

Nosocomial Infections: A Discussion of the Problem and the Most Common Types

Each year, nosocomial, or hospital-acquired infections, kill more people than auto accidents or breast cancer.

The Centers for Disease Control and Prevention (CDC) estimates that there are approximately 2 million cases of hospital-borne infection each year, which result in nearly 100,000 deaths. ¹

Where and why do they occur?

Nosocomial infections occur most often in intensive care units and acute surgical and orthopedic wards. According to the World Health Organization, infection rates are likely to occur among patients with increased susceptibility due to old age, lowered immune status or underlying diseases. ² The hospital environment, bacterial resistance, being exposed to microorganisms in the hospital or chemotherapy are additional causes of infection. The four most common infections – catheter-associated urinary tract infections, surgical site infections, blood-stream infections and ventilator-assisted pneumonia – account for a majority of hospital-acquired infections.

Types:

Catheter-Associated Urinary Tract Infection (CAUTI)

Catheter-associated urinary tract infections usually are caused by the insertion of an indwelling urinary catheter for more than seven days. According to the CDC, they are the most common type of hospital-acquired infections with the lowest mortality rate and lowest additional hospital costs. They occur most often in non-surgical ICUs, where an infection develops 25 percent of the time. ³

Surgical Site Infection (SSI)

According to the CDC, surgical site infections are the second leading type of hospital-acquired infection, based on data collected from 1990 to 2004 in the National Nosocomial Infections Surveillance (NNIS) system. ⁴ According to the Institute for Healthcare Improvement, an estimated 2.6 percent of the nearly 30 million operations are complicated by surgical site infections each year. Some of the causes of surgical site infections include airborne microorganisms present during surgery, a lack of a sterile surgical environment or the contamination of an intravenous anesthetic. Surgical site infections cost an additional \$3,000 per infection in medical costs. ⁵ Patients usually have to be hospitalized for an average extra 7.8 days and the mortality rate is 3.1 percent.

Catheter-Related Bloodstream Infection (CRBSI)

Primary bloodstream infection typically occurs in critically ill patients who are hooked up to a central line. The CDC estimates that there are 250,000 hospital-acquired bloodstream infections per year, with the vast majority of these associated with central venous catheters. ⁶ One author estimated that more than 26,000 patients die each year from hospital-acquired bloodstream infections. The incidence of BSIs is highest in pediatric ICUs and accounts for 14 percent of all nosocomial infections. ⁷ Treating CRBSIs costs an average of \$25,000 per episode or between \$296 million to \$2.3 billion annually in medical costs. ⁸

Ventilator Associated Pneumonia (VAP)

Patients who most often develop VAP either are in a coma upon admission, have high creatinine levels or have been transferred into an intensive care unit (ICU). According to a study in the *New England Journal of Medicine*, nosocomial pneumonia is a leading cause of death from hospital-acquired infections, with an associated crude mortality rate of approximately 30 percent, making it the most common cause of death among all nosocomial infections.⁹ Treating VAPs costs hospitals \$40,000 per patient. In the Pennsylvania Health Care Cost Containment Council (PHC4) study detailed below, VAP accounted for 1,335 of the 11,668 reported nosocomial infections.¹⁰

Results of PHC4 Study

The study focused on approximately 1.56 million admissions to 173 Pennsylvania general acute care hospitals. The hospitals reported 11,668 hospital-acquired infections to PHC4.

Of the 11,668 patients who contracted nosocomial infection, 15.4 percent died, compared to a mortality rate of just 2.4 percent for those patients without infection. This equated to an additional 1,510 deaths among those with hospital-acquired infections.

Type of Infection Reported by Hospitals	Number of Nosocomial Infections
Surgical Site	1,317
Urinary Tract	6,139
Bloodstream	1,932
Pneumonia	1,335
Multiple	945
Total	11,668

In Pennsylvania hospitals alone, admissions in which patients contracted hospital-acquired infections in 2004 resulted in an additional 205,000 hospital days at a cost of an additional \$2 billion in hospital charges as compared to patients who did not contract such infections.¹¹

Because of its voluntary nature, PHC4 acknowledges that underreporting likely was prevalent. (Sixteen of the hospitals, including several of the larger ones, reported no hospital-acquired infections at all.)

The data from the Pennsylvania study make it clear that hospital-acquired infection is a serious problem for the U.S. health care system. Even without consideration of potential mortality, the cost is staggering. However, mandatory reporting laws in several states are bringing light to the problem and eventually could help reduce costs. In 2005, Florida became the first state in the country to publicly report infection and mortality rates in all of its hospitals. In addition, it has provided data on conditions related to patient care and the performance rating of hospitals. Transparency about nosocomial infection is key in identifying where problems lie and acquiring the information needed to eliminate them.

- 1 "Hospital-acquired Infections in Pennsylvania." PHC4 Research Briefs. Issue No. 5 July 2005.
- 2 "Prevention of hospital-acquired infections: A practical guide." World Health Organization Department of Communicable Disease, Surveillance and Response. 2nd Edition December 2002.
- 3 "Monitoring Hospital-Acquired Infections to Promote Patient Safety- United States, 1990-1999. MMWR Weekly. 3 March 2000."
- 4 "Monitoring Hospital-Acquired Infections to Promote Patient Safety- United States, 1990-1999. MMWR Weekly. 3 March 2000."
- 5 "Surgical Site Infections." www.ihl.org. 31 May 2006.
- 6 Rizzo, Michael. "Striving to Eliminate Catheter-Related Bloodstream Infections: A Literature Review of Evidence-Based Strategies." p. 2, 30 September 2005.
- 7 Rizzo, Michael. "Striving to Eliminate Catheter-Related Bloodstream Infections: A Literature Review of Evidence-Based Strategies." p. 2, 30 September 2005.
- 8 Mermel, Leonard A. "New Technologies to Prevent Intravascular Catheter-Related Bloodstream Infections." www.cdc.gov. 1 June 2006.
- 9 Kollef, Marin H. "Current Concepts: The Prevention of Ventilator-Associated Pneumonia." The New England Journal of Medicine 340: 627-634. 25 February 1999.
- 10 "Hospital-acquired Infections in Pennsylvania." PHC4 Research Briefs. Issue No. 5 July 2005.
- 11 "Hospital-acquired Infections in Pennsylvania." PHC4 Research Briefs. Issue No. 5 July 2005.