

Sepsis patients fare better in hospitals with higher case volumes

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Patients with sepsis, one of the most time-sensitive and hard-to-detect illnesses in medicine, are more likely to survive the life-threatening condition when treated at a hospital that sees a higher volume of sepsis cases. New research from the Perelman School of Medicine at the University of Pennsylvania shows a clear relationship between hospitals that treat the most cases of severe sepsis and lower rates of inpatient deaths among those patients. The study, led by David F. Gaieski, MD, an associate professor of Emergency Medicine at Penn, is published online in the *American Journal of Respiratory and Critical Care Medicine*.

"One of the main barriers to treatment of sepsis is recognizing its early stages, since the symptoms are non-specific and often similar to those of a viral infection. However, early diagnoses and treatment are key to surviving sepsis and it may be that physicians at hospitals that see a larger volume of patients with [severe sepsis](#) are more attuned to these non-specific symptoms and have put protocols in place to aid in the detection of these [critically ill patients](#)," Gaieski said. "Our results provide preliminary support for the idea that severe sepsis patients may benefit from treatment at higher-volume specialty centers much the same as the reality that patients who've suffered severe injuries are brought to designated trauma centers and those who've had strokes typically come to certified stroke centers."

Sepsis is an illness caused by the body's inflammatory and anti-inflammatory responses to bacteria and other pathogens, including viruses and fungi—so it's not solely caused by the pathogens themselves,

but also by the cytokines the body releases in response to the pathogens. A bacterial infection anywhere in the body may set off the response that leads to sepsis, which can then cause blood pressure to drop, and major organs and body systems to stop working properly because of poor blood flow. Not only is severe sepsis becoming more common, but the in-hospital mortality rate can be as high as 38 percent, and the illnesses costs the United States health system approximately \$24 billion annually. The Centers for Disease Control and Prevention (CDC) currently lists septicemia as the 11th leading cause of death in the U.S., and the burden is expected to increase as the population ages.

The recent Penn study looked at hospital admissions—examining the relationship between annual case volume, urban location, organ dysfunction and survival—over a seven year period (2004-2010) among a total of 914,200 patients with severe sepsis, culled from the largest national database of publically available inpatient information. The study found an inverse relationship between severe sepsis case volume and inpatient mortality, in both urban and rural hospitals. Overall in-hospital mortality was 28 percent, but the study found that patients treated at higher-volume hospitals (those who treated 500 or more cases per year) had a 36 percent increase in their odds of inpatient survival compared to those treated at lower-volume hospitals (less than 50 cases per year). Typically, the highest volume hospitals are academic medical centers, which tend to be located in urban areas.

The study also examined the association between inpatient severe sepsis mortality and organ dysfunction type, finding that the most common organ system dysfunctions were renal, respiratory and cardiovascular. Additionally, the study found that mortality from severe sepsis increased as the number of organ dysfunctions increased.

Severe sepsis treatment efforts in the Hospital of the University of Pennsylvania's (HUP) emergency department have been focused on early

measurement of serum lactate—which can help indicate whether enough oxygen is being delivered to tissues in the body—as a marker of impending shock. The results are then used to identify potentially critically ill patients more quickly and then deliver protocolized resuscitation during their first hours in the hospital. Since these new protocols were adopted in 2005, Gaieski says that deaths among severe [sepsis](#) patients admitted to HUP through the emergency department dropped from 24 percent in 2005 to 11 percent in 2009.

"While it's important that we are getting it right at our tertiary care center, this paper highlights the variability in outcomes across the U.S. The real question here is: can we take the critical next step of disseminating best practices from high performing centers to the rest of the health care system?" says Brendan Carr, MD MS, assistant professor of Emergency Medicine and Epidemiology and senior author on the study. "We need large scale strategies that ensure the best possible outcome for critically ill [patients](#) no matter where they are when they get sick. We've built good systems for a few conditions that require early aggressive diagnostics and intervention—like trauma and stroke—but our response to the unplanned critically ill patient requires us to cooperate across public health, public safety and most importantly, competing healthcare systems."

Provided by University of Pennsylvania School of Medicine

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