



State Trauma Advisory Board 2014 Annual Report



**Arizona Department of Health Services
Will Humble, Director**

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Bureau of Emergency Medical Services & Trauma System
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State Trauma Advisory Board 2014 Annual 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
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Flagstaff Medical Center - Flagstaff, AZ

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Prescott Valley, AZ 86314

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Department of Public Safety - Phoenix, AZ

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

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Phoenix Indian Medical Center - Phoenix, AZ

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Phoenix Children's Hospital - Phoenix, AZ

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St. Joseph's Hospital and Medical Center - Phoenix, AZ

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National Organization of Emergency Physicians
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Trauma Center Representative
University of Arizona - Tucson, AZ

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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, CEP

Regional EMS Council - Central Region Representative
EMS Consultant - Chandler, AZ

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

Trauma Center Representative
West Valley Hospital - Goodyear, AZ

Tina L. Tessay, CEP

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

Michelle Ziemba, R.N., MSN

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

Trauma and EMS Performance Improvement Standing Committee Membership

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

Chair
West Valley Hospital - Goodyear, AZ

Bill Ashland, R.N.

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

Brian Bowling, B.S., FP-C

Air Ambulance Premier EMS Agency Quality Improvement
Native Air Ambulance - Tempe, AZ 85282

Robert Corbell, EMT-P

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

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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

Michelle Guadnola, R.N.

State Designated Level I Trauma Center Trauma Program
St. Joseph's Hospital & Medical Center - Phoenix, AZ

Rebecca Haro, NREMT-P

EMS Council Liaison
Sun City West Fire District - Phoenix, AZ

Darlene Herlinger, R.N., MSN

Prehospital EMS Coordinator (SAEMS/AEMS)
University of Arizona South Campus
Tucson, AZ

Sue Kern, R.N.

Prehospital EMS Coordinator (NAEMS/WACEMS)
Kingman Regional - Kingman, AZ

Summer Magoteaux, R.N.

Pediatric Representative (MD or RN)
Phoenix Children's Hospital - Phoenix, AZ

Jill McAdoo, R.N.

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

Mary McDonald, R.N., BSN

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

Eric Merrill, EMT-P

Ground Ambulance or First Responder Premier EMS Agency,
Quality Improvement Officer (SAEMS/AEMS)
Rio Verde Fire Department, Rio Verde, AZ

Melissa Moyer, CSTR

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

Pam Noland, R.N.

State Designated Level IV Trauma Center Program Manager
Northern Cochise Community Hospital
Willcox, AZ

Jim Prohaska, R.N.

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

Tiffany Strever, R.N.

State Designated Level I Trauma Center - Trauma Program
Representative - West Valley Hospital - Goodyear, AZ

Arvie Webster, R.N.

ACS Verified Level I Trauma Program Representative PI
Coordinator - University of Arizona Medical Center -
University Campus - Tucson, AZ

Dale Woolridge, M.D.

Injury Researcher
University of Arizona Department of Emergency Medicine
Tucson, AZ

Annual Report to the Director

Introduction

In 2013, the Arizona Trauma System continued to mature and improve through the guidance of the state's stakeholders. This collaboration produced significant and tangible progress that was prioritized in the state trauma plan. One of the many accomplishments of the past year is that a record number of trauma centers successfully completed the re-designation process. Another accomplishment is the collaboration and education among the trauma program managers during their recent meetings. There continues to be opportunities for sustained growth; the members of the Arizona Trauma System, representing hundreds of stakeholders and dozens of organizations, will continue to guide our future progress.

2013 - 2014 Highlights

- **Trauma Plan Progress – Key Highlights:** Several key initiatives that were either accomplished this past year or had significant progress include:
 - **Increase active participation by the State Trauma Advisory Board (STAB) members – Accomplished.**
 - Each meeting has a verbal roll call,
 - Each meeting packet includes an attendance report,
 - Bylaws have been amended to better communicate the attendance requirements,
 - Staff contacted members who have missed more than two consecutive meetings and will present responses at STAB during September's meeting.
 - **Develop a Trauma Program Managers Group – Accomplished.**
 - A majority of trauma program managers regularly attend workshops that are jointly sponsored by the Bureau of Emergency Medical Services and Trauma System (Bureau) and the University of Arizona Center for Rural Health.
 - Meeting 1: University of Arizona Medical Center 7/20/2013,
 - Meeting 2: Flagstaff Medical Center 11/15/2013,
 - Meeting 3: Banner Good Samaritan Medical Center 3/21/2014,
 - Meeting 4: Scottsdale Health Care Osborn Medical Center 7/18/2014,
 - Meeting 5: Scheduled for 11/21/2014 at St. Joseph's Hospital and Medical Center,
 - Meeting 6: Scheduled for 3/20/2015,
 - Meeting 7: Scheduled for 7/17/2015.
 - **Build and improve a tiered integrated trauma system – Significant Progress.**
 - The number of Level III and Level IV trauma centers in the rural and tribal areas has increased.

- Mt. Graham Regional Medical Center, Payson Regional Medical Center, Yavapai Regional Medical Center-West Campus, Yavapai Regional Medical Center-East Campus, and Payson Regional Medical Center have become designated Level IV trauma centers.
 - Tuba City Regional Medical Center has applied for Level III verification; Summit Regional Healthcare has shown interest in moving toward Level III verification.
 - Bureau staff met with Western Region Hospital Administrators (Yuma) and Sierra Vista Medical Center in an effort to renew interest in Level III designation.
 - Bureau staff met with Valley View Medical Center and Little Colorado Medical Center to discuss level IV trauma designation.
 - The Center for Rural Health continues to support Critical Access Hospital participation in the trauma system.
- **Improve trauma training to all level providers statewide – Significant Progress.**
- Banner Good Samaritan Medical Center, Flagstaff Medical Center, Chandler Regional Medical Center and the University of Arizona Medical Center- University Campus each hold certification to teach the Rural Trauma Team Development Course (RTTDC). In 2013, 6 courses were taught.
 - Trauma Outcomes and Performance Improvement Course (TOPIC) developed by the Society of Trauma Nurses, hosted by Banner Good Samaritan Medical Center and the Center for Rural Health, was offered to trauma program managers and medical directors.
 - John C. Lincoln- North Mountain shared the geriatric “G60” program with hospitals and pre-hospital partners throughout the state. The G60 program advocates for an aggressive multi-disciplinary response to older adults who have experienced trauma.
 - The Pediatric Advisory Committee for Emergency Services continues to provide funds to each of the four EMS Regions to support pediatric education.
 - Three regional councils [Arizona EMS (AEMS), Northern Arizona EMS (NAEMS), and the Southeastern Arizona EMS (SAEMS)] sponsored pediatric EMS conferences.
 - Maricopa Medical Center and the American Academy of Pediatrics are providing western Arizona hospitals and EMS agencies with pediatric outreach for the next two years.
 - The Bureau of Public Health Emergency Preparedness (PHEP) continues to support the Arizona Burn Network with grant funds.

- **Define regional scene and inter-facility transport protocols directing patients to the most appropriate level trauma center – Significant Progress.**
 - On July 14, 2014, a workgroup met to define the Arizona criteria for Over/Under Triage; a second meeting is scheduled for September.
 - SAEMS is in the process of updating their destination and triage protocols.
 - AEMS has updated its triage protocols to take into account level III trauma centers.
 - The EMResource website has been updated to record new level III trauma center designations.

- **Better inclusion of EMS data in the Arizona State Trauma Registry (ASTR) – Significant Progress.**
 - 86 EMS agencies (23%) submit 34,000 e-PCR records to the Arizona Pre-hospital Information and EMS Registry System (AZ-PIERS) each month. Current volume is 642,162 patient care records.
 - In 2013, the ASTR received completed run sheets 69% of the time for EMS ground agencies and 82% of the time for air ambulances. This was a decline for ground EMS; in 2012, 74% of the run sheets were completed.
 - AZ-PIERS trauma triage elements in the current dataset will be revised in future updates.
 - Individual and aggregate trauma reports were provided to all submitting EMS agencies and hospitals.

- **Arizona State Trauma Registry (ASTR):** The Trauma Registry Users Group (TRUG) continued to review elements and definitions to maintain its consistent high quality data across centers. A highly anticipated transition from a Virtual Protocol Network (VPN) to a web-based registry has begun. Centers that contribute the reduced trauma data set have transitioned successfully; in 2015 trauma centers that submit the full trauma data set will also transition to the web-based registry.

- **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 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/Bureau and the University of Arizona Emergency Medicine Research Center (AEMRC) are in the final months of the 3rd 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 in over 120 EMS systems in Arizona. For more information visit www.epic.arizona.edu.

- **Quality Assurance Reports to trauma centers:** Trauma centers received reports that benchmarked their individual performance to the statewide aggregate. These reports compared patient demographics, transfers, billing efficiency, mortality by ISS and body injuries, and many others. These reports can be found online at <http://www.azdhs.gov/bems/data/quality-assurance-reports.php?pg=qa>.

Opportunities

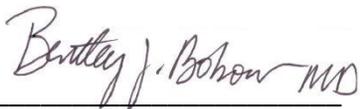
There are many remaining goals and objectives in the Arizona State Trauma Plan. The coming year will present a number of opportunities to enhance the Arizona Trauma System.

- Create a Trauma Plan Prioritization workgroup,
- Complete the transition to a web-based registry for all trauma centers,
- Federal requirements to utilize the ICD-10 reporting system along with revisions to the American College of Surgeons trauma center verification criteria will likely expose areas within our current regulatory language to be updated,
- The inclusion of several facilities into the trauma system from rural Arizona to improve access to trauma care,
- Improve the quality of EMS trauma triage data collection.

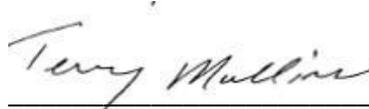
Conclusion

While we have been able to achieve many of our strategic goals this past year, many more remain. A great success has been the enhanced communication between all of the trauma centers and with our EMS agencies. The addition of new trauma centers bring talented and dedicated stakeholders that will continue to shape the development of our state trauma system in the future.

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



Bentley J. Bobrow, Chair
Bureau Medical Director



Terry Mullins
Bureau Chief

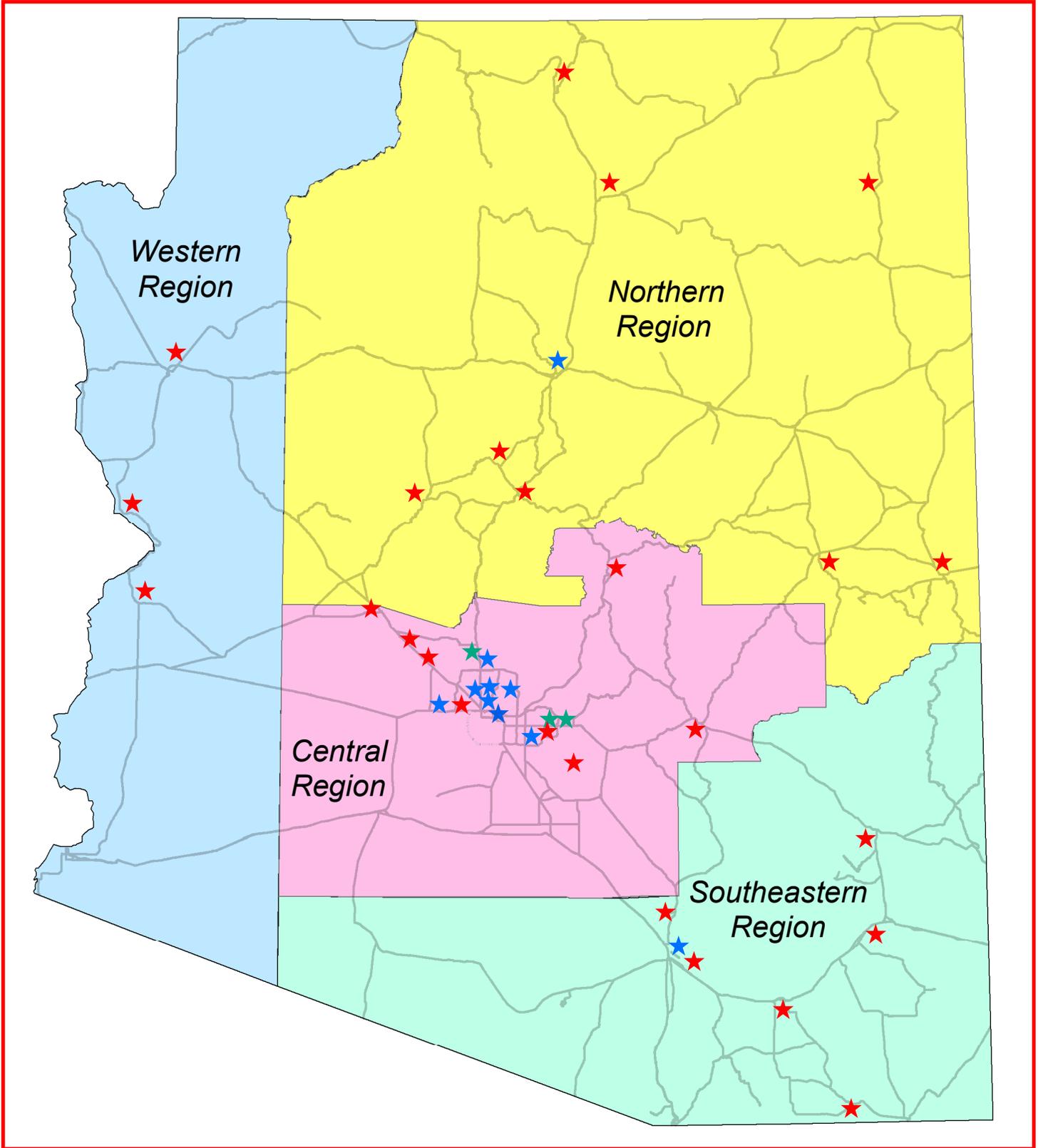
Arizona State Designated Trauma Centers

| 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 |
| Dignity Health, dba Chandler Regional Medical Center <i>(Provisional Designation)</i> | 1955 W. Frye Rd., Chandler, AZ 85224 | 3/24/14 | 9/24/15 |
| Flagstaff Medical Center | 1200 N. Beaver St., Flagstaff, AZ 86001 | 05/27/14 | 05/27/17 |
| John C. Lincoln - North Mountain | 250 E. Dunlap Ave., Phoenix, AZ 85020 | 04/24/14 | 04/24/15 |
| 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 | 11/20/13 | 11/20/16 |
| 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 |
| West Valley Hospital <i>(Provisional Designation)</i> | 13677 W. McDowell Road, Goodyear, AZ 85395 | 7/21/14 | 1/21/16 |
| Level III Trauma Centers | | | |
| Banner Baywood Medical Center | 6644 E. Baywood Ave., Mesa, AZ 85206 | 05/12/14 | 02/25/15 |
| John C. Lincoln Deer Valley Hospital | 19829 N. 27 th Ave., Phoenix, AZ 85027 | 06/09/14 | 4/08/17 |
| Mountain Vista Medical Center | 1301 S. Crismon Rd., Mesa, AZ 85209 | 7/23/14 | 7/26/16 |
| Level IV Trauma Centers | | | |
| Banner Boswell Medical Center | 10401 W. Thunderbird Blvd., Sun City, AZ 85351 | 12/17/12 | 12/17/15 |
| Banner Del E. Webb Medical Center | 14502 W. Meeker Blvd, Sun City West, AZ 85375 | 01/09/14 | 01/09/17 |
| 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 | 03/03/14 | 03/03/17 |
| Chinle Comprehensive Health Care Facility | P.O. Drawer PH, Chinle, AZ 86503 | 09/09/13 | 09/09/16 |
| 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 | 01/20/14 | 01/20/17 |
| Kingman Regional Medical Center | 3269 Stockton Hill Rd., Kingman, AZ 86409 | 10/15/12 | 10/15/15 |

| Health Care Institution | Address | Effective Date | Expiration Date |
|---|--|-----------------------|------------------------|
| La Paz Regional Hospital | 1200 W. Mohave Rd., Parker, AZ 85344 | 06/02/12 | 06/02/15 |
| Mt. Graham Regional Medical Center | 1600 S. 20 th Ave., Safford, AZ 85546 | 03/20/14 | 03/20/17 |
| 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 |
| Payson Regional Medical Center | 807 S. Ponderosa Street, Payson, AZ 85541 | 11/22/13 | 11/22/16 |
| 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 |
| Yavapai Regional Medical Center – West Campus | 1003 Willow Creek Road, Prescott, AZ 86301 | 01/10/14 | 01/10/17 |
| Yavapai Regional Medical Center – East Campus | 7700 E. Florentine, Prescott Valley, AZ 86314 | 6/24/14 | 6/24/17 |

EMS REGIONS AND TRAUMA CENTERS

August 21, 2014



Level I Trauma Center
Level III Trauma Center
Level IV Trauma Center

**ARIZONA STATE TRAUMA REGISTRY (ASTR)
2013 TRAUMA DATA SUBMISSION**

| 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 2013 | APR-JUN 2013 | JUL-SEP 2013 | OCT-DEC 2013 | |
| | ASTR Due Date | 7/1/2013 | 10/1/2013 | 1/2/2014 | 4/1/2014 | |
| Total Records from all Level I Trauma Centers by Qtr: | | 5615 | 5999 | 5894 | 5966 | |
| Banner Good Samaritan Medical Center | Number of Records | 624 | 660 | 604 | 727 | 2615 |
| | Date Received | 6/27/2013 | 9/27/2013 | 12/27/2013 | 3/14/2014 | |
| Flagstaff Medical Center | Number of Records | 364 | 441 | 514 | 415 | 1734 |
| | Date Received | 5/22/2013 | 8/26/2013 | 12/19/2013 | 2/25/2014 | |
| John C. Lincoln North Mountain Hospital | Number of Records | 737 | 747 | 737 | 838 | 3059 |
| | Date Received | 6/20/2013 | 9/26/2013 | 12/31/2013 | 4/1/2014 | |
| Maricopa Medical Center | Number of Records | 597 | 628 | 598 | 594 | 2417 |
| | Date Received | 6/25/2013 | 10/8/2013 | 1/7/2014 | 4/1/2014 | |
| Phoenix Children's Hospital | Number of Records | 518 | 577 | 633 | 640 | 2368 |
| | Date Received | 7/3/2013 | 10/7/2013 | 1/9/2014 | 4/17/2014 | |
| Scottsdale Healthcare-Osborn | Number of Records | 840 | 859 | 804 | 834 | 3337 |
| | Date Received | 6/26/2013 | 10/1/2013 | 1/13/2014 | 4/1/2014 | |
| St. Joseph's Hospital & Medical Center | Number of Records | 825 | 906 | 826 | 862 | 3419 |
| | Date Received | 6/28/2013 | 9/30/2013 | 12/23/2013 | 3/21/2014 | |
| University of AZ Medical Center-UNIVERSITY CAMPUS (was UMC) | Number of Records | 1110 | 1181 | 1178 | 1056 | 4525 |
| | Date Received | 7/1/2013 | 10/3/2013 | 12/30/2013 | 3/31/2014 | |

| 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: | 659 | 671 | 690 | 817 | |
| Banner Baywood Medical Center (new designation 7/30/12) | Number of Records | 158 | 144 | 133 | 185 | 620 |
| | Date Received | 6/27/2013 | 9/27/2013 | 12/27/2013 | 3/14/2014 | |
| John C Lincoln - Deer Valley (new designation 2/4/2013) | Number of Records | 121 | 186 | 203 | 212 | 722 |
| | Date Received | 6/19/2013 | 9/26/2013 | 12/31/2013 | 4/1/2014 | |
| Mountain Vista Medical Center (new designation 2/24/12) | Number of Records | 380 | 341 | 354 | 420 | 1495 |
| | Date Received | 6/24/2013 | 10/10/2013 | 12/30/2013 | 4/11/2014 | |

Bureau of EMS & Trauma System Data & Quality Assurance Section

| LEVEL IV TRAUMA CENTERS (Full or Reduced Data Set) | | Reporting Quarter | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | |
|---|-------------------|-------------------|------------|------------|-----------|-----------|---------------------|
| Total Records from ALL Level IV Trauma Centers by Qtr: | | | 1715 | 1669 | 1873 | 1838 | Hospital YTD Totals |
| FULL DATA SET LEVEL IV | | | | | | | |
| Banner Boswell Medical Center (Full Data Set) | Number of Records | 71 | 52 | 51 | 76 | | 250 |
| | Date Received | 6/27/2013 | 9/27/2013 | 12/27/2013 | 3/14/2014 | | |
| Banner Estrella Medical Center (new designation 8/30/12) | Number of Records | 115 | 121 | 102 | 120 | | 458 |
| | Date Received | 6/27/2013 | 9/27/2013 | 12/27/2013 | 3/14/14 | | |
| Banner Gateway Medical Center (new designation 1/2/13) | Number of Records | 60 | 19 | 32 | 25 | | 136 |
| | Date Received | 6/27/2013 | 9/27/2013 | 12/27/2013 | 3/14/14 | | |
| Banner Ironwood Medical Center (new designation 10/11/12) | Number of Records | 19 | 13 | 12 | 14 | | 58 |
| | Date Received | 6/27/2013 | 9/27/2013 | 12/27/2013 | 3/14/14 | | |
| Banner Del Webb (new designation 1/9/2014) | Number of Records | | | 125 | 160 | | 285 |
| | Date Received | | | 12/27/2013 | 3/14/2014 | | |
| Kingman Regional Medical Center | Number of Records | 140 | 129 | 132 | 107 | | 508 |
| | Date Received | 6/20/2013 | 10/1/2013 | 1/14/2014 | 4/2/2014 | | |
| Summit Healthcare Regional Medical Ctr | Number of Records | 74 | 74 | 114 | 95 | | 357 |
| | Date Received | 6/25/2013 | 9/27/2013 | 12/23/2013 | 4/1/2014 | | |
| Tuba City Regional Health Care | Number of Records | 177 | 213 | 224 | 227 | | 841 |
| | Date Received | 6/28/2013 | 10/1/2013 | 1/2/2014 | 4/1/2014 | | |
| University of AZ Medical Center-SOUTH CAMPUS (was UPH) (new designation 2/13/12) | Number of Records | 366 | 185 | 99 | 118 | | 768 |
| | Date Received | 7/25/2013 | 9/17/2013 | 12/12/2013 | 3/28/2014 | | |
| Verde Valley Medical Center(Cottonwood) | Number of Records | 36 | 62 | 61 | 51 | | 210 |
| | Date Received | 7/9/2013 | 10/1/2013 | 12/26/2013 | 4/8/2014 | | |
| Yavapai Regional Medical Center-West (Full Data Set) | Number of Records | 53 | 83 | 140 | 114 | | 390 |
| | Date Received | 7/2/2013 | 10/1/2013 | 12/31/2013 | 4/8/2014 | | |
| REDUCED DATA SET LEVEL IV | | | | | | | |
| Banner Page Hospital | Number of Records | 47 | 79 | 66 | 48 | | 240 |
| | Date Received | 7/1/2013 | 10/1/2013 | 1/24/2014 | | | |
| Benson Hospital | Number of Records | 17 | 15 | 22 | 29 | | 83 |
| | Date Received | 7/1/2013 | 11/14/2013 | 12/1/2013 | 1/24/2013 | | |
| Chinle Comprehensive Health Care | Number of Records | 54 | 73 | 88 | 71 | | 286 |
| | Date Received | 6/25/2013 | 9/29/2013 | 4/1/2014 | 4/1/2014 | | |
| Cobre Valley Medical Center (new designation 11/26/12) | Number of Records | 39 | 10 | 29 | 25 | | 103 |
| | Date Received | 7/1/2013 | 10/1/2013 | 12/4/2013 | 3/20/2014 | | |
| Copper Queen Community Hospital | Number of Records | 51 | 54 | 67 | 45 | | 217 |
| | Date Received | 7/2/2013 | 10/1/2013 | 1/22/2014 | 4/2/2014 | | |
| Havasu Regional Medical Center | Number of Records | 94 | 82 | 70 | 96 | | 342 |
| | Date Received | 6/18/2013 | 9/27/2013 | 1/20/2013 | 4/1/2014 | | |
| La Paz Regional Hospital | Number of Records | 16 | 14 | 14 | 18 | | 62 |
| | Date Received | 7/8/2013 | 10/21/2013 | 1/3/2014 | 5/1/2014 | | |
| Northern Cochise Hospital | Number of Records | 25 | 32 | 37 | 34 | | 128 |
| | Date Received | 7/1/2013 | 10/1/2013 | 1/14/2014 | 3/31/2014 | | |
| Oro Valley Hospital | Number of Records | 17 | 26 | 42 | 36 | | 121 |
| | Date Received | 6/26/2013 | 9/15/2013 | 5/12/2014 | 5/12/2014 | | |
| Payson Regional Medical Center | Number of Records | | | 21 | 26 | | 47 |
| | Date Received | | | | | | |

Bureau of EMS & Trauma System Data & Quality Assurance Section

| | | | | | | |
|--|-------------------|-----------|-----------|-----------|-----------|-----|
| Southeast Arizona Medical Center | Number of Records | | 29 | | | 29 |
| | Date Received | | 10/1/2013 | | | |
| White Mountain Regional Medical Center | Number of Records | 182 | 247 | 282 | 190 | 901 |
| | Date Received | 6/26/2013 | 10/1/2013 | 1/2/2014 | 3/31/2014 | |
| Wickenburg Community Hospital | Number of Records | 62 | 57 | 43 | 62 | 224 |
| | Date Received | 7/1/2013 | 10/1/2013 | 5/13/2014 | 5/13/2014 | |
| Mt Graham Regional Medical Center | Number of Records | | | | 51 | 51 |
| | Date Received | | | | 5/13/2014 | |

Bureau of EMS & Trauma System Data & Quality Assurance Section

| NON-DESIGNATED HOSPITALS (Full or Reduced Data Set) | Reporting Quarter | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | |
|--|-------------------|-----------|------------|------------|------------|----------------------------|
| Total Records from all Non-Designated Hospitals by Qtr: | | 0 | 280 | 303 | 287 | Hospital YTD Totals |
| Sierra Vista Regional Medical Center (Full Data Set) | Number of Records | | | | | 0 |
| | Date Received | | | | | |
| Yuma Regional Medical Center (Full Data Set) | Number of Records | | | | | 0 |
| | Date Received | | | | | |
| Banner Desert Medical Center (Full Data Set) | Number of Records | | 280 | 303 | 260 | 843 |
| | Date Received | | 9/27/2013 | 12/27/2013 | 3/14/14 | |
| Yavapai Regional Medical Center-East (Full Data Set) | Number of Records | | | | 27 | 27 |
| | Date Received | | | | 4/8/2014 | |

Total 2013 Reporting Hospitals = 38
 (*does not include * pending facilities)

| Total ASTR 2013 Records by Quarter: | | | |
|--|-------------|-------------|-------------|
| 7989 | 8619 | 8760 | 8908 |

| Total ASTR 2013 |
|------------------------|
| 34,276 |

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.

TRAUMA PATIENT INCLUSION DEFINITION

ARIZONA STATE TRAUMA REGISTRY (ASTR)

Effective for records with ED/Hospital Arrival Dates Jan. 1, 2008 – Dec. 31, 2013

➤ EMS TRAUMA TRIAGE PROTOCOL

A patient with injury or suspected injury who is triaged from a scene to a trauma center or ED based upon the responding EMS provider's trauma triage protocol; OR

➤ INTER-FACILITY INJURY TRANSFERS BY EMS

A patient with injury who is transported via EMS transport from one acute care hospital to another acute care hospital; OR

***Note: For 2012 trauma data, only Level III and IV Trauma Centers were required to report inter-facility injury transfers. For 2008-2011 and 2013 forward, all designation levels are required to report inter-facility injury transfers.**

➤ HOSPITAL TRAUMA TEAM ACTIVATIONS

A patient with injury or suspected injury for whom a trauma team activation occurs; OR

➤ ADMITTED OR DIED BECAUSE OF INJURY & MEETS ASTR DIAGNOSIS CODES

A patient with injury who:

Is admitted as a result of the injury OR who dies as a result of the injury

AND

Has an ICD-9-CM N-code (injury diagnosis code) within categories 800 through 959 (except exclusions below):

EXCLUSIONS for admitted or died ICD-9-CM 800-959 patients:

- Only has late effects of injury or another external cause:
(ICD-9-CM N-code within categories 905 through 909)
- Only has a superficial injury or contusion:
(ICD-9-CM N-code within categories 910 through 924)
- Only has effects of a foreign body entering through an orifice:
(ICD-9-CM N-code within categories 930 through 939)
- Only has an isolated femoral neck fracture from a same-level fall:

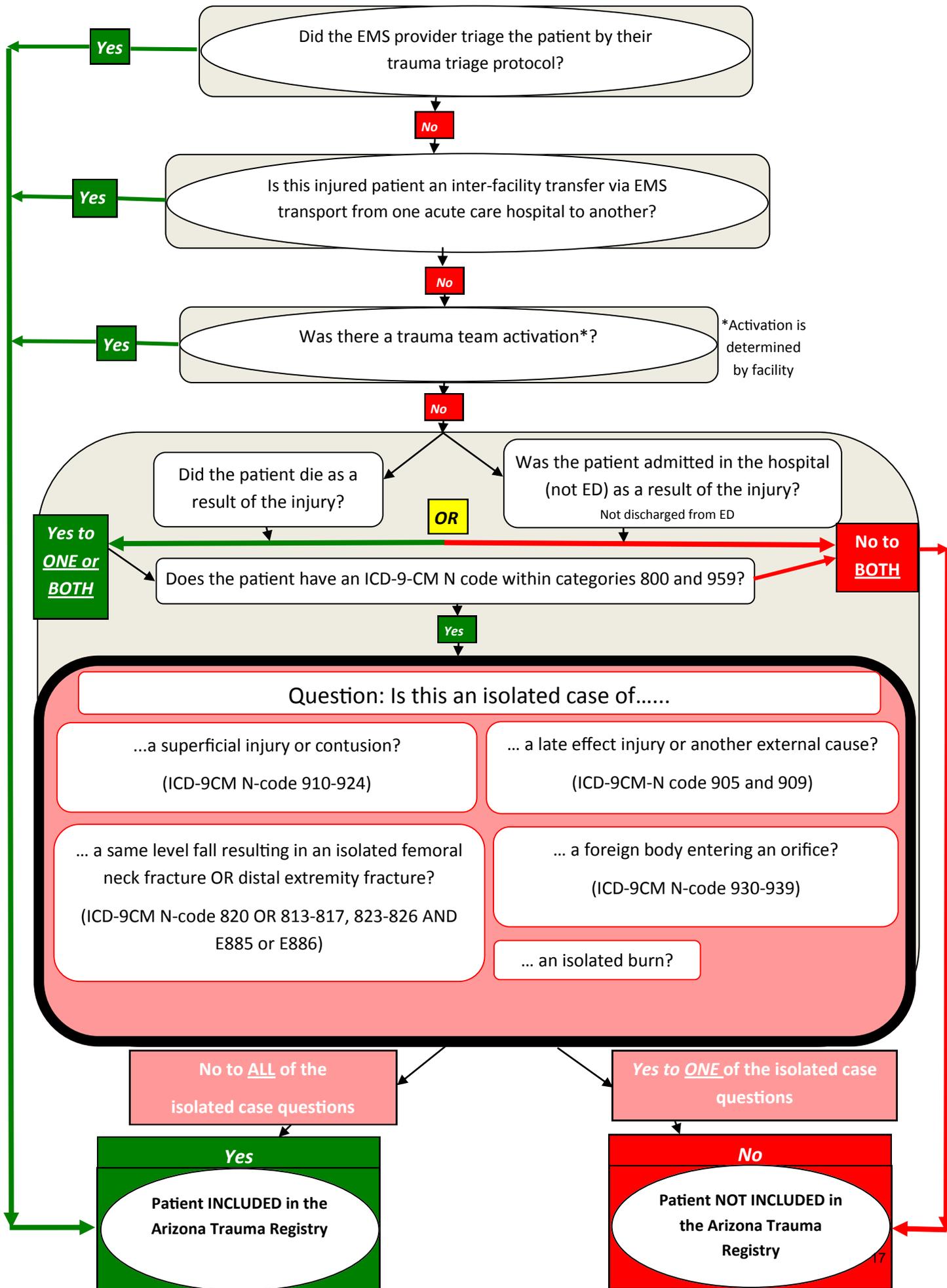
(ICD-9-CM N-code within category 820 **AND** ICD-9-CM E-code within category E885 or E886)

- Only has an isolated distal extremity fracture from a same-level fall:
(ICD-9-CM N-code within categories 813 through 817 or 823 through 826 **AND** ICD-9-CM E-code within category E885 or E886)
- Only has an isolated burn:
(ICD-9-CM N-code within categories 940 through 949)

*Inter-facility transfer item 1-B was added to the ASTR Inclusion Criteria, per the Bureau of EMS & Trauma System in November 2008. This item was then revised by the TEPI advisory committee for 2012, requiring only Level III and IV trauma centers to submit inter-facility transfers. For 2013 data forward, the advisory committee reinstated the original 2008-2011 inter-facility transfer criteria.

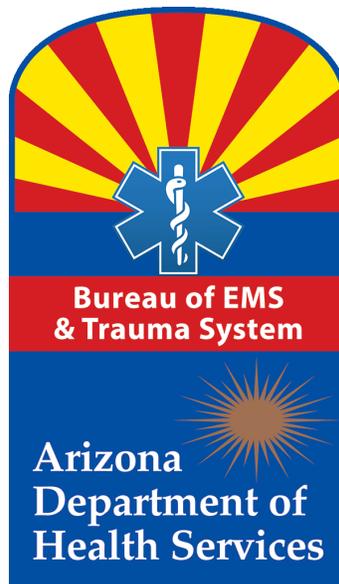
Note: New ASTR inclusion criteria went into effect for trauma records with ED/Hospital Arrival Dates Jan. 1, 2008 forward. Changes to inclusion criteria affect the numbers and types of records submitted to ASTR. Inclusion changes should be taken into consideration when comparing multiple years of trauma data.

2013 Arizona Trauma Registry Inclusion Criteria



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

**State Trauma Advisory Board
2014 Annual Report**



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ACKNOWLEDGEMENT

The Arizona Department of Health Services' Bureau of Emergency Medical Services and Trauma System (BEMSTS) wishes to acknowledge the continued hard work and dedication of the many individuals involved in working to improve patient outcomes. Special thanks are extended to the members of the State Trauma Advisory Board, Trauma and EMS Performance Improvement committee, participating trauma centers, medical directors, program managers, and registrars. Their dedication to continuously improving the data collection processes makes it possible to fully evaluate and advance the trauma system in Arizona.

2014 ARIZONA STATE TRAUMA REGISTRY ANNUAL REPORT

Purpose:

The purpose of this report is to describe the incidence and outcomes of trauma patients injured in Arizona through the Arizona State Trauma Registry (ASTR). ASTR is dedicated to capturing information on the most severely injured patients in Arizona. The definition of an Arizona trauma patient is presented on pages 15-17. Various descriptions of locations, rates, and mechanisms of injury are presented.

Methods:

In 2013, the ASTR received data from 35 state designated trauma centers and two non-designated healthcare institutions. For the 2013 reporting year, the Arizona EMS and Trauma System had eight Level I trauma centers. There were six Level I trauma centers in Maricopa County, one in Coconino County, and one in Pima County. There were 22 Level IV trauma centers and three Level III trauma centers located primarily in the rural areas of the state. Two non-designated hospitals voluntarily submitted data to the ASTR for the year 2013. Please refer to pages 11-14 for a list of 2013 reporting hospitals, their designation level, and type of data set collected.

Arizona's Levels I - III trauma centers were required to submit the full ASTR data set. Level IV and non-designated facilities had the option to submit the full or reduced data set. Full data set hospitals entered their data into their own version of Trauma One[®] and then exported the state required data elements to ASTR on a quarterly basis. Reduced data set hospitals entered data directly into the state trauma database. A validation tool checked more than 800 state and national rules. Validation was run at the hospital and at the state level. Inconsistencies were flagged and returned to the hospital for review or correction.

This trauma registry annual report analyzed cases for patients with an Emergency Department/Hospital Arrival Date of January 1 - December 31, 2013 with the Statistical Analysis System (SAS) Version 9.2.

Although the National Trauma Data Bank (NTDB) differs in inclusion criteria from the ASTR, certain measures were compared. State data were restricted by admission status, transfer status and outcome status to match when possible to the national data.¹

The ASTR received 34,275 records from 35 participating health care institutions in 2013. Case volume increases may not reflect a change in traumatic injuries but rather a more inclusive data collection system in the analysis.

Geo-Population:

Arizona is 400 miles long and 310 miles wide for a total area of 114,006 square miles. The topography has a blend of deserts, mountains, and plateaus. The highest point is Humphrey's Peak (12,633 feet above sea level), the lowest point 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.

There are twenty-two (22) federally recognized American Indian tribes in Arizona with a total population of 309,035 in 2013.

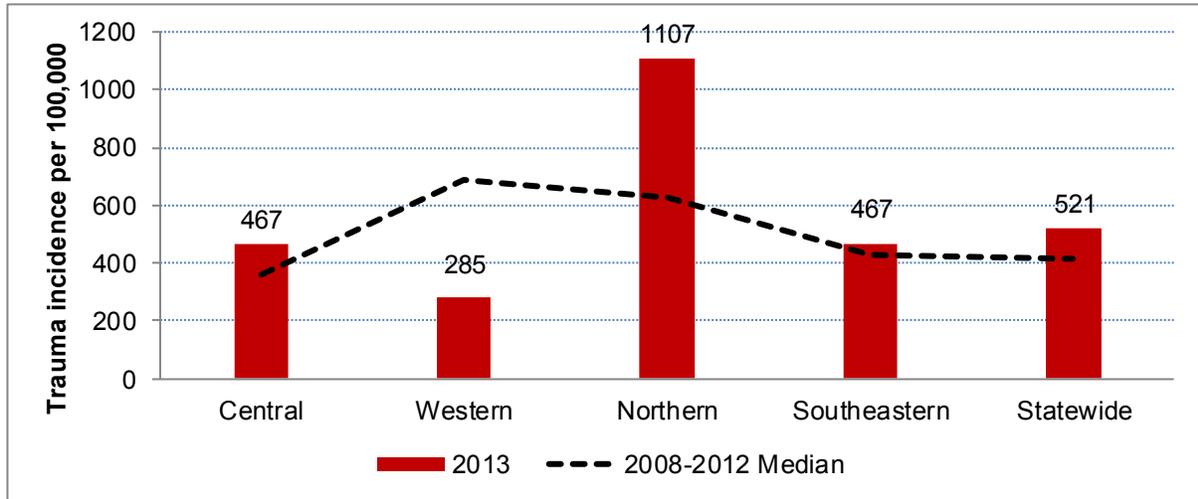
The total Arizona population increased by 1.2% to bring the number of residents to 6,581,053 in 2013.² Urban counties (Maricopa, Pima, Pinal, and Yuma) accounted for 84.2% of the population. The remaining counties (Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Mohave, Navajo, Santa Cruz, and Yavapai) accounted for 15.8% of the population.

Maricopa County, with a population of 3.9 million, is home to Phoenix, the capitol of state government.

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

² <http://azdhs.gov/plan/menu/info/pop/index.php>

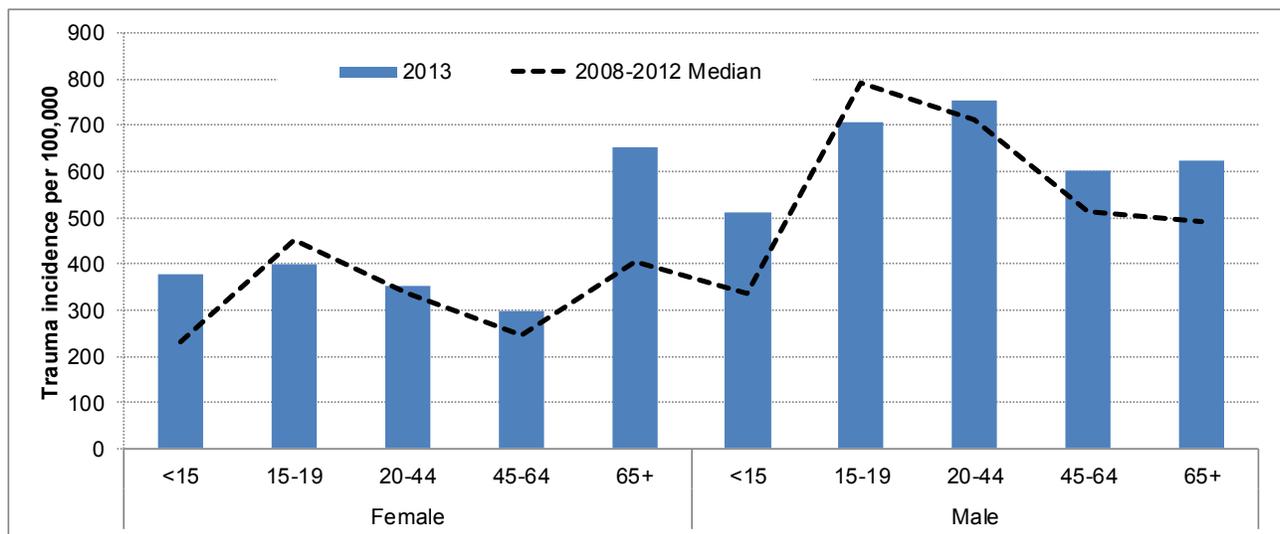
Figure 1: Region-specific trauma rates per 100,000 Arizona residents, ASTR 2008-2013



Although the Central region is the most densely populated and has the highest volume of trauma, in previous years it reported the lowest trauma rate per 100,000 residents when compared to all other regions (Figure 1). The Western region’s trauma rates may be under reported as a previously participating hospital with high volume did not contribute data to the ASTR in 2013.

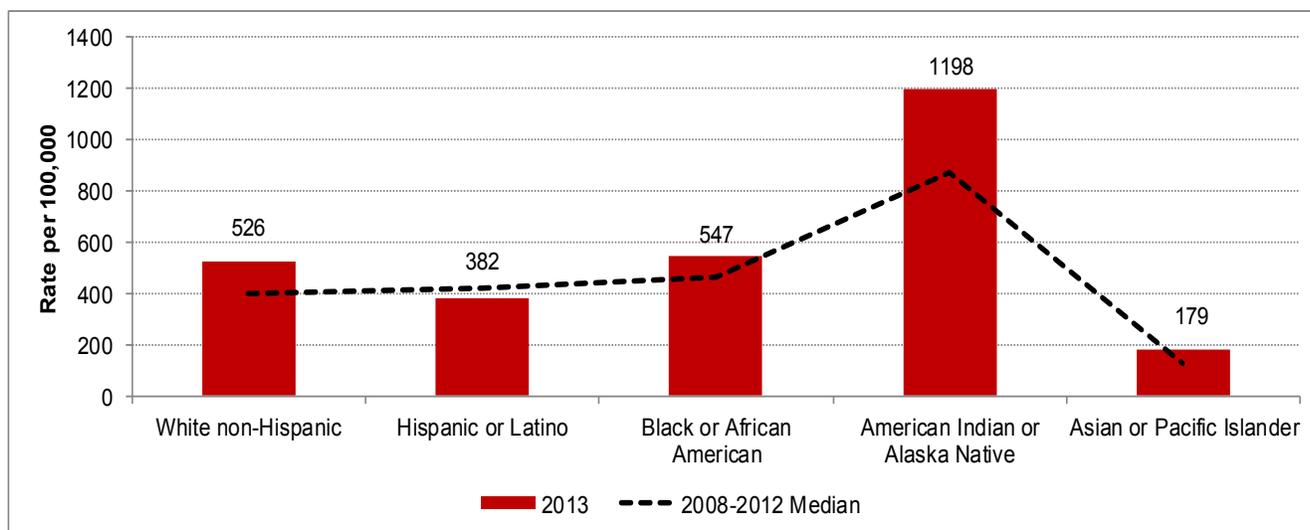
The volume of trauma per region was 20,517 in the Central, 1,235 in the Western, 5,866 in the Northern, and 5,723 in the Southeastern.

Figure 2: Gender & age-specific trauma rates per 100,000 Arizona residents, ASTR 2008-2013



Across most age groups, males have a higher trauma rate than females. There was a decrease in the trauma rate for 15-19 year olds in 2013 when compared to the 2008-2012 median. The highest trauma rate occurred in males 20-44, followed by geriatric (>65) females. It is possible that the increase in trauma rates for pediatric and geriatric populations may be related to an increase in the number of reporting hospitals located in rural communities (Figure 2).

Figure 3: Race-specific trauma rates per 100,000 Arizona residents, ASTR 2008-2013



Although White non-Hispanics had the highest volume of trauma, American Indian/Alaska Native experienced the highest trauma rates per 100,000 residents. An in-depth trauma report on American Indian trauma can be found at:

<http://www.azdhs.gov/bems/data/quality-assurance-reports.php?pg=county-regional>

Following American Indian/Alaska Natives trauma rates were Black/African American, White Non-Hispanics, and Hispanic or Latino. The lowest rates of trauma were seen in Asian or Pacific Islanders.

Table 1: Age-specific trauma proportion and case fatality proportion, ASTR 2013

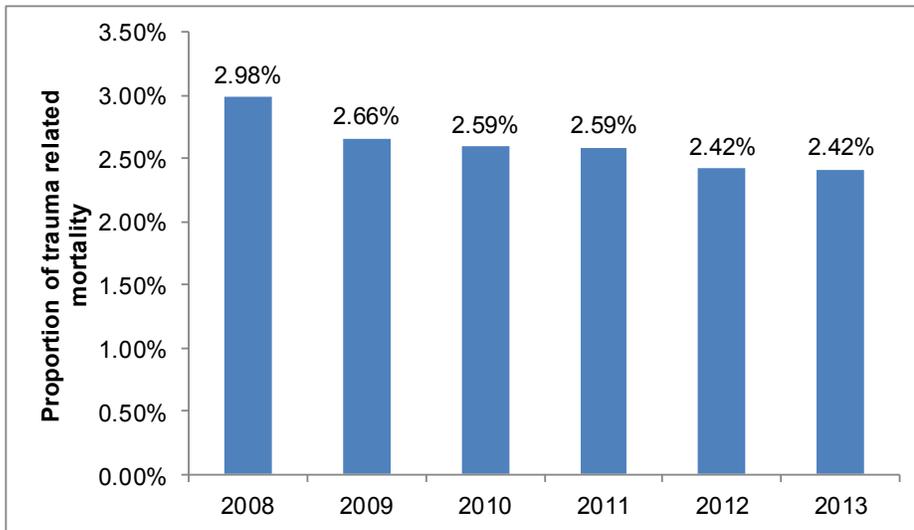
| INCIDENTS AND CASE FATALITY RATE BY AGE | | | | |
|---|---------------|----------------|------------|--------------------|
| Age | Count | Percent | Deaths | Case Fatality Rate |
| <1 | 2,493 | 7.27% | 18 | 0.72% |
| 1-4 | 1,165 | 3.39% | 23 | 1.97% |
| 5-9 | 1,177 | 3.43% | 10 | 0.84% |
| 10-14 | 1,274 | 3.71% | 19 | 1.49% |
| 15-19 | 2,625 | 7.65% | 54 | 2.05% |
| 20-24 | 3,322 | 9.69% | 71 | 2.13% |
| 25-34 | 5,103 | 14.88% | 126 | 2.46% |
| 35-44 | 3,705 | 10.80% | 100 | 2.69% |
| 45-54 | 3,925 | 11.45% | 104 | 2.64% |
| 55-64 | 3,199 | 9.33% | 111 | 3.46% |
| 65-74 | 2,499 | 7.29% | 71 | 2.84% |
| 75-84 | 2,237 | 6.52% | 63 | 2.81% |
| >85 | 1,549 | 4.51% | 58 | 3.74% |
| Missing | 2 | 0% | 0 | 0% |
| Total | 34,275 | 100.00% | 828 | 2.41% |

Trauma affects people of all ages and is the leading cause of death among persons 1-44 years of age.³ Of the reported 34,275 trauma patients, the overall mortality proportion was 2.4%.

The highest case fatality was observed among those over 85 years of age (3.7%) (Table 1).

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

Figure 4: Trauma related mortality proportion, ASTR 2008-2013



The case fatality proportion has been steadily decreasing from 2.98% in 2008 to 2.42% in 2013 (Figure 4). We intend to explore this decrease in mortality but preliminary analysis suggests this may be a result of less severely injured patients who met the inclusion criteria.

Figure 5: Age-specific trauma related mortality rates per 100,000 Arizona residents, ASTR 2008-2013

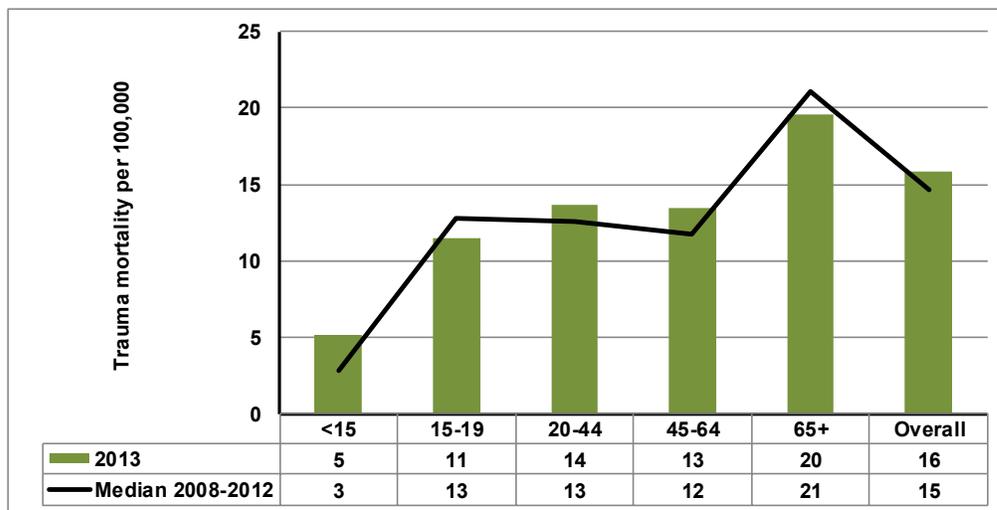


Figure 5 depicts trauma mortality rates per 100,000 Arizona residents by age. Arizona’s highest trauma mortality rate per 100,000 was in the 65+ age group. The mortality rate for 15-19 year age group decreased in 2013 as compared to the 2008-2012 median rate.

INJURY CHARACTERISTICS: MECHANISM OF INJURY

Figure 6: Top mechanisms of injury rate per 100,000 Arizona residents by region, ASTR 2013

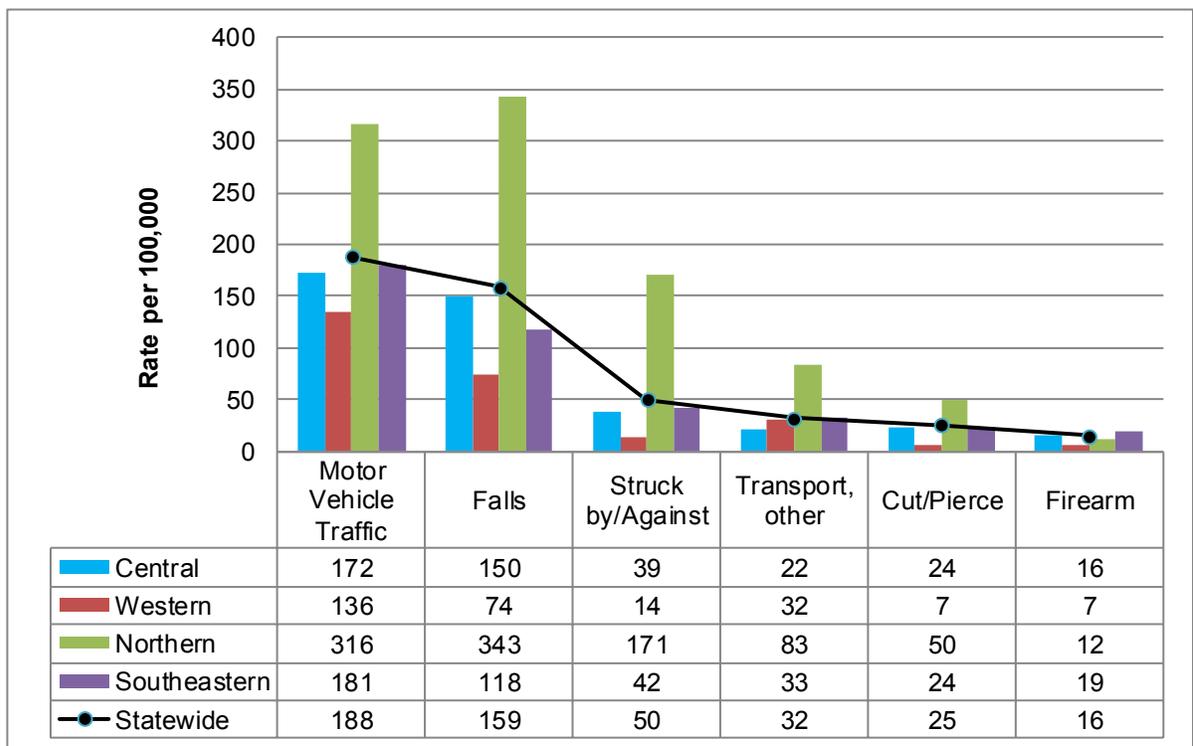


Figure 6 shows top mechanisms of injury rate per 100,000 Arizona residents by region for the year 2013. The Southeastern region has the highest rate for firearm injuries while the Northern region has the highest rate for the other five top mechanisms of injury.

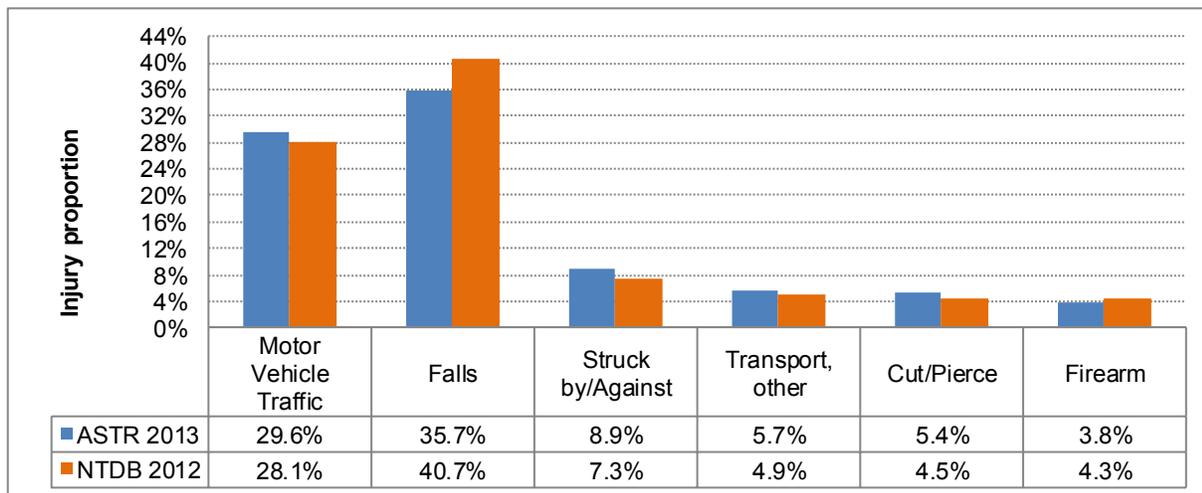
The motor vehicle traffic category only includes motor vehicles traveling on a public road or highway. “Transport, other” includes various other types of vehicles such as railway, off-road, water craft, and air craft. “Struck by/against” includes being struck by objects or people, intentionally or unintentionally.

Table 2: Mechanism of injury and case fatality proportion, ASTR 2013

| INCIDENCE AND CASE FATALITY PROPORTION BY MECHANISM OF | | | | |
|---|---------------|----------------|---------------|---------------------------------|
| MECHANISM | COUNT | PERCENT | DEATHS | CASE FATALITY PROPORTION |
| Motor Vehicle Traffic (MVT) | 12,349 | 36.02% | 360 | 2.91% |
| Falls | 10,443 | 30.46% | 140 | 1.34% |
| Struck by/Against | 3,283 | 9.57% | 19 | 0.57% |
| Transport, other | 2,087 | 6.08% | 31 | 1.48% |
| Cut/Pierce | 1,670 | 4.87% | 31 | 1.85% |
| Firearm | 1,022 | 2.98% | 169 | 16.53% |
| Pedal Cyclist, other | 768 | 2.24% | 8 | 1.04% |
| Other Specified | 579 | 1.68% | 12 | 2.07% |
| Unspecified | 519 | 1.51% | 28 | 5.39% |
| Natural/Environmental | 396 | 1.15% | 0 | 0 |
| Not elsewhere classifiable | 298 | 0.86% | 4 | 1.34% |
| Machinery | 220 | 0.64% | 0 | 0 |
| Fire/Burn | 189 | 0.55% | 1 | 0.52% |
| Overexertion | 161 | 0.46% | 0 | 0 |
| Pedestrian, other | 149 | 0.43% | 6 | 4.02% |
| Suffocation | 87 | 0.25% | 15 | 17.24% |
| Drowning | 31 | 0.09% | 4 | 12.90% |
| Poisoning | 15 | 0.04% | 0 | 0 |
| Missing, Not Applicable, or Not Documented | 9 | 0.02% | 0 | 0 |
| Total | 34,275 | 100.00% | 828 | 2.41% |

Table 2 describes the trauma incidence and fatality proportion by mechanism of injury for 2013 ASTR data. Motor vehicle traffic related trauma is the most common mechanism of injury (36.02%), followed by falls (30.46%), struck by/against (9.57%), transport, other (6.08%), cut/pierce (4.87%), and firearm (2.98%).

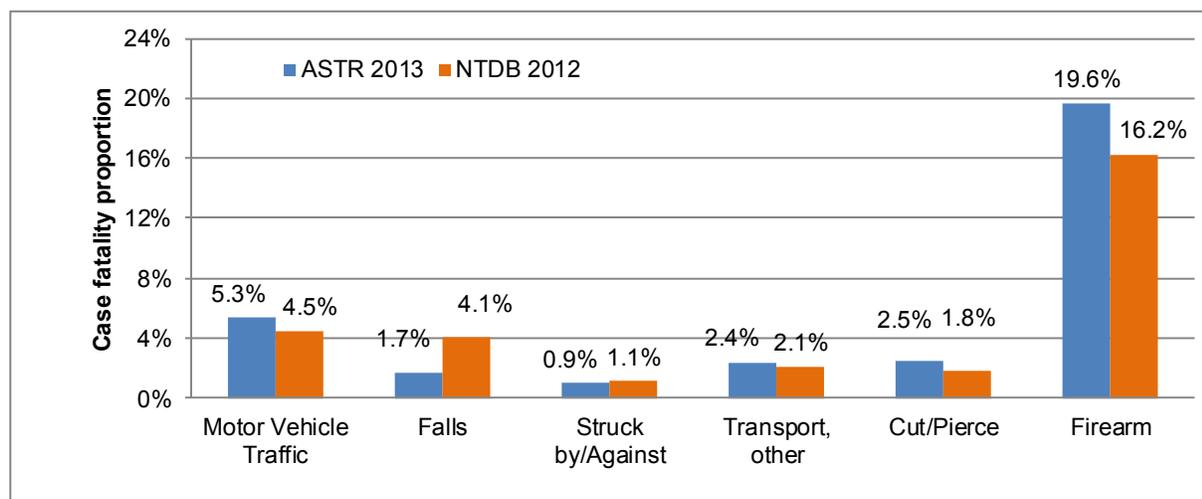
Figure 7: Top six mechanisms of injury proportion - ASTR vs. NTDB



For comparison purposes, ASTR inclusion criteria is matched to NTDB inclusion criteria.
 ASTR=Arizona State Trauma Registry, NTDB=National Trauma Data Bank

Arizona has a higher motor vehicle traffic 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). Falls may be under reported in this comparison as a result.

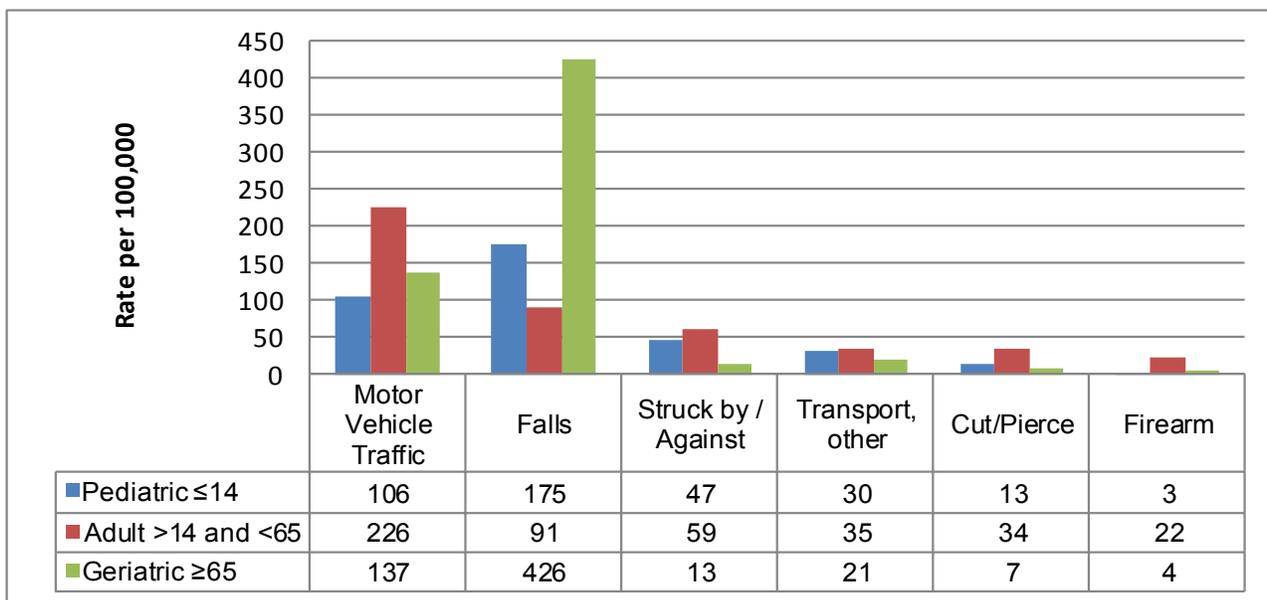
Figure 8: Top six mechanisms of injury case fatality proportion - ASTR vs. NTDB



For comparison purposes, ASTR inclusion criteria has been matched to NTDB inclusion criteria.
 ASTR=Arizona State Trauma Registry, NTDB=National Trauma Data Bank

Arizona has a higher case fatality proportion for firearm related traumas as compared to the firearm fatalities reported in the NTDB (19.6% vs. 16.2%). However, firearm injuries account for approximately 3% of all traumas in the state.

Figure 9: Selected mechanisms of injury rate per 100,000 Arizona residents by age category, ASTR 2013



The mechanism of injury with the highest rate in both geriatric (≥ 65 years) and pediatric (≤ 14) populations are falls, followed by motor vehicle traffic (Figure 9).

Figure 10: Trauma rate per 100,000 Arizona residents by age category and region, ASTR 2013

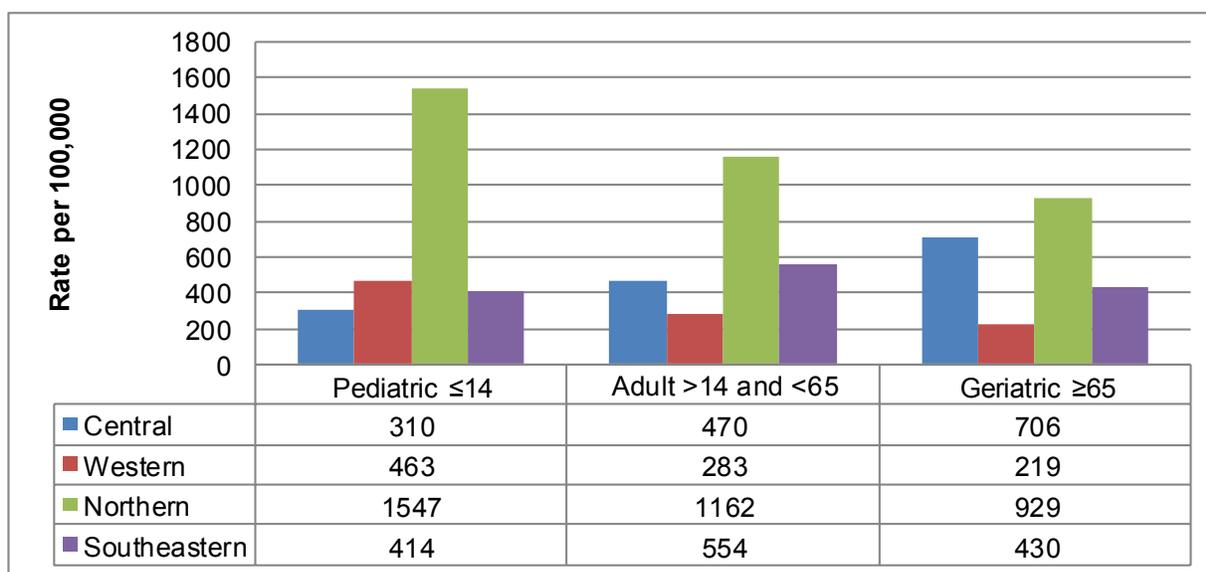
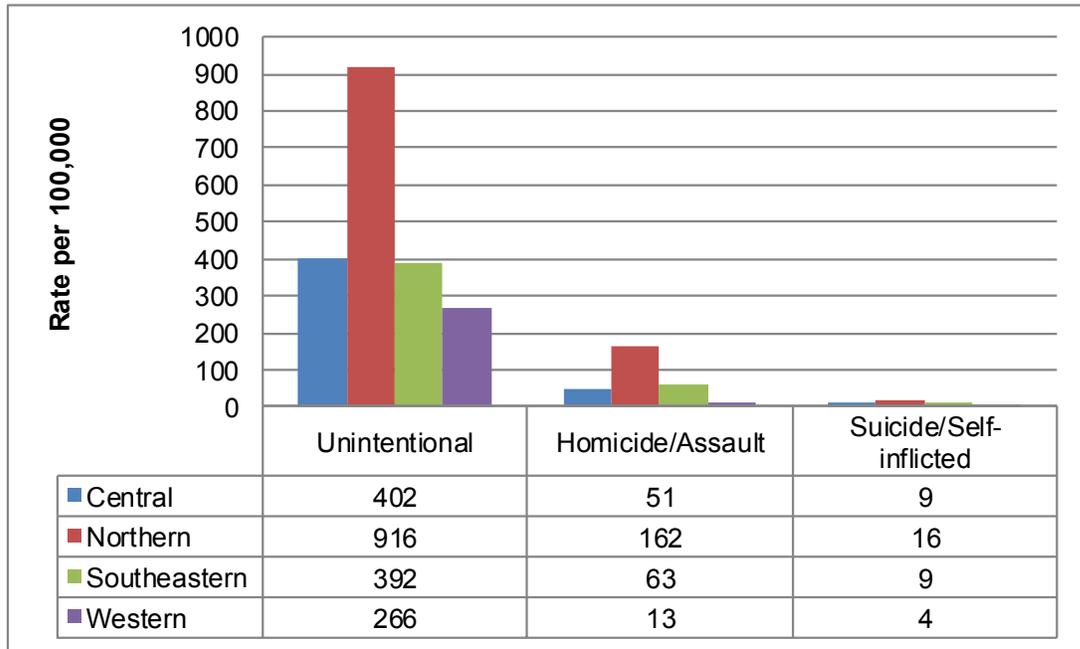


Figure 10 shows the highest trauma rates were in the Northern region regardless of age demographic.

INJURY CHARACTERISTICS: INTENT OF INJURY

Figure 11: Regional trauma rate by intent per 100,000 Arizona residents: ASTR 2013



The rate of unintentional injury was highest in the Northern region of the state. Homicide/assault and suicide/self-inflicted injury rates were also the highest in the Northern region.

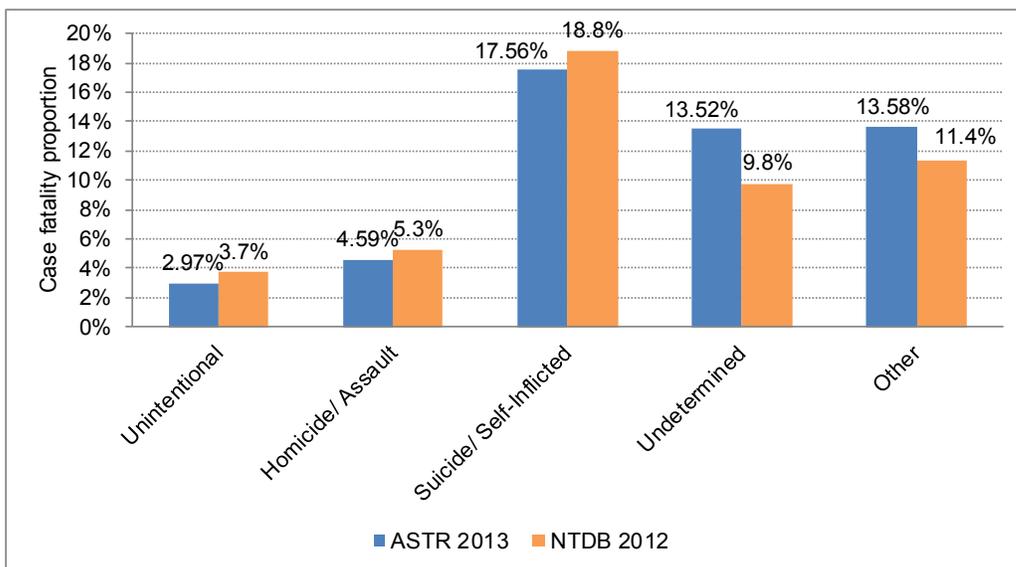
The Western region's trauma rates may be under reported as a previously participating hospital with high volume did not contribute data in 2013.

Table 3: Trauma incidence and case fatality proportion by intent and gender, ASTR 2013

| 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 | 29,319 | 85.54% | 571 | 1.94% | 17,177 | 58.58% | 12,136 | 41.39% |
| Homicide | 3,971 | 11.58% | 127 | 3.19% | 3,234 | 81.44% | 737 | 18.55% |
| Suicide | 601 | 1.75% | 91 | 15.14% | 445 | 74.04% | 156 | 25.95% |
| Undetermined | 276 | 0.8% | 28 | 10.14% | 207 | 75% | 69 | 25% |
| Legal Intervention | 100 | 0.29% | 11 | 11% | 92 | 92% | 8 | 8% |
| Not Applicable Not Documented or Blank | 8 | 0.02% | 0 | 0 | 4 | 50% | 3 | 37.5% |
| Total | 34,275 | 100% | 828 | 2.41% | 21,159 | 61.73% | 13,109 | 38.24% |

Overall, 85.54% of all 2013 trauma records were unintentional injuries, with a case fatality proportion of 1.94%. Suicide/self-inflicted traumas account for 1.75% of the overall, but has a case fatality proportion of 15.14% (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 has been matched to NTDB inclusion criteria. ASTR=Arizona State Trauma Registry, NTDB=National Trauma Data Bank

Figure 12 shows that trauma mortality is lower in Arizona for unintentional, homicide/assault, and suicide/self inflicted when compared to the National Trauma Data Bank (NTDB). Arizona has a higher mortality in “undetermined” and “other.”

Top six mechanisms of injury by intent

Figure 13: Unintentional trauma injury proportion, ASTR 2013 (n=29,319)

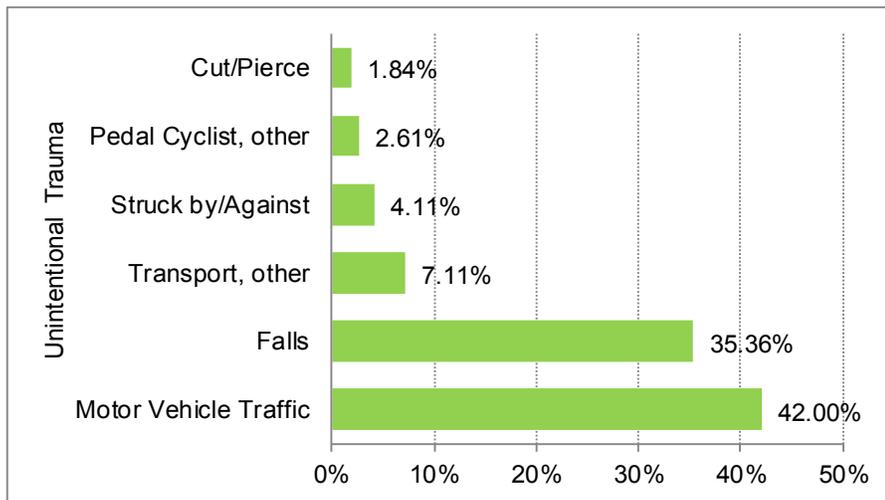


Figure 14: Homicide/assault related trauma proportion, ASTR 2013 (n=3,971)

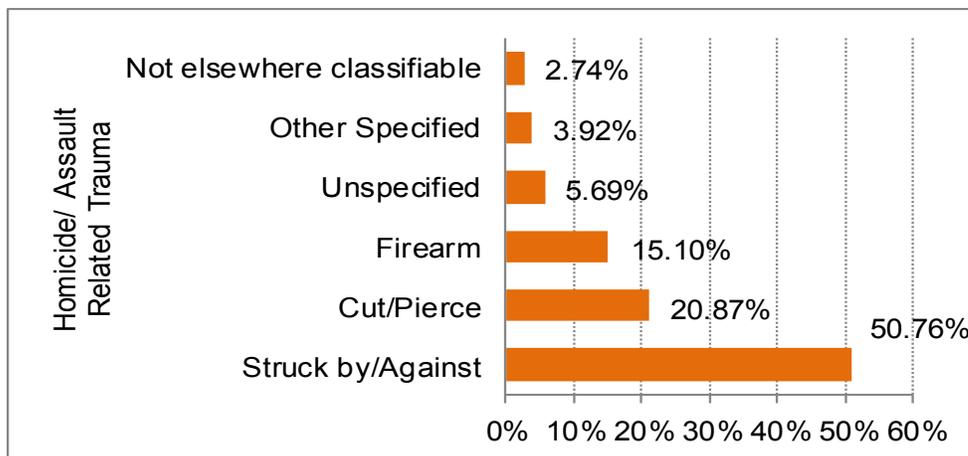
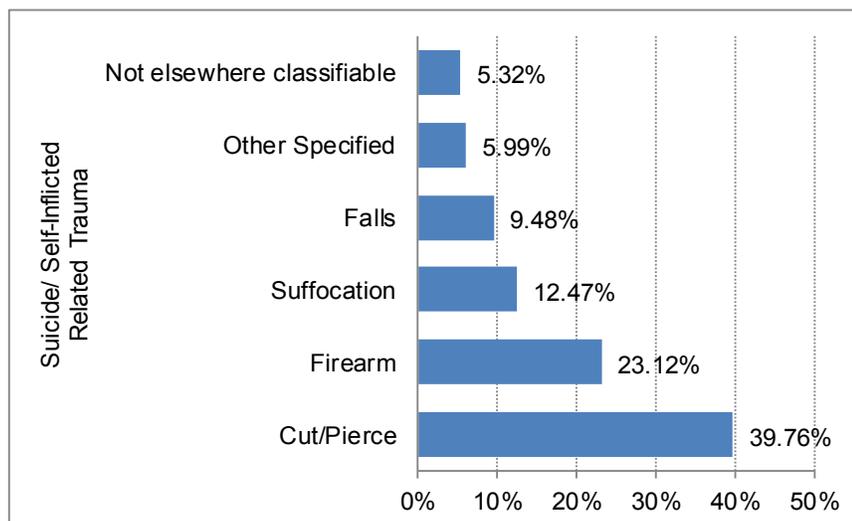


Figure 15: Suicide/Self-inflicted trauma proportion, ASTR 2013 (n=601)



INJURY CHARACTERISTICS: INJURY SEVERITY

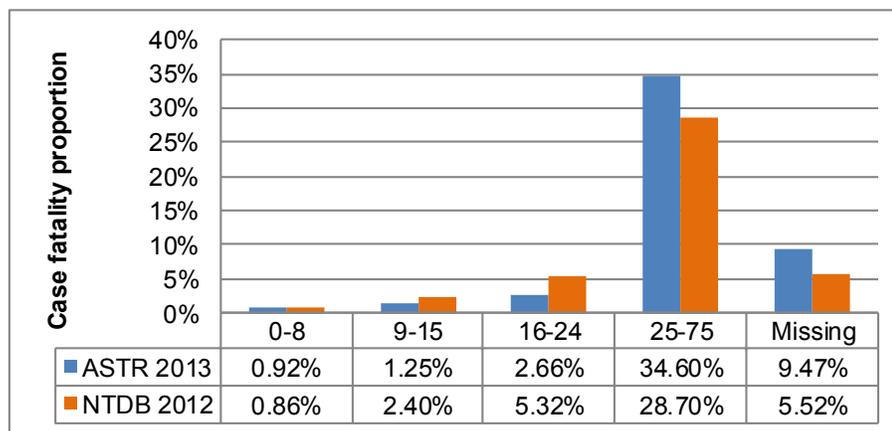
Table 4: Trauma incidence and case fatality proportion by Injury Severity Score (ISS), ASTR 2013

| INCIDENTS AND CASE FATALITY PROPORTION BY INJURY SEVERITY SCORE | | | | |
|---|--------|---------|--------|--------------------|
| Injury Severity Score | Count | Percent | Deaths | Case Fatality Rate |
| 0-8 | 21,802 | 63.6% | 107 | 0.49% |
| 9-15 | 7,175 | 20.93% | 86 | 1.19% |
| 16-24 | 2,605 | 7.6% | 69 | 2.64% |
| 25-75 | 1,582 | 4.61% | 546 | 34.51% |
| Missing | 1,111 | 3.24% | 20 | 1.8% |
| Total | 34,275 | 100% | 828 | 2.41% |

Approximately 5% of trauma patients had an Injury Severity Score (ISS) of ≥ 25 with a case fatality proportion of 35.5% (Table 4). An ISS represents the severity of an injury sustained by a patient. Injuries with an ISS < 15 are minor to moderate, and patients with an ISS over 25 have suffered a severe injury. An ISS is calculated through the use of the ninth revision of the International Classification of Diseases.

In 2013, the case fatality for patients with an ISS > 15 was 37.15%. This number has stayed consistent over the past three years (37.46% in 2010, 37.62% in 2011, and 35.68% in 2012).

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



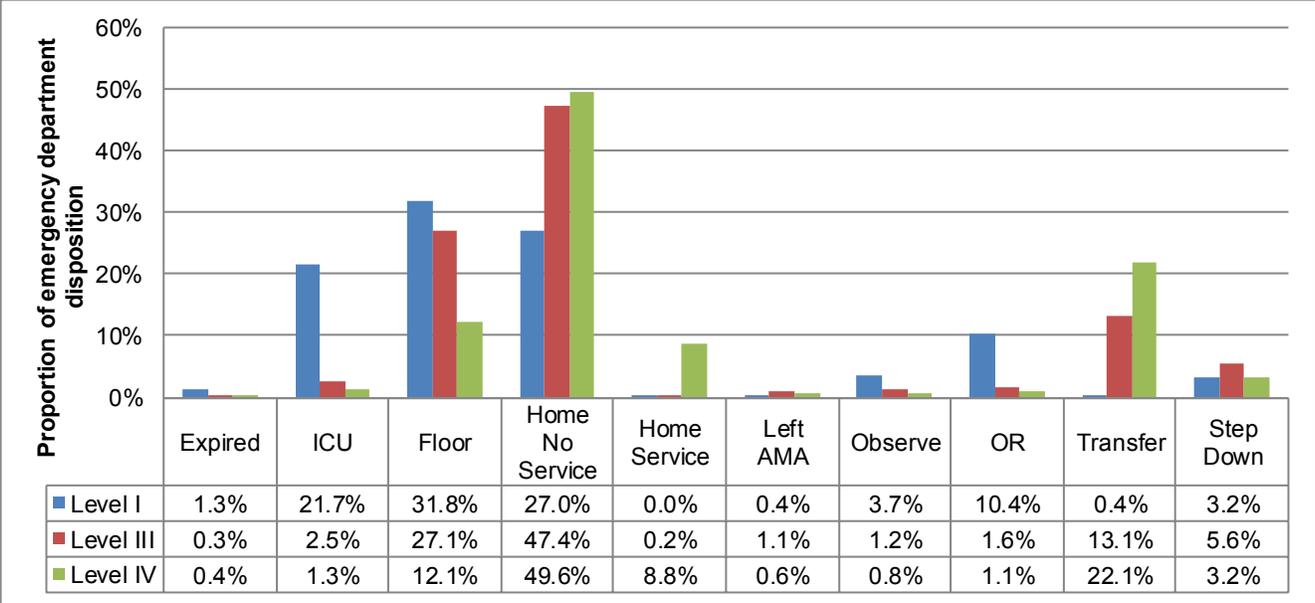
For comparison purposes, ASTR inclusion criteria is matched to NTDB inclusion criteria.

ASTR=Arizona State Trauma Registry, ISS=Injury Severity Score, NTDB=National Trauma Data Bank

Arizona has a slightly lower case fatality proportion for trauma patients with an ISS 16-24, but a higher fatality for patients with an ISS 25-75. Slightly less than 10% of cases had a missing ISS (Figure 16).

OUTCOMES

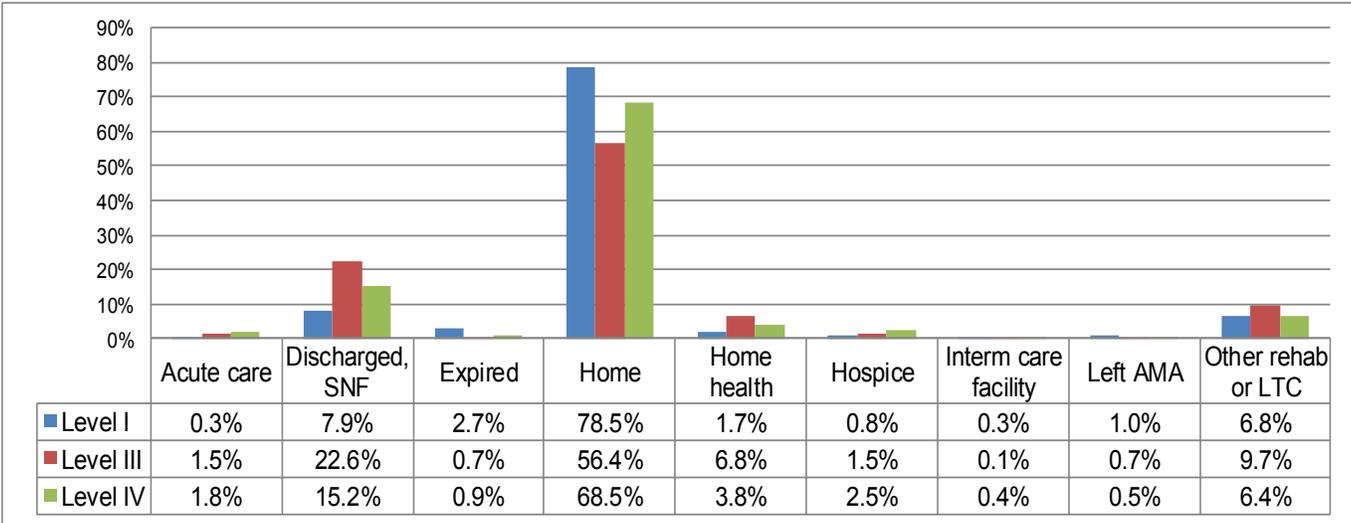
Figure 17: Proportion of emergency department discharge by disposition, ASTR 2013 (n=32,871)



AMA=Against Medical Advice, ICU=Intensive Care Unit, OR=Operating Room

A large portion of trauma patients in Level III and Level IV trauma centers were discharged with no out-patient services/home services from the Emergency Department (ED) (47% and 49.6%, respectively). In Level I trauma centers patients were either discharged home with no out-patient home services (27%), admitted from the ED to the floor of the hospital (31.8%), admitted to the Intensive Care Unit (ICU) (22%), or admitted to the Operating Room (OR)(10%).

Figure 18: Proportion of inpatient discharge by disposition, ASTR 2013 (n=20,304)

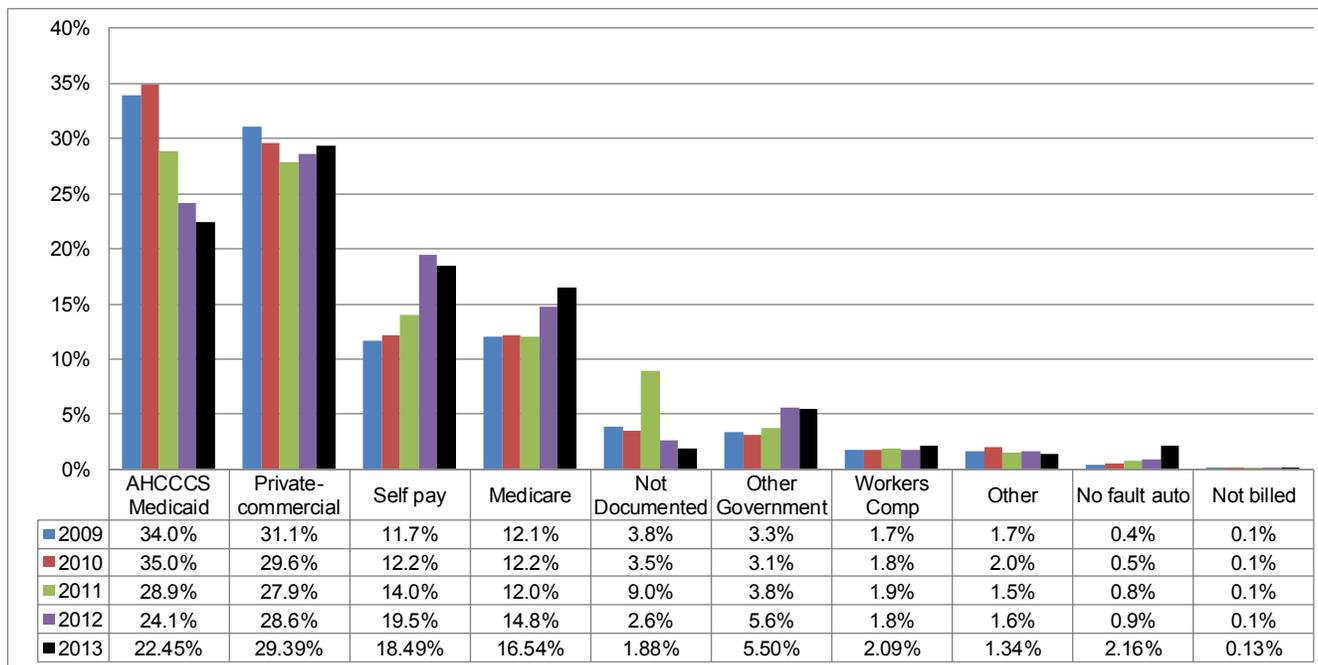


AMA=Against Medical Advice, SNF=Skilled Nursing Facility

Most patients were discharged to their home by all levels of trauma centers. Level III trauma centers discharged more of their patients to skilled nursing facilities (22.6%).

PRIMARY PAYMENT SOURCE AND TOTAL TRAUMA CHARGES

Figure 19: Primary payment source proportion, ASTR 2009-2013



Since 2009, the Arizona Health Care Cost Containment System (AHCCCS) as a primary payment source has decreased while self pay has increased (Figure 19).

Table 5: Primary payer, total charges and reimbursements, ASTR 2013 (n=34,275)

| Primary Payer | Total Charges ^a | Median Charges | Total Reimbursement* |
|-----------------------------|----------------------------|-----------------|----------------------|
| Private - commercial | \$466,788,339 | \$25,527 | \$127,394,700 |
| Self pay | \$294,907,697 | \$26,565 | \$2,401,954 |
| AHCCCS/Medicaid | \$284,985,291 | \$18,980 | \$25,166,234 |
| Medicare | \$264,125,309 | \$28,884 | \$45,303,485 |
| Other Government | \$85,721,469 | \$23,309 | \$9,001,184 |
| Workers Comp | \$40,597,782 | \$29,292 | \$14,350,623 |
| No fault auto | \$21,239,875 | \$15,986 | \$1,956,599 |
| Other | \$17,681,650 | \$21,755 | \$1,954,621 |
| Not documented | \$6,267,602 | \$18,685 | \$335,943 |
| Not billed | \$780,416 | \$10,354 | \$0 |
| Total Charges | \$1,483,095,430 | \$24,144 | \$227,865,343 |

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

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

The median charge to a trauma patient from the hospital was \$24,144. 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 charges and reimbursements, ASTR 2013 (n=34,275)

| Age groups | Total Charges | Median Charges | Total Reimbursement |
|----------------------|------------------------|-----------------|----------------------|
| <15 | \$125,207,093 | \$11,300 | \$22,866,064 |
| 15-19 | \$108,527,236 | \$21,334 | \$16,570,690 |
| 20-44 | \$548,688,718 | \$24,915 | \$67,403,464 |
| 45-64 | \$388,599,926 | \$30,021 | \$66,205,934 |
| 65+ | \$312,067,205 | \$32,912 | \$54,819,190 |
| Total Charges | \$1,483,095,430 | \$24,144 | \$227,865,343 |

The most expensive median charge for trauma treatment was seen in older adults (\$32,912).

Table 7: Charges and reimbursements, by mechanism of injury, ASTR 2013 (n= 34,275)

| Mechanism of Injury | Total Charges | Median Charges | Total Reimbursement |
|----------------------------|------------------------|-----------------|----------------------|
| Falls | \$420,598,075 | \$24,836 | \$77,430,913 |
| MVT - Occupant | \$373,122,548 | \$23,818 | \$51,868,712 |
| MVT - Motorcyclist | \$131,113,758 | \$34,659 | \$22,626,235 |
| Other Transport | \$96,594,594 | \$23,935 | \$16,256,483 |
| Struck by/Against | \$90,045,780 | \$17,965 | \$11,972,612 |
| MVT - Pedestrian | \$82,891,995 | \$33,537 | \$9,740,855 |
| Firearm | \$64,346,537 | \$30,453 | \$6,780,371 |
| Cut/Pierce | \$54,306,696 | \$23,978 | \$5,448,438 |
| Other Specified | \$32,727,688 | \$18,950 | \$5,987,416 |
| MVT - Pedal Cyclist | \$28,630,778 | \$27,680 | \$3,297,654 |
| Other Pedal Cyclist | \$27,767,546 | \$24,527 | \$4,837,490 |
| Not Specified | \$25,291,849 | \$23,422 | \$3,175,484 |
| Other Pedestrian | \$11,910,512 | \$33,977 | \$615,545 |
| MVT - Other | \$9,623,445 | \$17,314 | \$1,548,220 |
| Natural/Environmental | \$9,242,280 | \$17,601 | \$1,802,754 |
| Not elsewhere classifiable | \$8,211,009 | \$18,873 | \$1,174,792 |
| Machinery | \$6,091,848 | \$19,957 | \$1,405,748 |
| Fire/Burn | \$3,308,633 | \$8,357 | \$387,071 |
| Suffocation | \$3,038,526 | \$27,350 | \$434,348 |
| Overexertion | \$2,731,128 | \$9,570 | \$757,420 |
| Drowning | \$618,767 | \$15,374 | \$128,993 |
| Poisoning | \$611,628 | \$32,871 | \$78,199 |
| Missing | \$269,809 | \$24,312 | \$109,591 |
| Total | \$1,483,095,430 | \$24,144 | \$227,865,343 |

Trauma Centers charged \$793 million to treat patients for Falls and Motor Vehicle Traffic (MVT) - Occupant injuries. These two injuries accounted for 56% of reimbursements listed in Figure 19.

From 2012 to 2013, total trauma charges increased by \$157 million while reimbursement decreased by \$61 million.

DRUG AND ALCOHOL USE AND TRAUMA

Of the 28,164 adult patients, 20.49% of patients (5,773) were positive for alcohol and 15.23% of patients (4,290) were positive for drugs. Drug and/or alcohol use includes patients that were confirmed, suspected, or reported to have taken the substance. In 2013, 29.9% of all trauma patients over the age of 14 tested positive for either drug or alcohol use (Table 8).

The pediatric (≤ 14 years) population was excluded from the drug and alcohol analysis.

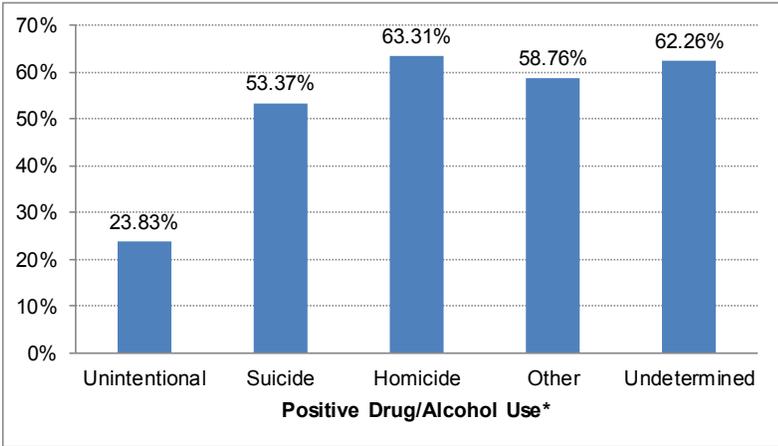
Table 8: Intent of injury and drug and alcohol use*, ASTR 2013

| INTENT OF INJURY AND DRUG ALCOHOL USE (Age >14 YEARS) | | | | |
|---|---------------|-------------|-----------------------|--------------------|
| Injury Intent | Count | Percent | Drug/ Alcohol Use* | Drug/ Alcohol % |
| Unintentional | 23,611 | 83.83% | 5,627 | 23.83% |
| Suicide/ Self-Inflicted | 577 | 2.04% | 308 | 53.37% |
| Homicide/ Assault | 3,661 | 12.99% | 2,318 | 63.31% |
| Other | 97 | 0.34% | 57 | 58.76% |
| Undetermined | 212 | 0.75% | 132 | 62.26% |
| Missing | 6 | 0.02% | 1 | 16.66% |
| Total (Age>14 Years) | 28,164 | 100% | 8,443 | 29.97% |

* Drug and/or alcohol use includes patients with confirmed, suspected, or reported to take either substance.

Traumatic cases that had drug/alcohol indicators over half the time were suicide/self-inflicted (53%), homicide/assault (63%), other (59%), and undetermined (62%).

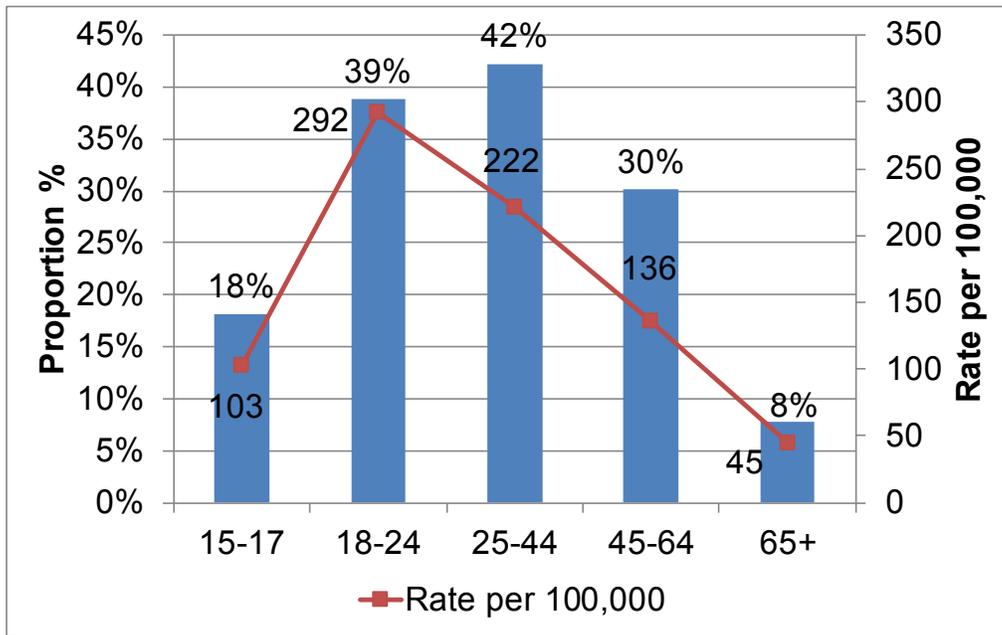
Figure 20: Drug and alcohol use* by intent, ASTR 2013 (n=28,164)



* Drug and/or alcohol use includes patients with confirmed, suspected, or reported to take either substance.

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

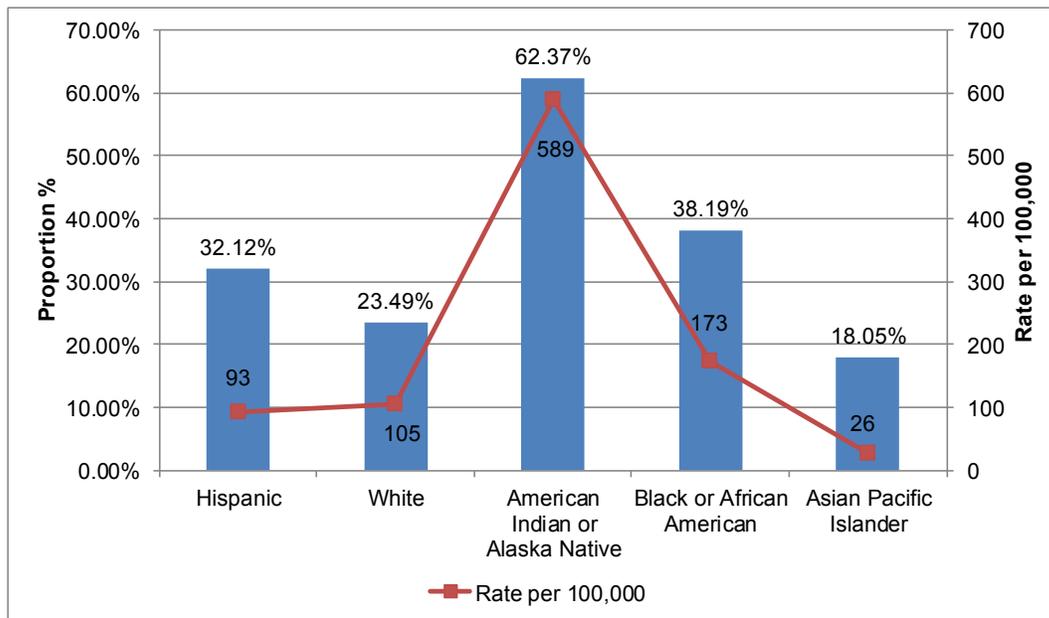
Figure 21: Drug and/or alcohol use* by age, ASTR 2013



* Drug and/or alcohol use includes patients with confirmed, suspected, or reported to take either substance.

In 2013, 39% of trauma cases that involved 18-24 year olds were suspected/confirmed to have alcohol and/or drugs in their system. When the differences in population were standardized, 18-24 year olds were reported to have the highest rate of alcohol or drug use of all groups (292 per 100,000).

Figure 22: Drug and/or alcohol use* by race/ethnicity, ASTR 2013

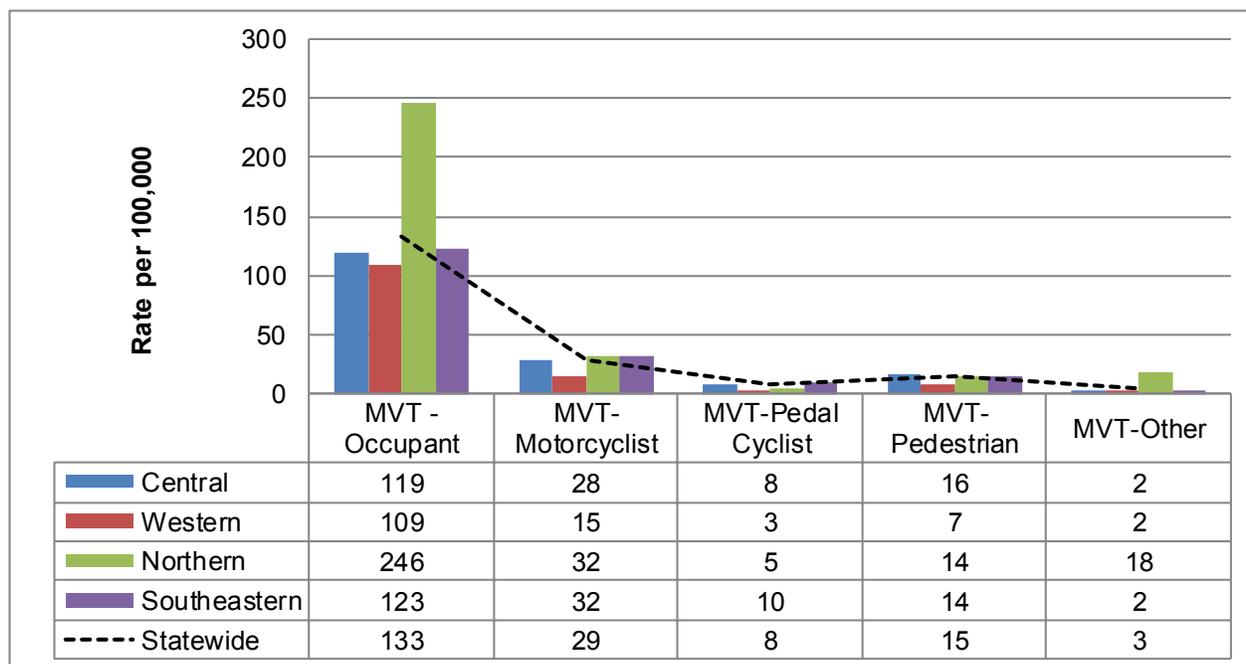


* Drug and/or alcohol use includes patients with confirmed, suspected, or reported to take either substance.

Figure 22 shows that 62% (1,909) of American Indian/Alaska Native trauma patients were under the influence of drugs and/or alcohol. However, the largest volume of trauma patients under the influence of drugs and/or alcohol were White (4,025).

MOTOR VEHICLE TRAFFIC RELATED TRAUMA

Figure 23: Motor vehicle traffic related trauma rate per 100,000 by region, ASTR 2013



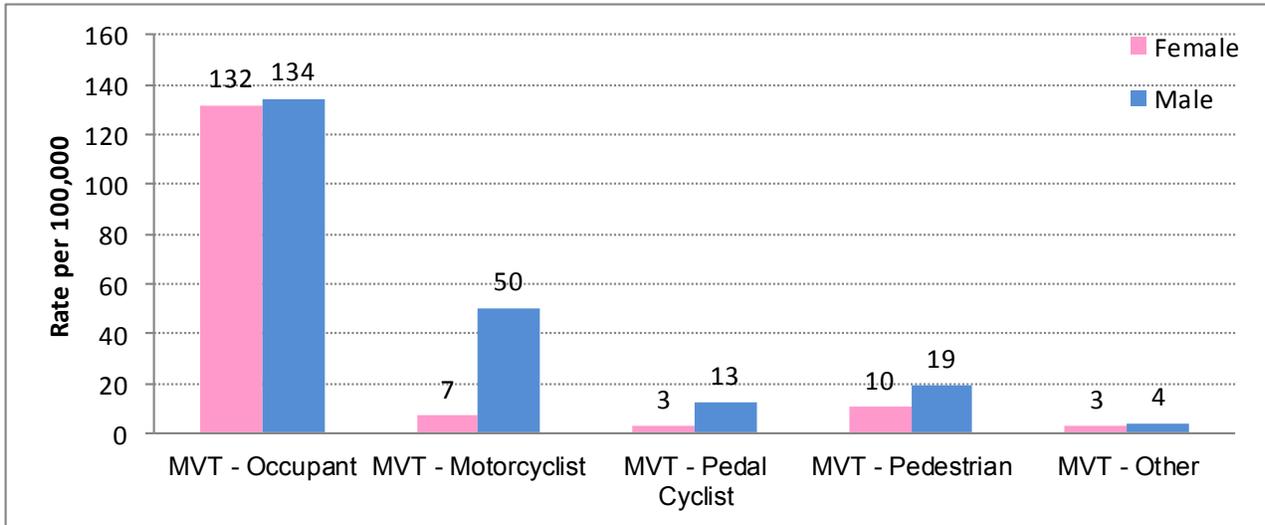
Although the Central Region had the highest volume of injured MVT-occupant, it reported the lowest rate per 100,000 residents. The Western region is thought to be under reported as a previously reporting hospital with high volumes did not report in 2013. The Northern Region had the highest motor vehicle traffic trauma per 100,000 residents (Figure 23).

Table 9: Motor vehicle traffic related trauma incidence and case fatality proportion, ASTR 2013

| INCIDENCE AND CASE FATALITY PROPORTION BY TYPES OF MVT | | | | |
|--|---------------|-------------|------------|--------------------------|
| Motor Vehicle Traffic Accidents | Count | Percent | Deaths | Case Fatality proportion |
| MVT - Occupant | 8,744 | 70.8% | 166 | 1.89% |
| MVT - Motorcyclist | 1,881 | 15.23% | 85 | 4.51% |
| MVT - Pedal Cyclist | 516 | 4.17% | 15 | 2.9% |
| MVT - Pedestrian | 978 | 7.91% | 88 | 8.99% |
| MVT - Other | 230 | 1.86% | 6 | 2.6% |
| Total | 12,349 | 100% | 360 | 2.91% |

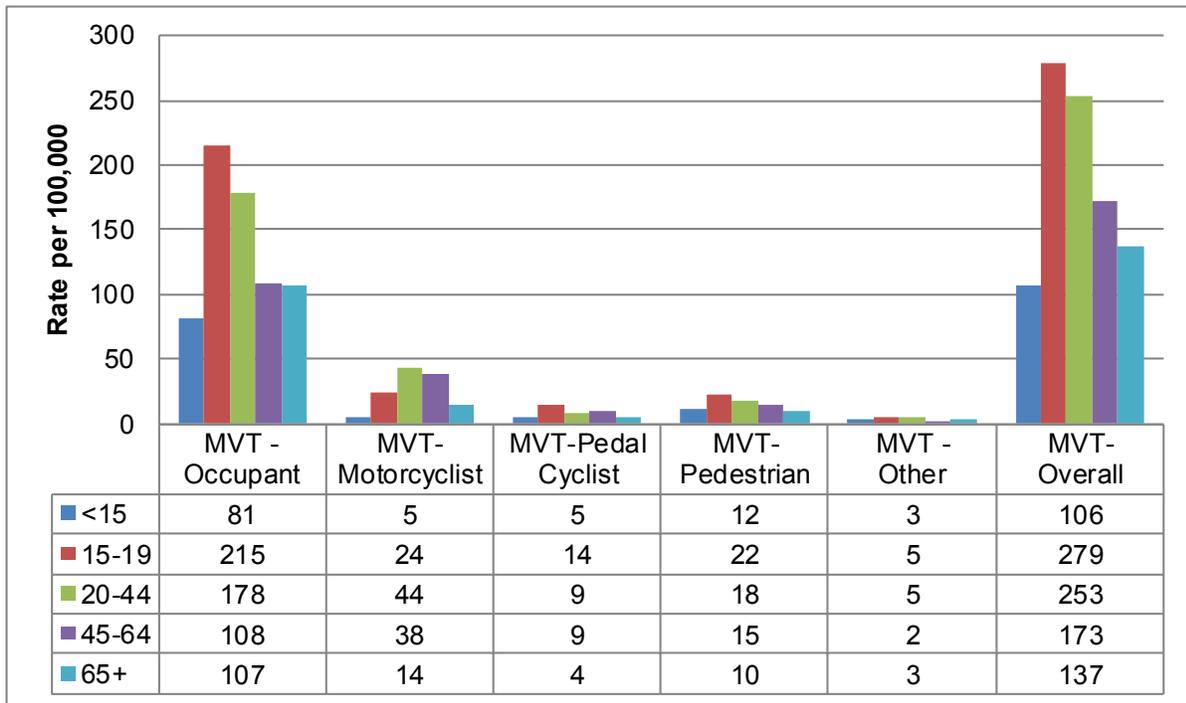
Table 9 describes the types of MVT related trauma and case fatality proportion. Of the 34,275 trauma cases, 36% (12,349) were from motor vehicle traffic related trauma. The highest case fatality proportion is among pedestrians involved in MVT related trauma (8.99%).

Figure 24: Motor vehicle traffic related trauma rates per 100,000 Arizona residents by gender, ASTR 2013



There was no gender difference found for injured MVT-occupant. 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 2013



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

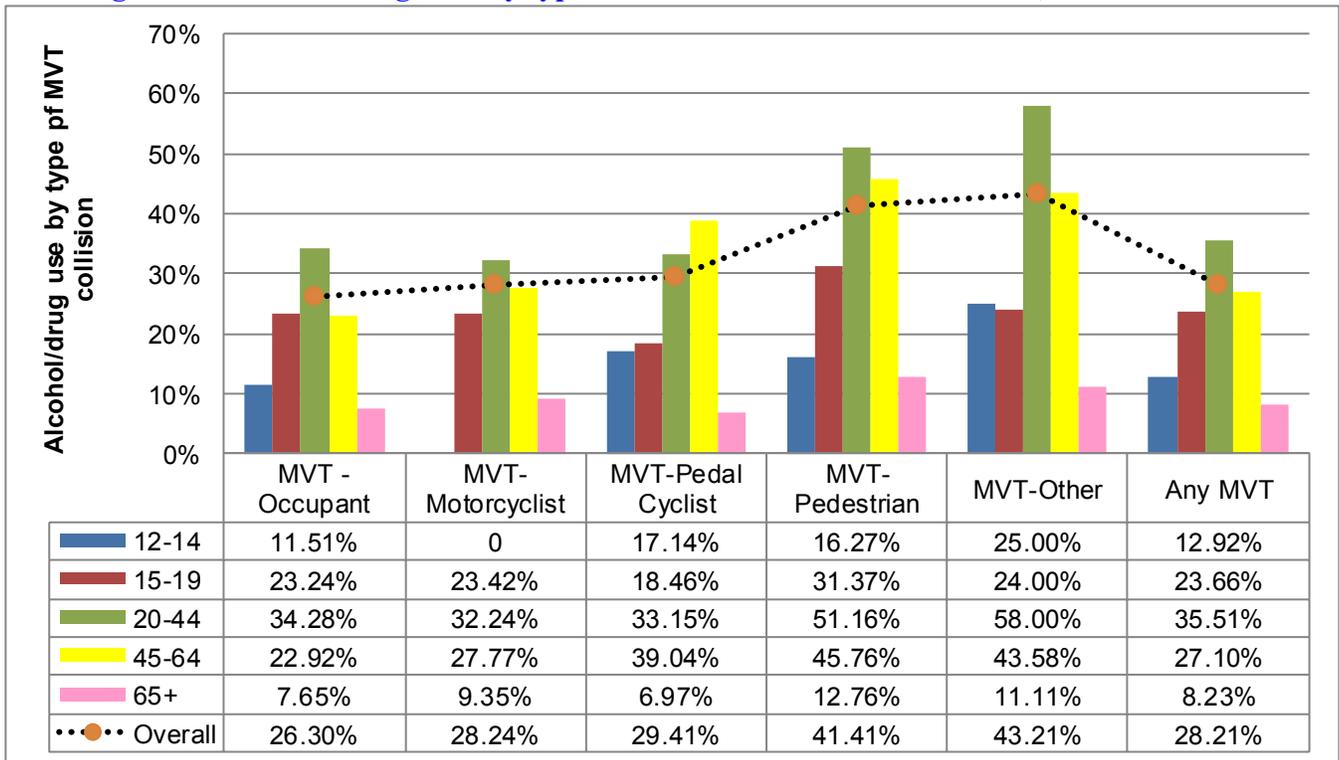
Table 10: Alcohol/drug use* by types of motor vehicle traffic collisions, ASTR 2013

| INCIDENCE AND CASE FATALITY PROPORTION BY TYPES OF MVT | | | | | | | | | | | | |
|--|--------------|--------------|------------------|---------------|-------------------|---------------|----------------|---------------|-----------|---------------|--------------|---------------|
| Age groups | MVT-Occupant | | MVT-Motorcyclist | | MVT-Pedal Cyclist | | MVT-Pedestrian | | MVT-Other | | Any MVT | |
| | N | % | N | % | N | % | N | % | N | % | N | % |
| 12-14 | 19 | 11.51% | 0 | 0 | 6 | 17.14% | 7 | 16.27% | 2 | 25% | 34 | 12.92% |
| 15-19 | 235 | 23.24% | 26 | 23.42% | 12 | 18.46% | 32 | 31.37% | 6 | 24% | 311 | 23.66% |
| 20-44 | 1,324 | 34.28% | 305 | 32.24% | 62 | 33.15% | 198 | 51.16% | 58 | 58% | 1,947 | 35.51% |
| 45-64 | 395 | 22.92% | 170 | 27.77% | 57 | 39.04% | 108 | 45.76% | 17 | 43.58% | 747 | 27.1% |
| 65+ | 80 | 7.65% | 13 | 9.35% | 3 | 6.97% | 12 | 12.76% | 3 | 11.11% | 111 | 8.23% |
| Overall | 2,053 | 26.3% | 514 | 28.24% | 140 | 29.41% | 357 | 41.41% | 86 | 43.21% | 3,150 | 28.21% |

* Drug and/or alcohol use includes patients with confirmed, suspected, or reported to take either substance.

For all MVT related traumas except MVT-pedal cyclist, 20-44 year olds have the highest proportion of alcohol/drug use compared to any other age group. In 2013, 35% of the 20-44 age group had used alcohol or drugs at the time of their trauma.

Figure 26: Alcohol/drug use* by types of motor vehicle traffic collision, ASTR 2013

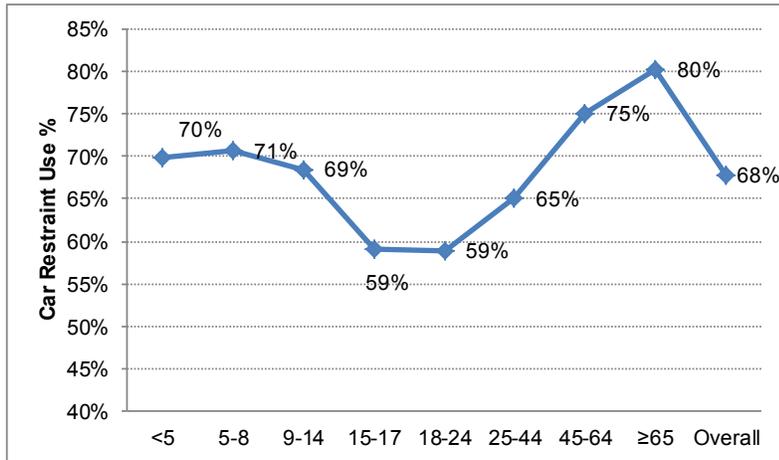


* Drug and/or alcohol use includes patients with confirmed, suspected, or reported to take either substance.

Overall, one in four MVT-occupants or MVT-motorcyclists involved in a collision were confirmed or suspected for using alcohol/drug (Table 10 and Figure 26). This number remained unchanged from last year.

PROTECTIVE DEVICE USE

Figure 27: Age-specific proportion of car restraint use, ASTR 2013 (n=8,774)



Of the 8,744 MVT injured occupants, 68% used a car seat or seat belt (restraint). Motor vehicle occupants ages 15-17 and 18-24 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 (n=1,881) and pedal cyclist (n= 1,284) for adult vs. pediatric, ASTR 2013

Of the 1,881 MVT motorcyclists who suffered a trauma, 48.7% used a helmet. Of the 1,284 traffic and non-traffic pedal cycle trauma, slightly more than a quarter used a helmet.

Of the 319 pediatric (<18 years) pedal cyclists involved in a trauma, only 14.7% used a helmet (Figure 28).

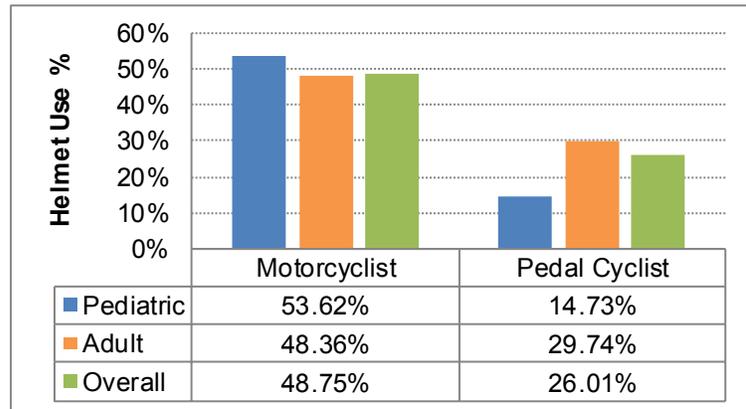
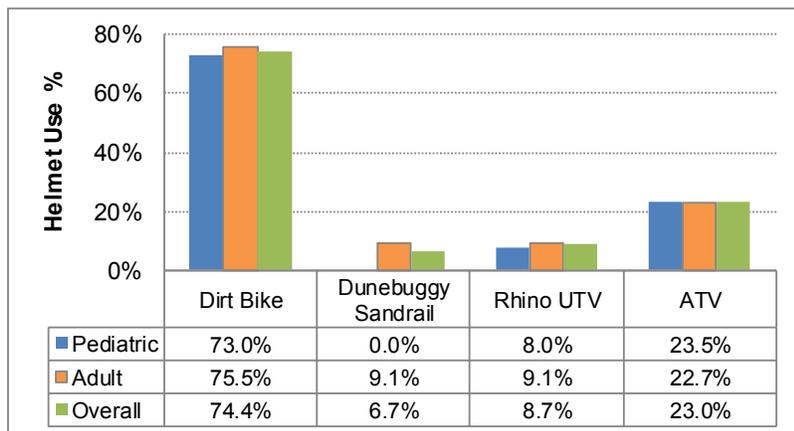


Figure 29: Rate of helmet use for select off road vehicles for adult vs. pediatric, ASTR 2013 (n=868)



Out of the 180 dirt bike injuries, 74 (41.1%) cases involved pediatric cases (<18 years). There were no pediatric cases involved in the 15 dunebuggy/sandrail injuries. The 69 rhino/UTV injuries had 25 (36%) pediatric cases. Lastly, 36% ATV trauma injuries involved pediatric cases.

Only 23% of patients injured on an ATV were wearing a helmet; whereas, 74.4% 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 2013 (n=8,384)

| TBI INCIDENCES AND CASE FATALITY PROPORTION BY AGE | | | | | | | | |
|--|--------------|-------------|------------|--------------------------|--------------------|-------------|-----------|--------------------------|
| Age groups | Major TBI | | | | Minor/Moderate TBI | | | |
| | Count | Percent | Deaths | Case Fatality Proportion | Count | Percent | Deaths | Case Fatality Proportion |
| <1 | 247 | 5.8% | 7 | 2.83% | 287 | 6.95% | 0 | 0 |
| 1-4 | 136 | 3.19% | 14 | 10.29% | 159 | 3.85% | 0 | 0 |
| 5-9 | 93 | 2.18% | 6 | 6.45% | 121 | 2.93% | 1 | 0.82% |
| 10-14 | 98 | 2.3% | 10 | 10.2% | 234 | 5.67% | 0 | 0 |
| 15-19 | 255 | 5.98% | 31 | 12.15% | 486 | 11.77% | 0 | 0 |
| 20-24 | 276 | 6.48% | 40 | 14.49% | 450 | 10.9% | 0 | 0 |
| 25-34 | 508 | 11.93% | 76 | 14.96% | 642 | 15.55% | 0 | 0 |
| 35-44 | 397 | 9.32% | 56 | 14.1% | 463 | 11.22% | 0 | 0 |
| 45-54 | 510 | 11.97% | 61 | 11.96% | 480 | 11.63% | 0 | 0 |
| 55-64 | 524 | 12.3% | 65 | 12.4% | 303 | 7.34% | 1 | 0.33% |
| 65-74 | 433 | 10.16% | 38 | 8.77% | 238 | 5.76% | 2 | 0.84% |
| 75-84 | 458 | 10.75% | 41 | 8.95% | 159 | 3.85% | 1 | 0.62% |
| ≥85 | 323 | 7.58% | 22 | 6.81% | 104 | 2.52% | 5 | 4.80% |
| Overall | 4,258 | 100% | 467 | 10.96% | 4,126 | 100% | 10 | 0.24% |

Major TBI is equivalent to Type I of the Barell Matrix or AIS code with head injury severity ≥ 3 . Moderate and minor TBI are equivalent to Type II and Type III of the Barell Matrix respectively. A total of 4,258 major TBI cases, and 4,126 minor/moderate TBI cases were treated in an ASTR reporting hospital in 2013. The case fatality proportion among major TBI cases is 10.96% (Table 11). The highest case fatality proportion was among 25-34 years for major TBI (14.9%), followed by the 35-44 years group (14.1%) (Figure 30).

Figure 30: TBI case fatality by age

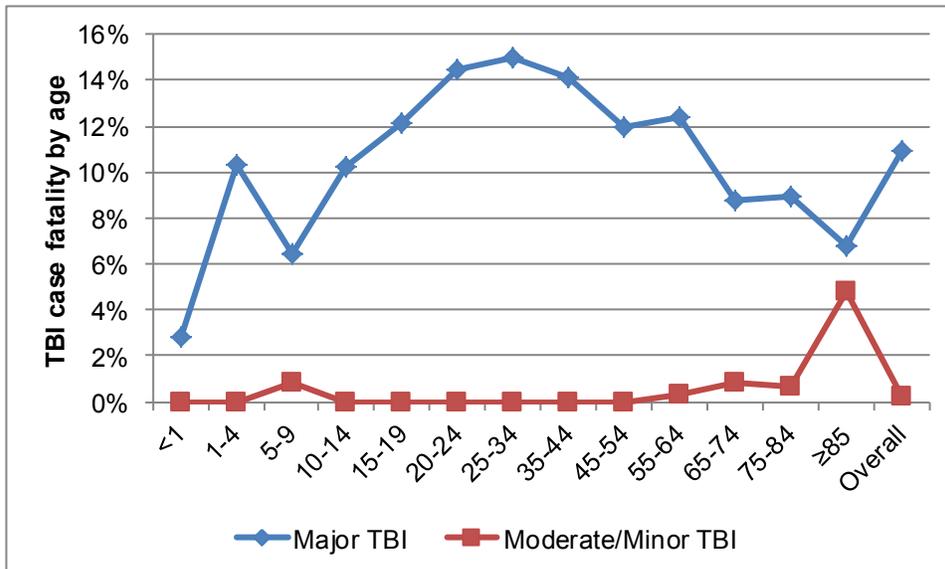


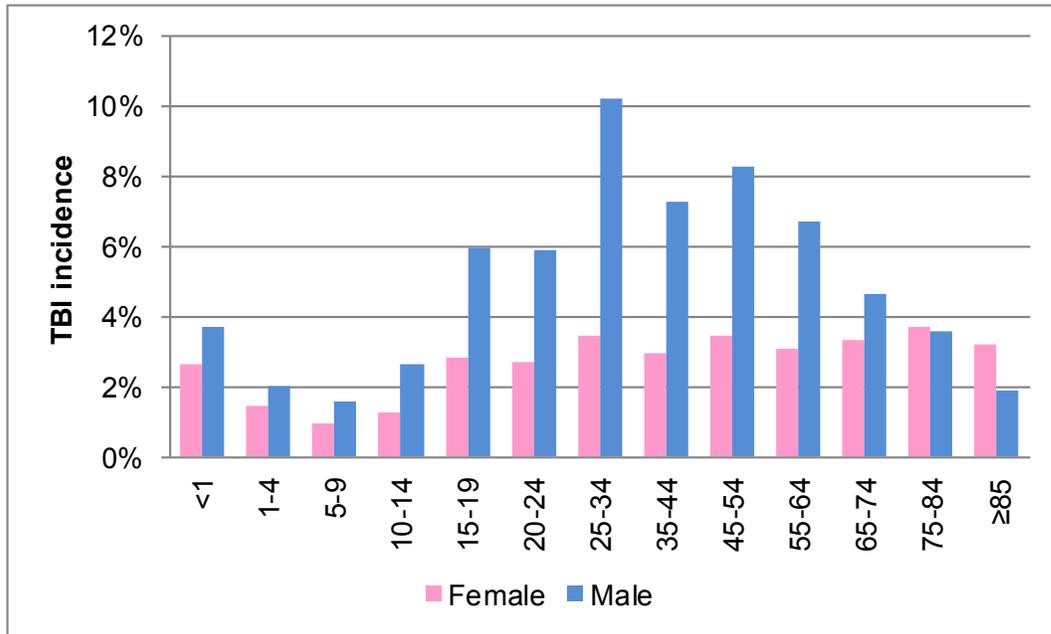
Table 12: Age-specific TBI incidence and case fatality proportion by ED GCS score, ASTR 2013 (n=8,301)

| TBI INCIDENCES AND CASE FATALITY PROPORTION BY GCS | | | | | | | | | | | | |
|---|------------------|----------------|---------------|---------------------------------|-----------------|----------------|---------------|---------------------------------|------------------|----------------|---------------|---------------------------------|
| Age groups | GCS 13-15 | | | | GCS 9-12 | | | | GCS <9 | | | |
| | Count | Percent | Deaths | Case Fatality Proportion | Count | Percent | Deaths | Case Fatality Proportion | Count | Percent | Deaths | Case Fatality Proportion |
| <1 | 460 | 6.63% | 1 | 0.21% | 14 | 4.11% | 1 | 7.14% | 26 | 2.52% | 5 | 19.23% |
| 1-4 | 244 | 3.52% | 0 | 0 | 17 | 5% | 0 | 0 | 30 | 2.91% | 14 | 46.66% |
| 5-9 | 181 | 2.61% | 0 | 0 | 7 | 2.05% | 1 | 14.28% | 24 | 2.33% | 6 | 25.00% |
| 10-14 | 297 | 4.28% | 0 | 0 | 8 | 2.35% | 1 | 12.5% | 26 | 2.52% | 9 | 34.61% |
| 15-19 | 633 | 9.13% | 0 | 0 | 21 | 6.17% | 1 | 4.76% | 83 | 8.05% | 30 | 36.14% |
| 20-24 | 587 | 8.46% | 0 | 0 | 26 | 7.64% | 1 | 3.84% | 110 | 10.67% | 39 | 35.45% |
| 25-34 | 904 | 13.04% | 0 | 0 | 42 | 12.35% | 1 | 2.38% | 194 | 18.83% | 75 | 38.65% |
| 35-44 | 680 | 9.81% | 2 | 0.29% | 42 | 12.35% | 3 | 7.14% | 133 | 12.91% | 51 | 38.34% |
| 45-54 | 793 | 11.44% | 3 | 0.37% | 53 | 15.58% | 1 | 1.88% | 137 | 13.3% | 57 | 41.60% |
| 55-64 | 659 | 9.50% | 6 | 0.91% | 42 | 12.35% | 4 | 9.52% | 123 | 11.94% | 56 | 45.52% |
| 65-74 | 583 | 8.41% | 4 | 0.68% | 20 | 5.88% | 2 | 10% | 63 | 6.11% | 34 | 53.96% |
| 75-84 | 530 | 7.64% | 11 | 2.07% | 26 | 7.64% | 2 | 7.69% | 60 | 5.82% | 29 | 48.33% |
| ≥85 | 380 | 5.48% | 12 | 3.15% | 22 | 6.47% | 2 | 9.09% | 21 | 2.03% | 13 | 61.90% |
| Overall | 6,931 | 100% | 39 | 0.56% | 340 | 100% | 20 | 5.88% | 1,030 | 100% | 418 | 40.58% |

ED= Emergency Department, GCS= Glasgow Coma Score, TBI=Traumatic Brain Injury

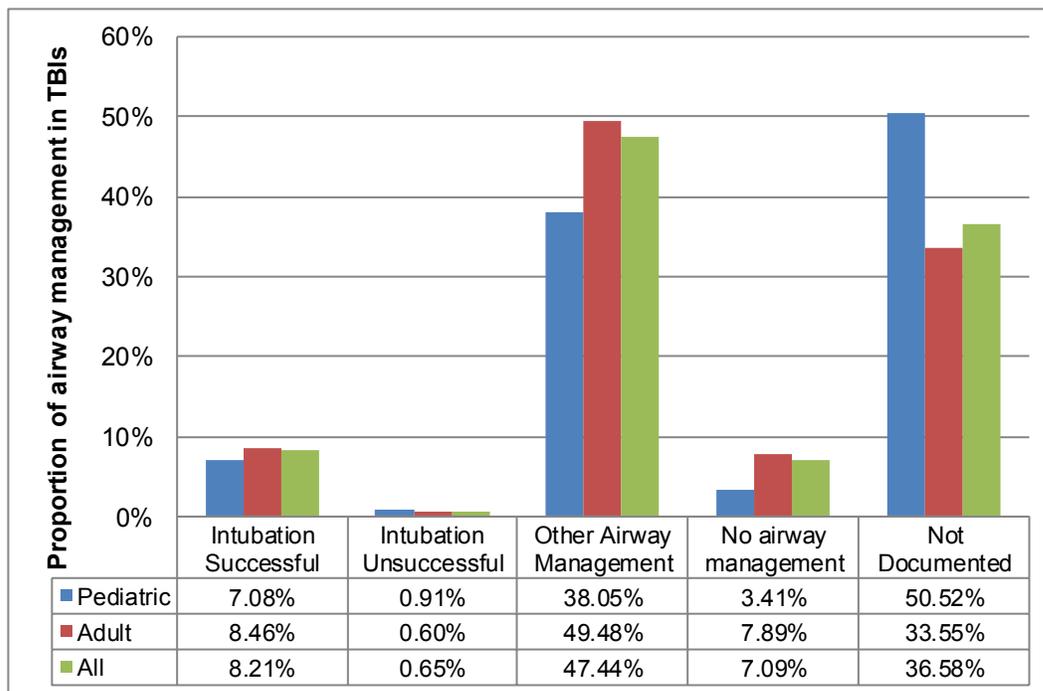
Table 12 shows distribution of TBI incidence and case fatality proportion by ED Glasgow Coma Score (GCS) and age. Overall mortality for the GCS<9 group was 40.58% and within this group, patients ≥85 year-old had the highest case fatality proportion. GCS information was missing in 74 TBI cases and were excluded from Table 12.

Figure 31: TBI incidence by age and gender, ASTR 2013, (n=8,384)



Males make up more TBI cases than females in every age group except for the ≥ 75 year age group (Figure 31).

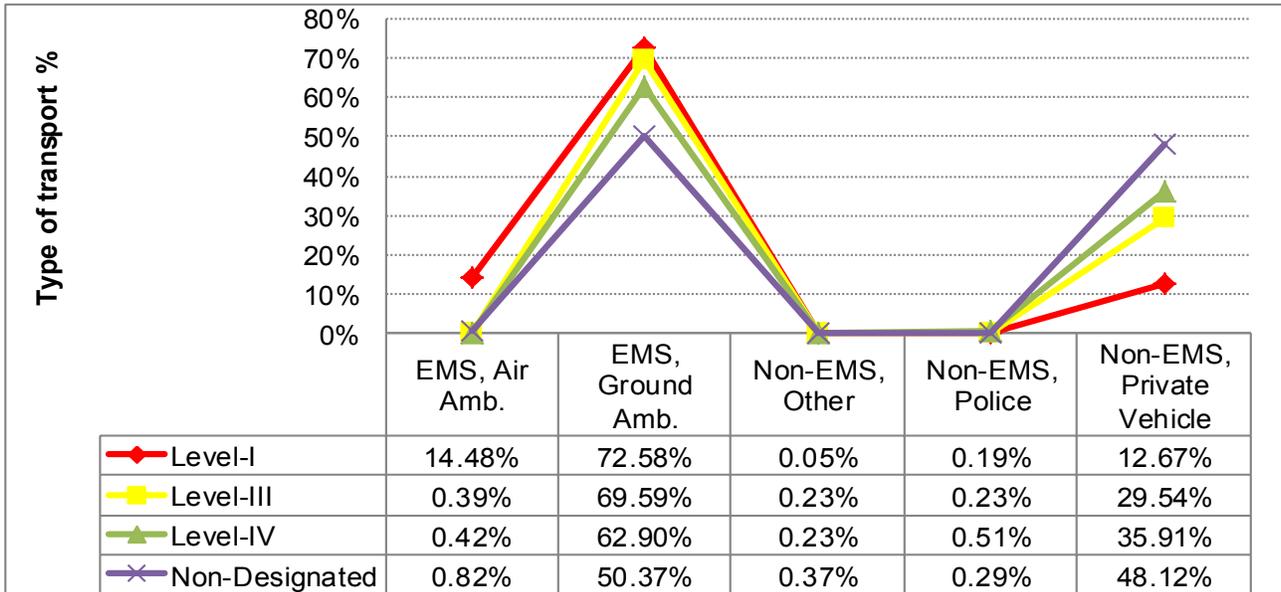
Figure 32: Field airway management among major TBI patients, ASTR 2013 (n=4,258)



Of the 762 pediatric (< 19 years) major TBI cases, 7% (54) received successful intubation. Overall 8% of the major TBI cases received successful intubation, 47% received other types of airway management (ex: auto-ventilator, bag valve mask , etc.), 7% did not receive any airway management and in 37% of the cases, airway management was not documented (Figure 32).

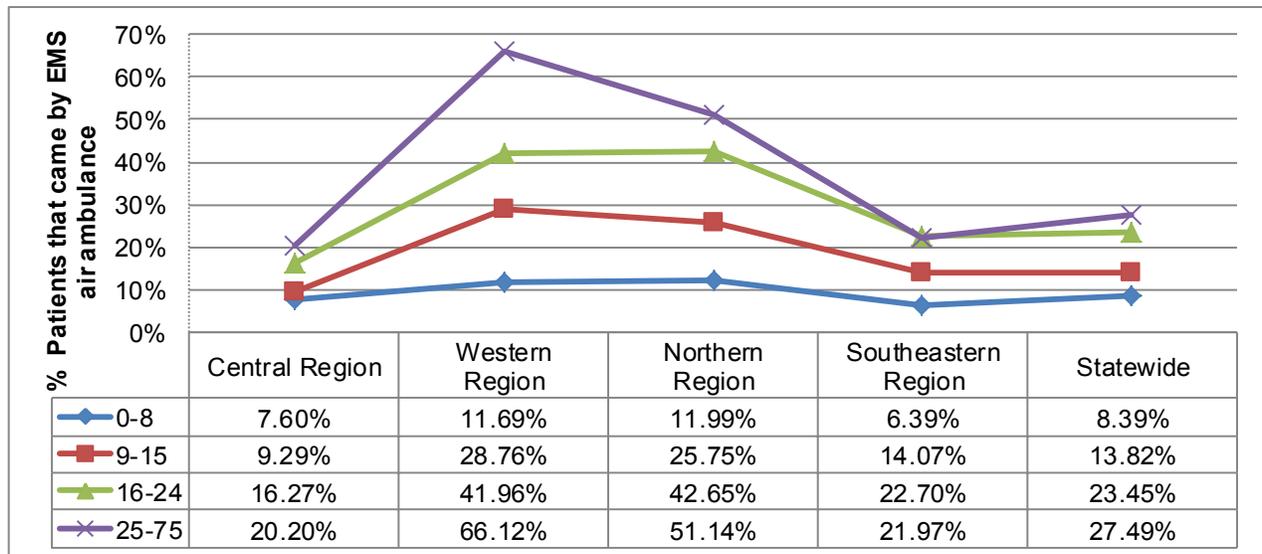
TYPE OF TRANSPORT

Figure 33: Mode of transport into reporting hospital, ASTR 2013



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 2013



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

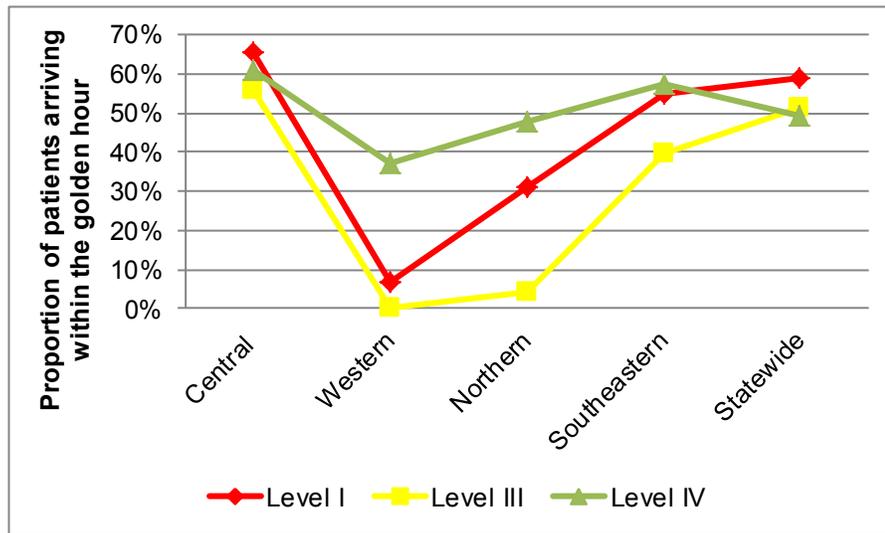
The golden hour report examines whether a patient arrived at a designated trauma center within one hour from the time of injury. Non-designated trauma centers and inter-facility transfers to a trauma center were not included in this analysis. The golden hour cannot be calculated for patients with a missing time of injury. Injury date/time was missing for approximately 27.4% (7,450) of patients transported to any trauma center; these cases were excluded from the analysis.

Table 13: Proportion of patients arriving within the Golden Hour by region, ASTR 2013

| 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 | 10,909 | 6,931 | 63.53% | 6,023 | 35.57% |
| Western | 777 | 270 | 34.74% | 235 | 23.22% |
| Northern | 3,580 | 1,489 | 41.59% | 801 | 18.28% |
| Southeastern | 4,469 | 2,344 | 52.45% | 391 | 8.04% |
| Statewide | 19,735 | 11,034 | 55.91% | 7,450 | 27.40% |
| Median Golden Hour | | | | | |
| | Total Patients Analyzed | 25th Percentile (hours) | Median (hours) | 75th Percentile (hours) | |
| Central | 10,909 | 0.6 | 0.9 | 1.3 | |
| Western | 777 | 0.8 | 1.4 | 2 | |
| Northern | 3,580 | 0.7 | 1.2 | 2 | |
| Southeastern | 4,469 | 0.7 | 1 | 1.5 | |
| Statewide | 19,735 | 0.7 | 0.9 | 1.5 | |

Of the 19,735 analyzed patients who arrived at a designated trauma center, 55.91% arrived within the golden hour. More patients (63.53%) 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 2013 (n=19,735)



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 2013

| 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 | % | N | % |
| Central | 10,909 | 5,331 | 65.59% | 1,091 | 56.09% | 509 | 60.81% |
| Western | 777 | 4 | 6.77% | 0 | 0 | 266 | 37.09% |
| Northern | 3,580 | 410 | 31.32% | 1 | 4.34% | 1,078 | 47.95% |
| Southeastern | 4,469 | 1,858 | 54.75% | 292 | 39.56% | 194 | 57.39% |
| Statewide | 19,735 | 7,603 | 58.99% | 1,384 | 51.12% | 2,047 | 49.44% |

Table 15: Golden hour by county of injury, ASTR 2013

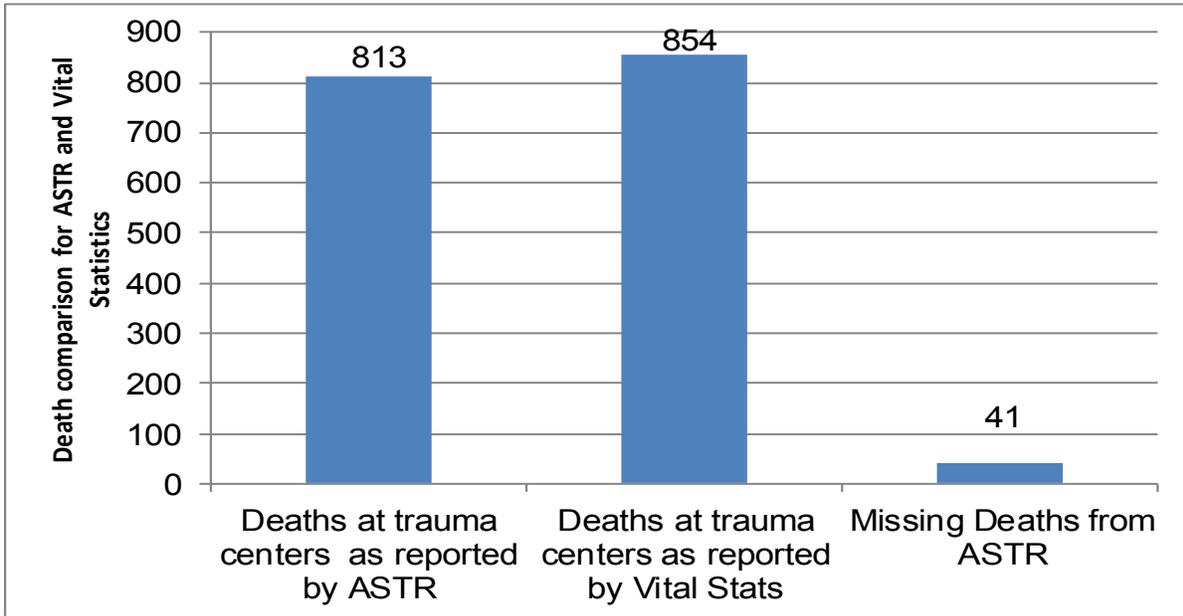
| GOLDEN HOUR BY COUNTY OF INJURY | | | | | |
|--|--------------------------------|-----------------|----------|--|----------|
| County of Injury | Total Patients Analyzed | ≤ 1 Hour | | Patients excluded due to missing data | |
| | | N | % | N | % |
| Maricopa | 9,586 | 6,492 | 67.72% | 5,464 | 36.30% |
| Pima | 3,795 | 2,122 | 55.91% | 245 | 6.06% |
| Coconino | 1,642 | 792 | 48.23% | 280 | 14.56% |
| Apache | 848 | 398 | 46.93% | 258 | 23.32% |
| Cochise | 515 | 208 | 40.38% | 131 | 20.27% |
| Pinal | 1,076 | 402 | 37.36% | 482 | 30.93% |
| Mohave | 670 | 238 | 35.52% | 175 | 20.71% |
| Navajo | 510 | 167 | 32.74% | 98 | 16.11% |
| La Paz | 90 | 29 | 32.22% | 43 | 32.33% |
| Yavapai | 580 | 132 | 22.75% | 165 | 22.14% |
| Yuma | 17 | 3 | 17.64% | 17 | 50.00% |
| Gila | 247 | 37 | 14.97% | 79 | 24.23% |
| Santa Cruz | 89 | 12 | 13.48% | 5 | 5.31% |
| Graham | 52 | 2 | 3.84% | 9 | 14.75% |
| Greenlee | 18 | 0 | 0 | 1 | 5.26% |
| Statewide | 19,735 | 11,034 | 55.91% | 7,452 | 27.41% |

The Golden Hour is not the only important measure for trauma patients. Ensuring that patients make it into the organized trauma system is vital, even if it takes more than 60 minutes. Additional trauma centers in rural Arizona will improve access to the trauma system.

DEATHS

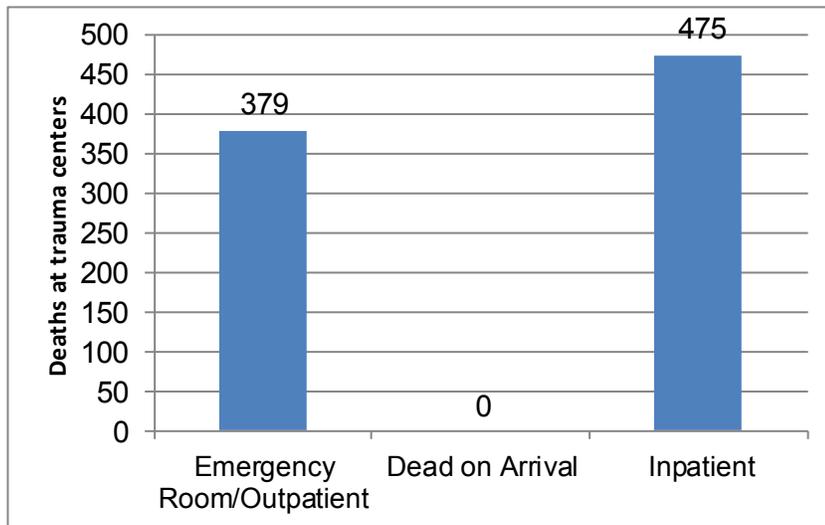
Understanding the number of deaths occurring in Arizona will help the trauma system in treatment and prevention efforts. The Vital Statistics registry was compared to the ASTR for data consistency and injury deaths occurring outside of the state's trauma centers.

Figure 36: Reported deaths comparison, ASTR 2013 and Vital Statistics 2013



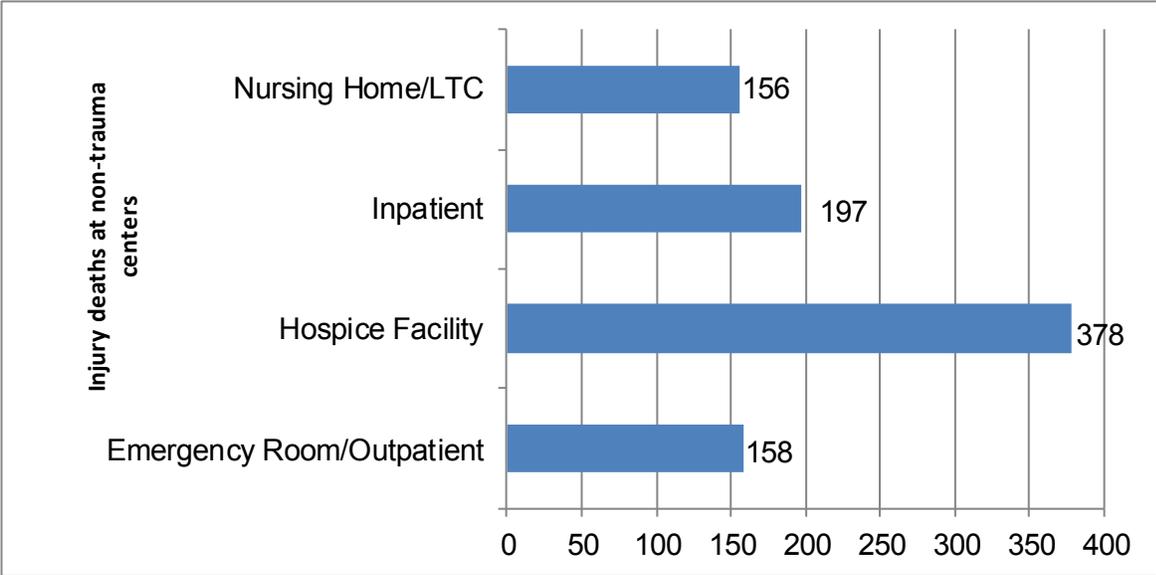
The Vital Statistics registry was queried to find injury deaths that occurred at a trauma center during their designation period. In 2013, facilities reported that 813 deaths occurred. At the same time, the Vital Statistics registry reported 854 deaths at trauma centers (Figure 36). Arizona's trauma centers failed to report 41 injury related deaths through the ASTR.

Figure 37: Number of deaths at trauma centers, Vital Statistics 2013 (n=854)



Of the 854 deaths that were reported by the Vital Statistics registry, 44% occurred in the Emergency Department. Trauma centers failed to report any patients that were dead on arrival through the deceased's death certificate. For 2012, 2011, and 2010 trauma centers reported 3, 7, and 4 patients that were dead on arrival, respectively.

Figure 38: Injury deaths in non-trauma center hospitals, Vital Statistics 2013 (n=889)



Injury deaths in non-trauma center facilities are presented in Figure 38. In 2013, trauma centers discharged 975 patients to hospice.

Figure 39: Out of Hospital Injury Deaths, Vital Statistics 2013 (n=1,798)

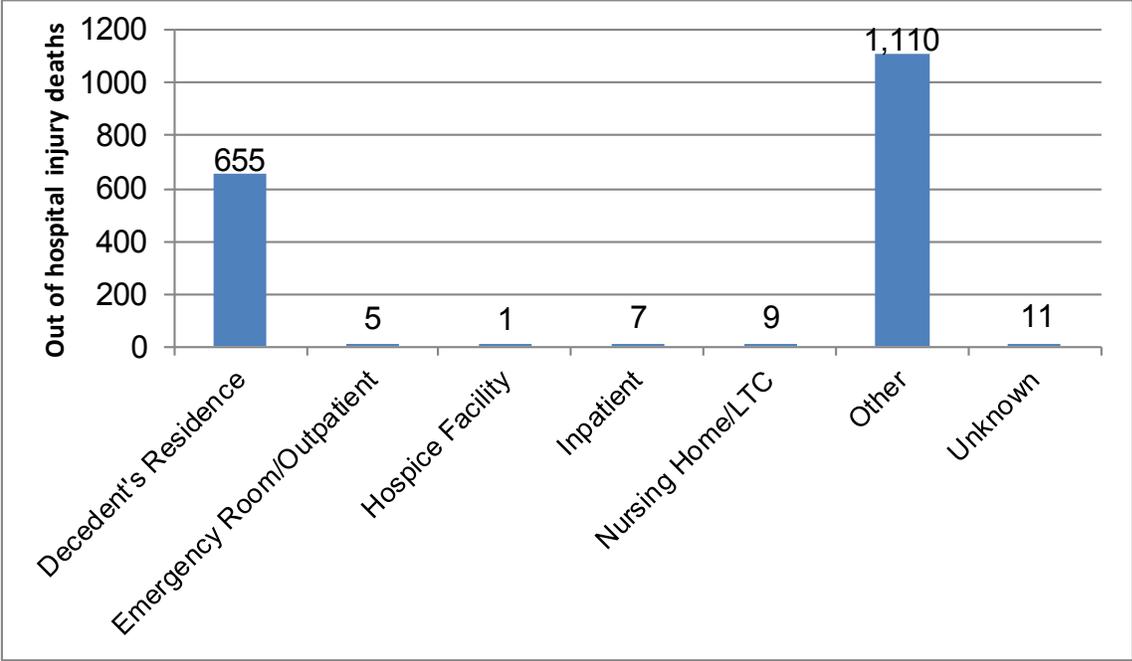


Figure 39 presents the injury deaths that occurred outside of a hospital. If the hospital name was omitted it is listed here as unknown.

ADMISSION TO REHAB/LTC

Of the 20,305 trauma patients admitted to a trauma center, 6.8% were discharged to a rehabilitation center or Long Term Care (LTC) facility. Table 16 shows the access to rehab/LTC by primary payer 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: Admitted to Rehab/LTC by Primary Payer, ASTR 2013

| ACCESS TO REHAB/LTC | | | | | | | | |
|---------------------|-------------------------|--------|-------------------------|--------|--------------------------------------|--------|-------------------------------------|--------|
| Primary Payer | Total Patients Admitted | | Discharged to Rehab/LTC | | ISS ≤ 15 and Discharged to Rehab/LTC | | ISS >15 and Discharged to Rehab/LTC | |
| | N | % | N | % | N | % | N | % |
| Medicare | 4,128 | 20.32% | 482 | 11.67% | 338 | 10.37% | 138 | 17.01% |
| Private | 6,762 | 33.30% | 571 | 8.44% | 312 | 5.78% | 256 | 21.06% |
| AHCCCS | 5,145 | 25.33% | 236 | 4.58% | 117 | 2.90% | 114 | 12.88% |
| Other | 502 | 2.47% | 17 | 3.38% | 7 | 1.60% | 10 | 18.18% |
| Self pay | 3,768 | 18.55% | 92 | 2.44% | 55 | 1.84% | 35 | 4.95% |
| Total | 20,305 | 100% | 1,398 | 6.89% | 829 | 5.15% | 553 | 66.71% |

AHCCCS=Arizona Health Care Cost Containment System, LTC=Long Term Care

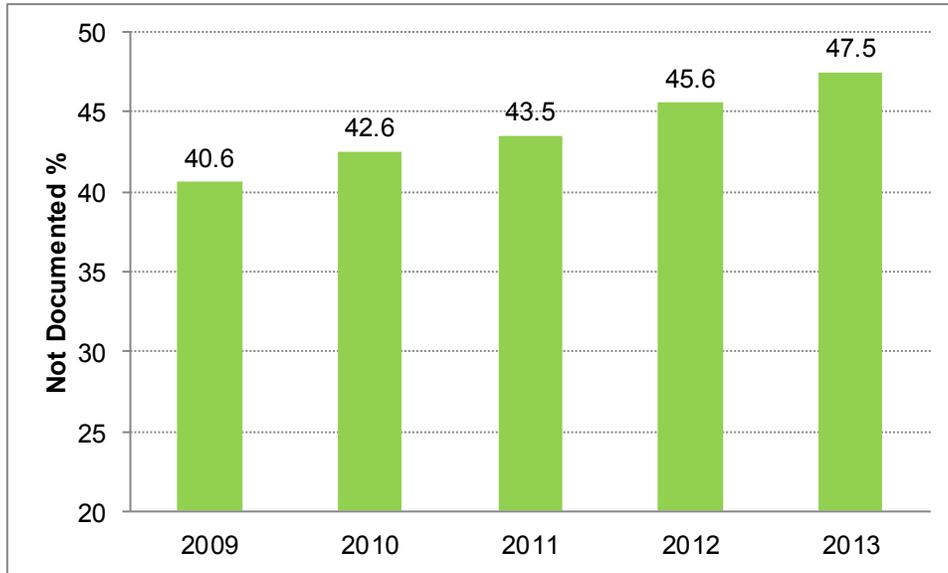
A missing element in the trauma data is the understanding of the physical, social, and mental functionality of patients upon discharge. Rehabilitation facilities often perform functional assessments of patients. The Arizona trauma system may benefit from additional information following treatment at a trauma center.

Table 17: Admitted to Rehab/LTC by Injury Region, ASTR 2013

| ACCESS TO REHAB/LTC | | | | |
|----------------------------|--|--------|-------------------------|--------|
| Injury Region | Total Patients Admitted to trauma center | | Discharged to Rehab/LTC | |
| | N | % | N | % |
| Southeastern Region | 2,615 | 12.87% | 276 | 10.55% |
| Northern Region | 2,557 | 12.59% | 204 | 7.97% |
| Missing Region | 507 | 2.49% | 35 | 6.90% |
| Western Region | 551 | 2.71% | 34 | 6.17% |
| Central Region | 14,075 | 69.31% | 849 | 6.03% |
| Total Admitted | 20,305 | 100% | 1,398 | 6.89% |

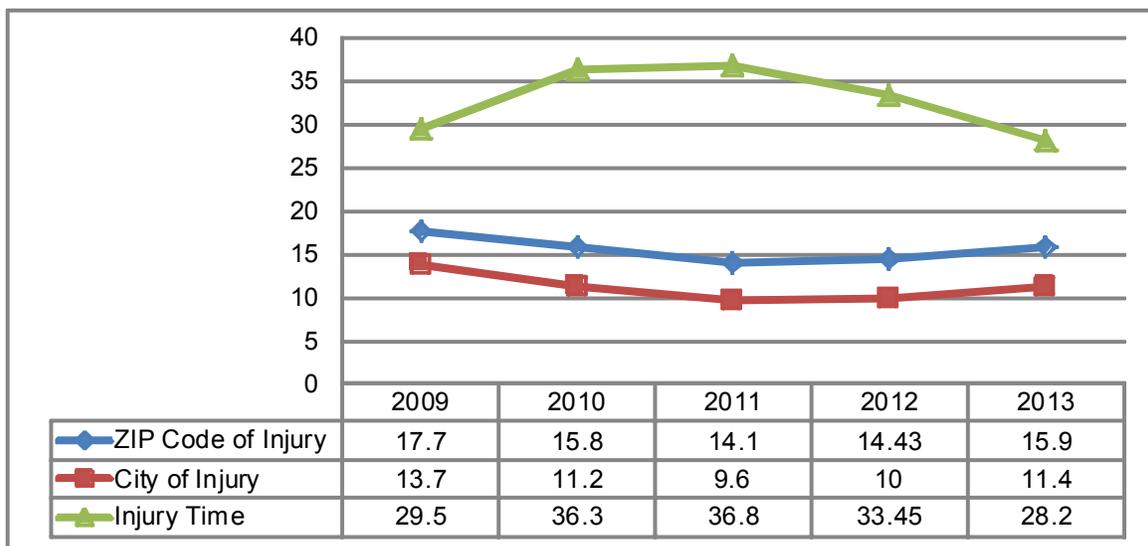
DATA QUALITY

Figure 40: Field airway management not documented among severely injured trauma patients, ASTR 2009-2013



Although data completeness continues to improve each year, obtaining pre-hospital data is still a challenge. A large percentage (47.5%) of field airway management data was not documented for severe trauma patients in 2013 (GCS <9 and ISS >15). Field airway management documentation has been consistent through the years (Figure 40). Over the years, the injury time field has been consistently missing which impacts vital measurements like Golden Hour (Figure 41).

Figure 41: Percent not documented for select injury data elements, ASTR 2009-2013



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 under reported.

