
Disinfection Kit Dramatically Reduces Bloodstream Infections in Vulnerable Pediatric Patient Population

SwabKIT and SwabCap Provide
Crucial Supplement to Manual
Disinfection Method

A Case Study

St. Mary's Hospital for Children
Bayside, New York

FACILITY

St. Mary's Hospital for Children (Bayside, New York). 97 beds. Part of the St. Mary's Healthcare System for Children.

LEAD CLINICIANS

Edwin Simpser, M.D.
Marianne Pavia, MT (ASCP), CIC
Heather Painter, RN

THE PROBLEM

Central line-associated bloodstream infections (CLABSIs), which are potentially fatal, are an even greater threat at St. Mary's Hospital for Children than at most institutions. St. Mary's is a pediatric post-acute-care facility whose patient population has multiple vulnerabilities to CLABSI, including many patients with short bowel syndrome. The combination of more frequent line accesses and increased contaminants in the patient's immediate environment greatly increases CLABSI risk.

St. Mary's goal of minimizing infections led it to confront a vexing issue in medicine: How to best disinfect the hubs of IV connectors. It is standard medical protocol to disinfect the hubs before accessing the lines to administer medications or nutrition. When hospitals have high CLABSI rates, however, inadequate hub disinfection is often one of the suspected causes. The method involves manually scrubbing the hub with isopropyl alcohol (IPA) and then waiting for the alcohol to dry before accessing the line.

Because noncompliance with the technique is suspected to be an issue at most hospitals, St. Mary's conducted a seven-month observational study of compliance. Remarkably, the study found the manual protocol was performed correctly in every recorded incidence. There were two possible ways to interpret these results:

- 1) Hub disinfection was adequate and was not contributing to St. Mary's CLABSI problem, which meant that preventive efforts should be focused elsewhere, or
- 2) The manual method was not sufficient even when performed correctly.

Clinical staff decided on a multi-pronged approach that simultaneously reduced contaminants and increased disinfection.

SOLUTION

Since the observational study suggested that manual disinfection of IV connectors for central lines might be inadequate, St. Mary's first hoped to improve prevention by trialing a relatively new device that was developed to supplement the manual method. The device, called SwabCap,[®] is a small plastic cap that twists onto the threads of the connector hub. Twisting the cap into place depresses a sponge inside the cap that is saturated with IPA. Depressing the sponge in turn dispenses the IPA over the hub and threads.

The cap is designed to keep the hub and threads bathed in disinfectant as long as the cap is attached. This attribute intrigued St. Mary's because it represented a possible advantage over manual disinfection, given that increased contact time with IPA is known to increase the bacteria kill. In vitro studies showed the hub was thoroughly disinfected after five minutes of attachment.

Because the cap was designed to be left in place between line accesses, it also protects against touch and airborne contamination. Manual disinfection cannot provide that level of protection.

Since St. Mary's was not sure if improved connector disinfection could reduce its CLABSI rate by itself, the hospital also planned to introduce two other changes to its protocol. The first was a foam disc (Biopatch[®]) placed around the catheter insertion site that dispenses chlorhexidine

gluconate (CHG), a skin disinfectant, for up to seven days. The second change was a new protocol of scrubbing patients' IV lines with CHG after diaper changes, to prevent contamination from fecal bacteria.

IMPLEMENTATION

Before SwabCap could be trialed by St. Mary's, it was first approved by the hospital's Central Line Committee. St. Mary's first trialed SwabCap in the third quarter of 2010, before trialing Biopatch and the new diaper change protocol. After documenting the impact of the disinfection cap by itself, the hospital initiated the other measures.

For the trial, some units of SwabCap were obtained as part of a package product called SwabKIT,[™] which includes a 10 mL pre-filled saline flush syringe in addition to the disinfection cap. The kit option was chosen to improve the efficiency of flushing the line and disinfecting the IV connector.

RESULTS

The three-month trial of SwabCap yielded a nearly 48 percent reduction in CLABSIs. After adding the CHG disc and the protocol of disinfecting IV lines after diaper changes, the combined initiatives produced a CLABSI rate for 2010 that was 33.8 percent lower than the rate in 2009. The reduced rate has continued into 2011 and appears to be sustainable.

DISCUSSION

Several conclusions can be inferred from the success of St. Mary's CLABSI prevention initiative:

Creating a more comprehensive central line bundle. When an institution has a pediatric population that is unusually vulnerable to CLABSIs, it should consider that standard central line bundles may not offer sufficient protection, even if staff compliance with them is meticulous. Patients are better protected when the facility analyzes all potential sources of infection and implements evidence-based devices and practices designed to address those sources.

For example, SwabCap, Biopatch, and disinfecting IV lines after diaper changes each addresses a different potential source of infection – sources that may not be covered by traditional bundles. These additional measures bolster prevention during the maintenance phase of catheter care, when most CLABSIs occur.

Supplementing traditional IV connector disinfection. St. Mary's observational study of its manual disinfection protocol was revelatory when combined with the positive results obtained with SwabCap. Together, the data from the study and trial suggest that: 1) manual disinfection may not provide sufficient protection against prevalent infections by itself even when it is performed exactly as directed; and 2) a device like SwabCap appears to compensate for inherent deficiencies in the manual method – perhaps because it provides prolonged contact with IPA and also protects against touch and airborne contamination.

Solution to problems with manual disinfection. Although St. Mary's does not have compliance and variation problems with the manual method, hospitals typically have great concerns about those issues. SwabCap usage effectively eliminates those concerns.

Applicability of solutions to other institutions. Biopatch and SwabCap are applicable at any institution where patients have central lines. So is the general approach of "covering all the bases" in infection prevention. St. Mary's is not the first institution to demonstrate that a more comprehensive approach to infection prevention can produce dramatic results.

The two devices and new protocol trialed at St. Mary's are now standard practice at the facility. SwabCap is used both as a part of SwabKIT (see above) and separately.
