

**Title:** Identifying areas of improvement in reducing inter-facility transfer times from Level IV Trauma Centers to Level I Trauma Centers: A statewide systemic approach.

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**Introduction:** An important objective of a statewide trauma system is to get patients to the right level of care in the appropriate amount of time. Delays to definitive care were identified as a concern in the rural Arizona trauma system. The Arizona State Trauma Registry (2012) reported median Emergency Department (ED) Length of Stay (LOS) at Level IV Trauma Centers (L4TCs) of 3 hours, with 80% of the patients being transferred after 2 hours of arrival.

**Objective:** The purpose of this study was to identify potential factors that delay transfers from Level IV Trauma Centers to Level I Trauma Centers (L1TCs) to their definitive care.

**Methods:** The Arizona Department of Health Services (ADHS) Bureau of Emergency Medical Services and Trauma System (BEMSTS) and the University of Arizona Center for Rural Health collaborated with state wide Trauma Program Managers to develop a prospective study that identified factors that result in extended ED LOS at L4TCs.

A twenty-nine item questionnaire captured seven major time intervals that measured internal processes on trauma patient transfers. Level IV Trauma Centers voluntarily submitted questionnaires for all transfers to a Level I Trauma Center that occurred between January 1, 2014 and June 30, 2014. Data was entered into an Access database and analyzed with version 9.2 of the Statistical Analysis Software (SAS).

Patients were dichotomized into total ED LOS of  $\leq 2$  hours and  $> 2$  hours. The median difference was calculated for each of the seven major time intervals using a Wilcoxon Two Sample test, and a p-value significant at  $< 0.05$ .

**Results:** Overall, there were 282 questionnaires received from 13 of the 26 Level IV Trauma Centers in the state. Of these, 34.3% (n=97) had an ED LOS of  $\leq 2$  hours. The median difference between the two groups for each of the seven time intervals is displayed in Table 1.

Time Intervals (In Minutes)	$\leq 2$ hours	$> 2$ hours	P-Value
	Median (Q1, Q3)	Median (Q1, Q3)	
Patient ED arrival to trauma team activation	10 (3, 16)	10 (5, 20)	0.3530
Patient ED arrival to first physician contact	1 (0,10)	8 (0, 20)	$<0.0001^*$
Physician contact to decision to transfer	35 (9, 59)	117 (76, 164)	$<0.0001^*$
Level IV outreach time to Level I confirmation	6 (0, 14)	10 (0, 30)	0.0174*
Level I confirmation time to EMS contact	2 (0, 9)	10 (0, 35)	0.0002*
EMS contact time to their arrival	21 (10, 30)	26 (12, 41)	0.0135*
EMS arrival to patient discharge	15 (9, 22)	16 (10, 25)	0.3519

\*significant Wilcoxon Two Sample Test

## Conclusions

Level IV Trauma Centers experience ED Dwell times greater than 2 hours when physician contact time and decisions to transfer are delayed. Further research is needed to determine transfer times are appropriately measured, documented, and analyzed to identify reasons for local and regional issues.

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