

## Episodes of Severe Sepsis May Result in Long-Term Cognitive and Functional Decline for Older Adults

Iwashyna TI, Ely EW, Smith DM, et al. Long-term cognitive impairment and functional disability among survivors of severe sepsis. *JAMA* 2010;304:1787–94.

### Study Overview

**Objective.** To examine the long-term impact of severe sepsis on cognitive and physical functioning.

**Design.** Prospective observational cohort study.

**Setting and participants.** Nationally representative sample of community-dwelling older Americans (age > 50 years) who are part of the Health and Retirement Study (HRS), an ongoing cohort study begun in 1992 in which participants are interviewed every 2 years. Individuals from this cohort whose data are linked with Medicare and who had a hospitalization for severe sepsis were compared with a cohort of hospitalized patients who did not have severe sepsis or any critical care use. Sepsis was identified with a claims-based definition that required evidence of both an infection and new-onset organ dysfunction during a single hospitalization. Both groups had at least 1 interview with baseline cognitive and physical function assessment between 1998 and 2004 prior to the index hospitalization. Patients were followed up through death or the 2006 HRS interview.

**Main outcome measures.** The primary outcome measures were functional status and cognitive impairment. Functional status was based on a total deficiency score that was the sum of the 6 activities of daily living (ADLs) and 5 instrumental ADLs (IADLs), or proxy report of these scores if patients could not an-

swer the surveys. Functional limitations were then categorized based on the number of the ADL+IADLs requiring assistance: no limits (0 requiring assistance), mild to moderate (1–3), and severe ( $\geq 4$ ). Cognitive function was assessed 2 ways, based on age. For patients < 65 years age, a 27-point scale was used that included domain tests of memory, serial 7 subtractions, and naming. For patients  $\geq 65$  years, a 35-point scale that included the same domains plus tests of orientation was used; proxy reports using validated informant questionnaires on cognitive decline were used for those unable to be interviewed. Cognitive impairment was then categorized as mild, moderate, or severe using cutoffs from prior HRS study data found to be consistent with degrees of dementia.

**Results.** A total of 516 severe sepsis versus 4517 non-sepsis hospitalization survivors were compared. In adjusted analyses, severe sepsis was associated with the development of 1.57 (95% confidence interval [CI], 0.99–2.15) new limitations for patients who initially had none. For non-sepsis hospitalizations, fewer functional limitations subsequently developed (0.48 [95% CI, 0.39–0.57]). The prevalence of moderate to severe cognitive impairment increased 10.6% for patients who survived sepsis (odds ratio, 3.34 [95% CI, 1.53–7.25]). These declines persisted for at least 8 years. For those non-sepsis hospitalizations, there were no associated changes in moderate to severe cognitive impairment (odds ratio, 1.15 [95% CI, 0.80–1.67]).

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**Conclusion.** Older adults who survive hospitalization for severe sepsis are at significant risk for developing long-term functional and cognitive impairment.

### Commentary

In the United States, it is projected that by 2030 the number of individuals  $\geq 65$  years will reach 71 million (double the number from 2000), constituting 20% of the country's population [1]. Across clinician types, caring for older adults will become more commonplace in the health care setting. As noted by authors of this study, both cognitive and physical disability—conditions frequently found in older adults—are associated with increased mortality, cost, and emotional (and physical) burdens for individuals, their family, and society [2,3]. This study by Iwashyna et al used a national study sample to evaluate long-term outcomes of patients hospitalized for severe sepsis. They found that individuals fortunate enough to survive a hospitalization for severe sepsis are at greater risk of subsequently developing long-term functional and cognitive impairment. Awareness of conditions placing elders at risk for worsened cognitive and physical disability may be a first step in identifying areas where better preventative and preparatory care can be provided to this at-risk population.

Clinicians, patients, family members, and caregivers can focus on preventative care by ensuring that patients or individuals receive annual flu and pneumonia vaccinations. Reducing infection risks, particularly in immunocompetent elders or those in high-risk settings such as nursing homes, is an early first step. Practice of good hygiene and hand washing is another easily performed but often forgotten step to reduce infection transmission. Certain types of infection that are more likely to develop into sepsis, such as urinary tract infections, may be reduced by decreasing urinary catheter insertion if possible. Patients should be made aware of reasons to see their physician or go to the hospital for treatment if they begin having fevers, tachycardia, chills, or decreased urine output—all signs of an infection that if treated early enough may avoid developing into severe sepsis.

For individuals who have suffered and survived severe

sepsis, preparation for the possible loss of functional independence afterwards may be facilitated with an understanding of potential problems that can subsequently develop. The risk of functional decline coupled with cognitive impairment may limit an individual's ability to care for themselves, impacting activities that range from eating, bathing, and walking to taking medications and preparing meals. Clinicians should be prepared to facilitate patient transitions to rehabilitation so that functional limitations with the most dramatic decline in ability are managed earlier on. Clinicians can also discuss with family members and care givers potential scenarios of the need for greater assistance with these ADLs and IADLs.

Limitations of this study include the use of a claims-based definition of sepsis. Prospective clinical evaluation of the severity of illness associated with the sepsis hospitalization (and likely septic shock) was not assessed. Additionally, data on the variation of functional and cognitive status outcomes were collected only during HSR surveys, which are completed every 2 years. Improvement or worsening of these outcomes between survey time points was not available.

### Applications for Clinical Practice

Long-term complications from an episode of severe sepsis for older adults that include functional and cognitive impairment may support more aggressive preventative care against future infection and preparation for possible loss of functional independence post sepsis.

—Review by Ula Hwang, MD, MPH

### References

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