

'Triple-threat' approach reduces life-threatening central line infections in children with cancer

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Hospitals can dramatically reduce the number of life-threatening central line infections in pediatric cancer patients by following a set of basic precautions, by encouraging families to speak up when they observe noncompliance with the protocol and by honest analysis of the root cause behind every single infection, according to a new Johns Hopkins Children's Center study.

In a report in the October issue of *Pediatrics*, published online Sept. 3, the researchers say this triple-threat approach has prevented one in five infections over two years.

Previous studies from Johns Hopkins and other institutions have demonstrated that meticulous daily care of the central line can cut the number of [bloodstream infections](#) in critically ill patients, but this is the first study, the researchers say, to focus on the most vulnerable of [pediatric patients](#) - those undergoing [cancer treatment](#) and [bone marrow transplants](#).

A central venous catheter, or central line, is a tube inserted into a major blood vessel in the neck, chest or groin as a portal for medication, fluids or blood draws.

Inserted incorrectly or mishandled after insertion, the central line can become a gateway for bacteria and other germs into the patient's

bloodstream, causing [invasive disease](#) and [organ damage](#). Because nurses and doctors access the catheter several times a day—as much as 10 to 30 times daily in [oncology patients](#), researchers say—proper handling of the device is critical.

"Children receiving cancer treatment are uniquely prone to invasive bloodstream infections because of their weakened immunity and because their central lines are accessed multiple times a day, with each entry posing a risk for infection," says lead investigator Michael Rinke, M.D., a pediatrician and a patient safety expert at the Johns Hopkins Children's Center.

The current study was carried out by pediatric oncology nurses, physicians and safety experts at the Johns Hopkins pediatric inpatient cancer unit. To keep bacteria and other pathogens at bay, the nurses deployed strict device-handling precautions that included—among other things—frequent and regular changing of the dressing covering the central line; regular changing of the tubes and caps attached to central line; cleaning of the line before and after each use; use of facial mask and gloves when handling the device; and hand-washing before and after handling the line.

In a novel twist, the Johns Hopkins investigators asked parents to provide additional oversight, equipping them with wallet flash cards on the "do's" and "don'ts" of central line care.

"Parents can act as an invaluable second set of eyes, and we urged them to be vigilant about the way their child's central line was handled." says co-investigator Kim Drucis, M.S.N., R.N., a pediatric oncology nurse. "We also encouraged them to ask questions and to speak up every time they noticed something different."

The oncology nurses also held monthly briefings to discuss every

infection that occurred during the study. Such root-cause analysis is already a staple of error reduction in other industries including airline, nuclear and military.

"Honest dissection of one's practice is neither easy nor pleasant but is absolutely critical to illuminate areas for improvement," says co-investigator Stephanie Panton, M.S.N., R.N., C.P.O.N.

The approach reduced infections by 20 percent over two years. During year one, the infection rate remained unchanged but in the second year, infections plummeted by 64 percent—a delayed ramp-up effect that points to the often-slow pace of meaningful change, the investigators say.

"Real change rarely occurs overnight. It requires sustained effort and unwavering focus, day after day, month after month, year after year," Rinke says. "It's a slow, arduous process, but the payoff can be dramatic."

Each year, 250,000 central line infections occur in the United States, up to one-fourth of them fatal, according to the Centers for Disease Control and Prevention. Each infection carries a price tag of up to \$25,000.

Provided by Johns Hopkins University School of Medicine

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