



# State Trauma Advisory Board 2013 Annual Report



Arizona  
Department of  
Health Services

Arizona Department of Health Services  
Will Humble, Director

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# **State Trauma Advisory Board 2013 Annual Report & 2012 Trauma Registry Data Report**

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## State Trauma Advisory Board

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.

**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

**Jeff Farkas, NREMT-P**

Statewide Fire District Association Representative  
Show Low Fire Department -- Show Low, AZ

**Iman Feiz-Erfan, M.D.**

Statewide Neurosurgical Society Representative  
Maricopa Medical Center -- Phoenix, AZ

**Martyn J. Fink, Aviation & Operations Sgt.**

Department of Public Safety Representative  
Department of Public Safety -- Phoenix, AZ

**Garth Gemar, M.D.**

National Association of Retired Persons Representative  
Rural/Metro-Southwest Ambulance, Glendale Fire Dept.,  
Surprise Fire Dept. and Banner Healthcare, AZ

**Philip Johnson, M.D.**

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

**Debbie Johnston, R.N., Vice President, Advocacy**

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

**David Notrica, M.D., FACS., FAAP**

Statewide Pediatric Organization Representative  
Phoenix Children's Hospital -- Phoenix, AZ

**Scott Petersen, M.D., (Vice Chair)**

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

**Rodney A. Reed**

Regional EMS Council – Western Region Representative  
City of Yuma Fire Department -- Yuma, AZ

**Peter Rhee, M.D., MPH**

Trauma Center Representative  
University of Arizona -- Tucson, AZ

**Anthony Rhorer, M.D.**

National Association of Orthopaedic Trauma Representative  
Sonoran Orthopaedic Trauma Surgeons -- Scottsdale, AZ

**Dave Ridings, Assistant Chief**

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**

Regional EMS Council – Central Region Representative  
Southwest Ambulance -- Mesa, AZ

**Chris Salvino, M.D., M.S., FACS**

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

**Tina L. Tessay**

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

**Mark Venuti, CEP**

Statewide Ambulance Association Representative  
Guardian Medical Transport -- Flagstaff, 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

**Jonathan Walker, D.O.**

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

**Christina Kwasnica, M.D.**

Statewide Rehabilitation Facility Representative  
St. Joseph's Hospital -- Phoenix, AZ

## Trauma and EMS Performance Improvement Standing Committee Membership

**Linda Worthy, R.N.**

Chair  
John C. Lincoln North Mountain Hospital -- Phoenix, AZ

**Bill Ashland, R.N.**

Vice Chair/State Designated Level I Trauma Center Trauma Program Manager  
Flagstaff Medical Center -- Flagstaff, AZ

**Vicki Bennett, R.N., MSN**

State Designated Level I Trauma Center Trauma Program Representative, Scottsdale Healthcare/Osborn, Scottsdale, AZ

**Robert Corbell**

EMS Registry Group Member  
Northwest Fire District  
Tucson, AZ

**Paul Dabrowski, M.D.**

Trauma Surgeon, Banner Good Samaritan Medical Center, Phoenix, AZ

**Robert Djergaian, M.D.**

Rehabilitation Specialist  
Banner Good Samaritan Hospital -- Phoenix, AZ

**Kim Duncan**

State Designated Level IV Trauma Center Program Manager  
Southeast Arizona Medical Center,  
Douglas, AZ

**Josh Gaither**

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

**Garth Gemar, M.D.**

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

**Pamela Goslar, Ph.D.**

IPAC Representative  
St. Joseph's Hospital & Medical Center  
Phoenix, AZ

**Karen Graham, R.N.**

Prehospital EMS Coordinator (SAEMS/AEMS)  
Carondelet St. Joseph's Hospital  
Tucson, 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**

Prehospital EMS Coordinator – Base Hospital  
(SAEMS/AEMS), University of Arizona Medical Center,  
South Campus, Tucson, AZ

**Eric Merrill**

Ground Ambulance or First Responder Premier EMS Agency,  
Quality Improvement Officer (SAEMS/AEMS)  
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**

State Designated Level II or II Trauma Center, Emergency  
Department Director, Mountain Vista Medical Center  
Mesa, AZ

**Danielle Stello, R.N.**

Prehospital EMS Coordinator – Base Hospital  
(NAEMS/WACEMS)  
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**

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

# Annual Report to the Director

## Introduction

Since last year's annual trauma report, there has been a number of exciting things occur in the Arizona trauma system. A system-wide trauma assessment was conducted by the American College of Surgeons – Committee on Trauma (ACS-COT) in November 2012 with a final written report delivered to the Bureau of Emergency Medical Services & Trauma System (BEMSTS) January 2013. Since that time, the State Trauma Advisory Board (STAB), BEMSTS, and many other system stakeholders, including the University of Arizona's Center for Rural Health (CRH), took swift action in addressing some of the identified recommendations from the ASC-COT report to move our trauma system forward. The significant population growth in Arizona and healthcare climate change has made advancing the Arizona trauma system challenging. STAB and many trauma system stakeholders have done some outstanding work in identifying key objectives that will benefit the development of Arizona's trauma system. The following pages provide an overview of our progress this past year, followed by an extensive assessment on the clinical and system level data available from the Arizona State Trauma Registry (ASTR).

## 2012-2013 Accomplishments

**Arizona Trauma System Review:** A decision was made last year by STAB and BEMSTS to invite the ACS-COT for a system-wide trauma system review November 26 – 29 2012. A pre-review questionnaire was completed with all the necessary supporting documentation to properly review 18 trauma system elements. Normally, preparation for a system review is a 12 month project and through a strong collaborative effort the project was completed in a 3 month time period. The BEMSTS received the final report from the ACS-COT on January 28 2013 with a list of system recommendations for the future development of Arizona's trauma system. The ACS-COT report was reviewed by STAB on February 25, 2013 where the recommendation was made to reconvene the trauma plan workgroup to complete a trauma system plan that would be reviewed by STAB on September 26, 2013.

**Arizona State Trauma Plan:** A trauma plan workgroup was identified consisting of trauma system stakeholders to represent trauma care in rural, urban, and tribal areas of Arizona. The workgroup met in person on a monthly basis between April and August with sub-groups providing additional work and feedback in between the scheduled meetings. After reviewing the current Arizona Trauma Plan, the Model Trauma System Planning and Evaluation Assessment results and the ACS-COT recommendations, the workgroup decided to arrange the plan around eight major goals. Each goal is supported with parallel objectives and measureable strategies to achieve those goals. Accountability and responsibility are defined, as is the timeline in which each strategy will be reviewed and evaluated on a regular basis. While this is designed to be a five-year plan, its structure allows for an annual assessment and revision process to ensure that it remains current with our goals for trauma system development.

**ACS Recommendation:** Use the BIS results to inform the State Trauma Plan - completed

**ACS Recommendation:** Update the State Trauma Plan - completed

**Trauma System Performance Improvement Project:** In April, the Bureau of EMS and Trauma System concluded the development of four trauma system performance indicators recommended by a workgroup of trauma managers, medical directors, and the University of Arizona's Center for Rural Health. These four

system indicators are consistent with the recommendations from the ACS in that they are measurable, targeted, achievable, and take advantage of resources within our system to accomplish.

1. Reduce the length of time that a trauma patient remains in the emergency department of a level IV trauma center before being transported to a higher level trauma center
2. Reduce the frequency that trauma patients are transferred to another hospital for a higher level of care after admission to a level IV trauma center
3. Reduce the number of trauma patients that die in non-trauma centers
4. Improve the billing efficiency of all trauma centers for trauma patients

In order to accomplish these goals, the BEMSTS along with the Center for Rural Health organized a meeting of all the trauma program managers at the University of Arizona Medical Center for a one-day workshop to introduce these measures and develop a plan for accomplishing the goals of the project. The plan will be presented to the Trauma and EMS Performance Improvement Standing Committee in November in the hopes that it will recommend to STAB the adoption as part of the State Trauma Plan. This group will meet three or four times annually to monitor and evaluate progress on the plan's goals.

**ACS Recommendation:** Regularly convene a meeting of all trauma program managers - ongoing

**ACS Recommendation:** Pick system performance indicators and stick with them - ongoing

**ACS Recommendation:** Develop a trauma system performance improvement plan - ongoing

**Improve the verification process of new provisional trauma centers and Level IV trauma centers:** The BEMSTS and the members of the trauma center site visit teams (both ACS site visit teams as well as Arizona site visit teams) had noted that centers seeking designation as trauma centers were frequently less prepared than they should have been for the trauma designation process. It was determined that future provisional and level IV trauma center applicants will be required to complete and submit a pre-review questionnaire (PRQ) based on designation criteria. The completed PRQ was then distributed to the site visit team members to enhance their ability to conduct a meaningful and comprehensive assessment of the requesting facility.

**ACS Recommendation:** Establish criteria and standards for designation and de-designation of trauma centers - completed

**Korea-Arizona Trauma Summit:** During the past two years, an international partnership has been forged between the Arizona Trauma System and the Korean Society of Traumatology (KST). The KST has been tasked by the South Korean government to develop a national trauma system. Arizona was selected as a model for developing a system-wide approach to implementing and measuring trauma care. The establishment of this partnership began in 2012 when the Korean government dispatched 12 trauma surgeons and public health officials to begin learning how Arizona's effective statewide trauma system was implemented.

A Korea-Arizona Trauma Summit took place in Phoenix and Tucson, April 1-4, 2013. The summit hosted by the Ramsey Social Justice Foundation in collaboration with the Arizona Department of Health Services was an opportunity for the people of Korea to learn about coordinated, state-of-the-art trauma care. The Korean delegation was comprised of 34 physicians, public health and government officials, including a member of the National Assembly, Republic of Korea, Mr. Oh Jae Sae; the Director General of Public Health Policy from the Ministry of Health and Welfare; and the President of the National Medical Center. The group met with Arizona

government (state, county, and city) officials, medical experts, and hospital administrators. The summit included EMS and hospital tours, numerous trauma care, simulation, telemedicine, and data related presentations, and demonstrations facilitated by the Arizona trauma system stakeholders. This unique international summit provided a tremendous cross-cultural experience for both countries involved.

**Native American Trauma Report:** In collaboration with the Arizona Department of Health Services (ADHS) Office of Injury Prevention (OIP), the ADHS Native American Liaison, the Regional Indian Health Services Directors and the Inter Tribal Council of Arizona, the Data and Quality Assurance team assessed and published an American Indian Trauma Report using data from the Arizona State Trauma Registry. The report was formally presented to the Tribal Leaders in August 2013.

**ACS Recommendation:** Collaborate with OIP to develop targeted reports - completed

**County Trauma Reports:** The Data and Quality Assurance team prepared comprehensive reports detailing the demographics, incidence, causes, severity and charges relating to trauma for each of the 15 counties in Arizona. These individualized reports were presented to the County Health Officers during the July 2013 ADHS – County Health Officer joint meeting.

**ACS Recommendation:** Run standing reports for routine review of trauma system performance, locally, regionally, and on a statewide basis – In process

**The Arizona Excellence in Pre-Hospital Injury Care (EPIC) Public Health Project:** Traumatic brain injury (TBI) is a major public health problem in Arizona and across the United States and carries an immense societal burden. In response to this public health problem, the Director of ADHS has established two projects called the Excellence in Prehospital Injury Care (EPIC) and the EPIC4KIDS. These projects are based upon the growing scientific evidence that the management of TBI in the early minutes after injury profoundly impacts outcome. The ADHS/BEMSTS and the University of Arizona Emergency Medicine Research Center (AEMRC) are in the 3<sup>rd</sup> year of a 5-year NIH supported effort to implement and measure the nationally vetted evidence-based TBI treatment guidelines. EPIC is a unique statewide trauma quality improvement effort aimed at improving outcomes from moderate and severe TBI through implementing these prehospital TBI treatment guidelines across the state of Arizona. EPIC involves prehospital data collection and ASTR data linkage as well as risk stratification which allows the evaluation of the *effectiveness* of those prehospital interventions focused on oxygenation, ventilation, and blood pressure management across the many EMS systems in Arizona. For more information visit [www.epic.arizona.edu](http://www.epic.arizona.edu)

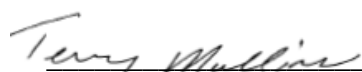
## Conclusion

This year has been a year of great progress relating to trauma system planning and assessment. We have many challenges before us associated with the Patient Protection and Affordable Care Act, lingering economic challenges, and continuing population growth. It is clear that the State Trauma Advisory Board and our many stakeholders have charted a clear, measurable, and descriptive way to move forward allowing us to continue to reduce the incidence and severity of injuries in Arizona and to improve the outcome for those who are injured.

Respectfully submitted on behalf of the Members of the State Trauma Advisory Board,



Bentley J. Bobrow, Chair



Terry Mullins, Bureau Chief



Daniel Didier,  
Trauma Section Chief

## Arizona State Designated Trauma Centers

Health Care Institution	Address	Effective Date	Expiration Date
<b>Level I Trauma Centers</b>			
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	08/31/12	08/31/15
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
<b>Level III Trauma Centers</b>			
Banner Baywood Medical Center (Provisional Designation)	6644 E. Baywood Ave., Mesa, AZ 85206	07/30/12	01/30/14
John C. Lincoln Deer Valley Hospital (Provisional Designation)	19829 N. 27 <sup>th</sup> Ave., Phoenix, AZ 85027	02/04/13	10/04/14
Mountain Vista Medical Center (Provisional Designation)	1301 S. Crismon Rd., Mesa, AZ 85209	02/24/12	2/20/14
<b>Level IV Trauma Centers</b>			
Banner Boswell Medical Center	10401 W. Thunderbird Blvd., Sun City, AZ 85351	12/17/12	12/17/15
Banner Estrella Medical Center	9201 W. Thomas Road, Phoenix, AZ 85037	08/30/12	08/30/15
Banner Gateway Medical Center	1900 N. Higley Road, Gilbert, AZ 85234	01/02/13	01/02/16
Banner Ironwood Medical Center	37000 N. Gantzel Rd., San Tan Valley, AZ 85140	10/11/12	10/11/15
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
Cobre Valley Regional Medical Center	5880 S. Hospital Dr., Globe, AZ 85501	11/26/12	11/26/15
Copper Queen Community Hospital	101 Cole Ave., Bisbee, AZ 85603	12/01/12	12/01/15
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	10/15/12	10/15/15
La Paz Regional Hospital	1200 W. Mohave Rd., Parker, AZ 85344	06/02/12	06/02/15

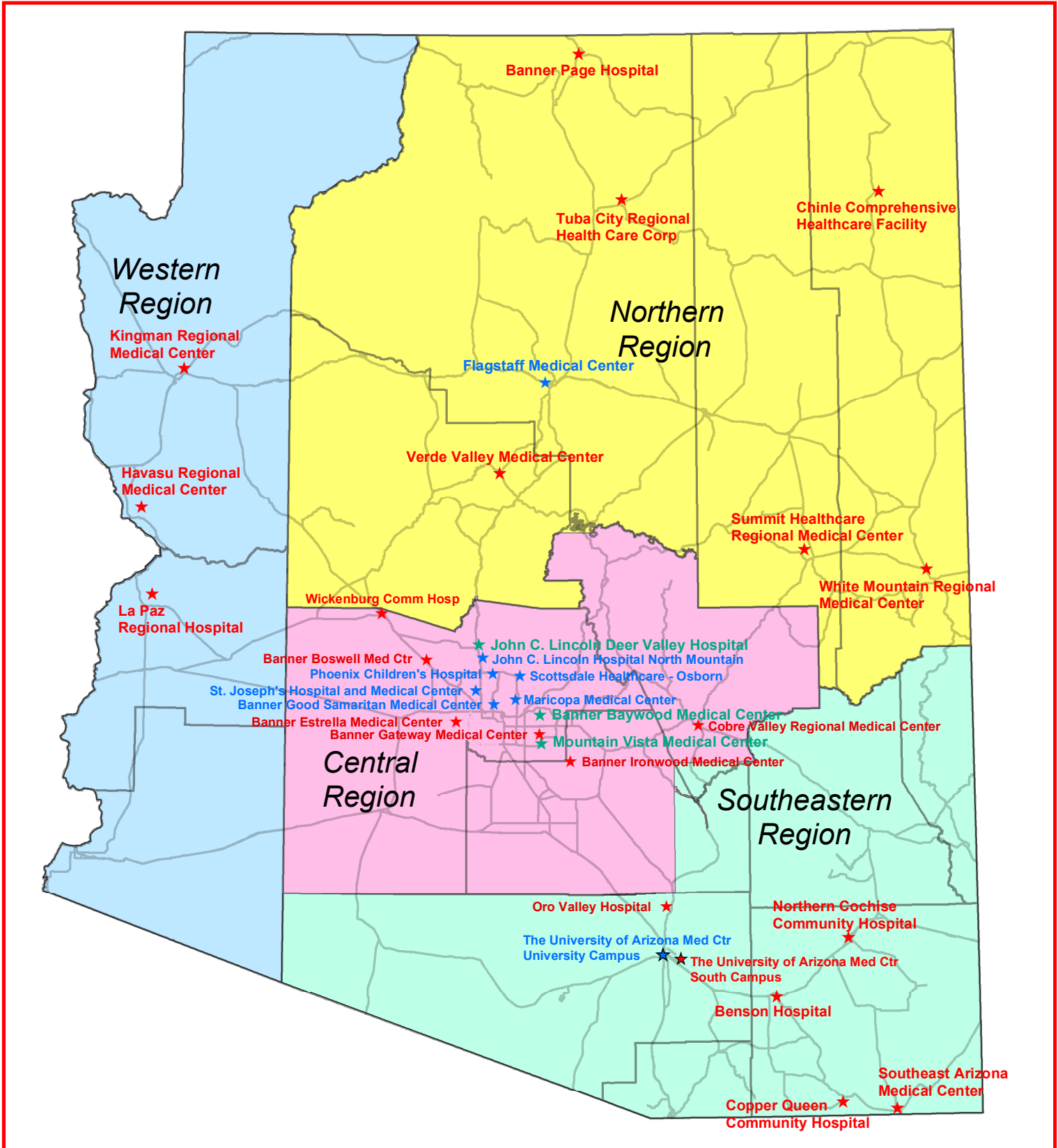


**Appendix A**

<b>Health Care Institution</b>	<b>Address</b>	<b>Effective Date</b>	<b>Expiration Date</b>
Northern Cochise Community Hospital	901 W. Rex Allen Dr., Willcox, AZ 85643	12/04/11	12/04/14
Oro Valley Hospital	1551 East Tangerine Road, Oro Valley, AZ 85755	4/18/13	4/18/16
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
The University of Arizona Medical Center South Campus	2800 E. Ajo Way, Tucson, AZ 85713	08/13/13	08/13/16
Tuba City Regional Health Care Corp.	P.O. Box 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 S. 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

# EMS REGIONS AND TRAUMA CENTERS

August 14, 2013



*Level I Trauma Center*

*Level III Trauma Center (Provisional)*

*Level IV Trauma Center*

**ARIZONA STATE TRAUMA REGISTRY (ASTR)  
2012 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 2012	APR-JUN 2012	JUL-SEP 2012	OCT-DEC 2012	
	ASTR Due Date	7/9/2012	10/1/2012	1/2/2013	4/1/2013	
Total Records from all Level I Trauma Centers by Qtr:		<b>5894</b>	<b>5842</b>	<b>5872</b>	<b>5871</b>	
Banner Good Samaritan Medical Center	Number of Records	668	686	692	701	2747
	Date Received	6/28/12	9/28/12	12/20/12	3/27/13	
Flagstaff Medical Center	Number of Records	315	356	445	387	1503
	Date Received	7/9/12	9/28/12	12/24/12	3/13/13	
John C. Lincoln North Mountain Hospital	Number of Records	771	714	704	696	2885
	Date Received	6/27/12	9/11/12	12/31/12	3/28/13	
Maricopa Medical Center	Number of Records	625	594	589	563	2371
	Date Received	7/3/12	9/26/12	12/14/12	4/9/13	
Phoenix Children's Hospital	Number of Records	505	527	525	583	2140
	Date Received	7/9/12	9/24/12	1/6/2013?	4/22/13	
Scottsdale Healthcare-Osborn	Number of Records	908	839	825	848	3420
	Date Received	7/3/12	9/27/12	12/31/12	4/1/12	
St. Joseph's Hospital & Medical Center	Number of Records	878	864	864	887	3493
	Date Received	6/29/12	9/25/12	12/26/12	3/26/13	
University of AZ Medical Center-UNIVERSITY CAMPUS (was UMC)	Number of Records	1224	1262	1228	1206	4920
	Date Received	7/9/12	10/1/12	1/2/13	3/20/13	

LEVEL III-PROVISIONAL TRAUMA CENTERS (Full Data Set)	Reporting Quarter	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Hospital YTD Totals
	Total Records from all Level III Provisional Hospitals by Qtr:	<b>405</b>	<b>395</b>	<b>618</b>	<b>940</b>	
Banner Baywood Medical Center (new designation 7/30/12)	Number of Records	0	0	88	155	243
	Date Received	New Reporting Hospital		12/20/12	3/27/13	
Mountain Vista Medical Center (new designation 2/24/12)	Number of Records	280	237	258	371	1146
	Date Received	6/29/12	10/2/12	1/8/13	3/12/13	
University of AZ Medical Center-SOUTH CAMPUS (was UPH) (new designation 2/13/12)	Number of Records	125	158	272	414	969
	Date Received	7/9/12	10/1/12	1/2/13	3/29/13	

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 ALL Level IV Trauma Centers by Qtr:	<b>804</b>	<b>962</b>	<b>1245</b>	<b>1331</b>	
<b>FULL DATA SET LEVEL IV</b>						
Banner Boswell Medical Center (Full Data Set)	Number of Records	0	0	85	124	209
	Date Received	New Reporting Hospital		12/20/12	3/27/13	
Banner Estrella Medical Center (new designation 8/30/12)	Number of Records	0	0	56	97	153
	Date Received	New Reporting Hospital		12/20/12	3/27/13	
Banner Gateway Medical Center (new designation 1/2/13)	Number of Records	0	0	0	48	48
	Date Received	New Reporting Hospital			3/27/13	
Banner Ironwood Medical Center (new designation 10/11/12)	Number of Records	0	0	9	20	29
	Date Received	New Reporting Hospital		12/20/12	3/27/13	
Kingman Regional Medical Center	Number of Records	111	124	172	179	586
	Date Received	6/27/12	9/30/12	1/8/13	4/11/13	

Bureau of EMS & Trauma System Data & Quality Assurance Section

Appendix C

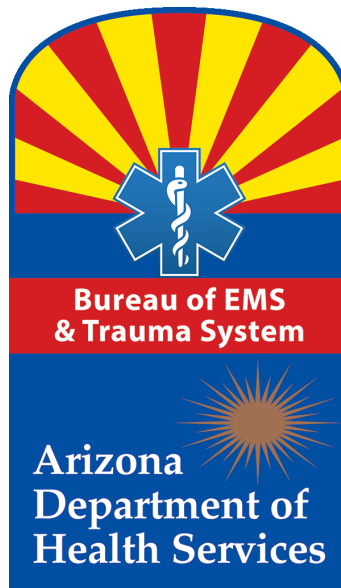
Summit Healthcare Regional Medical Ctr	Number of Records	73	66	101	77	317
	Date Received	7/19/12	10/9/12	3/28/13	4/17/13	
Tuba City Regional Health Care	Number of Records	216	244	213	148	821
	Date Received	7/9/12	10/5/12	1/2/13	3/27/12	
Verde Valley Medical Center(Cottonwood)	Number of Records	36	52	52	53	193
	Date Received	6/28/12	10/1/12	1/2/13	4/12/13	
<b>REDUCED DATA SET LEVEL IV</b>						
Banner Page Hospital	Number of Records	21	35	46	30	132
	Date Received	6/25/12	9/25/12	1/3/13	4/1/13	
Benson Hospital	Number of Records	13	10	18	19	60
	Date Received	6/25/12	9/20/12	12/18/12	4/1/13	
Chinle Comprehensive Health Care	Number of Records	57	48	58	36	199
	Date Received	7/6/12	10/1/12	12/31/12	4/1/13	
Cobre Valley Medical Center (new designation 11/26/12)	Number of Records	0	0	28	24	52
	Date Received	New Reporting Hospital		12/31/12	4/1/13	
Copper Queen Community Hospital	Number of Records	47	61	57	41	206
	Date Received	6/22/12	9/27/12	12/28/12	4/1/13	
Havasu Regional Medical Center	Number of Records	90	127	85	59	361
	Date Received	6/29/12	9/12/12	12/12/12	3/12/13	
La Paz Regional Hospital	Number of Records	29	21	16	15	81
	Date Received	7/3/12	10/3/12	1/2/13	4/22/13	
Northern Cochise Hospital	Number of Records	29	37	37	29	132
	Date Received	6/27/12	10/1/12	12/19/12	3/26/13	
Oro Valley Hospital	Number of Records	0	0	0	20	20
	Date Received	New Reporting Hospital			5/9/13	
Southeast Arizona Medical Center	Number of Records	27	55	83	144	309
	Date Received	7/1/12	9/24/12	1/2/13	3/29/13	
White Mountain Regional Medical Center	Number of Records	13	55	103	154	325
	Date Received	7/1/12	9/24/12	12/17/12	4/1/13	
Wickenburg Community Hospital	Number of Records	42	27	26	34	129
	Date Received	6/22/12	10/1/12	1/1/13	4/1/13	

<b>NON-DESIGNATED HOSPITALS (Full or Reduced Data Set)</b>	Reporting Quarter	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
Total Records from all Non-Designated Hospitals by Qtr:		<b>839</b>	<b>693</b>	<b>602</b>	<b>289</b>	Hospital YTD Totals
Sierra Vista Regional Medical Center (Full Data Set)	Number of Records	39	0	0	0	39
	Date Received	7/23/12	-	-	-	
Yavapai Regional Medical Center-West (Full Data Set)	Number of Records	30	55	77	60	222
	Date Received	7/2/12	9/27/12	1/18/13	3/27/13	
Yuma Regional Medical Center (Full Data Set)	Number of Records	770	638	525	209	2142
	Date Received	8/1/2012	12/28/2012	6/21/2013	6/21/2013	

<b>Total 2012 Reporting Hospitals = 34</b>	<b>Total ASTR 2012 Records by Quarter:</b>				<b>Total ASTR 2012</b>
	<b>7942</b>	<b>7892</b>	<b>8337</b>	<b>8431</b>	<b>32,602</b>

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

**State Trauma Advisory Board  
2013 Annual Report**



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## ***ACKNOWLEDGEMENT***

The Arizona Department of Health Services Bureau of Emergency Medical Services and Trauma System wishes to acknowledge the continued hard work and dedication of the many individuals involved in the Arizona EMS and Trauma System working to improve patient outcomes. We would especially like to thank all the participating Trauma Centers, Trauma Directors, Trauma Managers and Trauma Registrars for their contribution to continuously improve the data collection processes in order to fully evaluate the trauma system in Arizona.

# 2013 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 <sup>1</sup>.

## **Methods:**

In 2012, the Arizona State Trauma Registry (ASTR) received data from 31 state designated trauma centers and three non-designated healthcare institutions. For the 2012 reporting year, the Arizona EMS and Trauma System had 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 were located in the northern-most county of Coconino and in the southern county of Pima. There were twenty designated Level IV trauma centers and three designated Level III trauma centers dispersed primarily in the rural areas of the state. Three non-designated hospitals submitted data voluntarily to ASTR for the year 2012. Please refer to Appendix C for a list of 2012 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<sup>®</sup> 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, 2012 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 32,602 records from 34 participating health care institutions in 2012. 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 2012 was 6,498,570; this was up from the 2010 reported number of 6,438,178 residents <sup>2</sup>. In 2012, 84.2% 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 15.8% of the population.

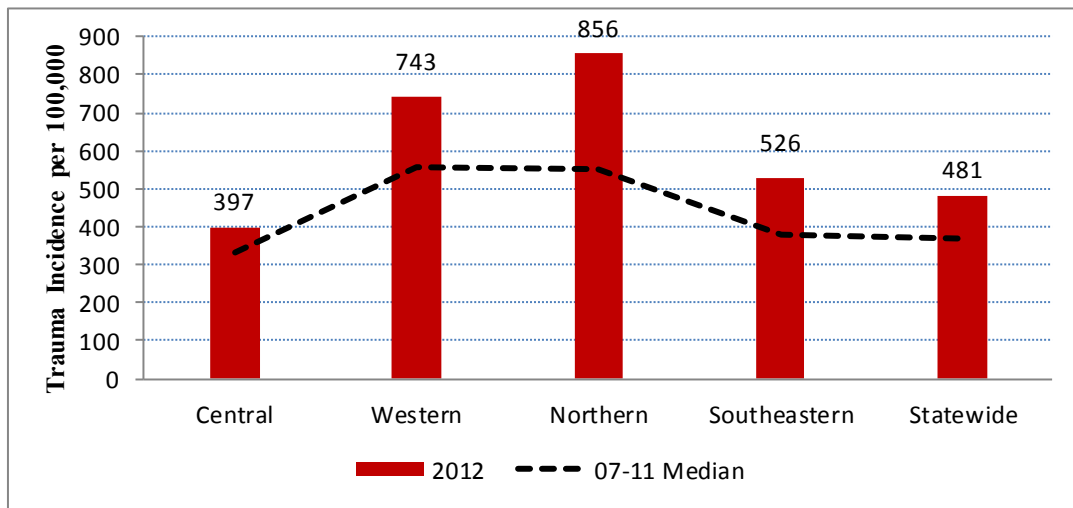
Maricopa County is the largest county with an area of 9,204 square miles, a population of 3.8 million, and the seat of state government in Phoenix.

Additionally, Arizona has within its borders twenty-two (22) federally recognized American Indian tribes, comprising a 2011 collective population of 296,529, of which 162,119 (55%) reside on reservations and tribal lands.

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

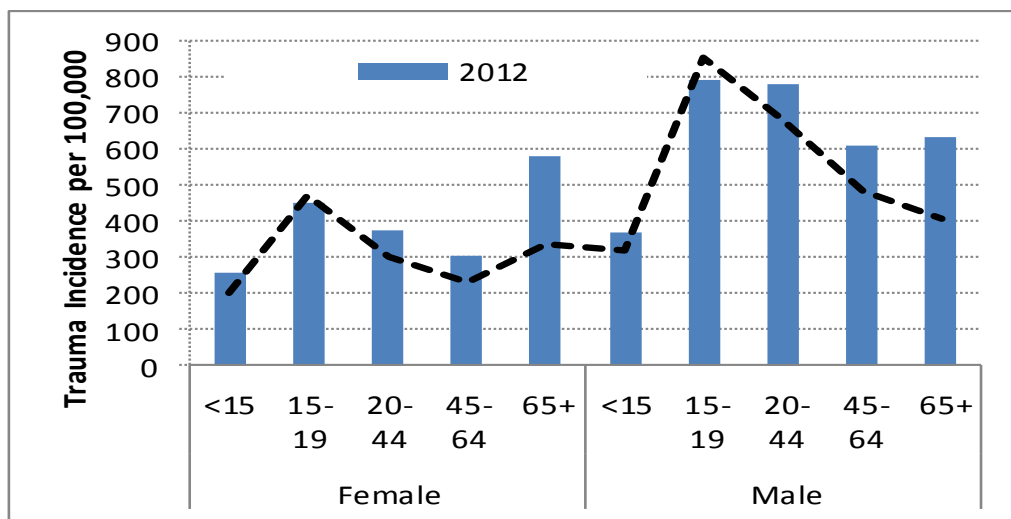
<sup>2</sup> <http://www.azdhs.gov/plan/menu/info/pop/pop12/pd12.htm>

**Figure 1: Region-specific trauma rates per 100,000 Arizona residents, ASTR 2007-2012**



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).

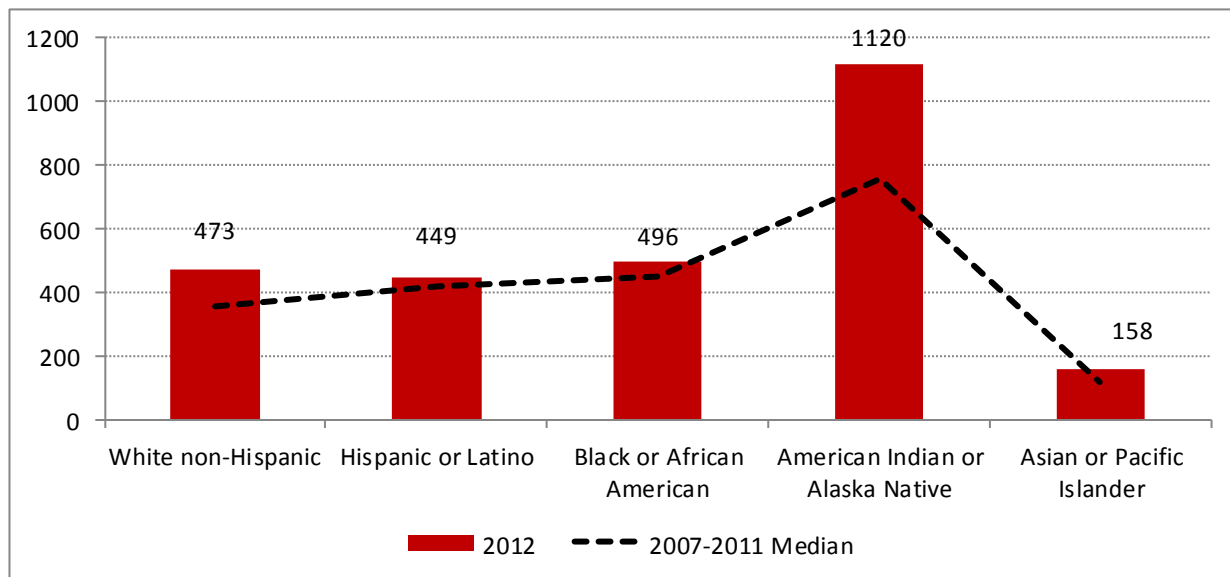
**Figure 2: Gender & age-specific trauma rates per 100,000 Arizona residents, ASTR 2007-2012**



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 2012 and the 2007-2011 five-year median. For females, the 65+ year old age group has the highest trauma rate followed by 15-19 year old age group in 2012. Increase in trauma rates for pediatric and geriatric populations may be due to an increase in the number of reporting hospitals in rural communities (Figure 2).



**Figure 3: Race-specific trauma rates per 100,000 Arizona residents, ASTR 2007-2012**



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

**Table 1: Age-specific trauma proportion and case fatality proportion, ASTR 2007-2012**

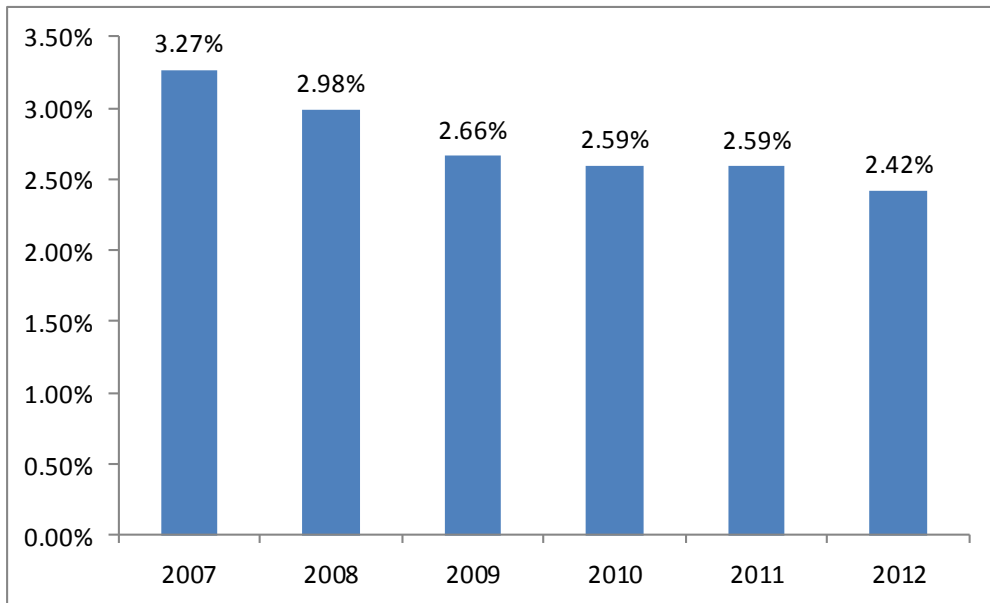
INCIDENCES AND CASE FATALITY PROPORTION BY AGE				
Age	Count	Percent	Deaths	Case Fatality Proportion
<1	449	1.37%	7	1.55%
1-4	1,241	3.80%	18	1.45%
5-9	1,214	3.72%	6	0.49%
10-14	1,354	4.15%	9	0.66%
15-19	2,933	8.99%	50	1.70%
20-24	3,599	11.03%	78	2.16%
25-34	5,022	15.40%	102	2.03%
35-44	3,908	11.98%	90	2.30%
45-54	3,913	12.00%	116	2.96%
55-64	3,263	10.00%	100	3.06%
65-74	2,330	7.14%	64	2.74%
75-84	2,031	6.22%	81	3.98%
>85	1,344	4.12%	68	5.05%
Missing	1	-	-	-
<b>Total</b>	<b>32,602</b>	<b>100.00%</b>	<b>789</b>	<b>2.42%</b>

Trauma affects people of all ages and is the leading cause of death among persons 1-44 years of age<sup>3</sup>. Of the reported 32,602 trauma patients, the overall mortality proportion was 2.42%.

The highest case fatality proportion was observed among the geriatric population, especially within the 75-84 age group (5.05%) (Table 1).

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

**Figure 4: Trauma related mortality proportion, ASTR 2007-2012**



The case fatality proportion in 2012 has decreased across all age groups as compared to 2007-2011 median (Figure 4).

**Figure 5: Age-specific trauma related mortality rates per 100,000 Arizona residents, ASTR 2007-2012**

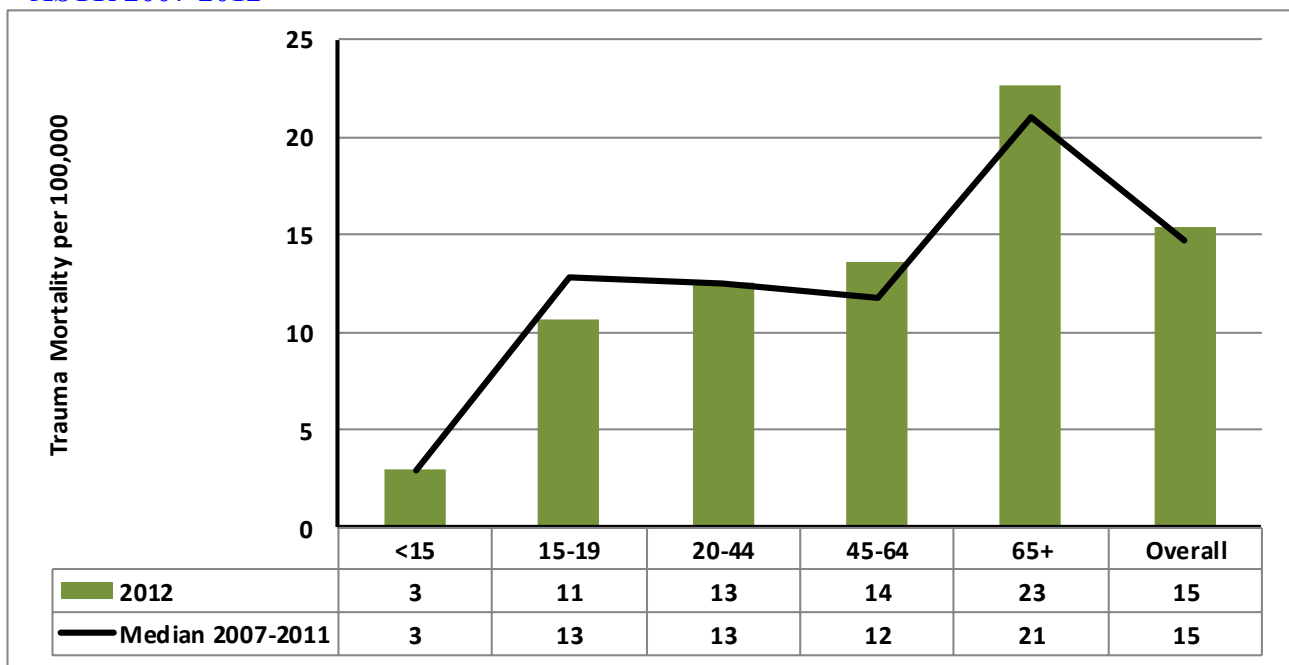


Figure 5 depicts trauma mortality rates per 100,000 Arizona residents by age. Arizona's highest trauma mortality rate per 100,000 was in the 65+ age group. The mortality rate for 15-19 year age group has decreased in 2012 as compared to the 2007-2011 median rate.

# INJURY CHARACTERISTICS: MECHANISM OF INJURY

**Figure 6: Top mechanisms of injury rate per 100,000 Arizona residents by region, ASTR 2012**

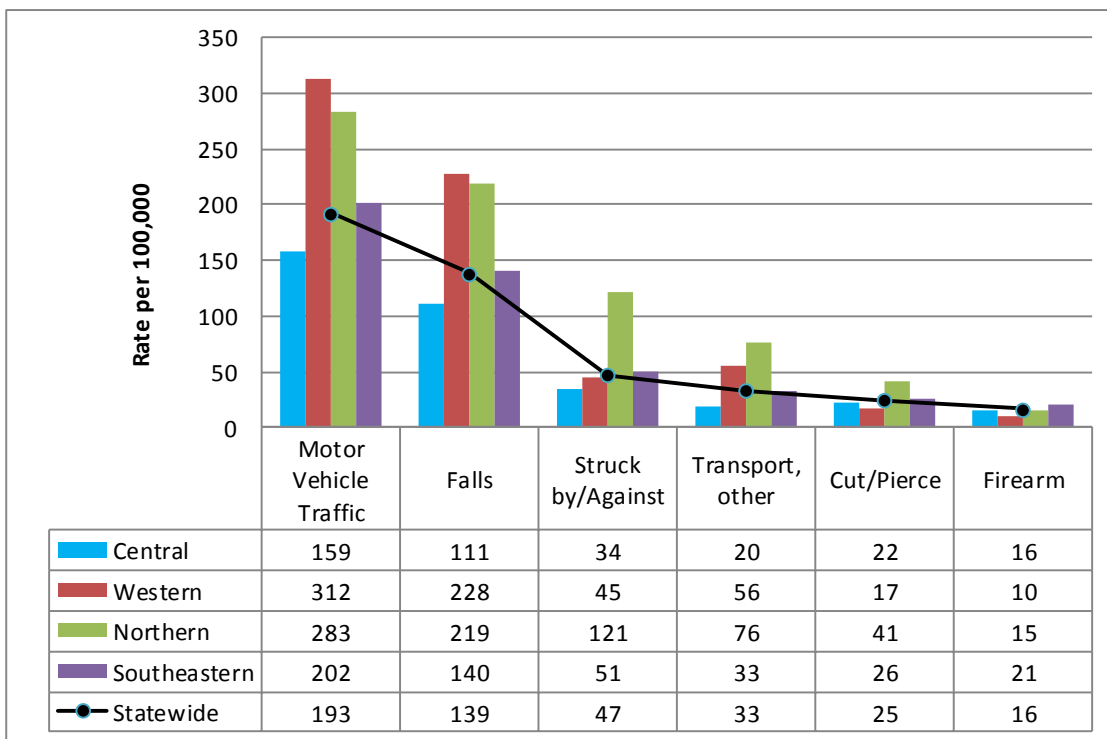


Figure 6 shows top mechanisms of injury rate per 100,000 Arizona residents by region for the year 2012. The western region has the highest rate for motor vehicle traffic (MVT) injuries and falls, while the northern region has the highest rate for the other four top mechanism of injuries as compared to other regions. The central region has the lowest injury rate for five out of the six top mechanisms of injury.

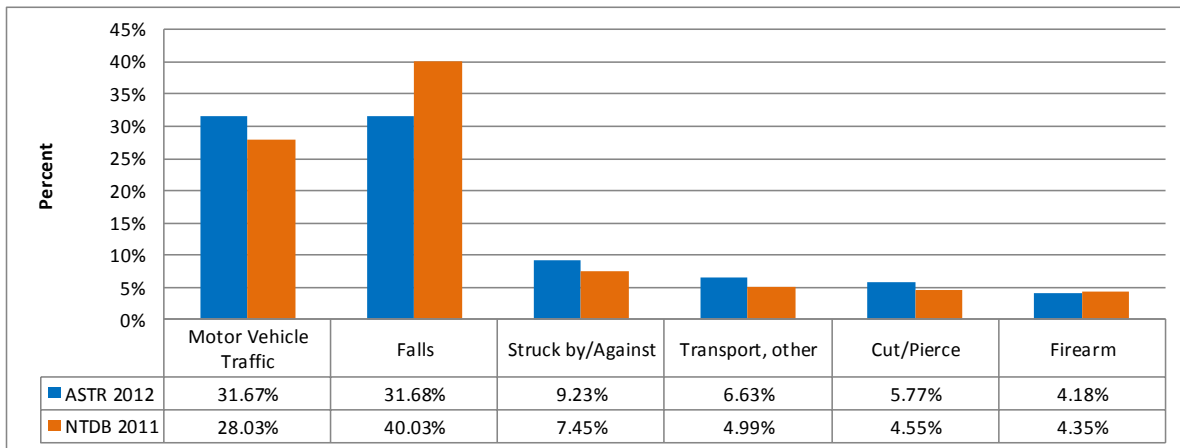
The MVT category only includes motor vehicles traveling on a public road or highway. Transport other includes various other types of vehicles such as railway, off-road, water craft, and air craft. Struck by/Against includes being struck by objects or people, intentionally or unintentionally.

**Table 2: Mechanism of injury and case fatality proportion, ASTR 2012**

<b>INCIDENCE AND CASE FATALITY PROPORTION BY MECHANISM OF INJURY</b>				
<b>MECHANISM</b>	<b>COUNT</b>	<b>PERCENT</b>	<b>DEATHS</b>	<b>CASE FATALITY PROPORTION</b>
<b>Motor Vehicle Traffic</b>	12,526	38.42%	316	2.52%
<b>Falls</b>	9,006	27.62%	167	1.85%
<b>Struck by/Against</b>	3,060	9.38%	24	0.78%
<b>Transport, other</b>	2,147	6.58%	21	0.97%
<b>Cut/Pierce</b>	1,606	4.92%	20	1.24%
<b>Firearm</b>	1,072	3.28%	168	15.67%
<b>Pedal Cyclist, Other</b>	759	2.32%	4	0.52%
<b>Unspecified</b>	564	1.72%	22	3.90%
<b>Other Specified</b>	561	1.72%	6	1.06%
<b>Natural/Environmental</b>	320	0.98%	3	0.93%
<b>Not elsewhere classifiable</b>	254	0.77%	3	1.18%
<b>Machinery</b>	174	0.53%	0	0
<b>Fire/Burn</b>	153	0.46%	2	1.30%
<b>Overexertion</b>	135	0.41%	0	0
<b>Pedestrian, Other</b>	120	0.36%	7	5.83%
<b>Suffocation</b>	83	0.25%	16	19.27%
<b>Drowning</b>	39	0.11%	9	23.07%
<b>*Missing/NA/ND</b>	15	0.04%	1	6.66%
<b>Poisoning</b>	8	0.02%	0	0
<b>Total</b>	32,602	100.00%	789	2.42%

Table 2 describes the trauma incidence and fatality proportion by mechanism of injury for 2012 ASTR data. MVT related trauma is the most common mechanism of injury (38.42%), followed by falls (27.62%), struck by/against (9.38%), transport-other (6.58%), cut/pierce (4.92%), and firearm (3.28%).

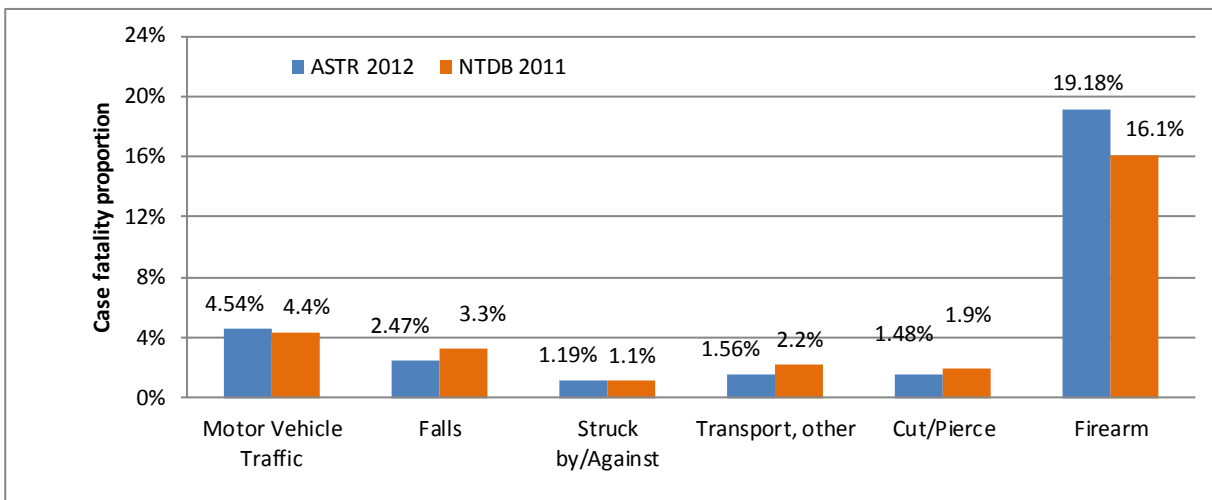
**Figure 7: Top six mechanisms of injury proportion - ASTR\* vs. NTDB**



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

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

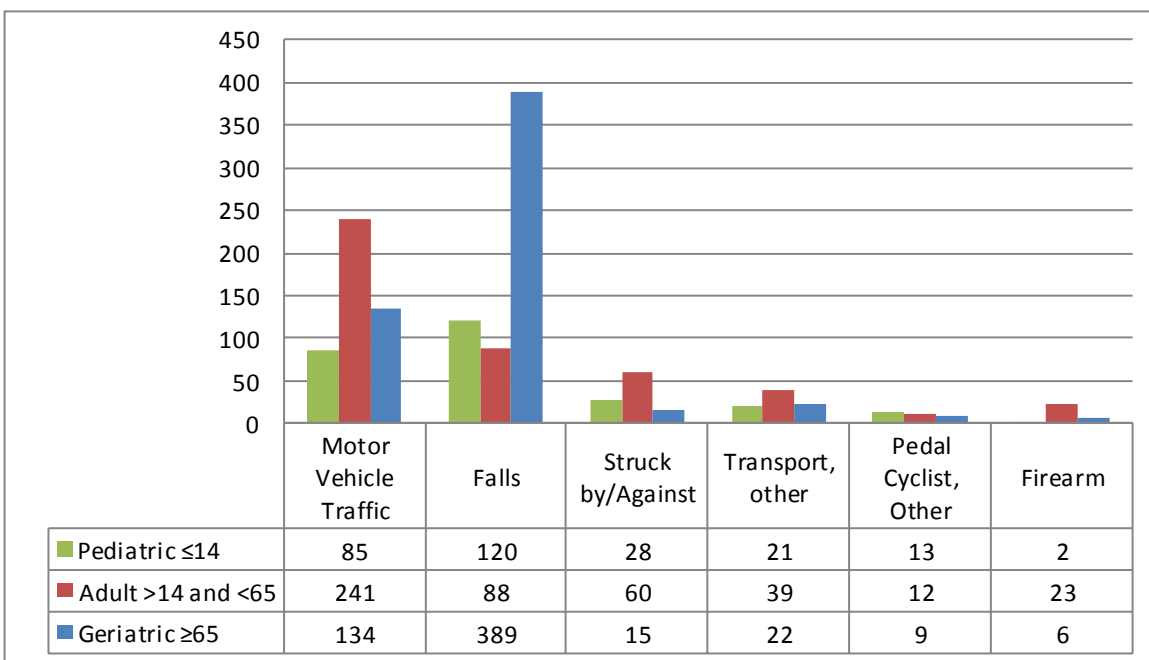
**Figure 8: Top six mechanisms of injury case fatality proportion - ASTR\* vs. NTDB**



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

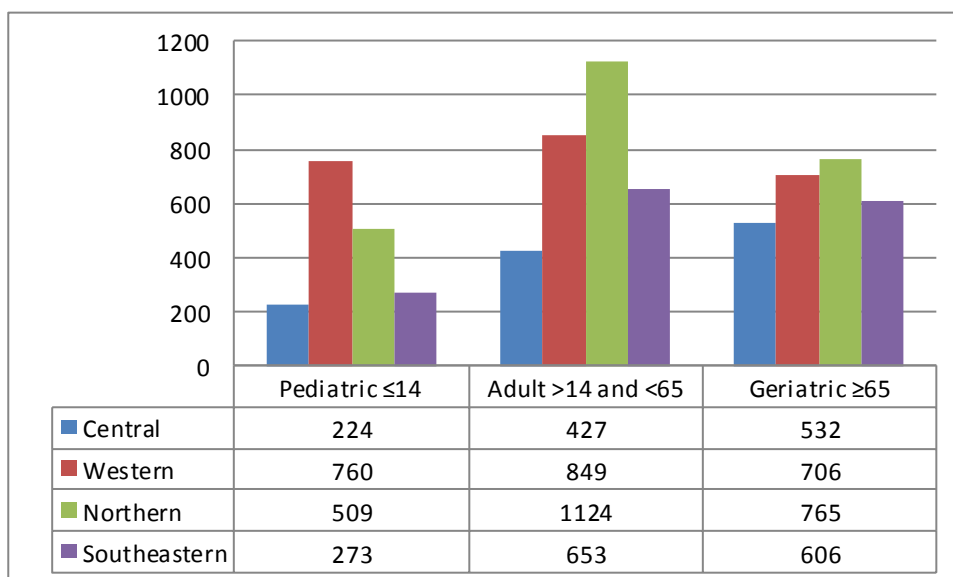
Arizona has a higher case fatality proportion for firearm related traumas as compared to the national firearm fatalities (19.18% vs. 16.1%). (Figure 8). However, firearm injuries account for approximately 4% of traumas in the state.

**Figure 9: Selected mechanisms of injury rate per 100,000 Arizona residents by age category, ASTR 2012**



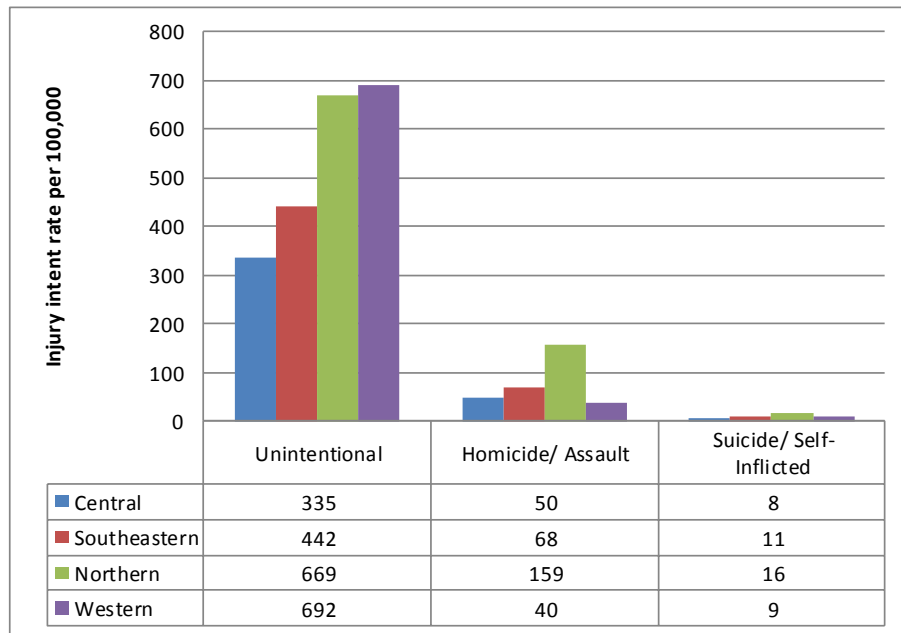
The highest rate of mechanism of injury in both geriatric ( $\geq 65$  years) and pediatric ( $\leq 14$ ) populations are falls, followed by motor vehicle traffic (Figure 9, 10). Pedal cyclist, Other does not appear as one of the top six mechanisms of injury for the overall population (Figure 6), but is one of the top six mechanisms of injury for both the pediatric and geriatric populations.

**Figure 10: Trauma rate per 100,000 Arizona residents by age category and region, ASTR 2012**



# INJURY CHARACTERISTICS: INTENT OF INJURY

**Figure 11: Regional trauma rate by intent per 100,000 Arizona residents: ASTR 2012**



Unintentional injury rates were highest in the western region of the state. Homicide/assault and suicide/self-inflicted injury rates were highest in the northern region.

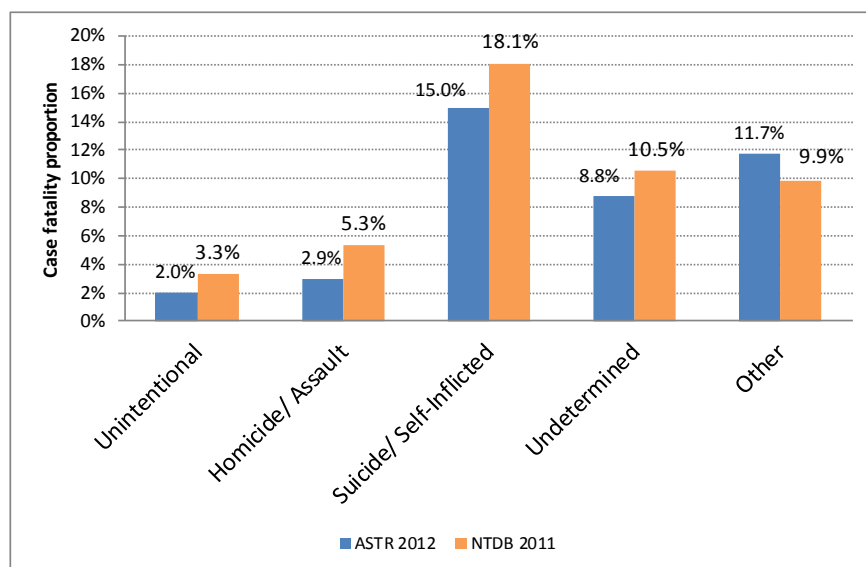
**Table 3: Trauma incidences and case fatality proportion by intent and gender, ASTR 2012**

TRAUMA INCIDENCES AND CASE FATALITY PROPORTION BY INTENT AND GENDER								
Intent	Overall		Deaths		Male		Female	
	Count	Percent	Count	Case Fatality Proportion	Case Count	Percent	Case Count	Percent
Unintentional	27,568	84.55%	548	1.98%	16,461	50.49%	11,106	34.07%
Homicide/Assault	4,115	12.62%	120	2.91%	3,353	10.28%	762	2.34%
Suicide/Self-inflicted	608	1.86%	91	14.96%	462	1.42%	146	0.45%
Undetermined	204	0.62%	18	8.82%	163	0.50%	41	0.13%
Other*	94	0.28%	11	11.70%	89	0.27%	5	0.02%
NA/ND/BL	13	0.03%	1	7.69%	7	0.02%	4	0.01%
<b>Total</b>	<b>32,602</b>	<b>100.00%</b>	<b>789</b>	<b>2.42%</b>	<b>20,535</b>	<b>62.99%</b>	<b>12,064</b>	<b>37.00%</b>

\* Injury intent of “Other” is defined as injury by legal intervention.

Overall, 84.55% of all 2012 trauma records were unintentional injuries, with a case fatality proportion of 1.98%. Suicide/Self-inflicted accounts for 1.86% of overall traumatic injury, but a case fatality proportion of 14.96% (Table 3). Among males, the incidence of Homicide/Assault is almost five times that of females.

**Figure 12: Trauma mortality proportion by intent - ASTR\* vs. NTDB**

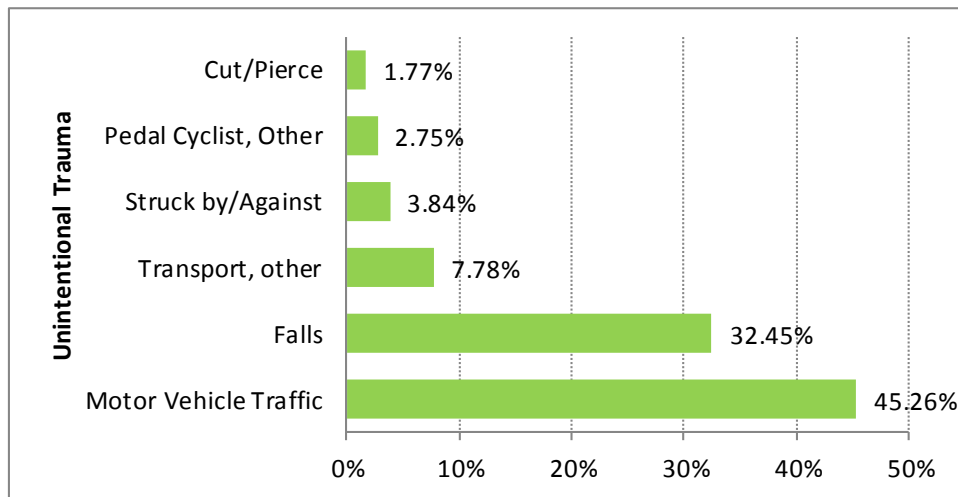


\* For comparison purposes, ASTR inclusion criteria is matched to NTDB inclusion criteria.

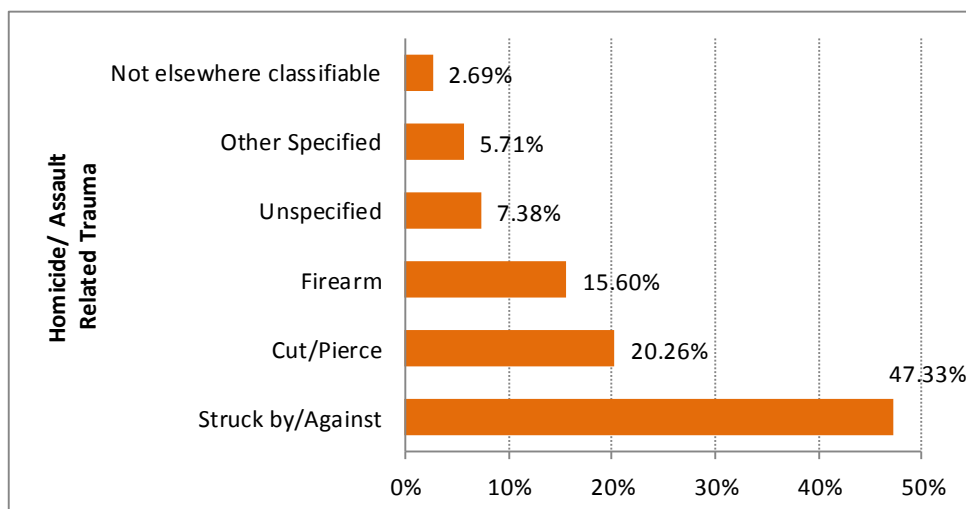


## Top six mechanisms of injury by intent

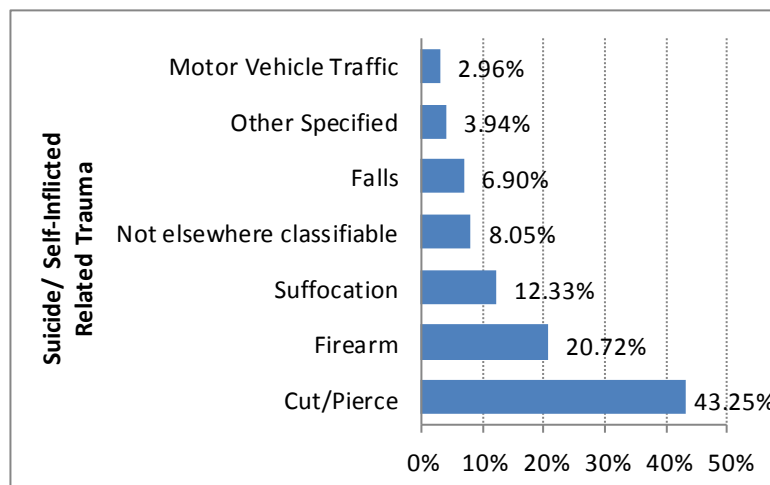
**Figure 13: Unintentional trauma injury proportion, ASTR 2012**



**Figure 14: Homicide/assault related trauma proportion, ASTR 2012**



**Figure 15: Suicide/Self-inflicted trauma proportion, ASTR 2012**



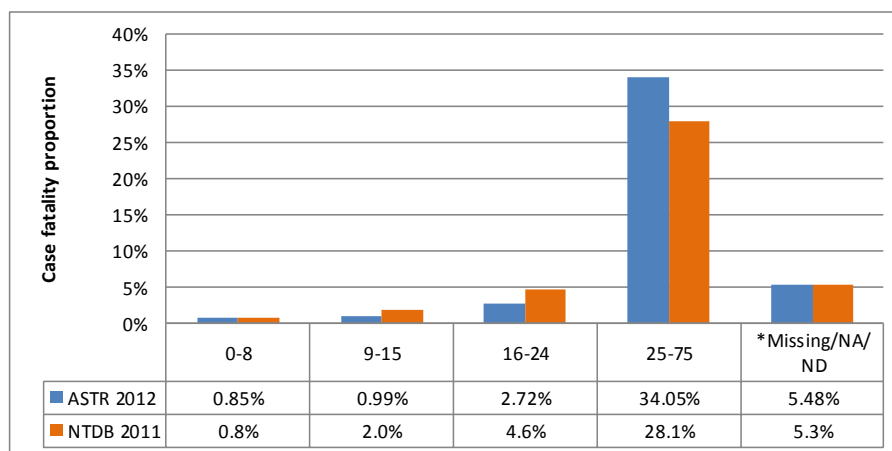
# INJURY CHARACTERISTICS: INJURY SEVERITY

**Table 4: Trauma incidence and case fatality proportion by Injury Severity Score (ISS), ASTR 2012**

INCIDENTS AND CASE FATALITY PROPORTION BY INJURY SEVERITY SCORE				
Injury Severity Score - ICD	Count	Percent	Deaths	Case Fatality Rate
<b>0-8</b>	20,507	62.90%	97	0.47%
<b>9-15</b>	6,817	20.90%	70	1.02%
<b>16-24</b>	2,631	8.07%	76	2.88%
<b>25-75</b>	1,582	4.85%	519	32.80%
<b>*Missing</b>	1,065	3.26%	27	2.53%
<b>Total</b>	32,602	100.00%	789	2.42%

Approximately 5% of trauma patients had an ISS of  $\geq 25$  with a case fatality proportion of 32.8% (Table 4).

**Figure 16: Trauma case fatality proportion by ISS - ASTR\* vs. NTDB**

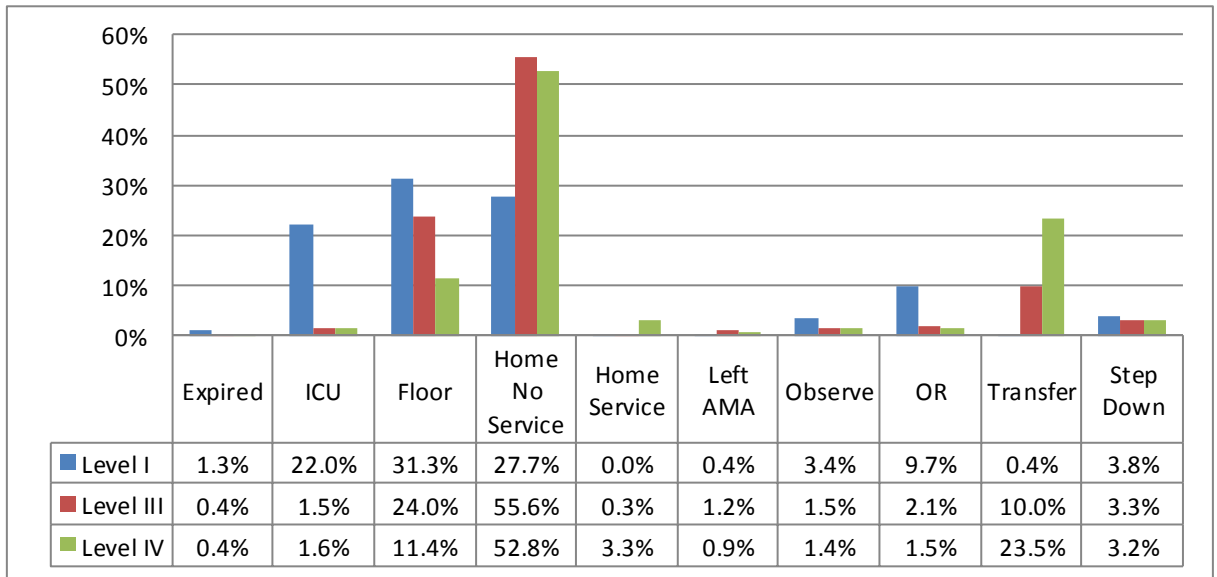


\* For comparison purposes, ASTR inclusion criteria is matched to NTDB inclusion criteria.

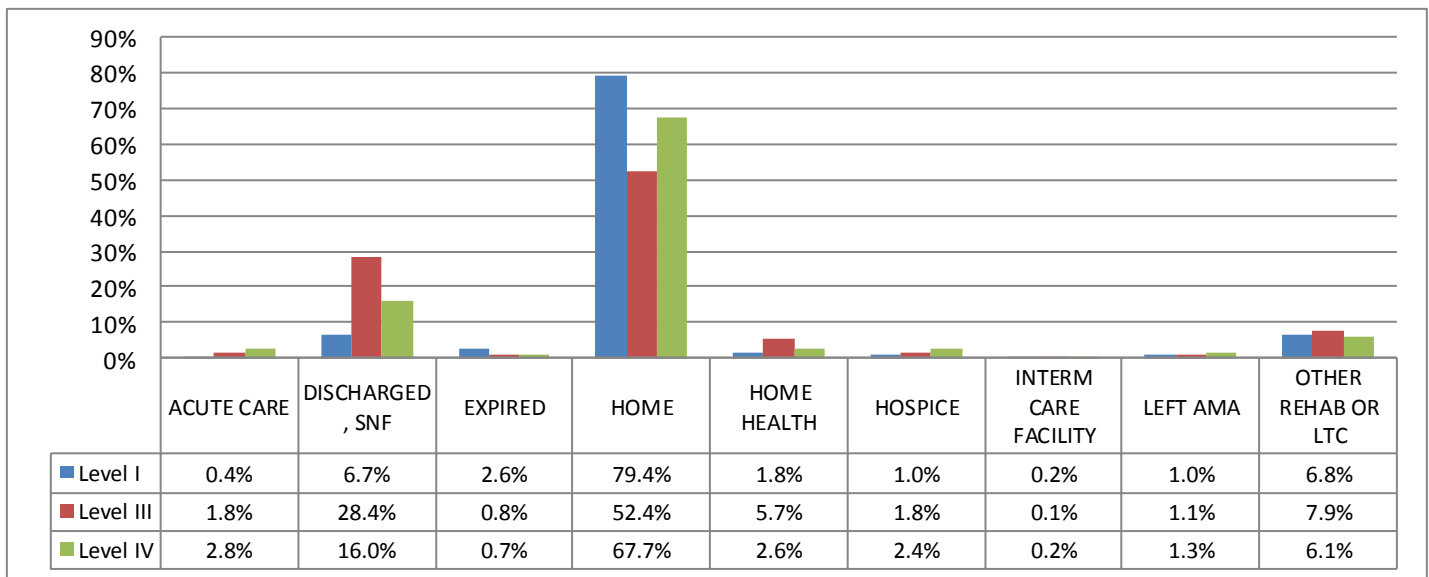
Arizona has a slightly lower case fatality proportion for trauma patients with an ISS 16-24, but a higher proportion for patients with an ISS 25-75 as compared to the national fatality proportion (Figure 16).

# OUTCOMES

**Figure 17: Proportion of ED discharge by disposition, ASTR 2012**

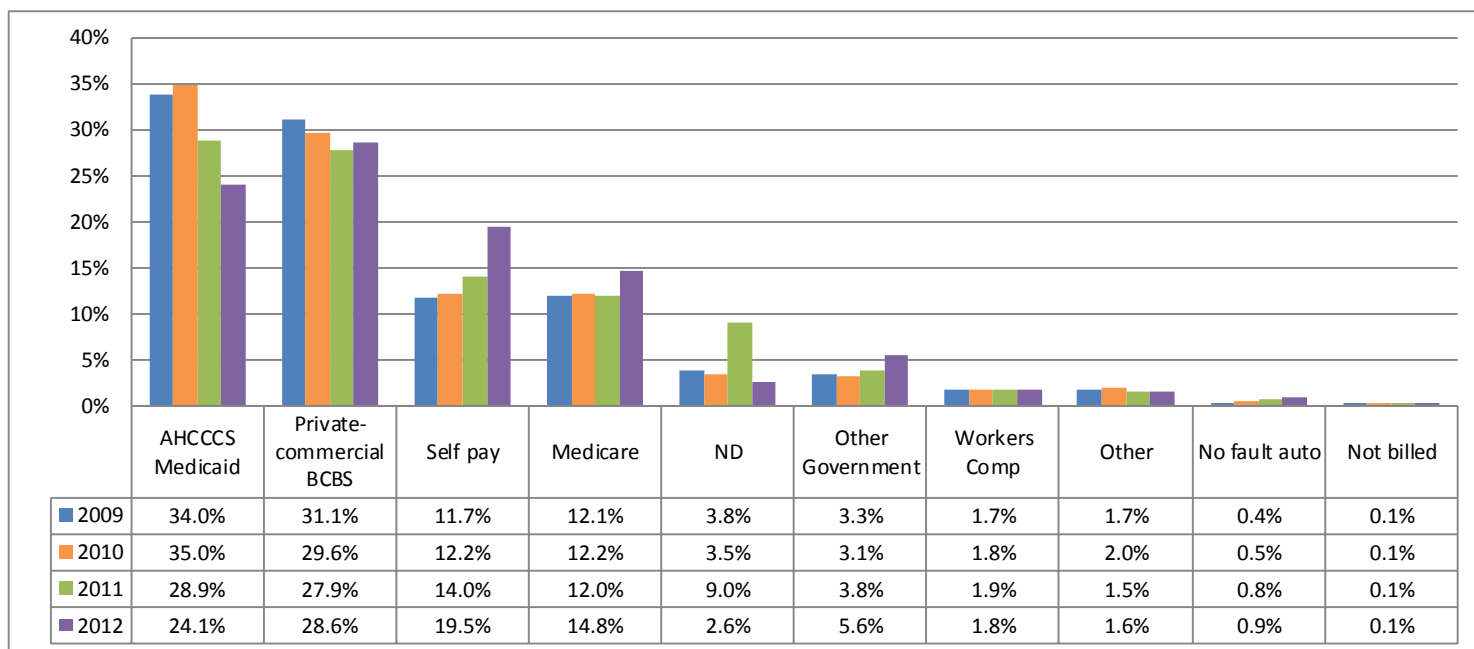


**Figure 18: Proportion of inpatient discharge by disposition, ASTR 2012**



# PRIMARY PAYMENT SOURCE AND TOTAL CHARGES

Figure 19: Primary payment source proportion, ASTR 2009-2012



Since 2009, AHCCS as a primary payment source has decreased while self pay has increased (Figure 19).

Table 5: Primary payor, total charges and reimbursements, ASTR 2012

Primary Payer	Total Charges <sup>a</sup>	Median Charges	Total Reimbursement*
Private-commercial/BCBS	\$411,120,374	\$22,115	\$144,122,955
AHCCCS/Medicaid	\$300,922,416	\$18,761	\$37,860,441
Self pay	\$256,277,712	\$22,242	\$30,481,485
Medicare	\$228,688,525	\$27,806	\$49,243,549
Other Government	\$69,580,978	\$20,355	\$10,478,792
Workers Comp	\$28,930,224	\$25,991	\$11,158,835
Other	\$19,336,550	\$11,946	\$3,594,086
No fault auto	\$7,444,640	\$11,160	\$2,548,674
Not billed	\$170,575	\$225	\$4,947
Not documented	\$3,220,455	\$13,170	\$224,569
<b>Total Charges</b>	<b>\$1,325,692,449</b>	<b>\$21,721</b>	<b>\$289,718,333</b>

\* Total reimbursement represents the amount reported at the time data were finalized.

<sup>a</sup>Total charges is defined as the whole dollar amount for services provided during an episode of care in the hospital.

The median charge to a trauma patient from the hospital was \$21,721. This does not include any pre-hospital charges or rehab charges associated with trauma.

# TOTAL CHARGES BY AGE AND MECHANISM OF INJURY

**Table 6: Age-specific total charges and reimbursements, ASTR 2012**

Age groups	Total Charges	Median Charges	Total Reimbursement
<15	\$98,180,646	\$12,744	\$18,241,720
15-19	\$98,503,290	\$18,526	\$24,015,975
20-44	\$506,773,125	\$22,114	\$105,457,545
45-64	\$365,771,294	\$25,338	\$86,284,549
65+	\$256,464,095	\$27,797	\$55,718,544
<b>Total Charges</b>	<b>\$1,325,692,449</b>	<b>\$21,721</b>	<b>\$289,718,333</b>

**Table 7: Total charges, median charges and reimbursements, by mechanism of injury, ASTR 2012**

Mechanism of Injury	Total Charges	Median Charges	Total Reimbursement
MVT - Occupant	\$374,543,025	\$20,941	\$78,259,861
Falls	\$321,523,463	\$22,422	\$76,045,689
MVT-Motorcyclist	\$131,489,303	\$31,003	\$28,405,019
Other Transport	\$89,709,532	\$22,877	\$23,296,752
Struck by/Against	\$80,833,519	\$16,964	\$15,991,415
MVT-Pedestrian	\$73,048,833	\$31,677	\$14,492,963
Firearm	\$67,129,113	\$25,397	\$12,885,779
Cut/Pierce	\$51,506,672	\$21,640	\$9,048,135
Not Specified	\$24,306,672	\$22,128	\$5,009,287
MVT-Pedal Cyclist	\$23,925,910	\$23,667	\$4,335,617
Other Pedal Cyclist	\$22,406,810	\$20,389	\$6,004,550
Other Specified	\$18,214,930	\$14,705	\$3,442,116
Natural/Environmental	\$8,490,967	\$18,016	\$2,035,005
MVT-Other	\$8,143,467	\$21,810	\$2,402,734
Not elsewhere classifiable	\$7,395,116	\$16,424	\$874,930
Other Pedestrian	\$5,542,266	\$25,691	\$1,323,672
Machinery	\$5,247,564	\$25,135	\$2,171,865
Fire/Burn	\$5,161,650	\$7,108	\$2,317,647
Suffocation	\$3,212,288	\$20,194	\$494,530
Overexertion	\$2,081,728	\$5,115	\$571,669
Drowning	\$1,263,657	\$14,546	\$194,382
Poisoning	\$171,881	\$19,312	\$37,549
*Missing	\$344,085	\$15,102	\$77,166
<b>Total</b>	<b>\$1,325,692,449</b>	<b>\$21,721</b>	<b>\$289,718,333</b>

Table 7 describes total hospital charges, median charges, and total reimbursements by mechanism of injury.

# DRUG AND ALCOHOL USE AND TRAUMA

The pediatric ( $\leq 14$  years) population was excluded from the drug and alcohol analysis. Of the 28,343 adult patients, 22% of patients (6,251) were positive for alcohol (confirmed, suspected, or reported use), and 15% of patients (4,137) were positive for drugs (confirmed or suspected legal or illegal use). Only 1.62% of the patients tested positive for legal drug use.

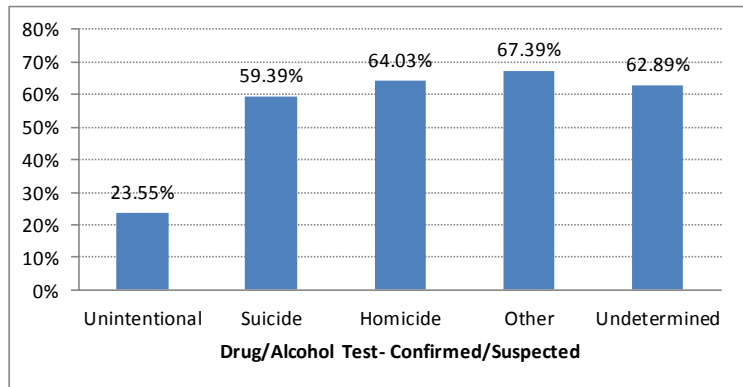
In 2012, 30.3% of trauma patients tested positive for either drug or alcohol use (Table 8).

**Table 8: Intent of injury and drug and alcohol use, ASTR 2012**

INTENT OF INJURY AND DRUG ALCOHOL USE (Age >14 YEARS)				
Injury Intent	Count	Percent	Drug/ Alcohol Use*	Drug/ Alcohol %
<b>Unintentional</b>	23,520	82.98%	5,541	23.55%
<b>Suicide/ Self-Inflicted</b>	596	2.10%	354	59.39%
<b>Homicide/ Assault</b>	3,965	13.99%	2,539	64.03%
<b>Other</b>	92	0.32%	62	67.39%
<b>Undetermined</b>	159	0.56%	100	62.89%
<b>Missing</b>	11	0.04%	0	0.00%
<b>Total (Age&gt;14 Years)</b>	28,343	100.00%	8,596	30.32%

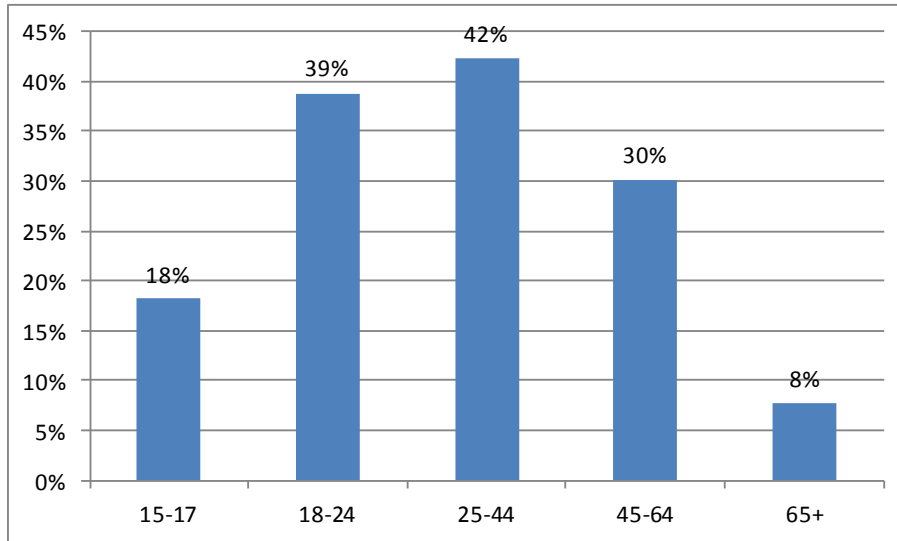
\* Drug and/or alcohol use.

**Figure 20: Drug and alcohol use by intent, ASTR 2012**



For all intents of injury except unintentional, more than half tested positive or were suspected positive for drugs or alcohol (Figure 20).

**Figure 21: Drug and/or alcohol use by age, ASTR 2012**



Trauma patients were found to have drugs and/or alcohol in their system 30% of the time (Table 8). Figure 21 shows the distribution of those by age groups. In 15-17 year olds, 18% of the trauma cases had drugs and/or alcohol in their system.

**Figure 22: Drug and/or alcohol use by race/ethnicity, ASTR 2012**

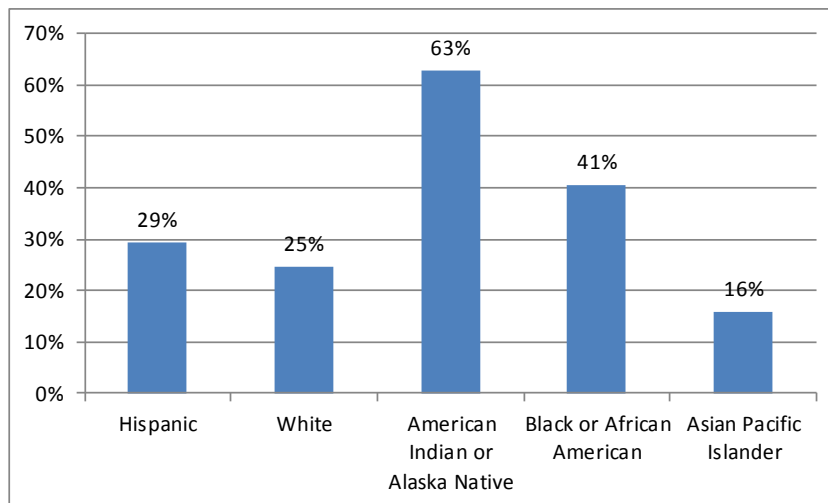
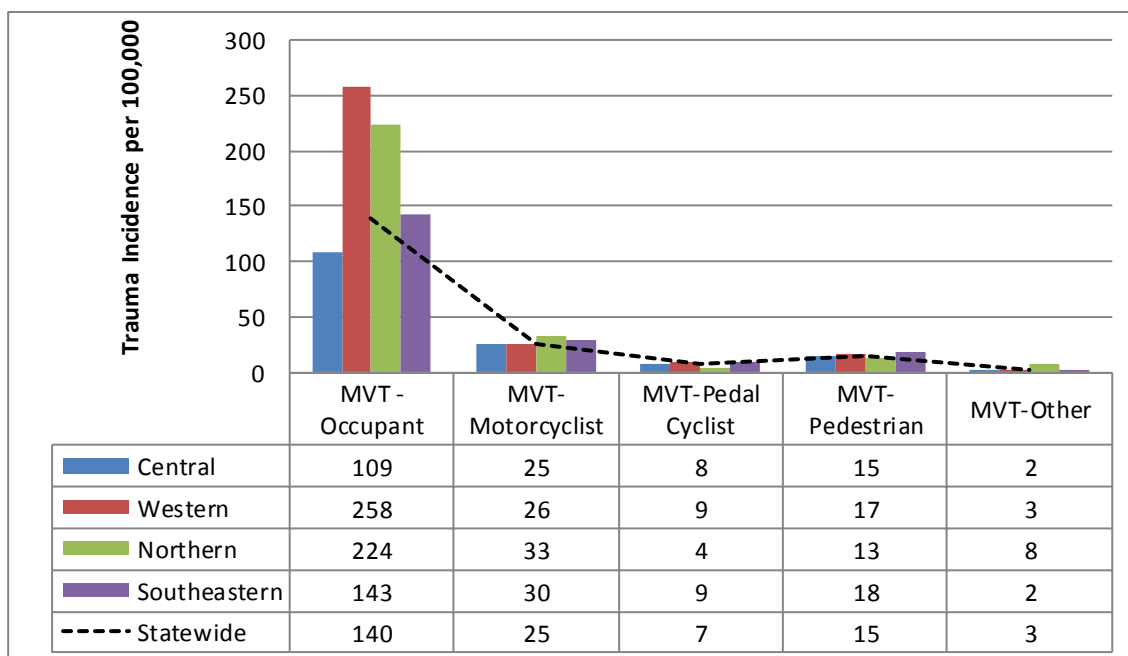


Figure 22 shows that 63% (1,909) of American Indian/Alaska Native trauma patients were under the influence of drugs and/or alcohol. However, the largest number of trauma patients under the influence of drugs and/or alcohol were White (4,025) and who more cases than any other race/ethnic group.

# MOTOR VEHICLE TRAFFIC RELATED TRAUMA

Figure 23: Motor vehicle traffic related trauma rate per 100,000 by region, ASTR 2012



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 23).

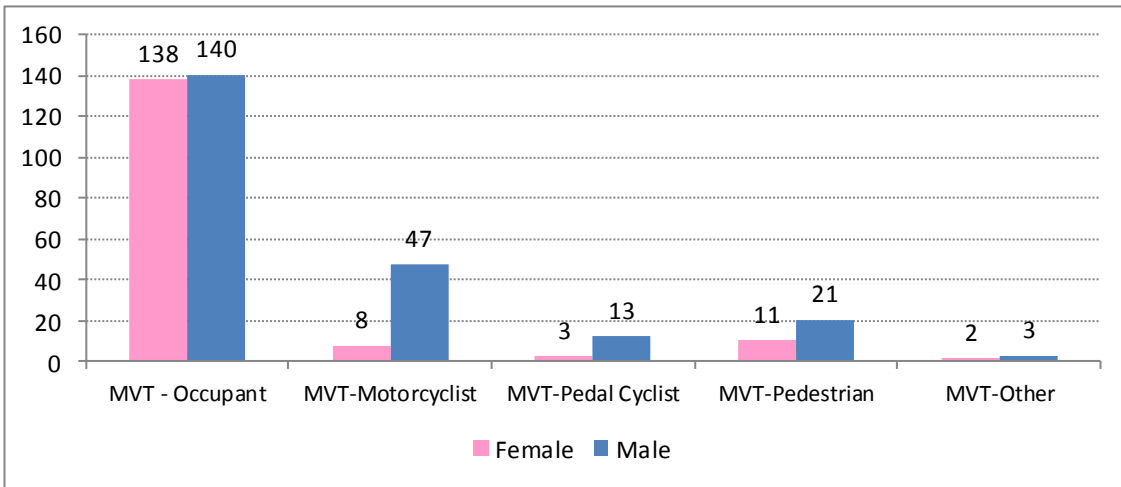
Table 9: Motor vehicle traffic related trauma incidence and case fatality proportion, ASTR 2012

INCIDENCE AND CASE FATALITY PROPORTION BY TYPES OF MVT				
Motor Vehicle Traffic Accidents	Count	Percent	Deaths	Case Fatality proportion
MVT - Occupant	9,031	72.09%	150	1.66%
MVT-Motorcyclist	1,794	14.32%	76	4.23%
MVT-Pedal Cyclist	509	4.06%	9	1.76%
MVT-Pedestrian	1,017	8.11%	73	7.17%
MVT-Other	175	1.39%	8	4.57%
<b>Total</b>	<b>12,526</b>	<b>100.00%</b>	<b>316</b>	<b>2.52%</b>

Table 9 describes the types of MVT related trauma and case fatality proportion. Of the 32,602 trauma cases, 38.4% (12,526) were motor vehicle traffic related trauma. The highest case fatality proportion is among pedestrians involved in MVT related trauma (7.17%).

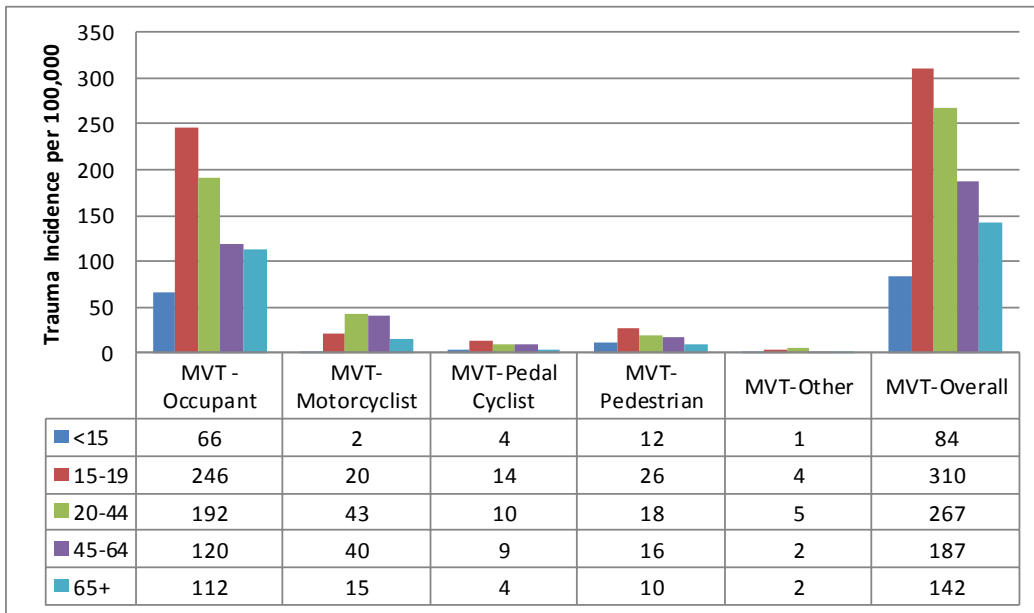


**Figure 24: Motor vehicle traffic related trauma rates per 100,000 Arizona residents by gender, ASTR 2012**



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 24).

**Figure 25: Motor vehicle traffic related trauma rates per 100,000 Arizona residents by age, ASTR 2012**



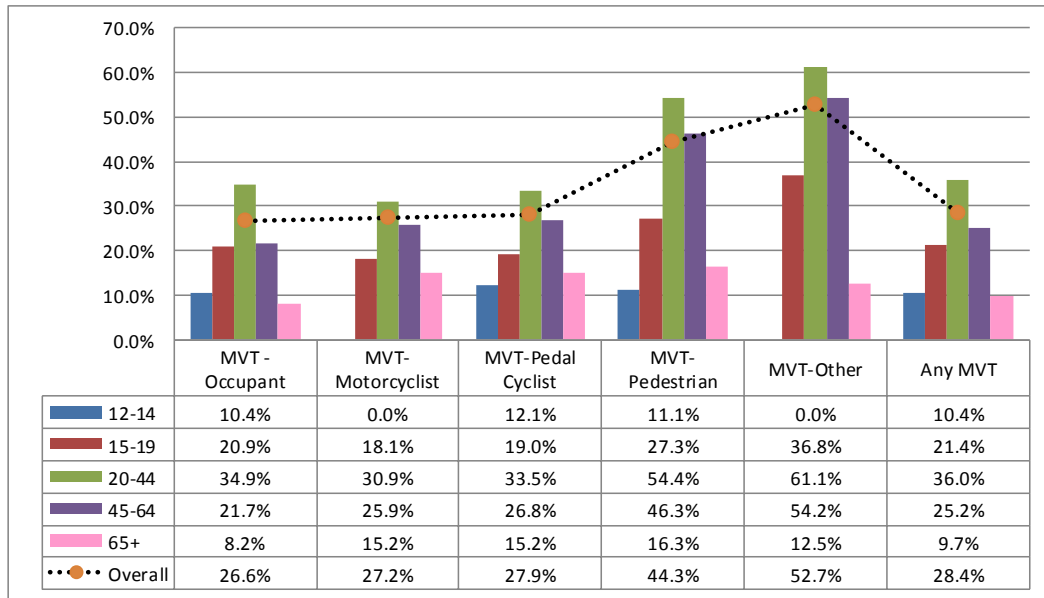
Although 20-44 year olds have the highest MVT related trauma incidence, 15-19 year olds have the highest MVT-occupant, pedal cyclist, and pedestrian related trauma rates per 100,000 (Figure 25).

**Table 10: Alcohol/drug use by types of motor vehicle traffic accidents, ASTR 2012**

ALCOHOL/DRUG USE BY TYPES OF MOTOR VEHICLE TRAFFIC INJURIES, ASTR 2012												
Age groups	MVT - Occupant		MVT-Motorcyclist		MVT-Pedal Cyclist		MVT-Pedestrian		MVT-Other		Any MVT	
	N	%	N	%	N	%	N	%	N	%	N	%
12-14	19	10.4%	0	0	4	12.1%	5	11.1%	0	0	28	10.4%
15-19	239	20.9%	17	18.1%	12	19.0%	33	27.3%	7	36.8%	308	21.4%
20-44	1,429	34.9%	281	30.9%	69	33.5%	215	54.4%	66	61.1%	2,060	36.0%
45-64	409	21.7%	164	25.9%	40	26.8%	118	46.3%	13	54.2%	744	25.2%
65+	82	8.2%	20	15.2%	5	15.2%	14	16.3%	2	12.5%	123	9.7%
Overall	2,178	26.2%	482	27.1%	130	26.9%	385	42.7%	88	52.4%	3,263	28.0%

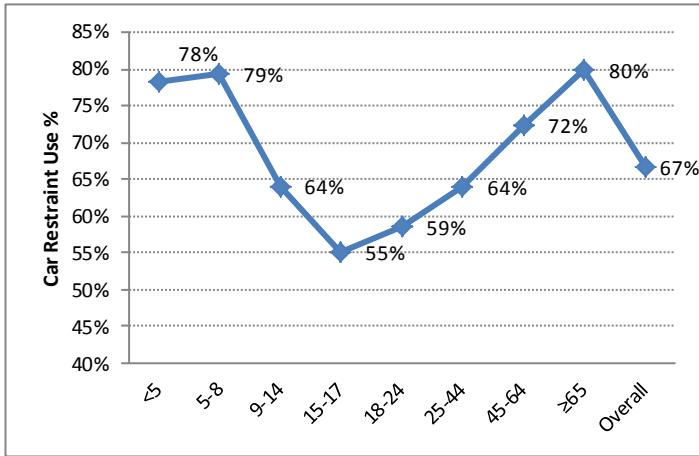
For all MVT related traumas, 21-44 year olds have the highest proportion of alcohol/drug use compared to any other age group. Overall, one in every four MVT-occupants or MVT-motorcyclists involved in an accident had an alcohol/drug use confirmed or suspected ( Table 10 and Figure 26).

**Figure 26: Alcohol/drug use by types of motor vehicle traffic accidents, ASTR 2012**



# PROTECTIVE DEVICE USE

**Figure 27: Age-specific proportion of car restraint use, ASTR 2012**

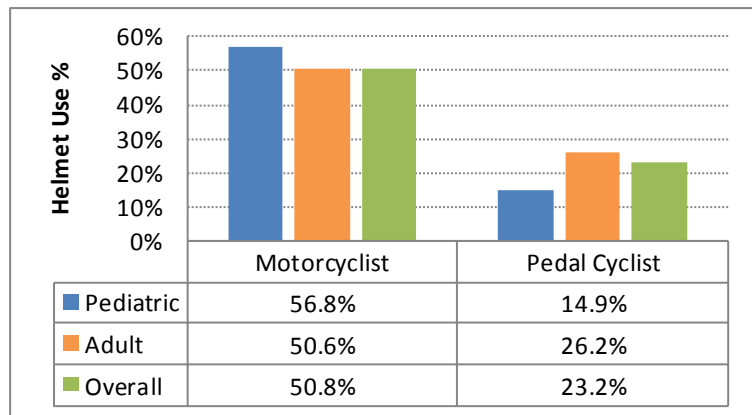


Of the 9,031 MVT injured occupants, 67% used a car seat or seat belt (restraint). Motor vehicle occupants ages 15-17 were least likely to use a restraint. The most frequent restraint use was found in adults ≥65 (Figure 27).

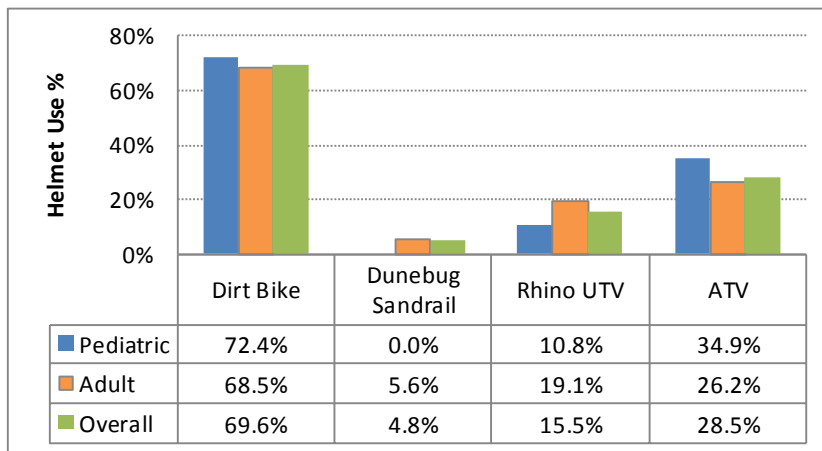
**Figure 28: Proportion of helmet use for motorcyclist and pedal cyclist for adult vs. pediatric, ASTR 2012**

Of the 1,794 MVT motorcyclists who suffered a trauma, 50% used a helmet. Of the 1,268 traffic and non-traffic pedal cycle trauma, less than a quarter used a helmet.

Of the 335 pediatric (<18 years) pedal cyclists involved in a trauma, only 14.9% used a helmet (Figure 28).



**Figure 29: Rate of helmet use for select off road vehicles for adult vs. pediatric, ASTR 2012**



Out of the 207 Dirt Bike injuries, there were 58 cases involving pediatrics (<18 years). Of the 21 Dunebuggy/Sandrail injuries, 3 were involved pediatrics. The 84 Rhino/UTV injuries had 37 cases of pediatrics. Lastly, 189 of the 720 ATV trauma injuries involved pediatrics.

Only 28.5% of patients injured on an ATV were wearing a helmet, whereas 69.6% of injured dirt bike riders were wearing a helmet (Figure 29).

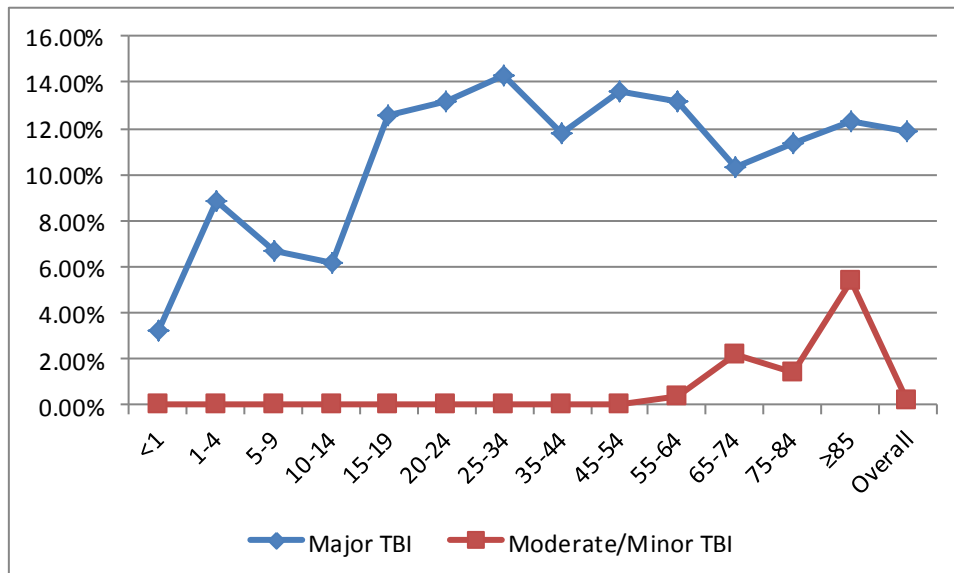
# TRAUMATIC BRAIN INJURY (TBI)

**Table 11: Age-specific TBI incidence and case fatality proportion, ASTR 2012**

TBI INCIDENCES AND CASE FATALITY PROPORTION BY AGE								
	Major TBI				Minor/Moderate TBI			
	Count	Percent	Deaths	Case Fatality Proportion	Count	Percent	Deaths	Case Fatality Proportion
<1	122	3.32%	4	3.27%	51	1.59%	0	0
1-4	124	3.37%	11	8.87%	148	4.63%	0	0
5-9	75	2.04%	5	6.66%	109	3.41%	0	0
10-14	81	2.20%	5	6.17%	200	6.25%	0	0
15-19	239	6.51%	30	12.55%	410	12.82%	0	0
20-24	319	8.69%	42	13.16%	440	13.76%	0	0
25-34	419	11.41%	60	14.31%	564	17.64%	0	0
35-44	338	9.20%	40	11.83%	402	12.57%	0	0
45-54	425	11.58%	58	13.64%	362	11.32%	0	0
55-64	440	11.98%	58	13.18%	265	8.29%	1	0.37%
65-74	397	10.81%	41	10.32%	138	4.31%	3	2.17%
75-84	424	11.55%	48	11.32%	70	2.19%	1	1.42%
≥85	267	7.27%	33	12.35%	37	1.15%	2	5.40%
<b>Overall</b>	<b>3,670</b>	<b>100.00%</b>	<b>435</b>	<b>11.85%</b>	<b>3,196</b>	<b>100.00%</b>	<b>7</b>	<b>0.21%</b>

Major TBI is equivalent to Type I of the Barell Matrix or AIS code with head severity  $\geq 3$ . Moderate and Minor TBI are equivalent to Type II and Type III of the Barell Matrix respectively. A total of 3,670 Major TBI cases, and 3,196 Minor/Moderate TBI cases were treated in an ASTR reporting hospital in 2012. The case fatality proportion among Major TBI cases is 11.8% (Table 11). The highest case fatality proportion was among 25-34 years for the Major TBI (14.3%), followed by the 45-54 years group (13.6%) (Figure 30).

**Figure 30: TBI case fatality proportion by age**



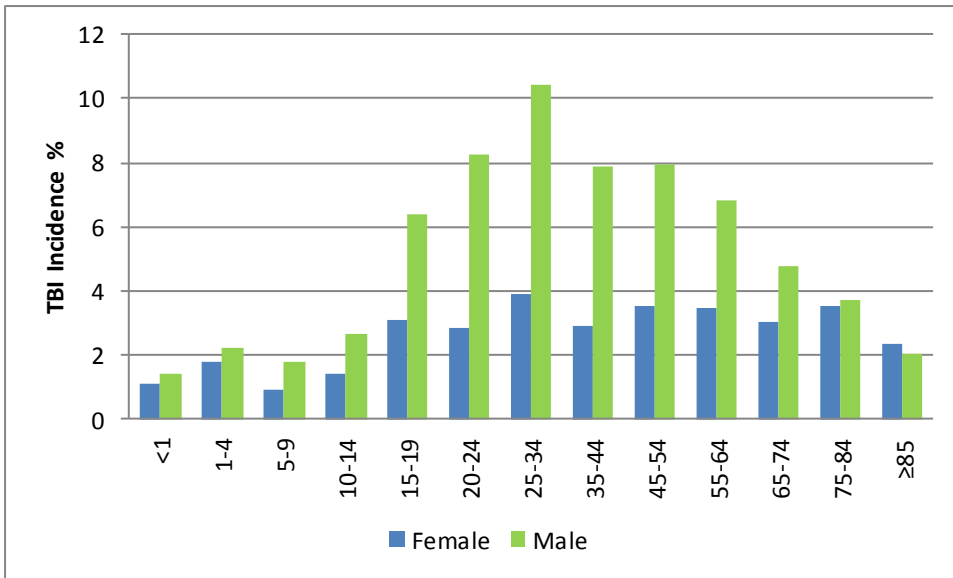
**Table 12: Age-specific TBI incidence and case fatality proportion by ED GCS score, ASTR 2012**

TBI INCIDENCES AND CASE FATALITY PROPORTION BY GCS												
Age	GCS <9				GCS 9-12				GCS 13-15			
	Count	Percent	Deaths	CFP	Count	Percent	Deaths	CFP	Count	Percent	Deaths	CFP
<1	7	0.75%	3	42.85%	4	1.16%	0	0	160	2.87%	1	0.62%
1-4	22	2.35%	11	50.00%	22	6.41%	0	0	226	4.05%	0	0
5-9	23	2.46%	5	21.73%	5	1.45%	0	0	155	2.78%	0	0
10-14	24	2.57%	5	20.83%	8	2.33%	0	0	249	4.46%	0	0
15-19	77	8.25%	28	36.36%	28	8.16%	1	3.57%	544	9.76%	1	0.18%
20-24	129	13.82%	38	29.45%	45	13.11%	3	6.66%	585	10.49%	1	0.17%
25-34	162	17.36%	57	35.18%	44	12.82%	1	2.27%	776	13.92%	2	0.25%
35-44	118	12.64%	38	32.20%	37	10.78%	1	2.70%	583	10.46%	1	0.17%
45-54	123	13.18%	49	39.83%	51	14.86%	6	11.76%	612	10.98%	2	0.32%
55-64	107	11.46%	50	46.72%	31	9.03%	0	0	563	10.10%	8	1.42%
65-74	70	7.50%	30	42.85%	24	6.99%	4	16.66%	440	7.89%	10	2.27%
75-84	45	4.82%	24	53.33%	23	6.70%	7	30.43%	425	7.62%	18	4.23%
≥85	26	2.78%	18	69.23%	21	6.12%	4	19.04%	255	4.57%	12	4.70%
<b>Overall</b>	933	100.00%	356	38.15%	343	100.00%	27	7.87%	5,573	100.00%	56	1.00%

CFP=Case Fatality Proportion

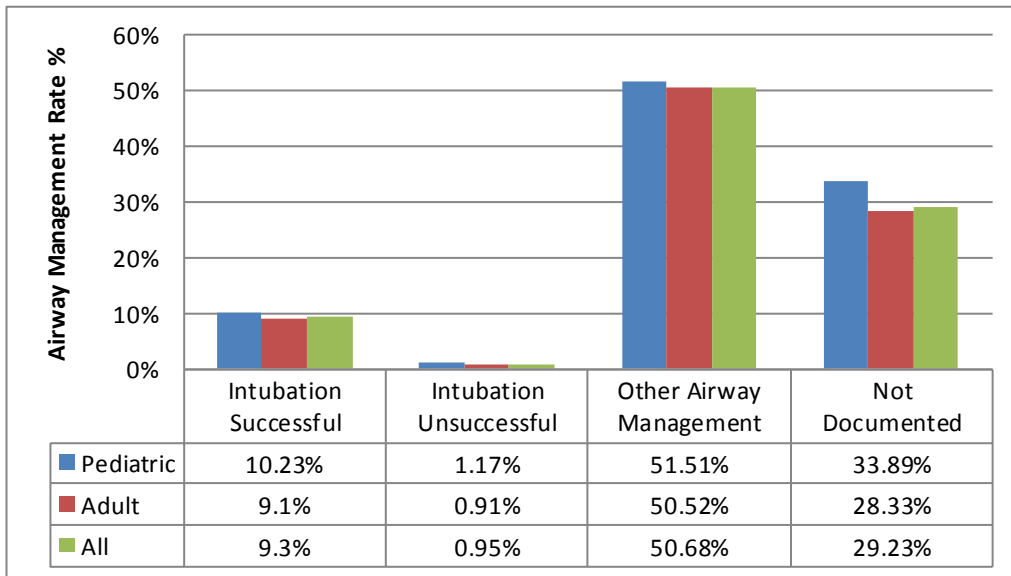
Table 12 shows distribution of TBI incidence and case fatality proportion by ED GCS score and age. Overall mortality for the GCS<9 group was 38.1% and within this group, patients ≥85 year-old had the highest case fatality proportion.

**Figure 31: TBI incidence by age and gender, ASTR 2012**



Males are more likely than females to sustain a TBI in any age group except in the geriatric population where the ratio of male to female TBI cases is similar (Figure 31).

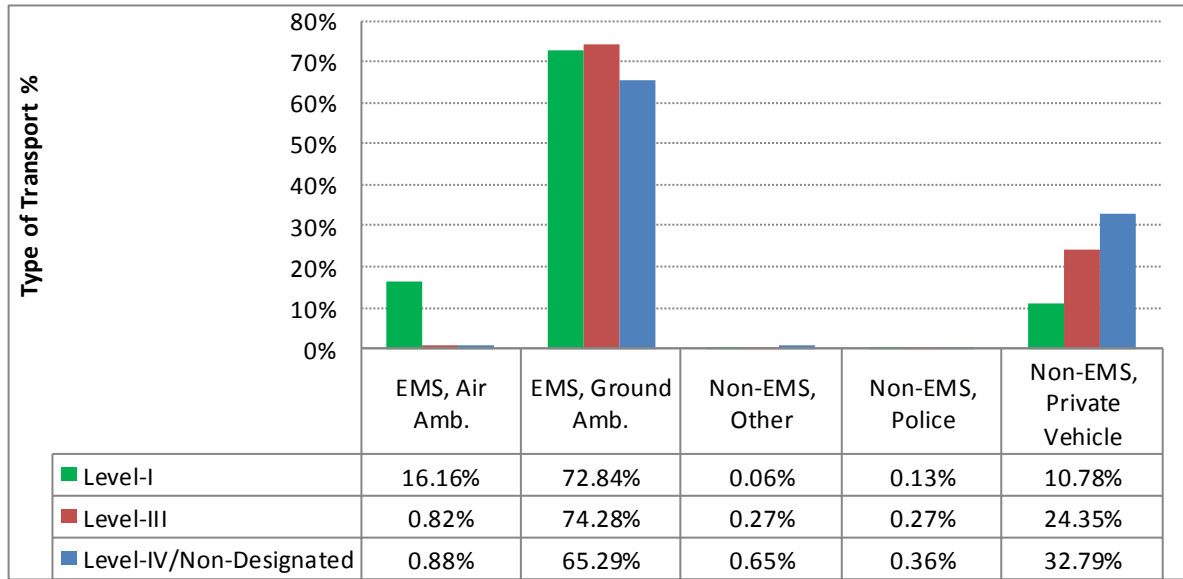
**Figure 32: Field airway management among major TBI patients, ASTR 2012**



Of the 596 pediatric (< 18 years) major TBI cases, 10% (61) received successful intubation. Overall 9% of the major TBI cases received successful intubation, 51% received other types of airway management (ex: auto-ventilator, bag valve mask , etc.), and in 29% of the cases, airway management was not documented (Figure 32).

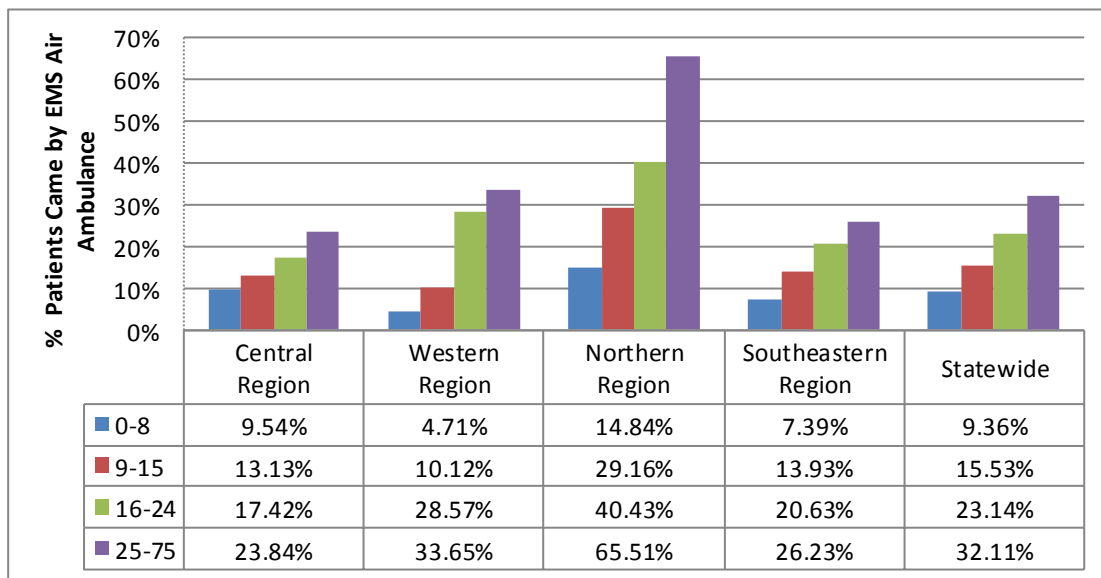
# TYPE OF TRANSPORT

**Figure 33: Mode of transport into reporting hospital, ASTR 2012**



EMS ground ambulances were the most common mode of transport into any trauma center. However, EMS air ambulances 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 III, Level IV, or non-designated hospital (Figure 33).

**Figure 34: Patients arriving at hospital via EMS air ambulance by region and ISS, ASTR 2012**



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 proportion of arrival by EMS air ambulance for all ISS categories as compared to any other region (Figure 34).

# GOLDEN HOUR

The golden hour report examines if a patient arrives at a designated trauma center within one hour of the 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 30% (7,158) of patients transported to any trauma center and were also excluded from the analysis.

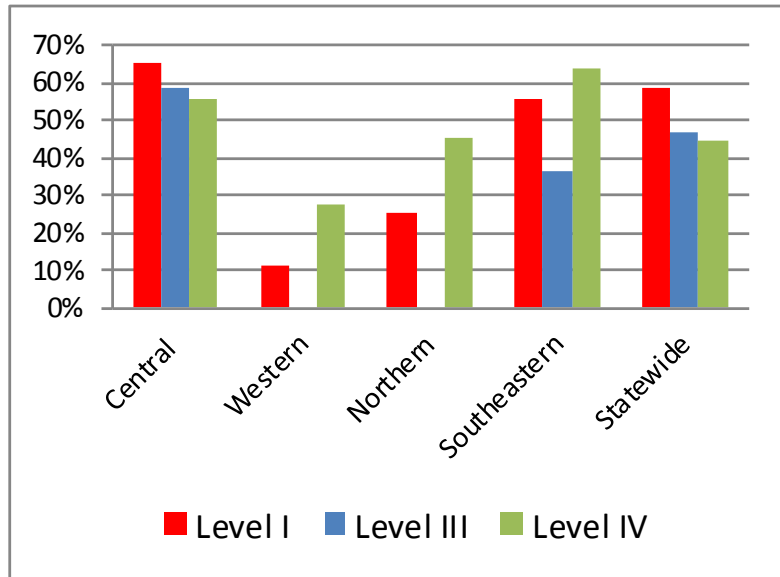
**Table 13: Proportion of patients arriving within the Golden Hour by region , ASTR 2012**

PATIENTS ARRIVING AT A TRAUMA CENTER WITHIN GOLDEN HOUR					
Golden Hour					
<=1 Hour					
Region	Total Patients Analyzed	≤ 1 Hour		Patients excluded due to missing data	
	N	N	%	N	%
Central	9,116	5,863	64.31%	5,362	37.03%
Western	770	205	26.62%	329	29.93%
Northern	2,218	775	34.94%	1,021	31.52%
Southeastern	4,974	2,635	52.97%	446	8.22%
Statewide	17,078	9,478	55.49%	7,158	29.53%
Median Golden Hour					
	Total Patients	25th Percentile	Median Hours	75th Percentile	
Central	9,116	0.6	0.9	1.2	
Western	770	1	1.5	2.4	
Northern	2,218	0.8	1.4	2.2	
Southeastern	4,974	0.7	1	1.4	
Statewide	17,078	0.7	0.9	1.5	

Of the 17,078 analyzed patients who arrived at a designated trauma center, 55.49% arrived within the Golden Hour. More patients (64.3%) injured in the central region arrived 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).



**Figure 35: Proportion of patients arriving within the golden hour by level of designation, ASTR 2012**



The benefit of Level IV designation is reflected in Figure 35 where a regional analysis for Golden Hour is shown. There are more patients reaching a Level IV trauma center within the Golden Hour in the western, northern, and southeastern regions as compared to a Level I trauma center.

**Table 14: Proportion of patients arriving within the golden hour by level of designation, ASTR 2012**

PATIENTS ARRIVING AT A TRAUMA CENTER WITHIN GOLDEN HOUR BY DESIGNATION LEVEL							
Golden Hour							
<=1 Hour							
Region	Total Patients	Level I		Level III		Level IV	
	N	N	%	N	%		
Central	9,116	5,194	65.3%	464	58.4%	205	55.7%
Western	770	4	11.1%	0	0.0%	201	27.4%
Northern	2,218	296	25.4%	0	0.0%	479	45.5%
Southeastern	4,974	2,034	55.7%	321	36.4%	280	63.8%
Statewide	17,078	7,528	58.8%	785	46.8%	1,165	44.9%

**Table 15: Golden hour by county of injury, ASTR 2012**

<b>GOLDEN HOUR BY COUNTY OF INJURY</b>					
<b>County of Injury</b>	<b>Total Patients Analyzed</b>	<b>&lt;= 1 Hour</b>		<b>Patients excluded due to missing data</b>	
		<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>Maricopa</b>	7,917	5,580	70.48%	4,780	37.64%
<b>Pima</b>	4,148	2,331	56.19%	188	4.33%
<b>Cochise</b>	650	296	45.53%	237	26.71%
<b>Coconino</b>	989	387	39.13%	740	42.79%
<b>Apache</b>	307	108	35.17%	126	29.09%
<b>La Paz</b>	84	29	34.52%	42	33.33%
<b>Navajo</b>	428	141	32.94%	68	13.70%
<b>Pinal</b>	923	281	30.44%	531	36.51%
<b>Yuma</b>	7	2	28.57%	14	66.66%
<b>Yavapai</b>	494	139	28.13%	87	14.97%
<b>Mohave</b>	679	174	25.62%	273	28.67%
<b>Santa cruz</b>	100	8	8.00%	10	9.09%
<b>Gila</b>	276	2	0.72%	51	15.59%
<b>Graham</b>	50	0	0	8	13.79%
<b>Greenlee</b>	26	0	0	3	10.34%
<b>Statewide</b>	17,078	9,478	55.49%	7,158	29.53%

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.

# ACCESS TO REHAB/LTC

Of the 19,011 patients admitted to the hospital following a traumatic injury, 7% were discharged to rehabilitation centers or Long Term Care facilities (LTC). Table 16 shows the access to Rehab/LTC by primary payor and Table 17 shows the same by injury region. The self-pay patients and the Central region had the lowest percent of patients discharged to Rehab/LTC.

**Table 16: Access to Rehab/LTC by Primary Payor, ASTR 2012**

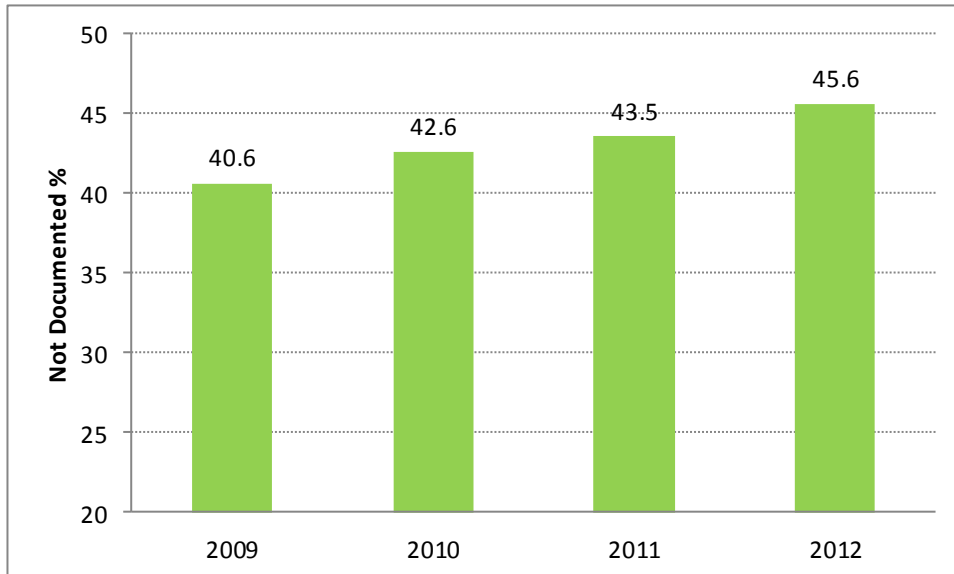
ACCESS TO REHAB/LTC				
Primary Payor	Total Patients Admitted		Discharged to Rehab/LTC	
	N	%	N	%
Self pay	3,494	18.37%	72	2.06%
AHCCCS	5,311	27.93%	233	4.38%
Private	5,880	30.92%	500	8.50%
Medicare	3,592	18.89%	503	14.00%
Other	496	2.60%	9	3.89%
Missing	238	1.24%	33	6.65%
<b>Total Admitted</b>	<b>19,011</b>	<b>100%</b>	<b>1350</b>	<b>7.10%</b>

**Table 17: Access to Rehab/LTC by Injury Region, ASTR 2012**

ACCESS TO REHAB/LTC				
Injury Region	Total Patients		Discharged to	
	N	%	N	%
Central Region	12,353	64.97%	703	5.69%
Western Region	899	4.72%	108	12.01%
Northern Region	2,208	11.61%	182	8.24%
Southeastern Region	2,833	14.90%	313	11.04%
Missing Region	718	3.77%	44	6.12%
<b>Total Admitted</b>	<b>19,011</b>	<b>100%</b>	<b>1350</b>	<b>7.10%</b>

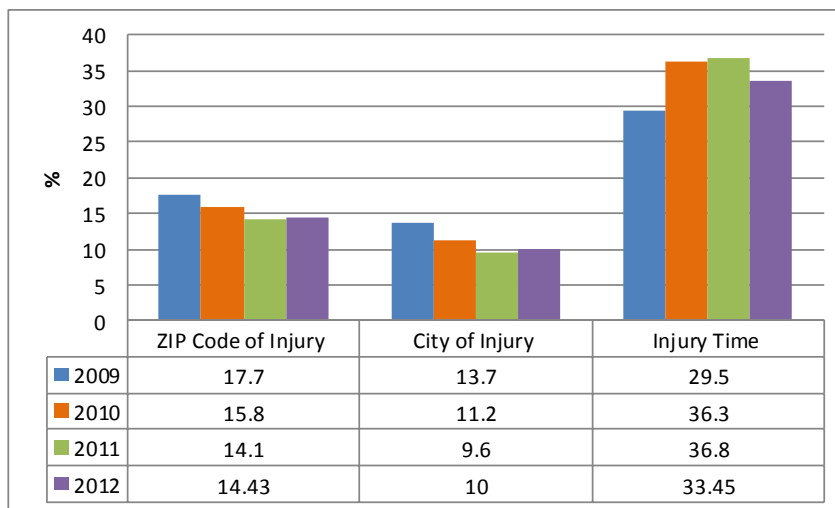
# DATA QUALITY

**Figure 36: Field airway management not documented among severely injured trauma patients, ASTR 2009-2012**



Although data completeness continues to improve each year, obtaining pre-hospital data is still a struggle. A large percent (45.5%) of field airway management data was not documented for severe trauma patients in 2012 (GCS <9 and ISS >15). Field airway management completeness has been consistent through the years (Figure 36). Over the years, the injury time field has been consistently missing which impacts vital measurements like Golden Hour (Figure 37).

**Figure 37: Percent not documented for select injury data elements, ASTR 2009-2012**



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.