

Patients with head injuries do better when treated by trauma centers, even if it means bypassing other hospitals

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Patients who sustain severe head injuries tend to have better outcomes if they are taken to a designated trauma center, but 44 percent of them are first taken to hospitals without these specialized care capabilities, according to new research from the Perelman School of Medicine at the University of Pennsylvania. In the largest study of its kind, researchers found that patients under 65 were significantly more likely to fare well—going home from the hospital without the need for nursing care or inpatient rehabilitation—if taken to a trauma center first, rather than a non-trauma center. Patients over 65 were significantly less likely to die from their head injury when they went first to a trauma center.

The results, published today in the *Journal of the American College of Surgeons*, highlight a serious care disparity for these severely injured patients, and point to the need for systematic changes to improve care.

"These findings highlight a big opportunity to improve outcomes for head injury patients," said the study's senior author, M. Kit Delgado, MD MS, an assistant professor of Emergency Medicine and Epidemiology. "Regional trauma centers were set up to serve patients like these, but clearly many of them are still ending up in hospitals that may not have protocols, resources, and experience to appropriately treat these severe injuries."

Head injuries are a factor in about 50,000 deaths in the United States

every year, and the incidence of these injuries appears to be rising. Between 2000 and 2010, [emergency room visits](#) and hospitalizations for head injuries increased from 521 to 824 per 100,000 people annually. Head injuries are also a major cause of hospitalization for the elderly, and also account for the majority of severe injuries undertriaged to non-trauma centers. Prior research has demonstrated that patients under 55 have significantly improved outcomes if treated in trauma centers, but these studies did not determine if older adults or patients with isolated head injuries had the same benefits. Since time to treatment may be critical and many non-trauma centers have neurosurgeons on staff capable of treating isolated head injuries, bypassing these hospitals to travel to further away trauma centers could theoretically lead to unintended consequences.

Delgado and colleagues, including lead author Elinore J. Kaufman, MD, MSHP, a resident in General Surgery at New York-Presbyterian Weill Cornell Medicine, who was a Penn Master of Science in Health Policy Research (MSHP) degree candidate at the time of the study, examined databases on emergency room visits for six states (NJ, NC, AZ, NY, FL, UT) during 2011-12. They identified 62,198 patients with severe, isolated head injuries who had been taken either to a trauma center (56 percent) or to a non-trauma center capable of performing neurosurgery (44 percent).

The ideal comparison of trauma center vs. non-trauma center outcomes would be a clinical trial in which patients are randomly assigned to one type of hospital or another. But, the authors say that for many logistical and ethical reasons that isn't feasible. However, the researchers had enough data to partly simulate a clinical trial setup by matching trauma-center and non-trauma center patients according to their sociodemographics, geography, cause, type, and severity of [injury](#), and other variables. They then used the patient's relative distance from their home to the closest trauma center and non-trauma center with

neurosurgery as a variable that effectively randomized where patients were treated.

In the resulting matched set of 21,823 cases, patients taken to trauma centers fared significantly better than those taken to non-trauma centers. Patients under 65 years old saw no mortality benefit, but had a 6.9 percent higher rate of a favorable discharge. Patients 65-and-older had a 3.4 percent lower risk of mortality with equal rates of being favorably discharged.

"These estimates of the benefits of sending patients to a trauma center are probably conservative, since we didn't include patients sent to non-trauma centers without neurosurgical capabilities," Kaufman said, adding that the complementary results for the two age groups are consistent with an overall improvement in outcomes. "If some of the older patients survived at trauma centers when they wouldn't have survived at non-trauma centers, that would have reduced mortality for that group but left many of those survivors in need of ongoing care and rehabilitation."

"It's good to now have evidence that demonstrates the benefit of traveling farther to a trauma center for these patients," Delgado said. "Hopefully, this will motivate EMS and trauma systems to double their efforts to triage patients with severe head injuries directly to trauma centers. There is major opportunity to improve outcomes as nearly half of these patients are being taken to non-[trauma](#) centers where their outcomes are worse."

The researchers suggest increasing compliance with current ambulance triage guidelines and future research to inform whether these guidelines should be revised to be more sensitive for picking up severe [head injuries](#) that may be less obvious at the time of presentation. Improvements in care at non-[trauma centers](#) would also reduce the

differences in outcomes, Delgado said.

Provided by Perelman School of Medicine at the University of Pennsylvania

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