



Trauma System Evaluation 101

Four part series located at: <http://directorsblog.health.azdhs.gov/?s=trauma>

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Evaluating a Trauma System – Part I

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How do we evaluate Arizona’s trauma system, you ask? Good question. Over the next few weeks I’ll blog about “*Trauma System Evaluation 101*” as well as some of the evaluation tools we use to assess Arizona’s trauma system.

The goal of any trauma system is to get the right patient to the right place in the right amount of time. Level I and II Trauma Centers have the equipment, staff and training for caring for the most severely injured patients (about 14% of all injuries). Level III Trauma Centers can care for the moderately injured patients (about 22% of all injuries) and stabilize and transfer the more seriously injured. Level IV Centers have the fewest resources and able to care for minor injuries (about 64% of all injuries) and stabilize and transfer the more seriously injured.

Remember, our goal is to get folks to the right place at the right time- which means severely injured patients arrive at a level I or II center (or are to be transferred there as quickly as possible)... and that mild or moderately injured patients aren’t over-triaged into an expensive level I or II facility. Over-triage means that patients whose injuries are not serious are nevertheless transferred to a level I or II trauma center instead of being transported to the closer level III or IV trauma center.

Why is this a problem? First off, it’s always better to keep a patient close to their home when possible. It’s easier on the patient and family for a lot of different reasons. Second, trauma care

at a level I is an expensive proposition but considerably less expensive at the level III and IV trauma center. Third, if all of our trauma patients get sent to the level I trauma centers, not only will they be inundated with non-critical patients, but they won't be able to respond when the patients that really need their help arrive.

Just like any other evaluation process, you have to look at a variety of different measures in order to perform a meaningful assessment. Looking for over-triage is one tool in the trauma system assessment tool box... but it needs to be looked at hand in hand with its partner measure – under triage. Measuring over-triage is done retrospectively. Hindsight is always more clear, particularly during a stressful situation. It's human nature to be cautious, therefore it is awfully hard to fault the paramedic who, in an abundance of caution, decides to transport a kid to a level I trauma center, even though they do not appear seriously injured.

A few years ago, the CDC brought together experts from across the country to review the peer reviewed literature on trauma triage. The outcome of that process was the development of the Guidelines for the Field Triage on Injured Patients – a proscriptive, evidence-based tool that takes into account variation within states and regions, while providing some good directions to our EMS folks on how to make decisions in the field. Our own State Trauma Advisory Body adopted these guidelines a couple of years back. If you want to learn more about over-triage, here is a [link](#) to a good article recently by the Robert Wood Johnson Foundation on this topic.

Evaluating a Trauma System – Part II

October 17, 2013



A couple of weeks ago, I [introduced](#) the concept of “Over Triage”... which is when EMS transports a patient to the highest level of care (like a level I trauma center) when they could have taken them to a level III or IV trauma center closer to their home. The downside of over-triage is that care at high-end centers is expensive. There's a nice [primer](#) on trauma systems if you want to read more.

This week's focus is on "Under Triage" – when EMS transports a patient to a facility that's not as qualified to care for their injuries. There are a number of factors that contribute to under triage: it's sometimes hard to assess how badly someone is hurt at the scene; emergency workers who don't have a lot of experience with children may not understand how quickly they can get worse; some adults have high pain thresholds and may make it difficult to see just how badly they're injured. The perception of tort liability exposure might even play a role sometimes.

The on scene EMS person needs to consider all these things when deciding which hospital is the best choice for their injured patients... and it's a critical decision. Under triage delays getting the patient the care they need and increases the chance that an injury may be overlooked and under-treated.

Under and over-triage are like a teeter-totter. Under triage is to the left of the balance point and over triage is to the right. The sweet spot is the point when you have just enough over triage necessary to guard against under- triage. So – how do we get to the sweet spot? I'll cover that in a couple weeks. In the meantime, the State Trauma Advisory Board finished a couple of great products this week. A new five year [State Trauma Plan](#) and the [2013 Annual Trauma Report](#)

Trauma System - Part III

October 30, 2013



A couple of weeks ago I wrote about the [basics of](#) evaluating a trauma system and last week I posted about [over & under triage](#). This week is about a tool we use to measure whether we're striking the right balance- the "Z Statistic".

Back in 1990, there was a famous study published ([Major Trauma Outcomes Study](#)) that reviewed thousands and thousands of trauma patient records to develop a statistical formula to benchmark the risk of dying from blunt (crushing or fractures) or penetrating injuries (gun shots, or cuts). That formula has been updated and today serves as the basis for the [Z Statistic](#) evaluation that we use to look at how many folks are/are not surviving based on their particular set of injuries. We look at our survival rates compared to that statistical formula and we provide that information to each of the level I trauma centers so that they can look at their results against the (blinded) aggregate information for the other hospitals.

When we wrote our [trauma rules](#) a number of years back we did a good job of making sure that the trauma hospitals had to have [performance improvement teams](#) in place including what are called morbidity and mortality reviews to look at key cases that can serve as an opportunity for learning and improving care. Next week I'll share the results for these Tools (Over & Under Triage, *Z Statistic*) plus a few others that we're regularly tracking and provide an overview of how we use the data to move our system forward.

Trauma System Performance- Part IV

November 6, 2013



Over the past month we have been looking at some different ways to measure and describe how a trauma system is performing. In the world of performance improvement the general belief is that you have to look at a number of different measures in order to be able to describe how the system is performing. Here goes:

- **Over-Triage** – In 2011, **35%** of patients treated at a level I trauma center had minor injury and went home after being treated in the emergency department. Most folks would consider this result to be on the high side (for the way we measure it).

- **Under Triage** –In 2011, **27%** of patients with moderate to severe injuries were treated at a hospital that was not specially designated to handle their injuries. This is considered to be a too high a percentage of patients not being taken to trauma centers. Generally you aim for around 5% under triage.
- **Z Statistic – Blunt:** Between 2008 and 2011 there were a total of 50,036 blunt trauma patients treated at the seven level I trauma centers. The Z-statistic results suggest that there were more survivors than expected (0.54 additional survivors for every 100 patients) and fewer deaths than expected (14%). These are really good results and show that our level I trauma centers are doing a good job caring for blunt injuries.
- **Z Statistic – Penetrating:** Between 2008 and 2011 there were a total of 7,957 penetrating injury patients treated at the seven level I trauma centers The Z-statistic results suggest that there were more survivors than expected (0.3 excess survivors over every 100 patients) and that the number of deaths was the same as expected. These are also pretty good results; we are better than average for penetrating injuries once a patient gets to the level I trauma center.
- **ED Dwell Time:** From 2008 to 2011, the average length of time patients stayed in the level IV emergency department before being transported to a level I trauma center was about 3 hours. This result shows that we can be more efficient in transferring patients to the level I trauma center.

What do these results tell us? A few things: 1) we need to make sure that moderate and severely injured patients get to the right trauma center and that more minor injured patients stay at their local hospitals (our EMS medical directors and EMS Regions will play a key role in making that happen); 2) our level I trauma centers need to keep up the good work with blunt patients and see if they can raise the bar for penetrating injuries; and 3) our level I trauma centers need to reach out to the level IV trauma centers and help them reduce the time it takes to transfer trauma patients.

We'll continue our work with the [State Trauma Advisory Board](#), the [EMS Council](#), the [Medical Direction Commission](#) and the [Trauma and EMS Performance Improvement Standing Committee](#) to track and improve the Arizona trauma System.