

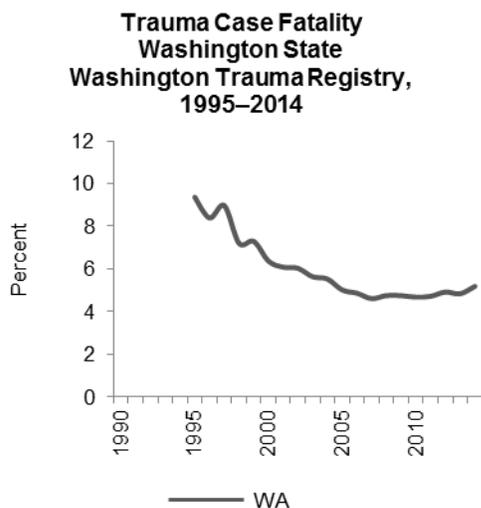
Trauma and Emergency Cardiac and Stroke Systems

Definition: Comprehensive statewide systems providing injury and illness prevention services and timely and appropriate delivery of trauma and cardiac and stroke treatment for people with traumatic injury and acute illness events. This chapter reports In-hospital deaths and survival of trauma patients, timely receipt of procedures to open clogged arteries for heart attack patients, and timely receipt of medication to dissolve clots for some stroke patients as measures of system effectiveness. (Additional information in [Technical Notes](#).)

This is a data update of the *Health of Washington State* chapter on [Trauma and Emergency Cardiac and Stroke Systems](#) published in 2012.

Time Trends

Trauma. One measure of trauma system effectiveness is the number of hospital deaths from traumatic injury.



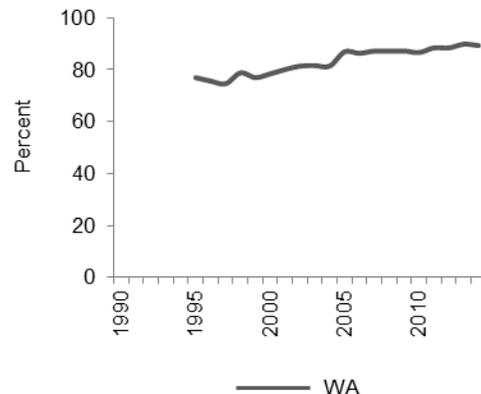
During 1995–2014, 13,602 deaths occurred out of 251,396 cases reported in the Washington Trauma Registry. In 1995, the rate was 9% and by 2005, it had fallen to 5%. The rate has remained at 5% through 2014.

Survival of severely injured patients (ISS 16 or greater) measures the success of the trauma care system (see [Technical Note](#)). Most patients with ISS less than 16 survive unless there are complications, such as age extremes or

conditions like heart or respiratory disease. While severely injured patients with ISS 16 or higher may be in a life-threatening situation, many benefit from timely and appropriate pre-hospital and hospital care.

In 1995, about 77% of severely injured patients survived. In 2014, the survival rate reached about 89%.

Survival from Major Injuries (ISS16+) Washington State Washington Trauma Registry, 1995–2014



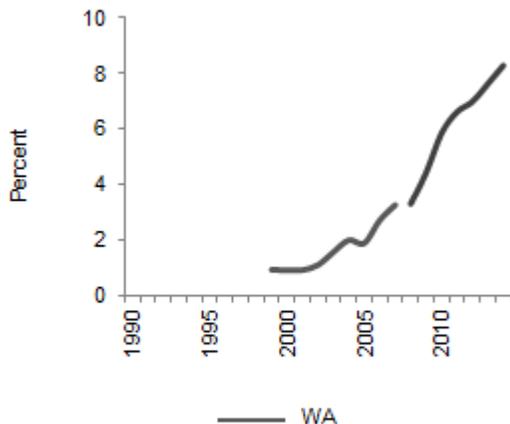
ISS: Injury-Severity Score (See Technical Notes)

Cardiac and stroke. Statewide data on receipt and timeliness of appropriate care for cardiac patients are not readily available.

Stroke is a particularly time-critical condition because the clot-dissolving medication can only be given within 4.5 hours of stroke onset.¹ Many patients do not receive t-PA because they get to the hospital too late, or the hospital does not have the resources to provide it. In Washington, the percent of patients hospitalized for ischemic stroke (strokes

caused by blood clots) that received acute reperfusion therapy with tissue plasminogen activator (t-PA—a clot-dissolving medication) increased from 0.9% in 1999 to 3.3% in 2007. In 2008, coding for this procedure changed, resulting in a break in the trend (see [Technical Note](#)). From 2008 to 2014, use of t-PA increased from 3.3% to 8.3% of stroke patients overall. There is, however, no readily available statewide data on timeliness of t-PA administration for those who arrived at a hospital within the required 4.5 hours. Currently, 54 of Washington’s 89 stroke-categorized hospitals submit their performance data to the American Heart/Stroke Association’s Get-With-the-Guidelines Registry. For those hospitals, the t-PA administration among the patients who arrived within the required 4.5 hours was 72% in 2014.²

Ischemic Stroke Hospitalizations Treated with t-PA Washington State CHARS, 1999–2014



t-PA : clot dissolving medication administered within 4.5 hours of symptom onset. The break in the trend is a result of changing coding for this procedure.

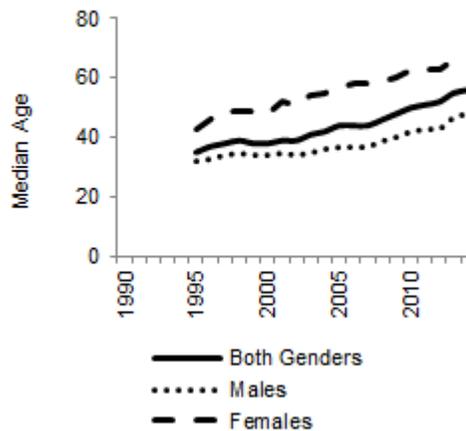
Age and Gender

Trauma. During 1995–2014, the median age of all trauma patients rose from 35 to 56 years. In 1995, only one in every five seriously injured (ISS 16+) trauma patients was 55 years or older. In 2014, nearly half of all serious injuries (about 47%) involved patients ages 55 or older. For trauma care, age is an important factor, regardless of injury severity, with increased mortality after age 55.³ Though the median age is increasing for both genders, women tend to

experience trauma later in life than men do. In 2014, the median age for males in the trauma registry was 48 years while it was 66 years for females.

Most injuries in older adults involve women who fall due to slipping or tripping. Given that many older adults are on blood thinners, a minor impact to the head can easily lead to deadly brain hemorrhage.⁴ Head injuries due to falls are a major contributor to deaths in elderly trauma patients.

Median Age of Trauma Patients Washington State Washington Trauma Registry, 1995–2014



Cardiac and stroke. Statewide age and gender data on receipt and timeliness of appropriate care for cardiac and stroke events are not readily available.

Economic Factors and Education

Trauma. The trauma registry does not include data on patient income or education.

Cardiac and stroke. Statewide economic and education data on receipt and timeliness of appropriate care for cardiac and stroke events are not readily available.

Race and Ethnicity

Trauma. Data on race and ethnicity are missing for more than 20% of patient records in the Washington trauma registry and as such are not presented here.

Cardiac and stroke. Statewide racial and ethnic data on receipt and timeliness of appropriate care for cardiac and stroke events are not readily available.

Data Sources

Washington Trauma Registry (WTR), Office of Community Health Systems, Department of Health, 1995-2014,

Washington Comprehensive Hospital Abstract Reporting System (CHARS), Center for Health Statistics, Department of Health, 1987-2014.

For More Information

Office of Community Health Systems (360) 236 2800,
<http://www.doh.wa.gov/PublicHealthandHealthcareProviders/EmergencyMedicalServicesEMSSystems/EMSandTrauma.aspx>;

<http://www.doh.wa.gov/PublicHealthandHealthcareProviders/EmergencyMedicalServicesEMSSystems/EmergencyCardiacandStrokeSystem.aspx>

Technical Notes

The Trauma Registry reports on trauma, not on all hospitalized injuries: The trauma inclusion criteria are: an injured patient (ICD-9 codes 800-904.9 and 910-959.9) who is admitted to a hospital for more than 48 hours (or any admission for a child through age 14); or who is transferred from the first receiving facility to another hospital; or who is airlifted from the scene; or for whom the hospital's trauma resuscitation team is activated; or who dies in the hospital. These inclusion criteria identify injured patients who could most benefit from an effective trauma system based on not just severity but also acuteness of their conditions. Trauma deaths occurring out of hospital are not included in the registry, with the exception of those who die in transport.

Definition of emergency cardiac and stroke events related to emergency care: Emergency cardiac events include hospitalizations from heart attack, unstable angina and cardiac arrest (ICD-9 codes 410, 411 and 427.5 in the first nine diagnoses, respectively). Stroke events include hospitalizations with ICD-9 codes 430-438 in the first nine diagnoses.

Injury Severity Score: This is a summary score for traumatic injuries. The ISS is calculated as the square of the abbreviated injury score (AIS). If more than one injury occurs, the highest AIS value is selected from each of up to six body regions (head/neck, face, thorax, abdominal and pelvic contents, limbs, and skin). The three highest of these are squared and summed. If any AIS score is six, then the ISS is 75. The ISS ranges from one (least severe) to 75 (usually fatal). Injuries with ISSs less than 9 are mild, such as simple cuts or sprains. ISS 9–15 indicates a moderate injury, such as a broken leg or single organ injury, while ISS 16–75 indicates a major injury, such as head injury, major abdominal injury and injury involving two or more major parts of the body.

See Champion, Sacco, Copes: Injury Severity Scoring Again. *Journal of Trauma*. 1995;38:94.

T-PA treatment:

Ischemic stroke hospitalizations treated with t-PA include hospitalizations with ICD-9 codes 433-434 in the first nine diagnoses that also had a procedure code of 99.10 for t-PA administration in the CHARS database. In 2008, an additional ICD9 diagnosis code, V45.88, became effective for identifying t-PA administration if a patient had been given treatment in one hospital and then was transferred to another hospital. While this method produced similar results as national analysis from the same type of inpatient data, it may grossly underestimate treatment rates.⁵ Coding of hospitalizations depends on billing requirements, which may limit the documentation of actual treatment given.^{5,6}

Acknowledgments

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Endnotes

¹ Lansberg MG, Bluhmki E, Thijs VN. Efficacy and safety of tissue plasminogen activator 3 to 4.5 hours after acute ischemic stroke: a metaanalysis. *Stroke*. 2009;40:2438–2441.

² American Heart Association/American Stroke Association. Get With The Guidelines Registry (GWTG) Stroke Module.

³ Kuhne CA, Ruchholtz S, Kaiser GM, Nast-Kolb D. Mortality in Severely Injured Elderly Trauma Patients: When Does Age Become a Risk Factor? *World J Surg*. 2005;29(11):1476-1482.

⁴ Franko J, Kish KJ, O'Connell BG, Subramanian S, Yuschak JV. Advanced Age and Preinjury Warfarin Anticoagulation Increase the Risk of Mortality After Head Trauma. *J Trauma*. 2006;61(1):107-110.

⁵ Kleindorfer D, Xu Y, Moomaw CJ, Khatri P, Adeoye O, Hornung R. US geographic distribution of t-PA utilization by hospital for acute ischemic stroke. *Stroke*. 2009;40:3580-3584.

⁶ Albright K, Martin-Schild S, Morales M, Grotta J. Comment on US Geographic Distribution of Recombinant Tissue Plasminogen Activator Use by Hospitals for Acute Ischemic Stroke. *Stroke*. 2010;41:e189.