

WASHINGTON STATE HEALTH SERVICES
RESEARCH PROJECT

Research Brief No. 62
June 2012

Sepsis Hospitalizations: Trends
and Geographic Variations

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Sepsis is a serious blood infection that typically arises from infections on the skin or in the lungs, abdomen or urinary tract.^{1,2} It is commonly known as “blood poisoning” and may also be called septicemia. In 2010, 16,903 Washington residents were hospitalized for sepsis (primary diagnosis of ICD-9-CM codes 038, 995.91 or 995.92). An additional 6,498 Washingtonians were hospitalized with sepsis as a secondary diagnosis.

Hospitalizations for sepsis can be costly. Between 2008 and 2010, patients with a primary diagnosis of sepsis had an average charge per stay of \$50,000 and a median charge per stay of \$28,000. During that same time period, general medical/surgical patients (excluding newborns, obstetrics, mental illness, or alcohol or substance abuse) had an average charge per stay of \$35,000, or \$15,000 less than the sepsis average, and a median charge per stay of \$21,500, or \$6,500 less than the sepsis median.

Sepsis disproportionately affects the elderly. For 2008-2010, the average age of a sepsis patient was sixty-six, the median age was sixty-nine, and the most frequent age was eighty-four. Among the general medical or surgical patients, the average age was fifty-eight and the median age, which was also the most frequent age, was sixty-one.

Sepsis can be deadly. For 2008-2010, 14.0% of Washington residents hospitalized for sepsis died in the hospital, while only 2.3% of the general medical or surgical patients were discharged deceased. During those same years, the age-adjusted in-hospital mortality rate for sepsis was 75.6 per 1000 patients, or nearly seven times greater than the 11.4 age-adjusted rate for general medical/surgical patients. Sepsis patients were also more likely to be discharged to hospice care, 4.0% versus 2.4%.

ABSTRACT

Sepsis is a serious bloodstream infection that can lead to death or disability.

Sepsis patients have an average cost per stay of \$50,000 or \$15,000 more than general medical/surgical patients.

Sepsis disproportionately affects the elderly.

The age-adjusted in-hospital mortality rate for sepsis is nearly seven times greater than the general medical/surgical rate.

Since 2000, age-adjusted sepsis hospitalization rates have been increasing by 16% per year, equaling more than a three-fold increase from 2000 to 2010.

Residents from the Everett, Bremerton and Vancouver environs, as well as those from most of Grays Harbor County, have particularly high hospitalization rates for sepsis.

Figure 1
Sepsis hospitalization rate trends, 1990-2010

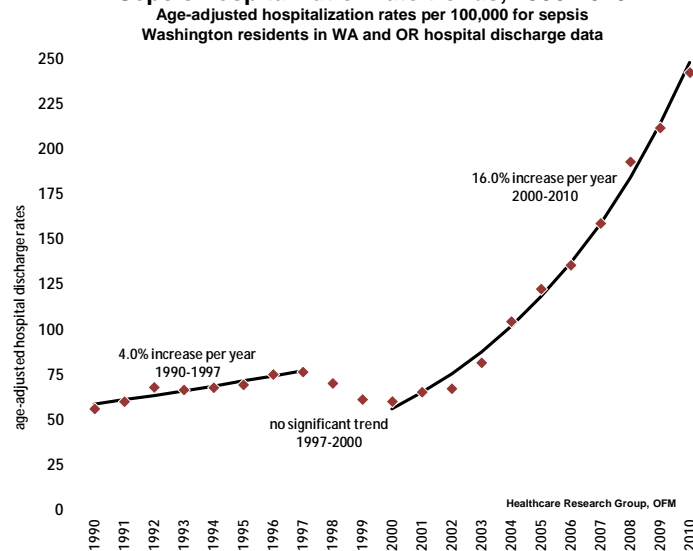
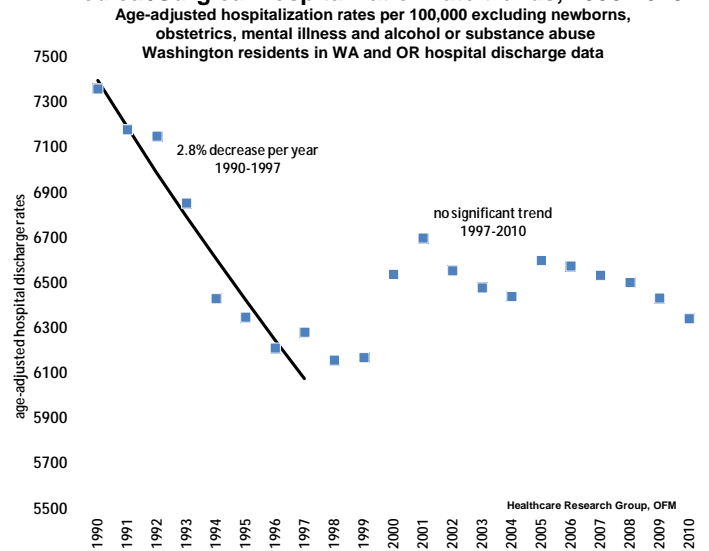
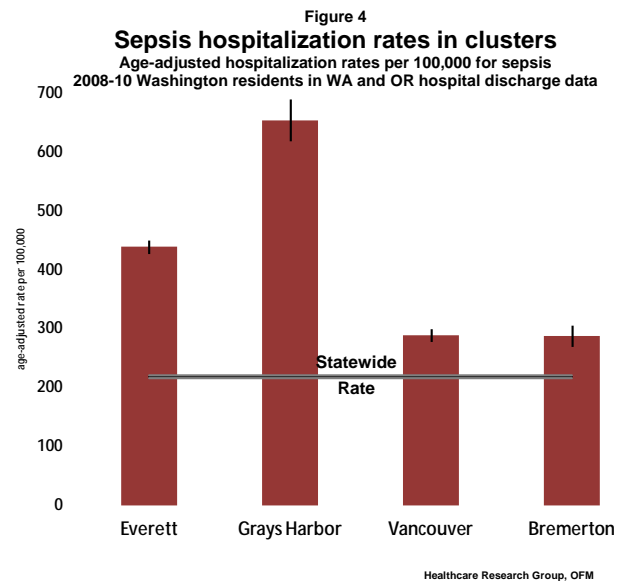
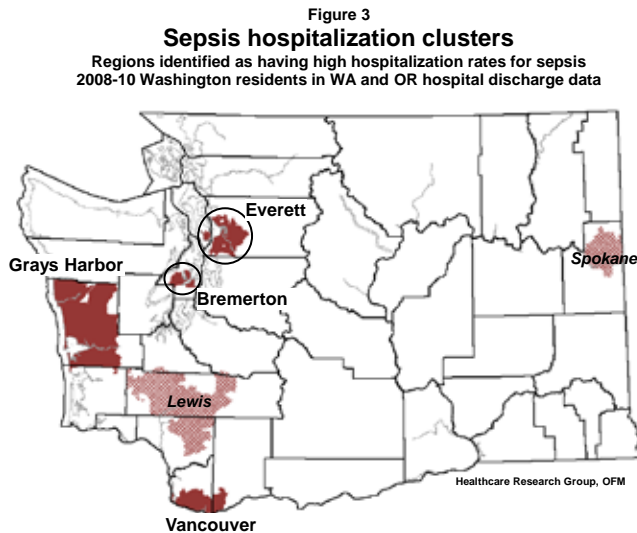


Figure 2
Medical/Surgical hospitalization rate trends, 1990-2010



Sepsis is on the rise. Washington's age-adjusted hospitalization rates for patients with a primary diagnosis of sepsis have been increasing by 16% per year since 2000, equaling more than a three-fold increase from 2000 to 2010. The trend for age-adjusted hospitalization rates for general medical/surgical discharges in Washington has been essentially flat for the last fourteen years. (See Figures 1 and 2.)

Some communities are at higher risk than others. Geographic variations in sepsis hospitalization rates, based upon the patients' ZIP code of residence and not their place of hospitalization, were identified using spatial analyses.³



As seen in Figure 3, for 2008-2010 combined, four regions were identified as having higher than expected hospitalization rates for patients with a primary diagnosis of sepsis. These are labeled as Everett, Bremerton, Vancouver and Grays Harbor, and include all of those cities and their environs, and most of Grays Harbor County. Figure 4 shows that the age-adjusted rates for each of these regions are significantly higher than the statewide rate.

Figure 3 also shows two additional areas, one labeled Lewis and including portions of Lewis and Cowlitz Counties, and the other labeled Spokane including Spokane City and environs. When looking at patients with either a primary *or* secondary diagnosis of sepsis, these two areas, along with the other four, had rates significantly higher than the state's.

While the focus of this analysis is primarily on patients hospitalized for sepsis, we also assessed cases in 2010 where the data indicated if sepsis was "present on admission." Among those 16,903 hospitalized in 2010 with sepsis as the primary diagnosis, 97% had the condition on admission, less than 1% acquired it during their hospital stay, and 2% were coded as blank or missing. For those additional 6,498 patients hospitalized in 2010 with sepsis as a secondary diagnosis, 41% had acquired their infection during their hospital stay. It may be worth noting that nationally the rate of patients who acquired sepsis or other infections through contact with the healthcare system is declining.⁴ Data specific to such a subset in Washington state are being collected, but are not yet available.

Abating the increasing trend of hospitalizations for sepsis poses many challenges. As noted by the Centers for Disease Control, our "aging population with more chronic illnesses; greater use of invasive procedures, immunosuppressive drugs, chemotherapy, and transplantation; and increasing microbial resistance to antibiotics"⁵ all contribute to this increasing trend. Focusing efforts on those communities that appear to be at the greatest risk may be one appropriate starting point.

Data sources:

1990-2010 CHARS, Washington State Department of Health
1990-2010 Oregon Hospital Discharge Data, Agency for Healthcare Research and Quality

¹ MedlinePlus Medical Encyclopedia. Septicemia. U.S. National Library of Medicine. National Institutes of Health. Available from:

<http://www.nlm.nih.gov/medlineplus/ency/article/001355.htm>.

² MedlinePlus Medical Encyclopedia. Sepsis. U.S. National Library of Medicine. National Institutes of Health. Available from: <http://www.nlm.nih.gov/medlineplus/ency/article/000666.htm>.

³ Software: Kulldorff M. and Information Management Services, Inc. SaTScan™ v8.0: Software for the spatial and space-time scan statistics. [www.satscan.org], 2009.

⁴ Centers for Disease Control and Prevention, Health care-associated infections declined in 2010, http://www.cdc.gov/media/releases/2011/p1019_healthcare_infections.html Accessed April 25, 2012

⁵ Hall, M.J., Williams, S.N., DeFrances, C.J., Golosinskiy, A. Inpatient care for septicemia or sepsis: A challenge for patients and hospitals. NCHS data brief, no 62. Hyattsville, MD: National Center for Health Statistics. 2011.