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**PROFESSION**

## ICU central-line infections drop dramatically nationwide

The reduction is a major achievement in improving care on a broad scale, patient safety experts say.

By KEVIN B. O'REILLY, amednews staff. Posted March 14, 2011.

American hospital intensive care units cut central line-associated bloodstream infections by about 60% over nearly a decade, saving an estimated 27,000 lives and avoiding up to \$1.8 billion in medical costs, said a new report from the Centers for Disease Control and Prevention.

"This is the first national success we have for patient safety in this country," said Peter J. Pronovost, MD, PhD. He is principal investigator of a bundle of central-line infection prevention techniques that in 2006 demonstrated success statewide in Michigan and has spread to nearly 1,000 hospitals in 43 states.

The CDC report, published in the March 4 *Morbidity and Mortality Weekly Report*, compared ICU bloodstream infection rates among the 260 hospitals reporting in 2001 with about 1,600 hospitals participating in the agency's National Healthcare Safety Network in 2009. Researchers used infection surveillance information and billing data on the number of days patients were on central lines to estimate the number of lives and dollars saved. About 25% of all patients with bloodstream infections die, the CDC said.

"This accomplishment stands out in terms of a national, large-scale, dramatic reduction in health care-associated infections," said Arjun Srinivasan, MD, lead author of the report and associate director for Healthcare Associated Infection Prevention Programs in the CDC's Division of Healthcare Quality Promotion. "I'm not aware of any other examples like this in the quality improvement literature."

In 2002, the CDC issued guidelines on preventing bloodstream infections related to central lines. In Dr. Pronovost's work in Michigan, reported in the Dec. 28, 2006, issue of *The New England Journal of Medicine*, ICUs virtually eliminated these bloodstream infections by implementing better hand hygiene, using full-barrier precautions when inserting central venous catheters, cleaning the skin with chlorhexidine, avoiding the femoral site for catheter insertion and removing unnecessary catheters.

### About 1 in 4 patients with a bloodstream infection dies.

What has set apart the national effort to cut bloodstream infections is the scientific rigor with which it has been pursued, said Robert M. Wachter, MD, chief of the Division of Hospital Medicine at the University of California, San Francisco Medical Center.

"No one woke up one day and said, 'Here's the bundle,'" Dr. Wachter said. "We had to study each element of the bundle and demonstrate that using barrier precautions or certain line-insertion techniques really worked. It took many years to demonstrate that."

Other experts agreed.

"This is one area where we have good science that tells clinicians what we should be doing and effective strategies to make sure they do it each and every time," said Nancy Foster, vice president for quality and patient safety policy at the American Hospital Assn.

The AHA is responsible for administering a \$5.8 million Agency for Healthcare Research & Quality grant to implement Dr. Pronovost's Comprehensive Unit-based Safety Program, known as On the CUSP.

### Infections outside the ICU

Central-line infections are not only a problem in the ICU. They also are common in other areas of the hospital and among patients on dialysis. The CDC report estimated there were 23,000 central-line infections among inpatients outside the ICU in 2009 and 37,000 bloodstream infections among hemodialysis outpatients in 2008. The CDC did not have comparative data for earlier in the decade.

The nature of the ICU may make it easier to implement infection prevention guidelines there, said Russell N. Olmsted, MPH, president of the Assn. for Professionals in Infection Control and Epidemiology.

### More than 80% of patients start dialysis using a catheter, raising the risk of bloodstream infections.

"In ICUs, you have a nicely defined unit with leadership from physicians and nurses and you can drive improvement in areas such as reducing central-line infections," said Olmsted, an epidemiologist with Infection Prevention and Control Services at St. Joseph Mercy Health System in Ann Arbor, Mich. "When you move outside that area to the standard medical/surgical unit, there is not necessarily a single physician or nurse who oversees things."

arteriovenous fistula.

Among dialysis patients, the challenge has been to encourage more of them to steer clear of catheters, Olmsted said. It is difficult to prevent infections among patients using a catheter for dialysis three times a week, he said. Since 2003, the Fistula First Breakthrough Coalition has sought to increase the number of patients opting for an

A Feb. 8 coalition report showed AV fistula use among dialysis patients rose from 34.1% in 2003 to 57.4% in 2010, but more than 81% of patients start dialysis using a catheter -- raising the risk of bloodstream infections.

Experts said the lessons learned from the national success with central-line infections could help slash catheter-related urinary tract infections, ventilator-associated pneumonia and surgical-site infections. One element critical to bringing the science to the bedside is putting doctors and other health professionals in charge of implementation, said Dr. Pronovost, director of the Division of Adult Critical Care Medicine at The Johns Hopkins Hospital in Baltimore.

"For too long, quality was something that clinicians felt was done to them rather than something that they do," he said. "Doctors and nurses own this. That change in norms was really key."

#### ADDITIONAL INFORMATION:

#### Making ICUs safer

Hospitals nationwide achieved a 58% decrease in the number of central line-associated bloodstream infections among patients in intensive care units. They also slashed the rate at which these infections occur.

	2001	2009
Total ICU central line-associated infections	43,000	18,000
ICU infections per 1,000 central-line days	3.64	1.65

Source: "Vital Signs: Central Line-Associated Blood Stream Infections -- United States, 2001, 2008, and 2009," *Morbidity and Mortality Weekly Report*, Centers for Disease Control and Prevention, March 4 ([www.cdc.gov/mmwr/preview/mmwrhtml/mm6008a4.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6008a4.htm))

#### WEblink

"Vital Signs: Central Line-Associated Blood Stream Infections -- United States, 2001, 2008, and 2009," *Morbidity and Mortality Weekly Report*, Centers for Disease Control and Prevention, March 4 ([www.cdc.gov/mmwr/preview/mmwrhtml/mm6008a4.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6008a4.htm))

On the CUSP: Stop HAI ([www.onthecuspstophai.org](http://www.onthecuspstophai.org))

"An intervention to decrease catheter-related bloodstream infections in the ICU," *The New England Journal of Medicine*, Dec. 28, 2006 ([www.ncbi.nlm.nih.gov/pubmed/17192537](http://www.ncbi.nlm.nih.gov/pubmed/17192537))

Fistula First Breakthrough Coalition ([www.fistulafirst.org](http://www.fistulafirst.org))

"Guidelines for the Prevention of Intravascular Catheter-Related Infections," *Morbidity and Mortality Weekly Report*, Centers for Disease Control and Prevention, Aug. 9, 2002 ([www.cdc.gov/mmwr/preview/mmwrhtml/rr5110a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5110a1.htm))

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