

## Multiple Issues with Multiple Traumas

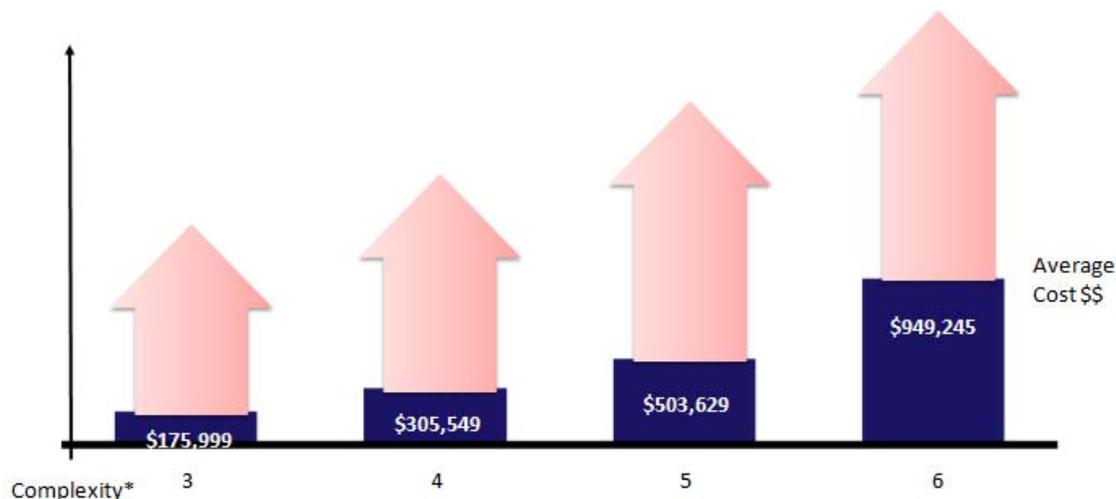
*Coordination of care is essential in achieving optimal outcomes*

Defining multiple trauma is straightforward enough – wounds or injuries occurring simultaneously to more than one body part. However, multiple trauma can manifest itself in an almost endless number of ways, be it a head injury with problem fractures, a spinal cord injury with chest wounds, or an abdominal injury with pelvic fractures. Moreover, five injuries occurring at once cause more than the sum of difficulties caused by the same five injuries occurring separately. For these reasons, managing and coordinating the care of multiple trauma injury is a highly complex and extended exercise.

It is clear from the data how much more difficult the management of multiple trauma is compared with discrete trauma. Though cases that are classified as “multiple trauma” represent only one-fifth of all trauma cases, they account for 61% of all trauma deaths.<sup>1</sup> This figure is even more significant given that trauma is the leading cause of death under the age of 44 and a major cause of death across all age

groups—in 2008, trauma injuries resulted in 25,731 deaths in America.<sup>2</sup>

There are also profound financial implications with multiple trauma. On average, compared to a patient suffering from a discrete trauma, a multiple trauma patient will require ventilation two to three times longer and will stay in the intensive care unit and hospital two to three times longer. According to the Agency for Health Research and Quality at the US Department of Health and Human Services, trauma in 2002 was second only to heart conditions as a percent of total health expenditures and led to \$75 billion in lost income. Moreover, due to the extreme medical complexity of multiple trauma injuries, the lifetime cost is often quite volatile and difficult to predict with much accuracy. This is particularly true when costly complications emerge.



Source: Paradigm mean values for medical costs years 2002-2008 adjusted for inflation (methodology likely understates risk exposure)

\* Complexity is a Paradigm Management Services proprietary scale assigned after a multivariate regression analysis.

Level 1: Minimal treatment, 2: Routine treatment, 3: Low-intensity treatment with predictable end points, 4: High-intensity treatment with indication for prolonged treatment or delayed recovery 5: Severe- unusually complicated with challenging end points to treatment, 6: Extremely severe- most complex requiring greatest amount of treatment with end points highly challenging and at risk for non-achievement.

## Trauma Scores

Within the medical field, two key trauma severity scoring tools should be used to measure the severity of a trauma: the Injury Severity Score (ISS) and the Glasgow Coma Scale (GCS). Using these tools is a good way to objectively weigh the collective instability and needs of an injured person. Given the inherently unpredictable nature of such injuries, these tools are less useful on an individual basis compared to the aggregate level.

The ISS is an anatomic score from 1-75. A lower the score indicates a more healthy individual. It is calculated by assessing the physical damage to six discrete parts of the body:

1. Head and neck, including cervical spine
2. Face, including the facial skeleton, nose, mouth, eyes and ears
3. Thorax, thoracic spine and diaphragm

4. Abdomen, abdominal organs and lumbar spine
5. Extremities including pelvic skeleton
6. External soft tissue injury

Each of these regions is evaluated on a six point scale, from “minor” to “unsurvivable.” If any of the scores are determined to be six, then the ISS is automatically set at 75; otherwise, the ISS is calculated by squaring, then summing, the value of the three most injured body regions ( $ISS = A^2 + B^2 + C^2$ ). A score of 16 or greater is defined as a multiple trauma.

The GCS is a physiologic score from 3-15, with higher being better. Focusing on a person’s neurological and cognitive state, the scale comprises three tests: eye, verbal and motor responses. On the GCS, a score of 8 or less is considered severe, 9-12 as moderate, and 13 or greater as minor.

## Phases of Treatment

The treatment of a multiple trauma injury may be separated into four main

phases. The first phase, acute emergency management, typically occurs within 24 hours of injury. The aim is to quickly identify any issues that must be addressed immediately and set in place an appropriate emergency management plan. Common issues include intracranial hemorrhage, vascular hemorrhage (e.g., arch), exploratory laparotomy, rectal/GU injuries and fracture fixation. At the end of this initial phase of treatment, treating physicians should use a final survey to identify any potentially missed injuries.

The second phase of treatment, definitive acute management, aims to achieve acute medical stabilization. This takes place in the days and weeks after the injury and will commonly address fracture management and wound coverage, as well as any complications that may arise. The most common



complications that may occur during this time are lung failure, blood infection, pneumonia, adult respiratory distress syndrome, shock, kidney failure, heart failure, abscess formation and blood clots.

The third phase is inpatient rehabilitation and can occur weeks or months after the injury. The goal during this phase is to maximize individual function and promote self-care.

The fourth and final phase, outpatient rehabilitation, aims to maximize community function. A large component of this period of treatment is residential and community reintegration, which can understandably prove difficult for those whose lives are forever changed due to a multiple trauma injury. This stage also focuses on psychological stability,

activities of daily living (ADLs), and ultimately, returning the injured to the same pre-injury quality of life. During this phase, particular attention should be paid to a set of complications that can be chronic in nature: difficulty in residential and community reintegration, chronic pain, addiction and on-going psychological issues.

## Prognosis

Due to the complexity of multiple trauma, it is very difficult to arrive at an accurate prognosis. In fact, more than weight (e.g. obesity), pre-morbid conditions (e.g. diabetes) and gender, age is the factor that most impacts predictions for recovery. The difference is profound. The mortality rate of those over 65 suffering multiple trauma is 60%, which jumps to over 90% when the GCS is under 5. Other factors impacting prognosis include the GCS and ISS, hypotension/hypoxia, and treatment delay (due to either prolonged transport post-injury or delays in definitive transfer due to injuries).

Although the above factors can influence a multiple trauma victim's prognosis, outcome predictors in any one individual are unreliable. As such, it is imperative that all treatment be administered under the presumption of recovery.

## Achieving the Best Outcomes

Although the outcome of multiple trauma care is inherently difficult to predict given the complexity of the injuries, there are ways to ensure one achieves the best results. It is perhaps most important to quickly transport the patient to a world-class trauma center as soon as possible after the injury. Intense inpatient and outpatient rehabilitation is also key to successfully treating multiple trauma.

The area with the most opportunity for improvement, however, involves the coordination of care, particularly the coordination of the specialty doctors and services that are often involved in these cases. A catastrophically injured person who sustains multiple trauma is likely to be treated by a plethora of technical specialists, each with his or her own perspective about necessary medical treatments. Communication and information gaps may be wide in these extremely complex cases, which can preclude efficient, appropriate, and cost-effective care.

In other words, the “big picture” is often overlooked during the acute phase of treating a person suffering from multiple trauma. With so many parties involved, it's easy to lose sight of the long-range goal: achieving the maximum possible level of recovery and functional ability.

Dedicating a team of specialists to serve as an information and communication bridge between the injured person, family, employer, carrier/client and many medical specialists will lead to the best outcomes. A voice of experience is needed to prioritize, coordinate, manage, monitor and advocate for the patient in multiple trauma cases.

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<sup>1</sup> ACS-NTDB 2009 Annual Report

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