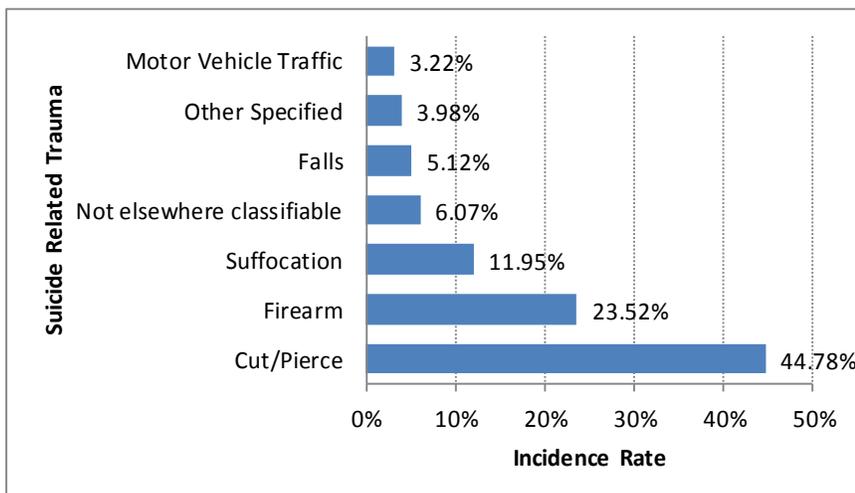


Figure 13: Suicide & attempted suicide related trauma injury rates, ASTR 2011



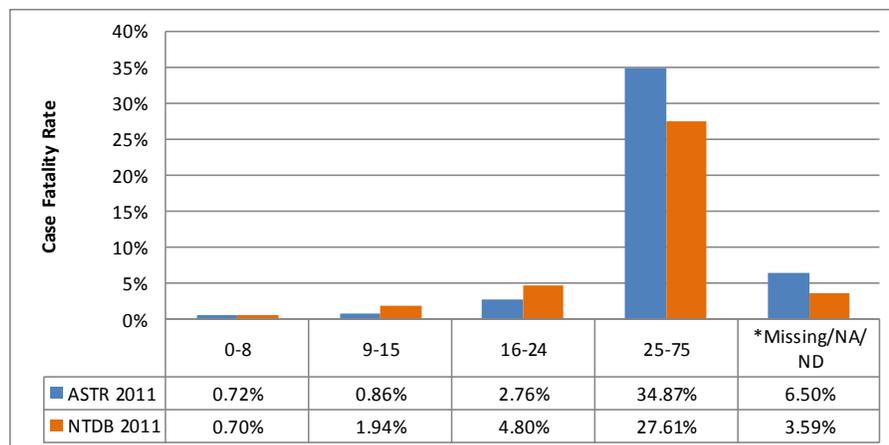
INJURY CHARACTERISTICS: INJURY SEVERITY

Table 4: Trauma incidence and case fatality rates by Injury Severity Score (ISS), ASTR 2011

INCIDENCE AND CASE FATALITY RATE BY INJURY SEVERITY SCORE				
Injury Severity Score - ICD	Count	Percent	Deaths	Case Fatality Rate
1-8	18,299	61.24%	69	0.37%
9-15	6,238	20.87%	51	0.81%
16-24	2,539	8.49%	69	2.71%
25-75	1,584	5.30%	553	34.91%
Missing/NA	1,217	4.07%	31	2.54%
Total	29,877	100.00%	773	2.58%

Approximately 5% of trauma patients had an ISS of ≥ 25 with a case fatality rate of 34.91% (Table 4).

Figure 14: Trauma case fatality rates by ISS - ASTR * vs. NTDB, 2011



* For comparison purposes, ASTR inclusion criteria is matched to NTDB inclusion criteria.

Arizona has a slightly lower case fatality rate for trauma patients with ISS 16-24, but a higher rate for patients with ISS 25-75 as compared to the national fatality rates (Figure 14).

OUTCOMES

Figure 15: Rate of ED discharge by disposition, ASTR 2011

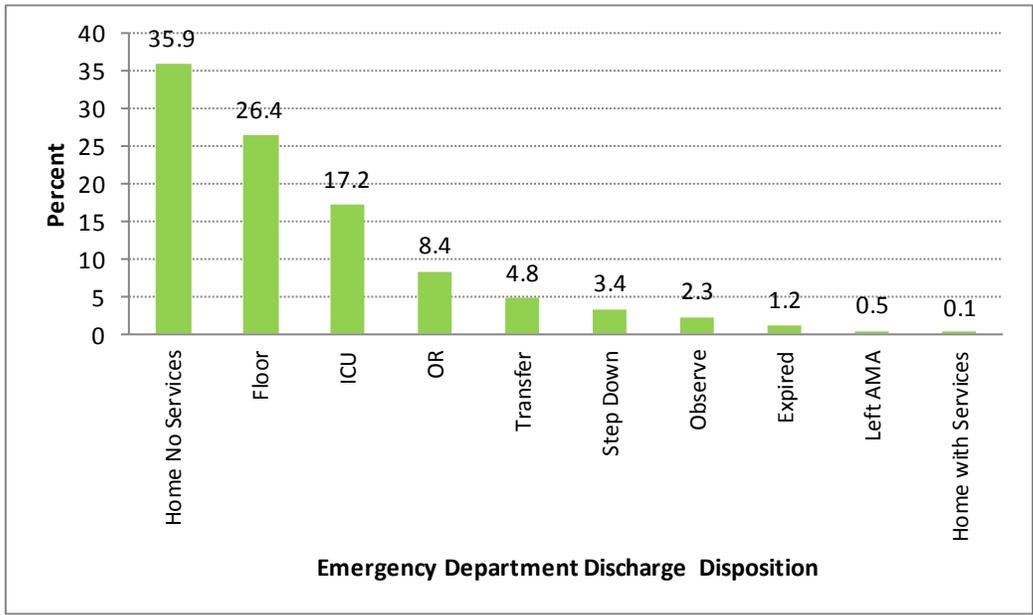
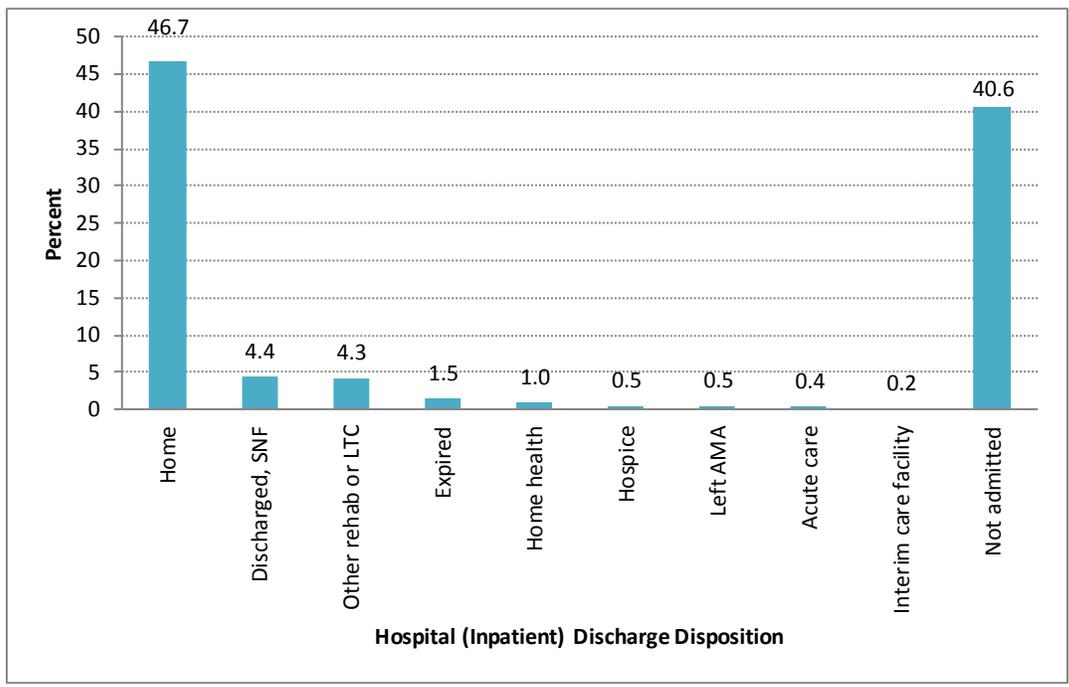
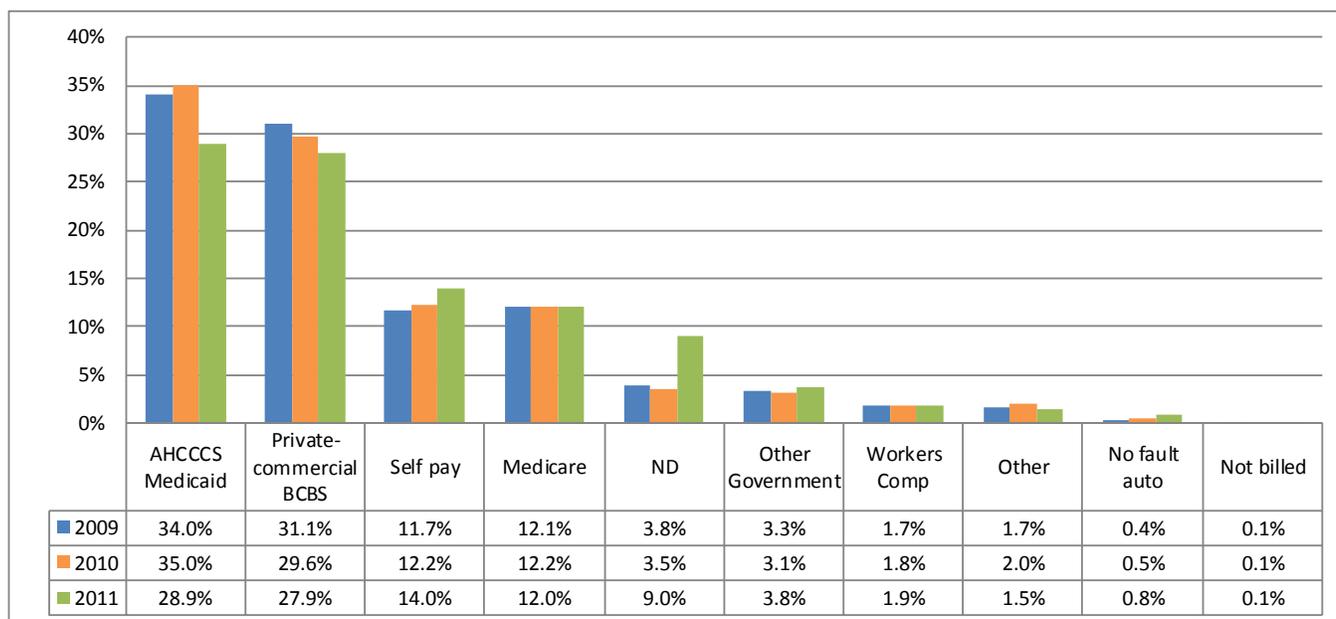


Figure 16: Rate of inpatient discharge by disposition, ASTR 2011



PRIMARY PAYMENT SOURCE AND TOTAL CHARGES

Figure 17: Primary payment source rate, ASTR 2009-2011



Since 2009, AHCCS and Private/Commercial/BCBS as a primary payment source has decreased while self pay has increased (Figure 17).

Table 5: Primary payment total charges and reimbursements, ASTR 2011

Primary Payer	Total Charges	Median Total Charges	Total Reimbursement
Private-commercial/BCBS	\$361,777,111	\$20,908	\$119,458,211
AHCCCS/Medicaid	\$358,071,834	\$20,474	\$49,894,636
Medicare	\$193,684,827	\$32,002	\$36,860,351
Self pay	\$163,221,958	\$22,638	\$8,424,893
Other Government	\$43,931,332	\$19,696	\$7,076,283
Workers Comp	\$29,359,479	\$29,171	\$12,648,526
Other	\$18,395,236	\$20,333	\$4,110,736
No fault auto	\$6,774,793	\$12,254	\$722,810
Not documented	\$2,521,808	\$25,223	\$256,936
Not billed	\$823,505	\$12,465	\$29,572
Total Charges	\$1,178,561,883	\$22,072	\$239,482,956

TOTAL CHARGES BY AGE AND MECHANISM OF INJURY

Table 6: Age-specific total charges and reimbursements, ASTR 2011

Age groups	Total Charges	Median Charges	Total Reimbursement
<15	\$75,224,056	\$11,050	\$14,570,457
15-19	\$88,807,940	\$18,456	\$18,673,172
20-44	\$482,965,754	\$22,611	\$89,688,185
45-64	\$339,884,441	\$28,111	\$76,866,436
65+	\$191,679,691	\$30,728	\$39,684,706
Total Charges	\$1,178,561,883	\$22,072	\$239,482,956

Table 7: Total charges, median charges and reimbursements, by mechanism of injury, ASTR 2011

Mechanism of Injury	Total Charges	Median Charges	Total Reimbursement
MVT - Occupant	\$357,609,567	\$20,702	\$69,403,144
Falls	\$249,786,168	\$23,419	\$55,574,747
MVT-Motorcyclist	\$121,186,871	\$30,026	\$27,157,827
Other Transport	\$85,079,896	\$21,858	\$22,715,056
Struck by/Against	\$73,647,799	\$20,626	\$14,277,574
Firearm	\$67,672,024	\$27,906	\$10,061,595
MVT-Pedestrian	\$60,261,987	\$30,208	\$8,354,556
Cut/Pierce	\$45,202,799	\$21,871	\$8,047,718
MVT-Pedal Cyclist	\$22,841,918	\$22,365	\$4,423,584
Not Specified	\$17,621,209	\$25,399	\$2,892,135
Other Pedal Cyclist	\$16,052,096	\$17,828	\$3,794,835
Other Specified	\$15,497,535	\$14,280	\$3,016,247
MVT-Other	\$9,161,205	\$25,013	\$2,213,441
Fire/Burn	\$7,886,353	\$8,142	\$1,232,261
Natural/Environmental	\$7,552,010	\$18,417	\$1,692,242
Machinery	\$6,087,775	\$17,863	\$1,835,199
Other Pedestrian	\$6,057,854	\$20,938	\$993,337
Not elsewhere classifiable	\$4,230,678	\$20,544	\$522,813
Suffocation	\$3,025,472	\$27,323	\$530,283
Overexertion	\$839,400	\$12,713	\$230,624
Drowning	\$501,070	\$11,370	\$66,362
Poisoning	\$210,002	\$14,736	\$52,624
*Missing	\$550,194	NA	\$394,749
Total	\$1,178,561,883	\$22,072	\$239,482,956

Table 7 describes Total Hospital Charges, Median Charges, and Total Reimbursements by Mechanism of Injury.

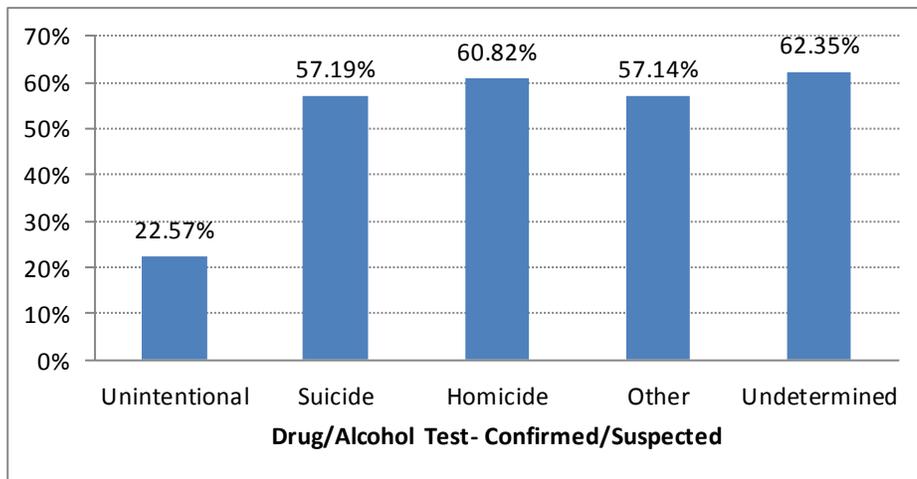
DRUG AND ALCOHOL USE AND TRAUMA

The pediatric (≤ 14 years) population was excluded from the drug and alcohol analysis. Of the 25,746 adult patients, 21.1% of patients (5,433) were positive for alcohol (confirmed, suspected, or reported use), and 13.8% of patients (3,563) were positive for drugs (confirmed or suspected legal or illegal use). Only 1.79% of the patients tested positive for legal drug use. In 2011, 28.97% of trauma patients tested positive for either drug or alcohol use (Table 8).

Table 8: Intent of injury and drug and alcohol use, ASTR 2011

Intent of Injury and Drug and Alcohol Use (Age >14 years)				
Injury Intent	Count	Percent	Drug/ Alcohol Use	Drug/ Alcohol %
Unintentional	21,384	83.06%	4,828	22.57%
Suicide	521	2.02%	298	57.19%
Homicide	3,594	13.96%	2,186	60.82%
Other	70	0.27%	40	57.14%
Undetermined	170	0.66%	106	62.35%
Missing	7	0.03%	1	14.28%
Total (Age>14 Years)	25,746	100.00%	7,459	28.97%

Figure 18: Drug and alcohol use by intent, ASTR 2011



For all intents of injury except unintentional, more than half tested positive or were suspected positive for drugs or alcohol (Figure 18).

Figure 19: Alcohol use by mechanism of injury, ASTR 2011

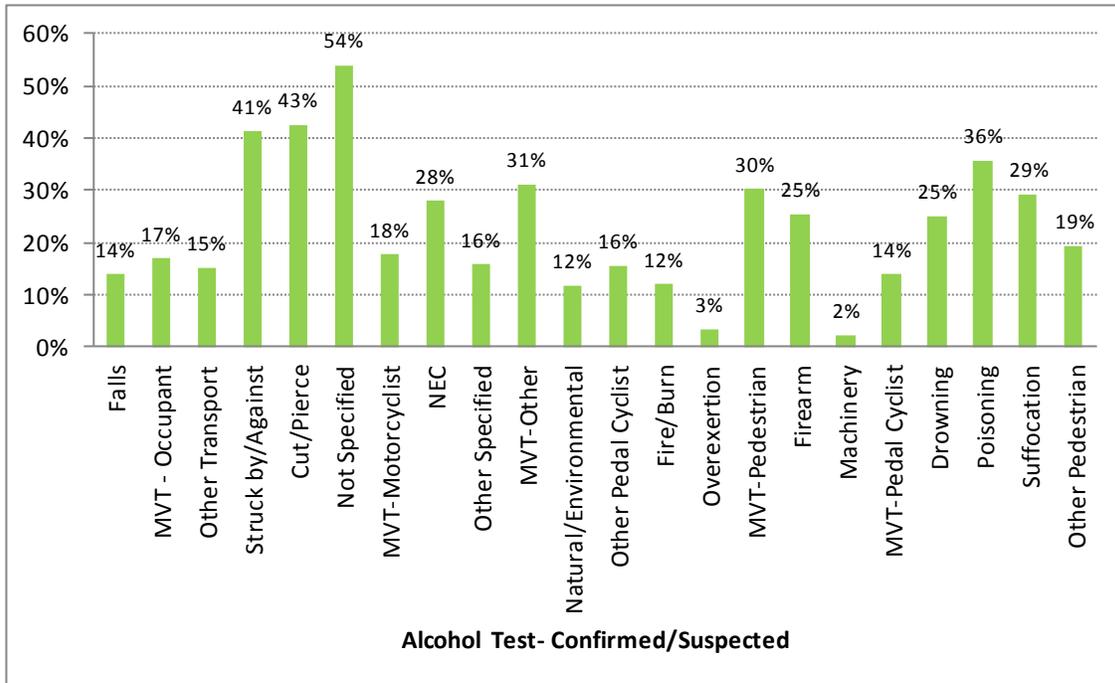
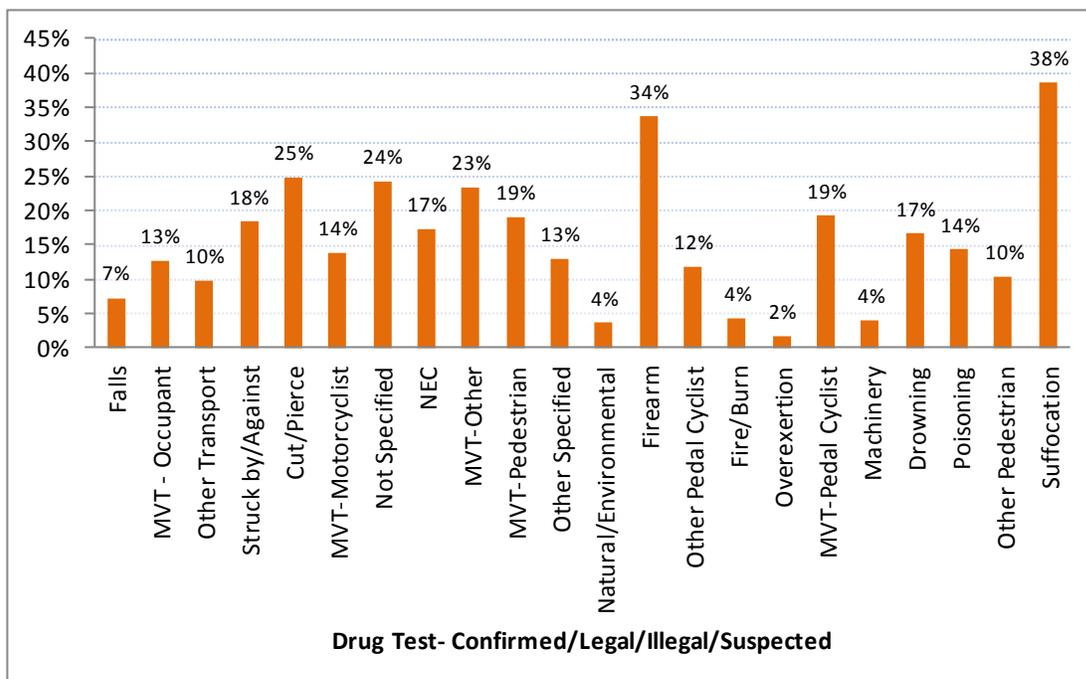


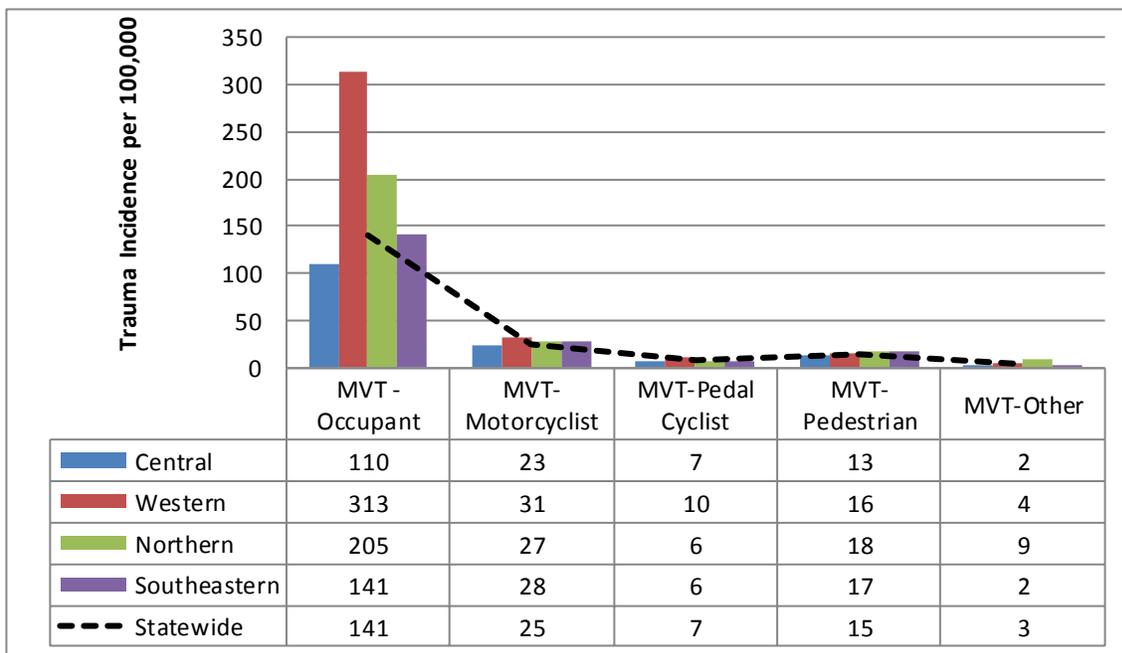
Figure 19 and Figure 20 list mechanism of injury in order of highest to lowest frequency with the percent of patients positive for alcohol or drug use respectively.

Figure 20: Drug use by mechanism of injury, ASTR 2011



MOTOR VEHICLE TRAFFIC RELATED TRAUMA

Figure 21: Motor vehicle traffic related trauma rate per 100,000 by region, ASTR 2011



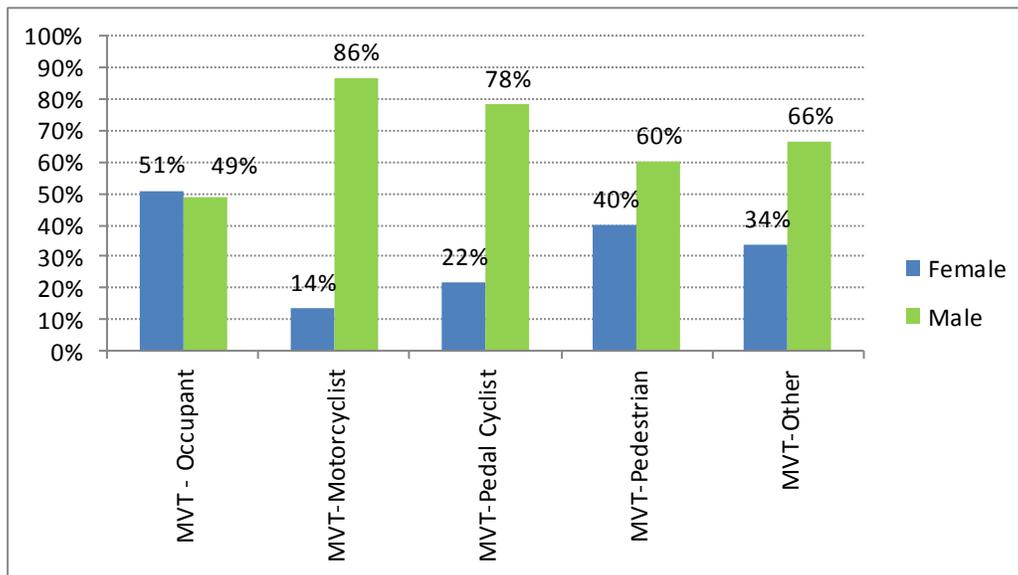
Although the Central Region had the highest volume of injured MVT-Occupants, it had the lowest rate per 100,000 residents, as compared to any other region. The Western Region had the highest rate per 100,000 residents (Figure 21).

Table 9: Motor vehicle traffic related trauma incidence and case fatality rate, ASTR 2011

INCIDENCE AND CASE FATALITY RATE BY TYPES OF MVT: 2011				
Motor Vehicle Traffic Accidents	Count	Percent	Deaths	Case Fatality Rate
MVT-Occupant	9,087	73.75%	146	1.60%
MVT-Motorcyclist	1,634	13.26%	71	4.34%
MVT-Pedal Cyclist	463	3.75%	16	3.45%
MVT-Pedestrian	958	7.77%	84	8.76%
MVT-Other	178	1.44%	5	2.80%
Total	12,320	100.00%	322	2.61%

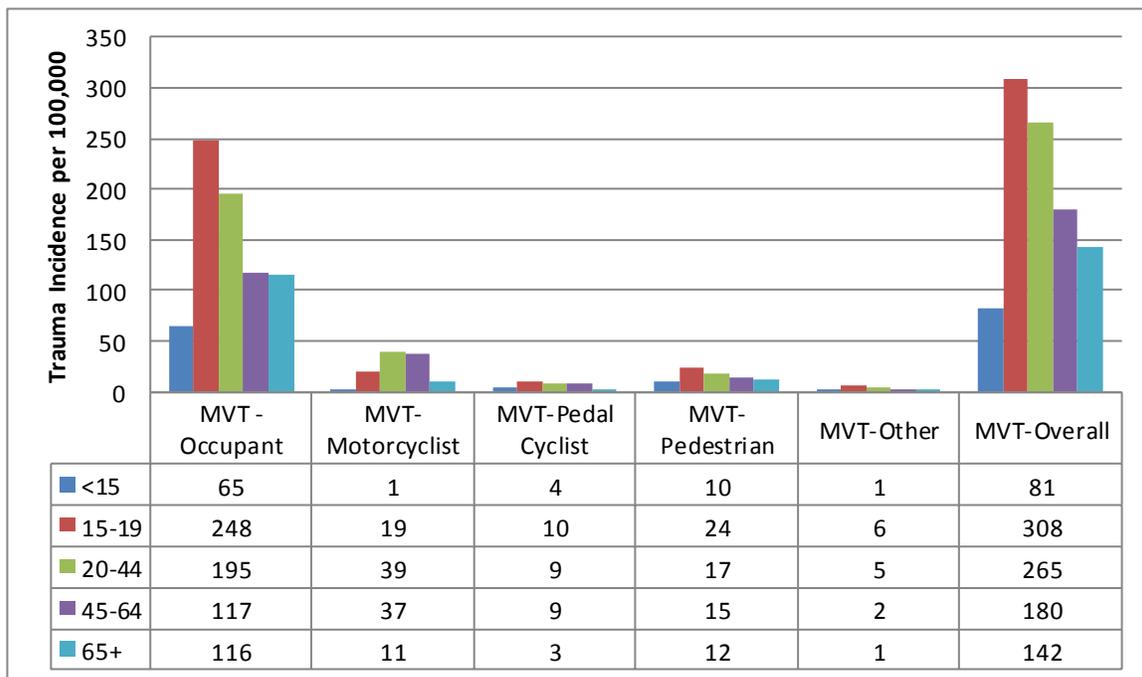
Table 9 describes the types of MVT related trauma and case fatality rate. Of the 29,877 trauma cases, 41.2% (12,320) were motor vehicle traffic related trauma. The highest case fatality rate is among pedestrians involved in MVT related trauma (8.76%).

Figure 22: Motor vehicle traffic related trauma by gender, ASTR 2011



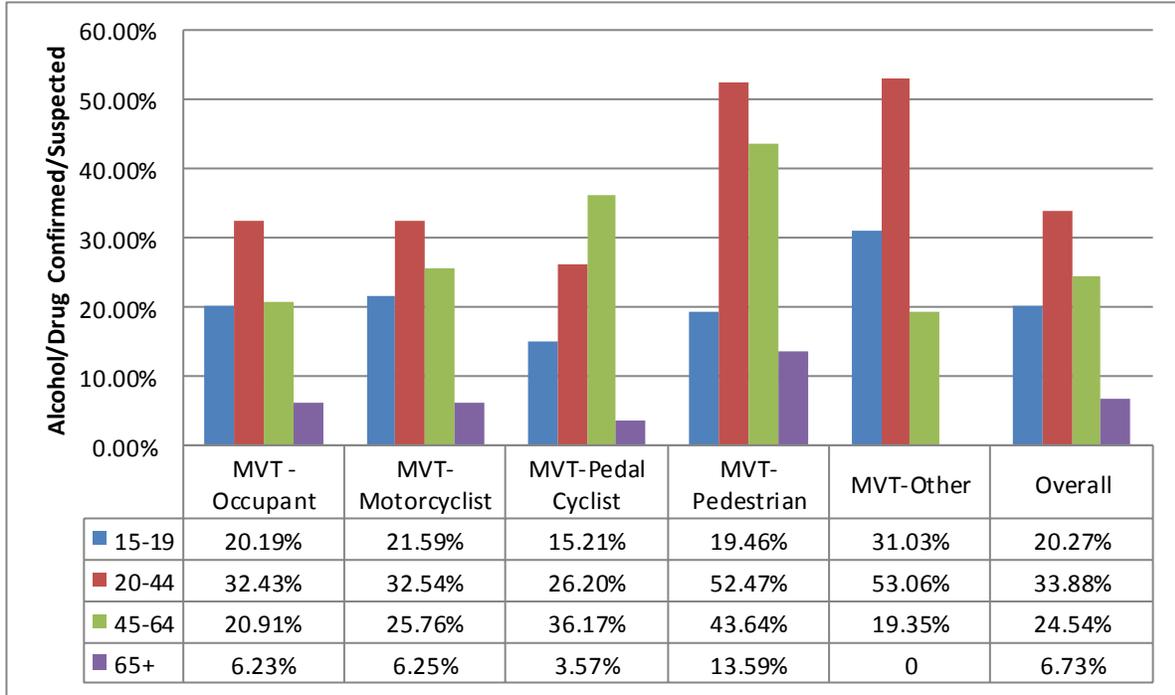
There was no gender difference found for injured MVT-Occupants. For all the other types of MVT related trauma, the predominant gender was Male (Figure 22).

Figure 23: Motor vehicle traffic related trauma rates per 100,000 Arizona residents by age, ASTR 2011



Although 20-44 year old age group has the highest MVT-Occupant incidence, 15-19 year old age group has the highest MVT-Occupant related trauma rates per 100,000 (Figure 23).

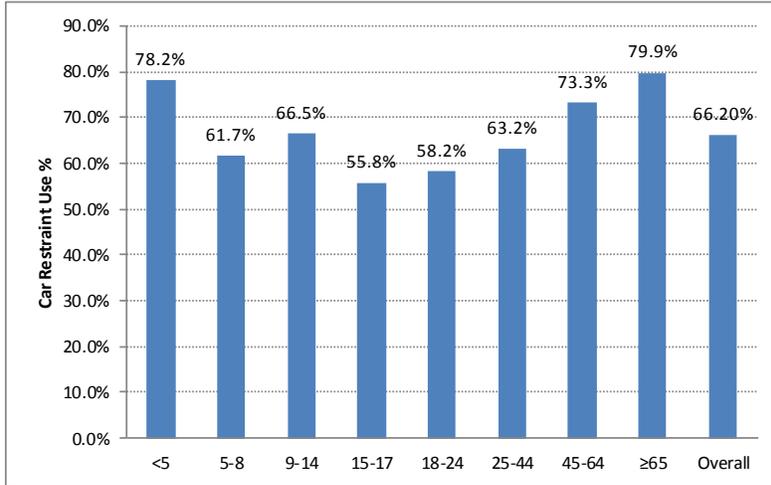
Figure 24: Alcohol/Drug use by types of motor vehicle traffic accidents, ASTR 2011



For all MVT related traumas, 21-44 year olds have the highest rate of alcohol/drug use compared to any other age group. Overall, one in every four MVT-Occupants or MVT-Motorcyclists involved in an accident had an alcohol/drug use confirmed or suspected (Figure 24).

PROTECTIVE DEVICE USE

Figure 25: Age-specific rates of car restraint use, ASTR 2011



Of the 9,087 MVT injured occupants, 66.2% used a car seat or seat belt (restraint). Motor vehicle occupants ages 15-24 were least likely to use a restraint. The most frequent restraint use was found in adults ≥65 (Figure 25).

Figure 26: Rate of helmet use for motorcyclist and pedal cyclist for adult vs. pediatric, ASTR 2011

Of the 1,634 MVT motorcyclists, less than half used a helmet. Of the 1,153 traffic and non-traffic pedal cycle accidents, less than a quarter used a helmet. Of the 256 Pediatric (<18 years) pedal cyclist involved in an accident, only 12.9% used helmet (Figure 26).

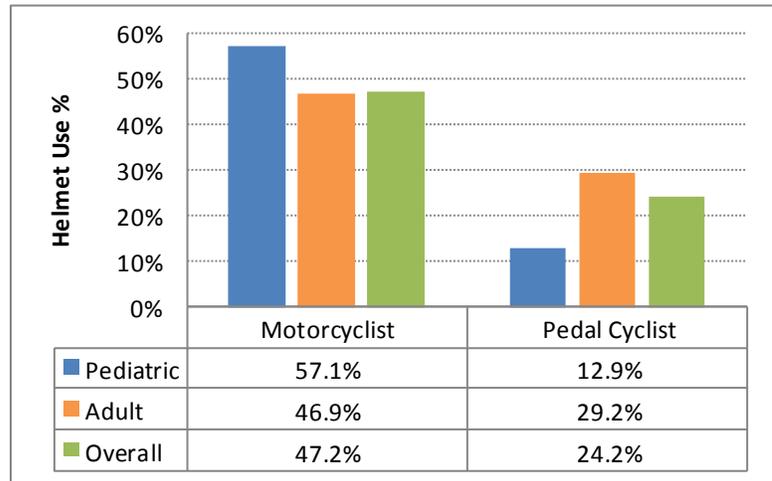
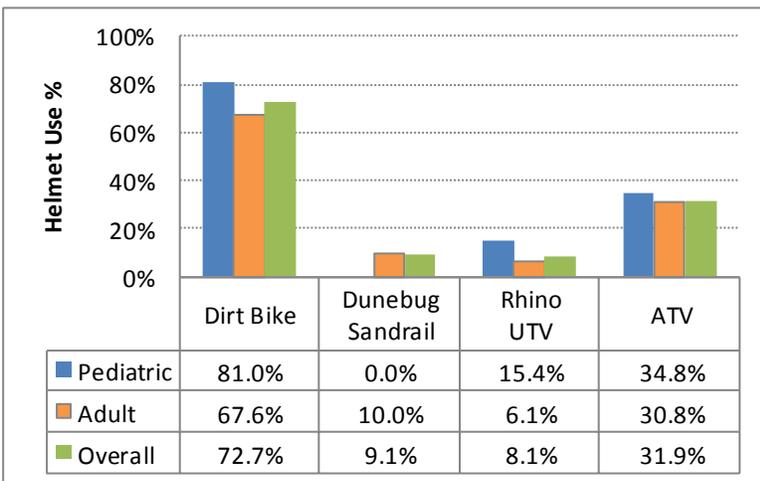


Figure 27: Rate of helmet use for select off road vehicles for adult vs. pediatric



Out of the 220 dirt bike injuries, 38.2% (84) were pediatric (<18 years). Out of the 33 dunebuggy/sandrail injuries, 9% (3) were pediatric. Out of the 62 Rhino/UTV injuries, 20.9% (13) were pediatric. Out of the 750 ATV injuries, 27.6% (207) were pediatric. Only 31.9% of patients injured on an ATV were wearing a helmet, whereas 72.7% of injured dirt bike riders were wearing a helmet (Figure 27).

TRAUMATIC BRAIN INJURY (TBI)

Table 10: Age-specific rates of incidence and case fatality for TBI, ASTR 2011

TBI INCIDENCE AND CASE FATALITY RATE BY AGE								
	Major TBI				Minor/Moderate TBI			
	Count	Percent	Deaths	Case Fatality Rate	Count	Percent	Deaths	Case Fatality Rate
<1	117	2.9%	4	3.4%	68	2.0%	0	0
1-4	126	3.1%	8	6.3%	137	4.0%	0	0
5-9	81	2.0%	4	4.9%	122	3.6%	0	0
10-14	109	2.7%	3	2.8%	217	6.4%	0	0
15-19	246	6.1%	27	11.0%	409	12.0%	0	0
20-24	352	8.8%	47	13.4%	448	13.1%	0	0
25-34	494	12.3%	65	13.2%	566	16.6%	0	0
35-44	415	10.4%	47	11.3%	448	13.1%	0	0
45-54	487	12.2%	67	13.8%	415	12.2%	0	0
55-64	469	11.7%	61	13.0%	269	7.9%	0	0
65-74	385	9.6%	44	11.4%	169	5.0%	3	1.8%
75-84	445	11.1%	48	10.8%	101	3.0%	2	2.0%
≥85	279	7.0%	24	8.6%	43	1.3%	1	2.3%
Overall	4,005	100.0%	449	11.2%	3,412	100.0%	6	0.2%

Major TBI is equivalent to Type I of the Barell Matrix or AIS code with head severity ≥ 3 . Moderate and Minor TBI are equivalent to Type II and Type III of the Barell Matrix respectively. A total of 4,005 Major TBI cases, and 3,412 Minor/Moderate TBI cases were treated in an ASTR reporting hospital in 2011. The case fatality rate among Major TBI cases is 11.2% (Table 10). The highest case fatality rate was among 45-54 years for the Major TBI (13.8%), followed by the 20-24 years group (13.4%) (Figure 28).

Figure 28: TBI case fatality rate by age

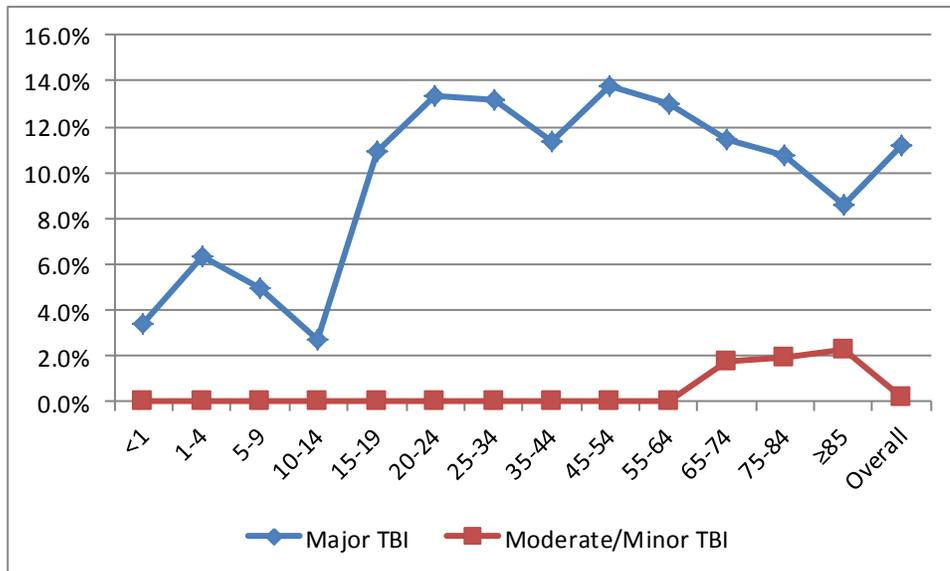
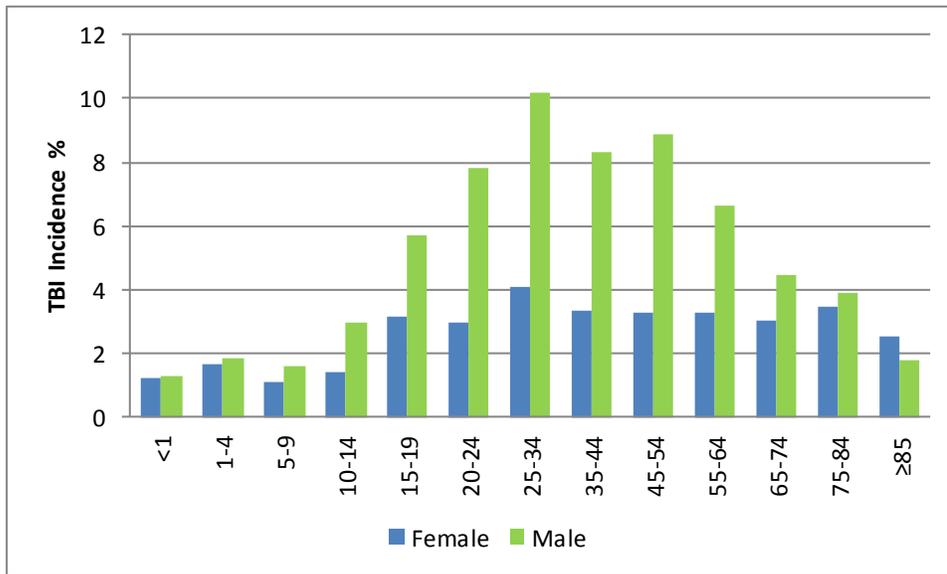
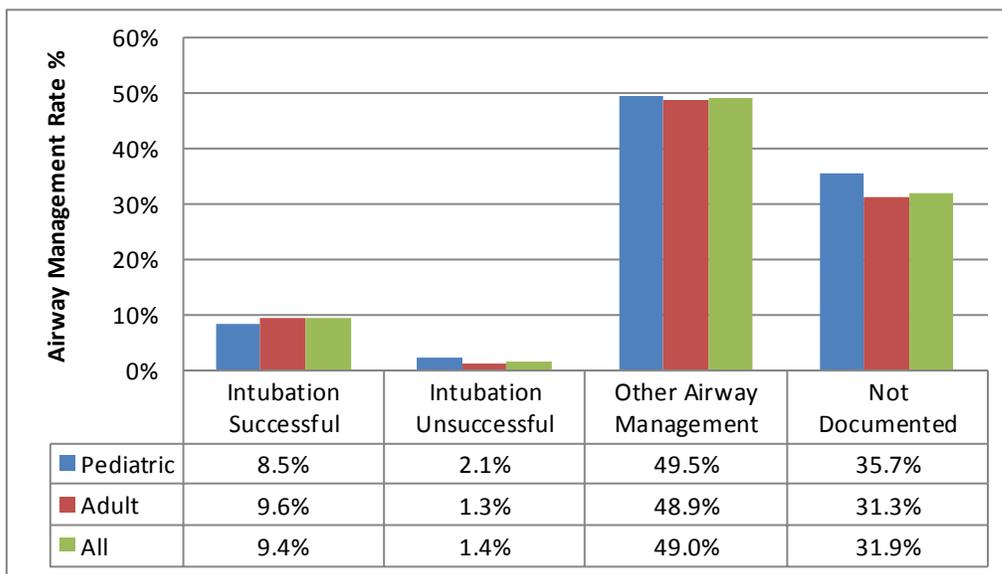


Figure 29: TBI incidence by age and gender, ASTR 2011



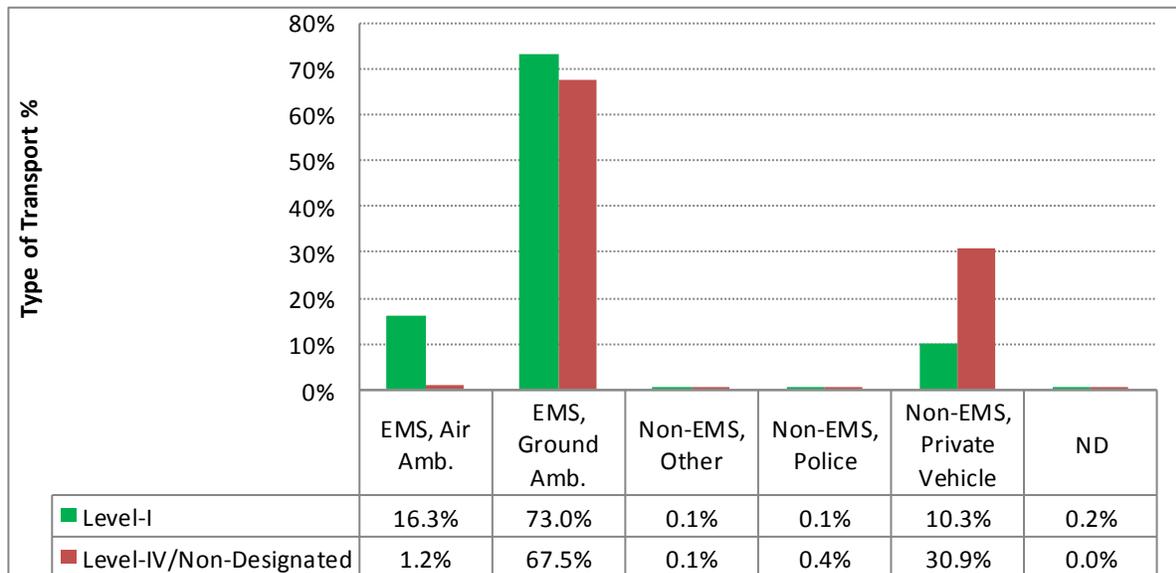
In the pediatric and geriatric population, the ratio of male to female TBI cases is similar. However, in the age group of 15-74, males are more likely than females to sustain a TBI (Figure 29).

Figure 30: Field airway management among major TBI patients, ASTR 2011



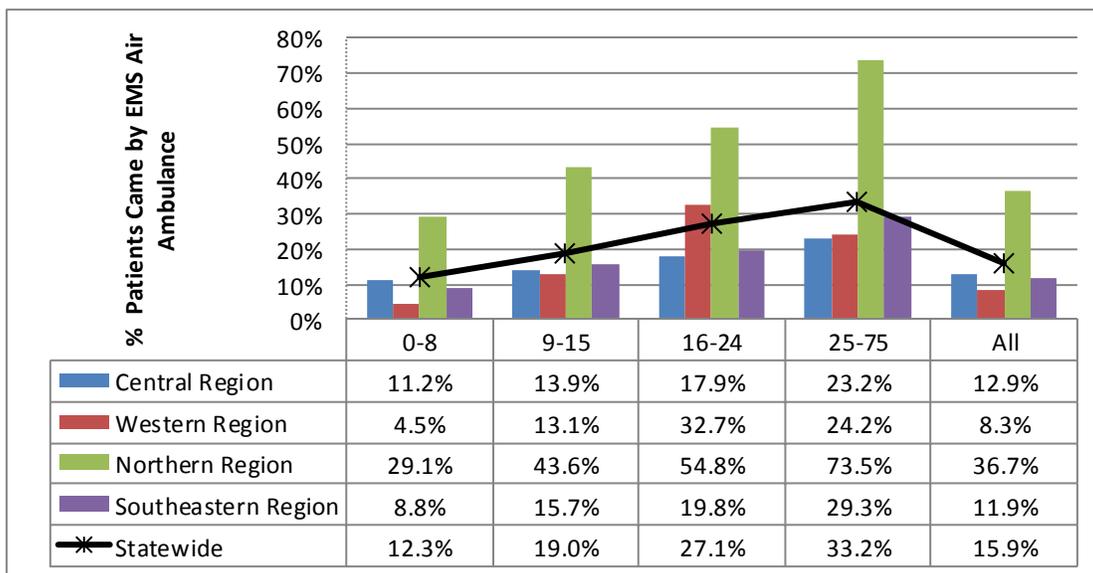
Of the 614 pediatric (< 18 years) Major TBI cases, 8.5% (52) received successful intubation. Overall 9.4% of the Major TBI cases received successful intubation, 49% received other types of Airway Management (ex: Auto-ventilator, Bag Mask Valve, etc.), and in 31.9% of the cases, Airway Management was not documented (Figure 30).

Figure 31: Mode of transport into reporting hospital, ASTR 2011



The percent of EMS ground transports into a Level I trauma center is fairly consistent with what is seen in a Level IV/Non-Designated hospital. However, EMS helicopter transports were more likely to be the mode of transport into a Level I Trauma Center, and private vehicles were more likely to be the mode into a Level IV/Non-Designated hospital (Figure 31).

Figure 32: Patients arriving at hospital via EMS air ambulance by region and ISS, ASTR 2011



The percent of patients arriving via EMS air ambulance is highest when the Injury Severity Score (ISS) is >15. The Northern Region had the highest rate of arrival by EMS air ambulance for all ISS categories as compared to any other regions (Figure 32).

GOLDEN HOUR

The Golden Hour report examines if a patient arrives at a designated trauma center within one hour from injury time. Non-designated Trauma Centers and inter-facility transfers into the reporting trauma center were not included in this analysis. Golden Hour cannot be calculated for patients with a missing injury time. Injury date/time was missing for approximately 32% of patients transported to a Level I Trauma Center and 21% of patients transported to a Level IV Trauma Center.

Of the 18,436 patients who arrived at a Level I Trauma Center, 38.23% arrived within the Golden Hour, whereas of the 3,402 who arrived at a Level IV Trauma Center, 30.98% arrived within the Golden Hour. More patients injured in the Southeastern region arrived at a Level I Trauma Center within the Golden Hour as compared to the other regions. Improved pre-hospital data completeness for Injury date/time might alter the Golden Hour results (Table 11).

Table 11: Rates of patients arriving within or outside of the golden hour by region and designation Level

PATIENTS ARRIVING AT LEVEL I OR LEVEL IV TRAUMA CENTERS WITHIN GOLDEN HOUR							
Golden Hour							
Level I							
Region	*Missing Injury Date/Time		≤ 1 Hour		>1 Hour		Total Patients
	N	%	N	%	N	%	
Central	5,113	40.51%	4,845	38.38%	2,663	21.09%	12,621
Western	42	55.26%	2	2.63%	32	42.10%	76
Northern	372	26.85%	256	18.48%	757	54.65%	1,385
Southeastern	311	7.83%	1,904	47.99%	1,752	44.16%	3,967
Missing Region	176	45.47%	42	10.85%	169	43.66%	387
Statewide	6,014	32.62%	7,049	38.23%	5,373	29.14%	18,436
Level IV							
Central	53	17.72%	130	43.47%	116	38.79%	299
Western	354	29.32%	349	28.91%	504	41.75%	1,207
Northern	323	25.49%	403	31.80%	541	42.69%	1,267
Southeastern	281	50.99%	161	29.21%	109	19.78%	551
Missing Region	45	57.69%	11	14.10%	22	28.20%	78
Statewide	1,056	31.04%	1,054	30.98%	1,292	37.97%	3,402

Figure 33: Rates of patients arriving within the golden hour by region, ASTR 2011

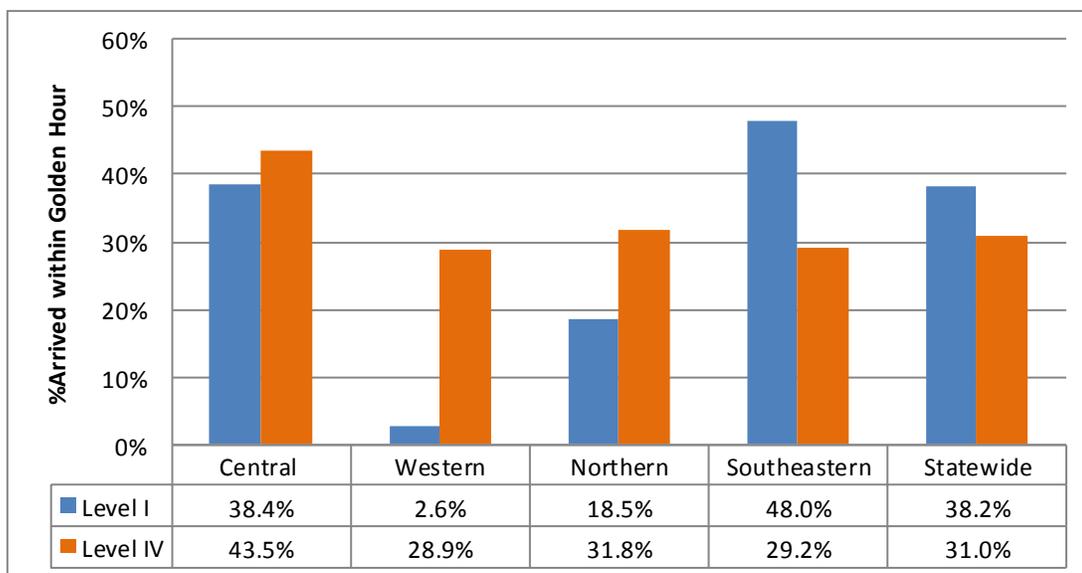


Table 12: Golden hour by county and designation level, ASTR 2011

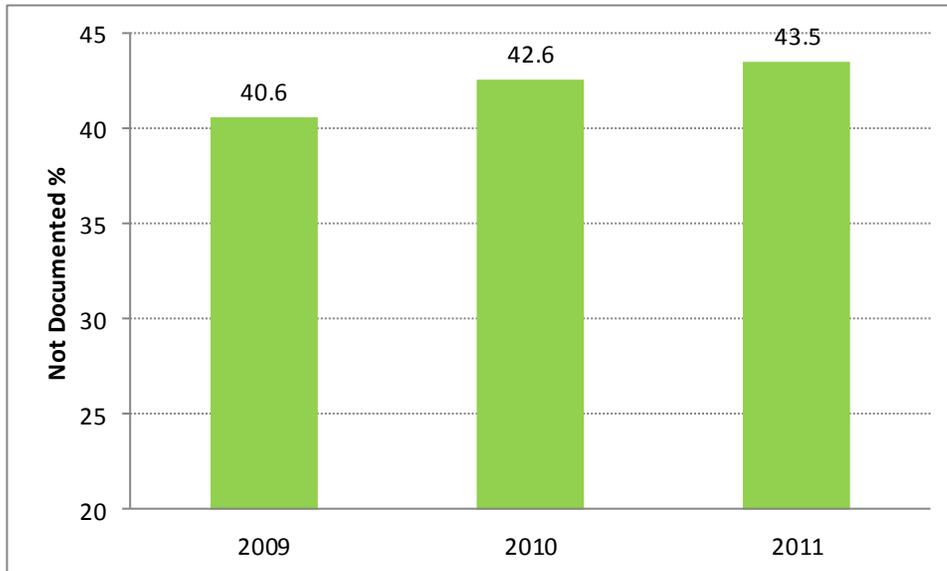
GOLDEN HOUR BY COUNTY OF INJURY					
County of Injury	Total Patients	Level I		Level IV	
		≤ 1 Hour		≤ 1 Hour	
		N	%	N	%
Apache	264	0	0	23	10.31%
Cochise	775	10	4.44%	161	29.27%
Coconino	1,260	231	30.55%	153	30.35%
Gila	304	8	2.64%	0	0
Graham	48	1	2.08%	0	0
Greenlee	20	0	0	0	0
La Paz	155	2	4.54%	52	46.84%
Maricopa	11,488	4,730	41.99%	107	47.34%
Mohave	1,109	0	0	297	27.09%
Navajo	574	2	1.36%	173	40.51%
Pima	3,567	1,888	52.92%	0	0
Pinal	1,128	107	10.12%	23	32.39%
Santa Cruz	108	5	4.62%	0	0
Yavapai	554	23	5.21%	54	47.78%
Yuma	19	0	0	0	0
Other	130	0	0	8	33.33%
Missing	335	42	14.94%	3	5.55%
All	21,838	7,049	38.23%	1,054	30.98%

The benefit of Level IV designation is reflected in Table 12 where a county level Golden Hour analysis is shown by designation level.

The Golden Hour is not the only important measure. Ensuring that patients make it into the organized trauma system is vital, even if it takes more than 60 minutes.

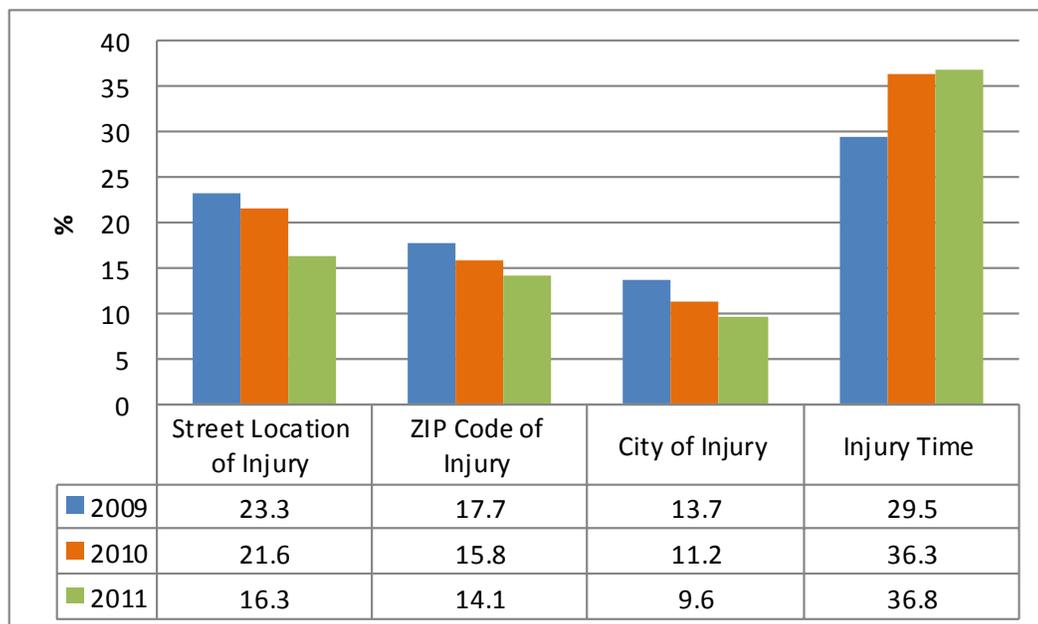
DATA QUALITY

Figure 34: Field airway management not documented among severely injured trauma patients, ASTR 2011



Although data completeness continues to improve each year, obtaining pre-hospital data is still a struggle. A large percent (43.5%) of field airway management data was not documented for severe trauma patients in 2011 (GCS <9 and ISS >15). Field airway management completeness has been consistent through the years (Figure 34). Over the years, the injury time field has been consistently missing which impacts vital measurements like Golden Hour (Figure 35).

Figure 35: Percent not documented for select injury data elements, ASTR 2011



Street Location is a free text field and not all entries are actual addresses. Data will need to be queried further to determine actual completeness and is thought to be underestimated.