

Reducing central line-associated bloodstream infections in children

The ups, downs, and lessons learned from an initiative to reduce pediatric CLABSIs

By Virpal Donley, BSN, RN, and Sherri Reese, BSN, RN, CIC

AFFECTING every patient population, central line-associated bloodstream infections (CLABSIs) increase morbidity and mortality. Although much has been published on adult CLABSIs, information on pediatric CLABSIs has lagged.

In 2005, the pediatric intensive care unit (PICU) at UC Davis Medical Center in Sacramento, California, had a CLABSI rate of 9.6 per 1,000 central-line days. This rate exceeded the National Healthcare Safety Network (NHSN) mean PICU rate of 6.6 per 1,000 central-line days. We set out to reduce our rate by developing a novel CLABSI prevention bundle. Our goal was to sustain a rate below the NHSN national benchmark.

At the same time, we joined the National Association of Children's Hospitals and Related Institutions collaborative aimed at reducing pediatric CLABSIs. In this article we share our experience over several years so readers can see how preventing CLABSIs requires constant vigilance.

First intervention

When we started the project in 2006, we had three aims—compliance with appropriate hand hygiene, a central-line insertion bundle, and a central-line maintenance bundle. Today, these are still our goals.

Hand hygiene

Our goal was 100% compliance with appropriate hand hygiene by every provider before and after patient care by January 2007. Compliance was assessed by random observation using a standardized hand hygiene audit form.

We focused on increasing compliance by providing better access to and increasing staff acceptance of hand hygiene products. We reviewed the unit layout and elicited staff feedback on the location and type of our hand hygiene products. We found these products were inaccessible in some locations; what's more, our staff complained they caused skin irritation. The solution was to in-

crease accessibility at the point of use and to switch to alcohol foam products.

We educated staff on proper hand hygiene techniques through one-to-one teaching and testing. We also created a hand hygiene video addressing proper technique and its importance to patient safety. This video is now part of our standard hospital orientation for all new employees.

Central-line insertion bundle

Our goal was to achieve 95% compliance with a central-line insertion bundle for all lines inserted in the PICU by April 2007. Compliance was assessed by direct observation and completion of a central-line insertion checklist by a nurse observer.

We also developed conversational aids to empower nursing staff to speak up if they observed breaks in technique, and created a central-line insertion cart to ensure all needed materials were easily acces-

sible. (See *Conversational aids to boost compliance*.)

Central-line maintenance bundle

Our goal was to demonstrate 95% compliance with a central-line maintenance bundle for all central lines in PICU patients by November 1, 2007. Compliance was assessed by direct observation using a standard audit tool. We quickly realized the new maintenance bundle was a large-scale project with many different components, which would require nursing staff to change their practice in many ways. So we developed a step-by-step program to be rolled out over an extended period to help staff assimilate the new practices. (See *Six steps to a cleaner line*.) Within 1 year of implementation, the central-line insertion and maintenance bundles had reduced our CLABSI rates to 2.5 per 1,000 line days.

Conversational aids to boost compliance

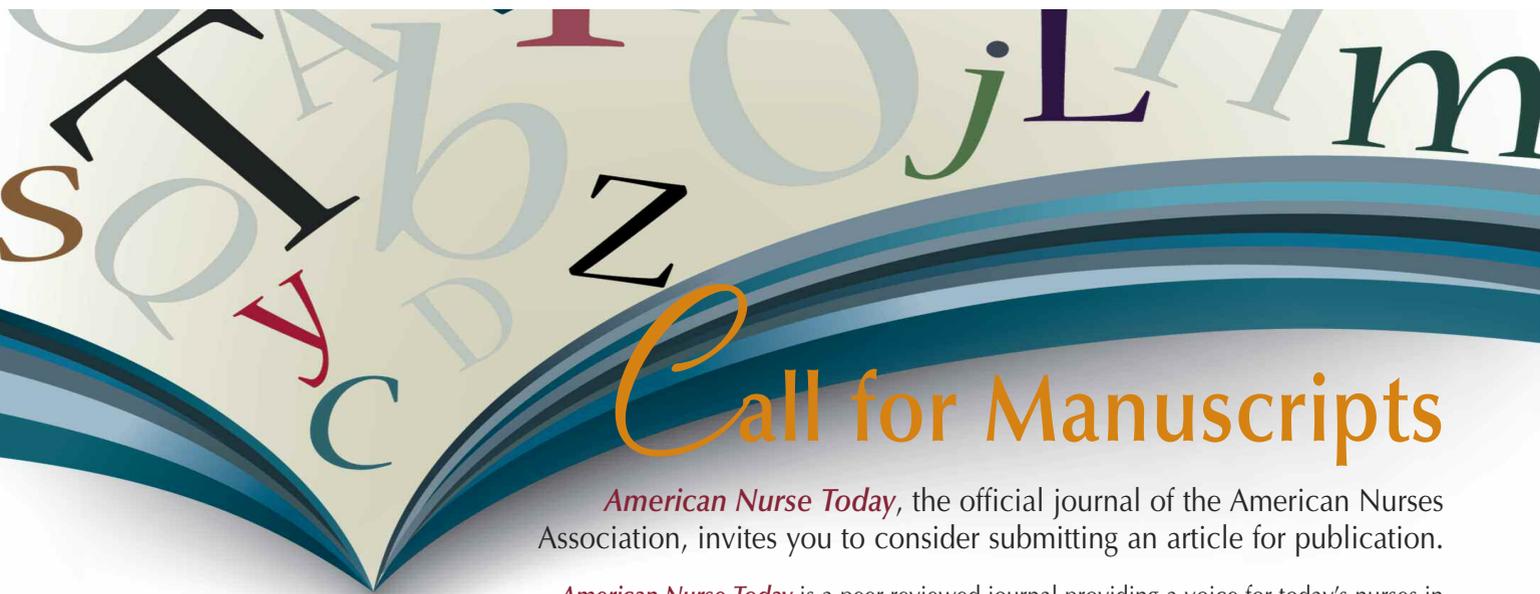
To boost compliance with the central-line insertion bundle and empower nurses to speak up, the authors developed conversational aids to use when observing caregivers insert the central venous line (CVL).

Observer's opening remarks

- "Just to remind everyone, we're using the checklist to improve our compliance with techniques that will reduce infections. I will be filling out the CVL insertion checklist while you do this procedure. Before you start, I can help gather everything you think you'll need for the procedure. What can I get for you? Is there anything I can help with?"
- [When the central line kit is opened:] "You can hand me the iodine ointment since we don't use it anymore."

Observer responses to compliance lapses

- "For the insertion checklist, can you confirm you performed adequate hand-washing before donning gloves?"
- "Can I get a cap, mask, sterile gloves, and sterile gown for you?"
- "I have extra chlorhexidine swabs for the skin prep."
- "The insertion bundle requires a skin scrub of at least 30 seconds, with another minute for drying. Here is another chlorhexidine swab to complete the skin prep."
- "It looks as if the catheter (or wire, dilator, finder needle, suture, etc.) may have become contaminated. I can get you a replacement. What size are you using?"
- "It looks as if your gloves have become contaminated. I'll get you a replacement pair. What size are you wearing?"
- "Those full-size drapes are for smaller children. I'll watch the airway under your drape." Or: "I can get a transparent drape for you if you prefer to see the patient under the drape."
- "Here's a biopatch."
- "I'll place this first dressing for you so you can talk to the family (or dictate your note, take a nap, etc.)."



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Six steps to a cleaner line

To help accustom our staff to the new central-line maintenance bundle, we developed a program called “Six steps to a cleaner line.” We rolled out the steps over a 2- to 3-week period. The program consisted of one-to-one teaching, a review of hospital policies and procedures on hand hygiene and central-line care, a quiz to evaluate staff understanding of the topics, and signage as reminders throughout the unit. To determine the time needed to roll out each step, we assessed staff knowledge and understanding of the changes to be implemented. Before moving on to the next step, all staff had to complete the education module.

- 1 Scrub the hub.** This step focuses on the importance of scrubbing all injection ports and junctions with alcohol for 30 seconds and letting the alcohol dry for 30 seconds.
- 2 See the site.** In this step, clinicians examine the central-line insertion site every 2 hours and check for presence and integrity of a chlorhexidine-impregnated disk.
- 3 Necessary and sufficient.** This step addresses removal of unnecessary central lines and reducing the number of line entries for laboratory blood draws.
- 4 Walking the line with line changes.** This step emphasizes the need to use a consistent approach for line and cap changes.
- 5 Dress for success.** This step focuses on how to apply the chlorhexidine-impregnated disk properly, use of sterile technique for dressing changes, frequency of dressing changes, and use of a chlorhexidine skin antiseptic when appropriate.
- 6 Care to culture correctly.** This step addresses proper techniques for drawing blood cultures, issues regarding blood-culture volume, and creation of a new blood-culture collection kit.

port showed a dramatic rise in our 2009 CLABSI rate—almost to our 2007 preintervention rate. We believe this stemmed from lack of close monitoring.

Reflecting on our past efforts, we concluded that although staff had complied with the new policies and monitoring, they hadn't truly embraced the need for the change. Bedside staff hadn't been the driving force for change, so they hadn't taken ownership of the interventions. Staff buy-in was essential for a true culture change—and that meant a new committee had to be formed.

The recovery

To achieve a more grassroots approach, the new committee was led by and composed of bedside nurses. Nurses held each other accountable for central-line practices and participated in monitoring compliance with the maintenance bundle. Nurses took each infection personally, giving each infection a face, not just a number. Nursing staff now had ownership of the CLABSI reduction program.

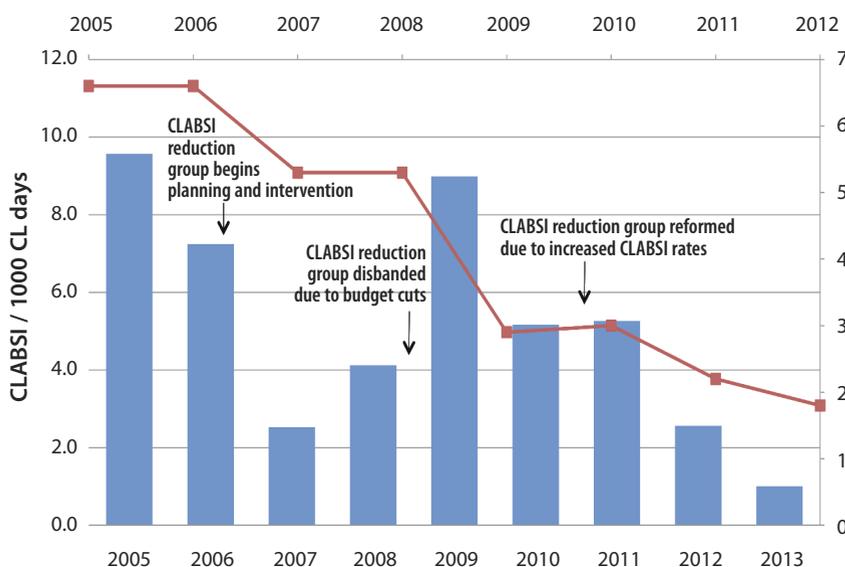
In 2012, our CLABSI rate declined, matching the low levels achieved in 2007. In May 2013, we were 1 week shy of going an entire year without a single CLABSI. (See *CLABSI rates over time*.) When the most recent CLABSI occurred, staff took it as a personal shortcoming. We used this as a learning opportunity to improve our practice. It taught us that for any change to be truly effective, the motivation must come from within each nurse. Success hinges on staff members' desire for change, not a mandate to change. ★

Visit www.AmericanNurseToday.com/?p=19463 for a central-line insertion checklist and a list of selected references.

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CLABSI rates over time

This graph shows how annual central-line associated bloodstream infections (CLABSIs) at UC Davis Center have changed over time, starting the year before the CLABSI prevention project began through 2013.



The setback—and a key realization

The PICU was able to sustain low rates for 2 years. But due to budget

cuts in 2009, our committee was disbanded and our monitoring efforts ended. In early 2010, the annual hospital-acquired infection re-