ARIZONA DEPARTMENT OF HEALTH SERVICES

BUREAU OF EMERGENCY MEDICAL SERVICES AND TRAUMA SYSTEM

LEVEL IV TRAUMA CENTERS PERFORMANCE MEASURES: INTER-FACILITY TRANSFERS ARIZONA STATE TRAUMA REGISTRY 2012

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Purpose:

This report provides Arizona's Level IV Trauma Centers with their individual performance benchmarked on inter-facility transfers against the aggregate.

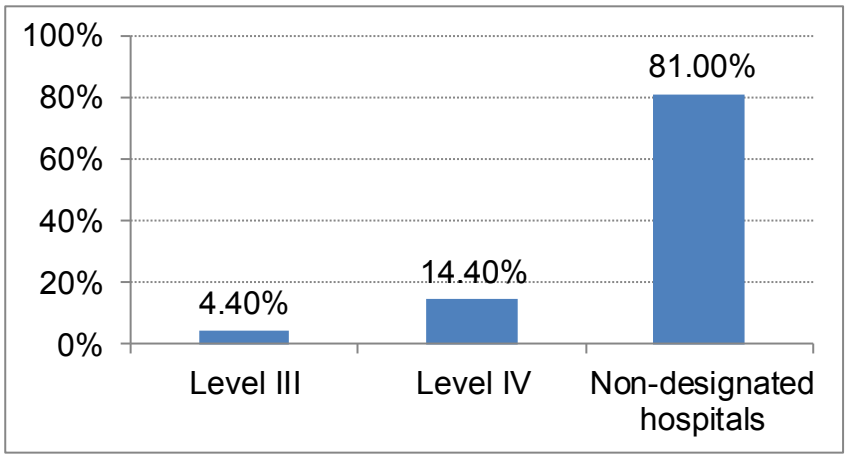
Performance Measures:

The Arizona State Trauma Registry 2012 (ASTR) queried cases with an *Emergency Department (ED) or Hospital Arrival Date* (D1_04) of January 1, 2012, to December 31, 2012. The following trauma transfer indicators were analyzed:

1. Inter-facility transfers demographics
   - ⇒ Age
   - ⇒ Gender
   - ⇒ Race/ethnicity
   - ⇒ County of injury
   - ⇒ Payer mix
   - ⇒ Injury severity score
   - ⇒ Mode of transport
   - ⇒ Discharge status
2. Inter-facility transfers and discharged home from ED at Level I
   - ⇒ Mode of transport
   - ⇒ ED length of stay
   - ⇒ Payer mix
3. ED length of stay at referring facility
   - ⇒ Total ED length of stay at referring facility
   - ⇒ ED LOS at referring facility when ISS > 9
   - ⇒ ED LOS at referring facility when ISS > 15

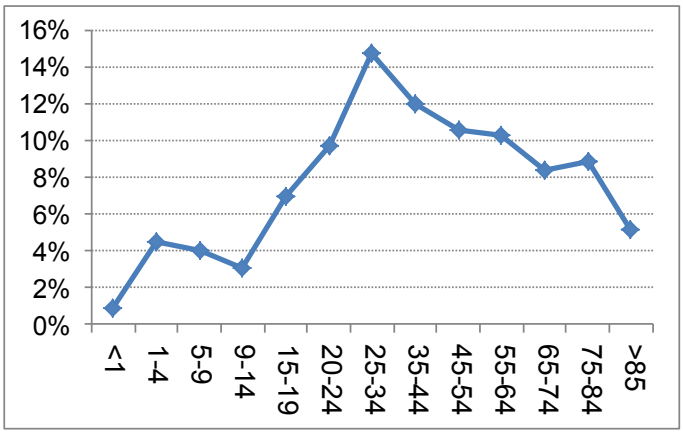
For additional information on data elements and definitions please refer to the ASTR data dictionary.

Table 1: Referring facility distribution to Level I Trauma Centers (n=5,008)



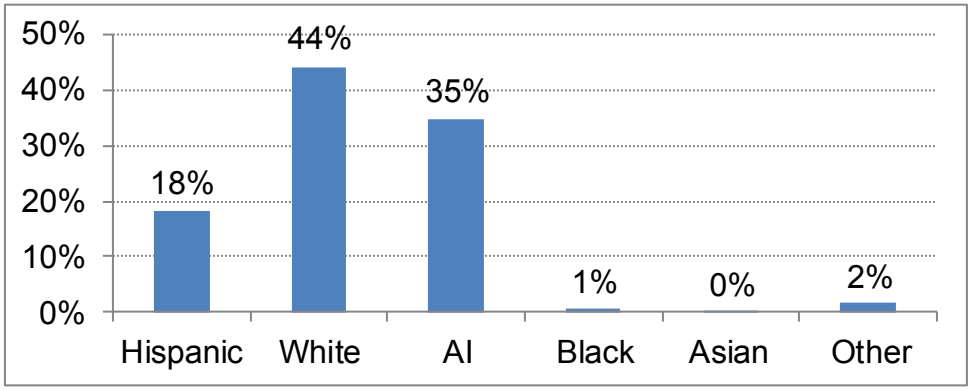
In 2012, there were 5,008 inter-facility trauma transfers. Most trauma transfers came from non-designated hospitals (83%) instead of Level IV Trauma Centers (17%). This shows a need for a more inclusive trauma system in the state.

Graph 1: Age distribution of transfers patients (n=5,008)



For all inter-facility trauma transfers, older adults (>65 years of age) made up 23.6%, adults (20-64 year of age) made up 53.6%, and children/teens (<19 years of age) made up 22.2%.

Graph 2: Race/ethnic distribution of transfers patients (n=5,008)



Over half of all patients were white (44%) followed by American Indians. Although American Indians/Alaskan Natives represent 5% of the total Arizona population, they were involved in 35% of all trauma transfers.

Table 2: Demographic for transfers

	N	%
Total transfers	847	100%
Age		
<1	7	0.82%
1-4	33	3.89%
5-9	32	3.77%
10-14	26	3.06%
15-19	60	7.08%
20-24	85	10.03%
25-34	123	14.52%
35-44	103	12.16%
45-54	85	10.03%
55-64	88	10.38%
65-74	75	8.85%
75-84	79	9.32%
>85	51	6.02%
Gender		
Female	281	33.17%
Male	566	66.82%
Race/Ethnicity		
Missing	5	0.59%
Hispanic	163	19.24%
White	401	47.34%
American Indian or Alaska Native	256	30.22%
Black or African American	8	0.94%
Asian Pacific Islander	2	0.23%
Other	12	1.41%

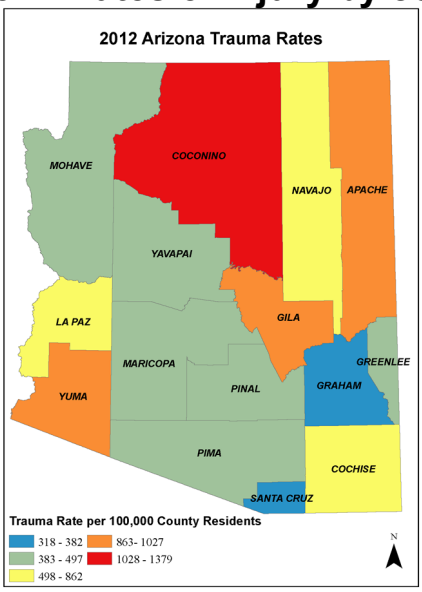
For every trauma transfer involving a female Arizona experienced two male transfers.

Table 3: County of injury for transfers

	N	%
Missing	23	2.71%
Apache	136	16.05%
Cochise	131	15.46%
Coconino	84	9.91%
Gila	18	2.12%
La Paz	20	2.36%
Maricopa	197	23.25%
Mohave	15	1.77%
Navajo	115	13.57%
Other	16	1.88%
Pinal	8	0.94%
Yavapai	84	9.91%

The largest distribution of trauma transfers came from Maricopa County. This was followed by Apache, Cochise, and Navajo. Pinal had the lowest number of transfers.

Figure 1: Rates of injury by county



When differences in populations are accounted for, a trauma rate can be calculated. These are presented in Figure 1.

Table 3: Body region location for transfer patients

	N	%
Missing	8	0.94%
Traumatic Brain Injury (TBI)	274	32.34%
Other Head, Face, Neck	107	12.63%
Spinal Cord Injury (SCI)	11	1.29%
Vertebral Column Injury (VCI)	89	10.50%
Torso	162	19.12%
Upper Extremity	98	11.57%
Lower Extremity	95	11.21%
Other & Unspecified	2	0.23%
System Wide & Late Effects	1	0.11%

The most common injury that Level IV Trauma Centers sent to a Level I Trauma Center was a Traumatic Brain Injury (32%) .

The other traumas mechanism were from injury to the Torso (19%), Other Head, Face, Neck (12%), Upper Extremity (11%), Lower Extremity (11%), and Vertebral Column Injuries (10%).

Graph 3: Injury Severity Score (ISS) of trauma transfers

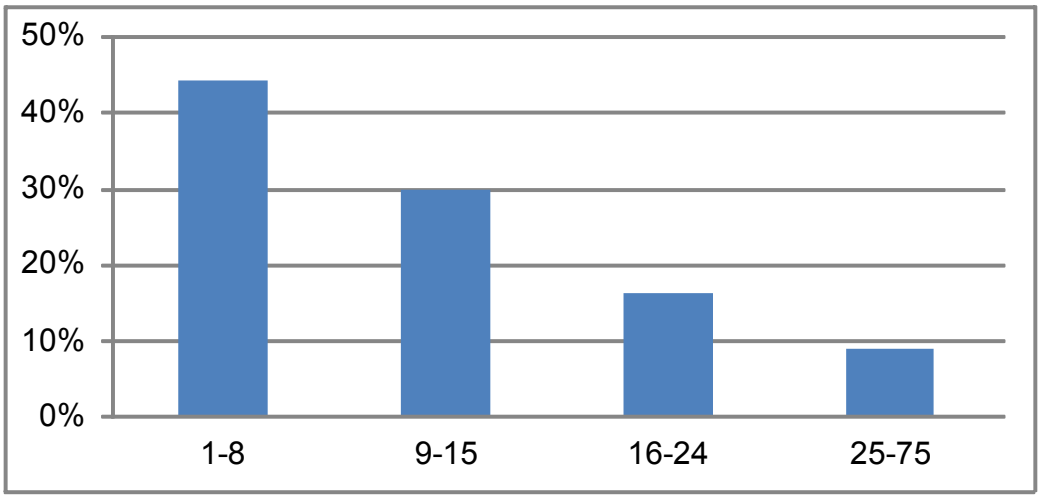


Table 4: Injury Severity Score of trauma transfers

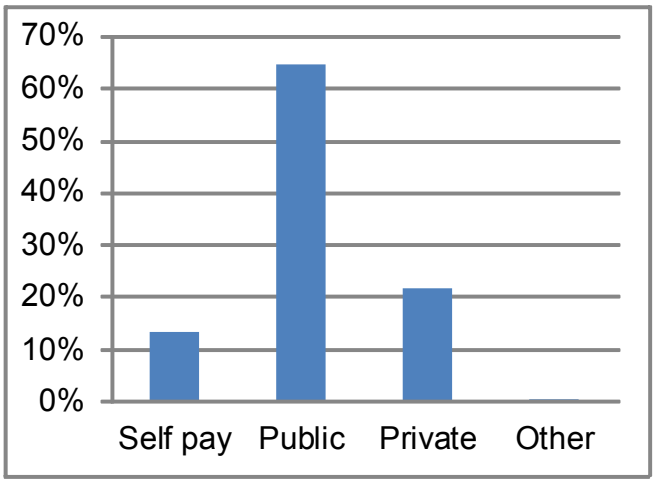
Most of the traumas sent to a Level I Trauma Center were minor to moderate injuries (73%). A minor or moderate injury is classified as an ISS less than 15. The remainder of transfer were severe injuries (24%) that had an ISS greater than 15.

	N	%
Missing	10	1.18%
1-8	374	44.15%
9-15	252	29.75%
16-24	136	16.05%
25-75	75	8.85%

Table 5: Payer mix of trauma transfers

	N	%
Missing	6	0.7%
Self pay	112	13.22%
Public	546	64.46%
Private	181	21.36%
Other	2	0.23%

Graph 4: Payer mix of trauma transfers



Insurance from public sources were most commonly used to pay for treatment and transport mode. These include the Arizona Health Care Cost Containment System (AHCCCS), Medicare, or other government. Only 21% of patients had private insurance.

Most transfers were done by an air (56%) or ground ambulance (41%). Air transfer should be reserved for the most severely injured patients.

Table 6: Payer mix of transfer patients

	N	%
Missing	16	1.8%
Air	474	55.9%
Ground	349	41.2%
Other	1	0.11%
Private Vehicle	7	0.82%

Table 7: Discharge status for transfer patients

	N	%
Admit death	20	2.36%
Discharge home after admission	635	74.97%
Emergency Department death	1	0.11%
Discharge home from Emergency Department	59	6.96%
LTC/SNF/Other rehab	124	14.63%
Transfer/Acute care	8	0.94%

Patients that were transferred to a Level I Trauma Center were admitted and discharged home 75% of the time. Discharges to a rehabilitation or skilled care facility occurred 7% of the time. Typically, patients in long term care and skilled nursing facilities require a high level of care for activities of daily living (nursing, physical/occupational therapy). The goal of the Emergency Medical Service (EMS) system is to reduce mortality and morbidity through appropriate response and prevention.

Table 8: Method of transport for transfers discharged from ED

	N	%
Total transfers	59	100%
Air	21	35.6%
Ground	38	64.4%

Graph 5: Payer mix for transfers discharged from ED (n=59)

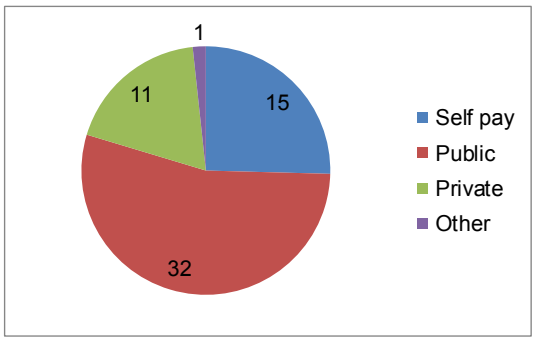


Table 9: Body region location for transfers discharged from ED (n=59)

	N	%
Missing	1	1.69
Traumatic Brain Injury	11	18.64%
Other Head, Face, Neck	12	20.33%
Vertebral Column Injury	9	15.25%
Torso	8	13.55%
Upper Extremity	6	10.16%
Lower Extremity	11	18.64%
System Wide & Late Effects	1	1.69%

More than half of trauma transfers were charged to Arizona taxpayers. Although, the total cost is unable to be reported, the median base rate for an Advanced Life Support ground ambulance call is $1,128 (as of 2014). The median mileage cost adds $15.20 per mile.

The median base rate for an air ambulance transport is $12,600 with additional costs of $140 per mile. As a courtesy, the Bureau publishes the rates of air and ground ambulances:

http://www.azdhs.gov/bems/ambulance/

If median base rates (excluding mileage charges) are extrapolated, air and ground ambulance charges for patients who were transferred and discharged from the ED would total $307,464. The distribution of charges among payers would be: Public- (54%) $166,030, Self-pay- (25%) $76,866, and Private insurance- (12%) $36,895. Individual case studies by providers should be performed to analyze the appropriateness of these transfers.

No trend was observed with the location on the body affected. The most common locations were the Other Head, Face, Neck (20%), Traumatic Brain Injury (18%), and the Lower Extremity (18%).

Table 10: ED LOS* for all transfers

	N	%
Total transfers	847	100%
Missing	202	23.84%
Less than 2 hours	84	9.91%
2 to 4 hours	323	38.13%
4 to 6 hours	169	19.95%
6 hours or more	69	8.14%

*ED LOS=Emergency Department Length of Stay

Table 11: ED LOS for transfers with an ISS greater than 9

	N	%
Total transfers	345	100%
Missing	81	23.47%
Less than 2 hours	37	10.72%
2 to 4 hours	140	40.57%
4 to 6 hours	67	19.42%
6 hours or more	20	5.79%

Table 12: ED LOS with an ISS greater than 15

	N	%
Total transfers	211	100%
Missing	49	23.22%
Less than 2 hours	26	12.32%
2 to 4 hours	85	40.28%
4 to 6 hours	38	18%
6 hours or more	13	6.16%

Injury severity of patient was not associated with a lower dwell time. In all of the categorized scores, patient dwell time stayed consistent.

The largest proportion of patients had an ED dwell time of 2 to 4 hours (~40%). Facilities should consider processes that will respond to higher acuity patients rapidly and appropriately.

A system initiative has been developed with the University of Arizona- Office of Rural Health to

- Reduce ED Dwell Times,
- Reduce the numbers of transfers of admissions,
- Reduce the number of deaths at non trauma centers, and,
- Increase billing efficiency.

Hospitals that would like to improve these processes should visit http://www.azdhs.gov/bems/data/performance-improvement-tools.php?pg=trauma-system-qa

Previous reports by ADHS have determined that the biggest cost-savings are in Physician contact to decision to transfer (82 minutes), Level I confirmation time to EMS contact (8 minutes), and Patient ED arrival to first physician contact (7 minutes).

A benchmark of transferring a trauma patient in under 2 hours has been established by the Trauma and EMS Performance Improvement standing committee and the Trauma Program Managers in the state.