

# Penn medicine draws road map for elimination of central line-associated bloodstream infections

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Central line-associated bloodstream infections (CLABSI) fell by more than 90 percent during the past three years at the Hospital of the University of Pennsylvania due to a multi-pronged approach combining leadership initiatives, electronic infection surveillance, checklists to guide line insertion and maintenance, and implementation of the Toyota Production System to encourage best practices in line care. The findings, which Penn physicians say provide a road map for cutting the deadly, costly toll of hospital-acquired infections nationwide, will be presented on Friday, March 20 at the 19th Annual Meeting of the Society for Healthcare Epidemiology of America (SHEA).

"We were only able to see a sustained reduction in infections when we took a multifaceted approach throughout the entire hospital. There are many procedures, many steps and many personnel that are involved in the placement, care and maintenance of central venous catheters. We have learned that a successful program to reduce CLABSI must take all of these factors into consideration," says Neil Fishman, MD, director of Healthcare Epidemiology and [Infection Prevention](#) and Control at the 735 bed Philadelphia hospital and president-elect of SHEA. "Central line-associated [bloodstream infections](#) can add up to \$40,000 to the cost of a hospitalization and take their toll in human lives. The mortality rate of CLABSI has been reported as high as 30 percent. Our program ultimately makes the hospital a safer place to receive medical care."

Previous studies on CLABSI reduction efforts have focused only on intensive care units. But since the majority of CLABSI cases occur on other hospital floors that care for acutely ill, high-risk patients who require the long-term venous access for delivery of IV medications or nutrition, the Penn investigators sought to identify ways to eliminate all preventable infections of this kind. When the campaign began, in the fall of 2005, more than 30 patients with central lines developed bloodstream infections in the hospital each month. Over time, however, a series of process, technology and equipment improvements has cut the number of infections to less than five each month. Only one case was reported in February of 2009.

Key early components of the effort called for strict adherence to hand hygiene, chlorhexidine to clean the skin prior to procedures, and sterile techniques during line insertion, access and dressing changes. Checklists helped prompt staff adherence to the guidelines. New technology to improve management of catheter insertion sites also played an important role in battling the infections. When the authors identified problems with the handling of the line dressings - they were poorly placed or falling off, leaving room for bacteria to enter the line - they introduced a more adherent bandage and began using a new chlorhexidine (CHG) sponge. The sponge contains an antiseptic that can kill bacteria before they gain access to the bloodstream.

When the staff learned that a special cap that had been used to keep blood from clotting inside the lines was associated with increased bloodstream infections, its use was eliminated, leading to another drop in CLABSI rates.

The University of Pennsylvania Health System also began using an electronic surveillance program, TheraDoc®, at a cost of more than \$1 million, to help quash infections. This state-of-the-art-system allows hospital unit leadership teams to monitor hospital-acquired infection

data in real time, and to rapidly identify problems and trends and intervene to stop them. Fishman believes that ready access to this data along with a hospital administration that understands the importance of preventing these infections and provides the resources to do so are the cornerstones of fighting healthcare-associated infections. He notes that the hospital system has used this model to attack other hospital-acquired infections such as ventilator-associated pneumonias and catheter-associated urinary tract infections.

More recently, several HUP units implemented the Toyota Production System, which applies processes honed in the auto manufacturing industry to reduce variation in practice and to streamline and improve hospital care. The hospital has also begun an active central line surveillance program to help identify problems that could result in a bloodstream infection and take action before an infection develops.

"Our goal is to provide the very best care for our patients," says Patrick J. Brennan, MD, chief medical officer and senior vice president for the University of Pennsylvania Health System, "and we will not rest until we eliminate bloodstream infections from our hospitals."

Source: University of Pennsylvania School of Medicine ([news](#) : [web](#))

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