

3 years out, safety checklist continues to keep hospital infections in check

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The state of Michigan, which used a five-step checklist developed at Johns Hopkins to virtually eliminate bloodstream infections in its hospitals' intensive care units, has been able to keep the number of these common, costly and potentially lethal infections near zero — even three years after first adopting the standardized procedures. A report on the work is being published in the February 20 issue of *BMJ (British Medical Journal)*.

Peter Pronovost, M.D., Ph.D., a professor of anesthesiology and [critical care medicine](#) at Johns Hopkins University School of Medicine and a patient safety expert, says the widely heralded success in Michigan — the first state system to tackle in a wholesale fashion infections in central-line catheters ubiquitous in intensive-care units — has significantly changed the way physicians think about these infections.

"Prior to our work, we thought these were largely inevitable infections and that they were simply a cost of being in the hospital," says Pronovost, the report's leader and the developer of the checklist. "Now we know they are universally preventable. We've reset the benchmark."

Many quality improvement innovations, Pronovost says, are a flash in the pan — successful while they are being implemented and monitored, only to fall by the wayside once no one is watching anymore. Sustainability of the kind seen in Michigan requires a "complete culture change" that goes well beyond checklists and reminders to wash hands and use chlorhexidine antiseptic, he says.

Culture change means a work environment in which "nurses question doctors who don't wash their hands or use the checklist diligently," Pronovost says. "It means clinicians no longer thinking central-line infections are inevitable.

"They now believe these infections are preventable and they are creating a culture where they are," he adds.

Pronovost says his new paper is one of the first large studies to demonstrate that the results of a quality-improvement program can be sustained.

The checklist contains five basic steps for doctors to follow when placing a central-line catheter: wash their hands; clean a patient's skin with chlorhexidine; wear a mask, hat, gown, and gloves and put sterile drapes over the patient; avoid placing a catheter in the groin where infection rates are higher and remove the catheter as soon as possible, even if there's a chance it might be needed again at some point.

Central lines are used regularly for patients in the ICU to administer medication or fluids, obtain blood tests, and directly gauge cardiovascular measurements such as central venous blood pressure. Each year roughly 80,000 patients become infected and 30,000 to 60,000 die at a cost of \$3 billion nationally. Before heading to Michigan, Pronovost tested the checklist at Johns Hopkins Hospital, where catheter infections have also been virtually eliminated.

The new study covered more than 100 ICUs in the Michigan hospital system, which was a large pilot site for Pronovost's infection-prevention measures. Alongside the use of the cockpit-style checklist, the program included training physicians and nurses about infection control and using special, standardized central-line supply carts controlled for one-time use.

The safety plan also required immediate "stop now" orders by any member of the health care team when a checklist is not followed to the letter and feedback to each member of the care team about the number and rates of catheter-related bloodstream infections at weekly and quarterly meetings.

The Centers for Disease Control and Prevention estimates that between 10 percent and 20 percent of inpatients acquire some type of infection while in the hospital.

Before the checklist project in Michigan, the median rate of central-line infections there was about 3 per 1,000 catheter-hours, above the national average. After 18 months, most Michigan ICUs reported none of these bloodstream infections. The new research shows that after three years, the same was true — a "breathtaking" result, Pronovost says.

Pronovost and his team from the Hopkins Quality and Safety Research Group are taking the checklist system across the globe, with rollouts in the United Kingdom, Spain, parts of Peru and even Pakistan. They are also bringing the program to all 50 states. Last summer U.S. Health and Human Services Secretary Kathleen Sebelius called for a 75 percent reduction in these [catheter](#) infections over the next three years.

Pronovost and his colleagues are partnering with state health departments and hospital associations across the country to make sure there is buy-in from the many stakeholders involved in preventing these bloodstream infections.

The key to success is not just following standardized checklist steps, he says. To change culture, what's more important is that hospitals also search for errors on a continuing basis, know their infection rates and monitor them after implementing safety innovations. Doctors and nurses need to know the measures they are taking are working, to realize that the science behind the checklist is valid, he says.

"The use of checklists is not the endgame. Reduced infection rates are," Pronovost says. "The public wants to know: Am I going to get infected? If hospitals had to make these rates public, these infections would end."

Provided by Johns Hopkins Medical Institutions

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