

# Trauma MedEd

## The Value Of Trauma Center Care

The cost of care in a trauma center is high. And when anything is expensive, it's natural to wonder about its cost-effectiveness. A group of biostatisticians recently looked at the treatment costs and cost-effectiveness of treating trauma patients in a US trauma center vs a nontrauma hospital. They were very comprehensive in looking at costs, including costs for transportation, treatment at a transferring hospital, rehospitalization for acute care if needed, inpatient rehab, stays in long-term care or skilled nursing care facilities, outpatient care and informal care given by family members.

**Treatment at a trauma center saved 3.4 lives per 100 patients treated.** The overall added cost for treatment at a trauma center was **about \$36,000 per life year gained.** However, in order to gauge cost-effectiveness we need to know what a year of life is worth. As you can imagine, this is tough to figure out. A number of researchers have looked at this, and it typically ranges from \$50,000 to \$200,000 per year. Thus, trauma center care is overall cost-effective.

The data was more closely analyzed, and it appears that the cost-effectiveness is greater for patients with more severe injuries. Unfortunately, cost-effectiveness is not as clear for patients who are 55 years or older.

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### TRAUMA CALENDAR OF EVENTS

#### AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA

LOCATION: HILTON SAN FRANCISCO, SAN FRANCISCO, CA

DATE: SEPTEMBER 18-21, 2013

#### TRAUMA CENTER ASSOCIATION OF AMERICA

#### TRAUMA MEDICAL DIRECTOR COURSE

LOCATION: PEPPERMILL RESORT, CASINO & SPA, RENO, NV

DATE: NOVEMBER 5-8, 2013

**The bottom line: Trauma is a leading cause of death in this country. The concept of treating more severely injured patients at trauma centers is both effective and cost-effective. Trauma systems need to be fine-tuned so that they get the right patient to the right hospital and so care for elderly patients continues to improve.**

*Reference: The Value of Trauma Care. J Trauma 69(1):1-10, 2010.*

## Benefit Of Transport To A Trauma Center

Most trauma systems set certain prehospital criteria that, when met, direct that patient to a trauma center. It is now well-established that care of these patients results in improved survival if they are managed at those centers. **Unfortunately, undertriage is still a problem**, meaning that those patients may not always be taken to a hospital most appropriate to care for their injuries. **What is the penalty that your patient pays if this happens?**

The University of Toronto performed a nice, prospective study across a large region with both urban and rural areas. Database information was analyzed for all victims of motor vehicle crashes who had a severe injury (ISS>15) or who died. Over 6,000 crash victims' data were analyzed.

Just under half of the victims (45%) were triaged to a

trauma center. Of those who were taken to other hospitals, slightly more than half (58%) were transferred to one within 24 hours, **but nearly 5% died in the non-trauma center ED.** The overall mortality for severely injured patients who were taken to a nontrauma center was 8.7%. **This was a 30% increase in adjusted mortality compared to those taken to a trauma center directly.**

**Bottom line: Follow the rules! EMS authorities and trauma systems should make it a priority to adopt the CDC protocol or create trauma guidelines based on them that ensure patients with significant injuries are taken directly to a trauma center. Going to the nearest hospital (if it is not a trauma center) or bending to the patient's preference is not in their best interest (and may kill them)!**

*Reference: The mortality benefit of direct trauma center transport in a regional trauma system: a population-based analysis. J Trauma 72(6):1510-1515, 2012.*

## Going From Level II To Level I

There is a growing body of literature that demonstrates that Trauma Center care of major trauma patients results in improved outcomes. However, there has been little reliable data regarding differences between Level I and Level II centers. The existing papers compare separate Level I and Level II centers in the same or similar communities. **This article is unique in that it studies a single trauma center that changed from Level II to Level I.**

A community hospital trauma center serving part of the Denver, Colorado metropolitan area retrospectively reviewed all patients admitted from January 1998 through March 2007. All admissions from January 1998 through December 2002 were to a Level II trauma center, and admissions from December 2002 through March 2007 occurred after Level I designation of the same hospital. The primary outcome measure for the study was mortality.

A total of 17,413 trauma patients were admitted during the study. 54.6% were admitted during its Level II (LII) designation and 45.4% while Level I (LI). Patients admitted during LI were older and more

severely injured, had fewer comorbidities, and were more likely to be hypotensive.

Overall mortality for the entire study period was 3.69%. **When severely injured patients were analyzed (ISS>15) mortality decreased from 14.11% as LII to 8.99% as LI.** A similar pattern was seen when examining adjusted mortality by Abbreviated Injury Scale (AIS) scores by body region. **After changing from LII to LI, mortality of patients with head injury decreased from 14.5% to 10%, chest injury decreased from 11.3% to 7.1%, and abdominal/pelvic injury decreased from 17.1% to 6.8%.**

Complication rates also decreased after designation as LI. These included ARDS, thromboembolism, sepsis, pneumonia, and UTI.

**Bottom line: This is the first study of the effect on mortality after changing ACS verification or designation to a higher level in one hospital. This allows the hospital to serve as its own control after LI designation. Significant reductions in mortality were noted with especially striking results in severely injured patients. This paper did not address the specific changes required for verification that had an impact on mortality. Potential changes included the establishment of a core group of trauma surgeons with critical care certification who were available in-house 24 hours a day, immediate OR availability 24 hours a day, a new specialized medical trauma team, a dedicated group of SICU nurses, and the addition of medical students and surgical residents to clinical rotations.**

**Additional changes that occurred included increasing the number of evidenced-based trauma protocols, policy changes dictating scheduled trauma conferences, research, and dedicated OR availability.**

**Overall, this was a unique and well constructed study of changing mortality after changing a trauma center from Level II to Level I. It should serve as an impetus to push trauma hospitals to strive for the highest designation they are capable of.**

*Reduced mortality at a community hospital trauma center: the impact of changing trauma level designation From II to I. Arch Surg 143(1):22-27, 2008.*

## Financial Triage – The Wallet Biopsy

A significant amount of volume coming in to Level I and Level II trauma centers is transferred from other hospitals. Occasionally, concerns are raised that some hospitals "cherry pick" the patients, retaining those who are insured and transferring those who are not. If this is true, it has the potential to undermine the entire trauma transfer system by delaying and impeding patient care and by financially damaging the higher level trauma centers. A few single state or single health care system studies have been performed, and some of them have suggested that the uninsured were more likely to be transferred to high level trauma centers.

The group at Parkland looked at a national sample using the National Trauma Databank, and compared the insurance status of patients transferred to Level I and II centers to those retained at Level III and IV centers. **Overall, most patients (83%) were insured.** At first glance, transferred patients were significantly more likely to be uninsured (18% vs 14%). However, they were also more seriously injured and more likely to have multiple injuries. When adjusted for these differences, **the transferred patients were no more likely to be uninsured than the others.**

**Bottom line: There does not appear to be any concerted effort nationally to inappropriately transfer uninsured injured patients to high level trauma centers. The perception arises because the uninsured have a tendency toward higher risk behaviors that may result in serious injury.**

**However, it is possible that cherry picking may occur on occasion at the local level. If you are a trauma director experiencing this phenomenon, the best course of action is to speak directly to the director at the referring hospital. Politely discuss your perceptions and offer to see if there is anything you can do to help with their triage process. Frequently, letting them know you are aware of the pattern causes them to improve their transfer decision making.**

*Reference: Financial triage in transfer of trauma patients: a myth or a reality. Am J Surg 198(3):e35-e38, 2009.*

## Is There A Shortage Of On-Call Surgical Specialists?

Many ED physicians complain about a perceived lack of surgical specialists on call to emergency departments. A survey looking at the issue was conducted by the Robert Wood Johnson Clinical Scholars program and Yale University. They sent the survey to ED directors at 715 randomly selected hospitals around the country. The response rate was very good, with 62% returning their surveys.

An overwhelming majority (74%) of EDs indicated that they do experience inadequate call coverage by surgical specialists. Notable comparisons included:

- Teaching hospital (68% had problems) vs non-teaching hospital (78%)
- Level I trauma center (60% had problems) vs Level II trauma center (59%) vs Level III trauma center (77%)

Almost two thirds of respondents said they had lost 24/7 coverage of at least one surgical specialty within the last 4 years. Hospitals in metropolitan areas were more likely to experience this problem, as were hospitals in the Northeast and South, compared to the West and the Midwest.

As you can imagine, coverage issues can cause larger problems. **Nearly a quarter of hospitals either lost or downgraded their trauma center level due to lack of surgical specialist coverage.** And 27% reported **patients leaving before they could be seen by the specialist.**

The percentage of hospitals with no coverage or problem coverage by surgical specialty was as follows:

- General surgery - 36%
- Trauma surgery - 64%
- Neurosurgery - 75%
- Plastics - 81%
- Hand - 80%
- Ortho - 50%

**Bottom line: It is becoming apparent that there are limits to the amount of on-call specialty coverage that money can buy. Careful coordination and regionalization may offer aid to some centers, but we need to look critically at strategies in use that**

**work and find ways to disseminate them to maintain the best emergency care possible.**

*Reference: The Shortage of On-call Surgical Specialist Coverage: A National Survey of Emergency Department Directors. Academic Emerg Med 17(12):1374-82, Dec 2010.*

## Why Do Trauma Patients Get Readmitted?

Readmission of any patient to the hospital is considered a quality indicator. **Was the patient discharged too soon for some reason?** Were there any missed or undertreated injuries? Information from the Medicare system in the US (remember, this represents an older age group than the usual trauma patient, but not for long) indicates that 18% of patients are readmitted and 13% of these are potentially preventable.

A non-academic Level II trauma center in Indiana retrospectively reviewed their admissions and readmissions over a 3 year period and excluded patients who were readmitted on a planned basis (surgery), with a new injury, and those who died. This left about 5,000 patients for review. **Of those, 98 were identified as unexpected readmissions.**

There were 6 major causes for readmission:

- **Wound** (23) - cellulitis, abscess, thrombophlebitis. Two thirds required surgery, and 4 required amputation. All of these amputations were lower extremity procedures in obese or morbidly obese patients.
- **Abdominal** (16) - ileus, missed injury, abscess. Five required a non-invasive procedure (mainly endoscopy). Only 2 required OR, and both were splenectomy for spleen infarction after angioembolization.
- **Pulmonary** (7) - pneumonia, empyema, pneumothorax, effusion. Two patients required an invasive procedure (decortication, tube placement).
- **Thromboembolic** (4) - DVT and PE. Two patients were admitted with DVT, 2 with PE, and 1 needed surgery for a bleed due to anticoagulation.
- **CNS** (21) - mental status or peripheral neuro

exam change. Eight had subdural hematomas that required drainage; 3 had spine fractures that failed nonoperative management.

- **Hematoma** (5) - enlargement of a pre-existing hematoma. Two required surgical drainage.

About 14% of readmissions were considered to be non-preventable by a single senior surgeon. Wound complications had the highest preventability and CNS changes the lowest. Half occurred prior to the first followup visit, which was typically scheduled 2-3 weeks after discharge. This prompted the authors to change their routine followup to 7 days.

**Bottom line: This retrospective study suffers from the usual weaknesses. However, it is an interesting glimpse into a practice with fewer than the usual number patients lost to followup. The readmission rate was 2%, which is very good. One in 7 were considered "preventable." Wounds and pulmonary problems were the biggest contributors. I recommend that wound and pulmonary status be thoroughly assessed prior to discharge to bring this number down further. Personally, I would not change the routine followup date to 1 week, because most patients have far more complaints that are of little clinical importance than compared to 2 weeks after discharge.**

*Reference: Readmission of trauma patients in a nonacademic Level II trauma center. J Trauma 72(2):531-536, 2012.*



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