

# Improving Infection Control Compliance Using Combined Cap/Flush Syringe Technology to Reduce Central Line Associated Bloodstream Infections

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## INTRODUCTION

The CDC 2011 Guidelines for the Prevention of Intravascular Catheter Related Infections recognize that pathogenesis of a Central Line Associated Bloodstream Infection (CLABSI) can be caused by “direct contamination of the catheter or catheter hub by contact with hands or contaminated fluids or devices” and recommend “minimiz[ing] contamination risk by scrubbing the access port with an appropriate antiseptic...” (Category IA recommendation).

It is difficult to perform routine evaluation of compliance with recommendations to “scrub the hub”. Covert observations conducted in November 2011 at a dual-campus community hospital (>400 beds) found that less than 6% of observed staff complied with hospital “scrub the hub” protocol for manually disinfecting luer-lock intravenous connector hubs prior to use. This is much shorter than the recommended 15-second scrub time, despite ongoing staff education efforts.

Despite implementation of both insertion and maintenance bundles for CLABSI prevention, the facility was unable to reduce CLABSI rates from a stable baseline. Given the advent of public reporting and increasing regulatory and reimbursement penalties for CLABSI, the facility decided to trial an alcohol cap technology to determine if implementing alcohol disinfection cap technology for passive hub disinfection increases staff compliance with hub disinfection practices and reduces CLABSI rates.

## MATERIALS & METHODS

Beginning in December 2011, the facility implemented the alcohol disinfection cap technology, tracking compliance and CLABSI rates as process and outcome measures, respectively. Data was collected by the hospital Infection Prevention team and analyzed before and after implementation of the disinfection cap technology.

- December 2011: Implemented stand-alone alcohol disinfection cap technology hospital-wide for all central venous catheters.



**Stand-alone disinfection cap technology**



**Dual disinfection cap/flush syringe technology**

- May 2012: In response to lagging compliance (49.2% as of April 2012), the facility expanded implementation of stand-alone disinfection cap technology to all intravenous lines (including peripheral IVs) in addition to implementing disinfection flush syringe technology on select units (adult ICU, 2 large med/surg units).
- August 2012: Compliance increased to 83.4%.

Surveillance for CLABSI was conducted using National Healthcare Safety Network (NHSN) definitions.

All cap compliance observations were conducted as unannounced surveys by the product clinical education team.

No additional projects other than routine ongoing educational efforts to reduce CLABSI were introduced during the time frame analyzed.

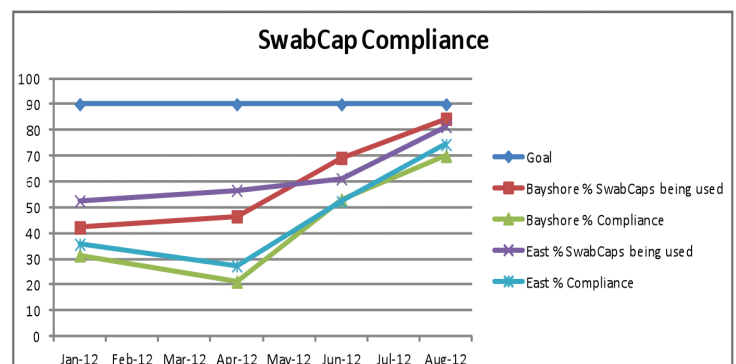
## RESULTS

Compliance rates with hub disinfection increased from less than 6% (manual disinfection with isopropyl alcohol) to 49.2% (standalone disinfection cap technology) and 83.4% (disinfection cap/flush combination).

Comparing the 7 months prior to implementation with the 7 months following implementation, the CLABSI rate across all units at both facilities decreased from 1.13 to 0.84 per 1000 catheter days (a decrease of 26.2%). In addition, the rate in ICUs decreased from 1.61 to 0.90 per 1000 catheter days (44.1% reduction) and in non-ICU units from 0.94 to 0.64 per 1000 catheter days (31.9% reduction).

Units with higher compliance rates, in general (i.e., ICUs), were able to achieve greater reduction in CLABSI by the end of the post-intervention period, than units with lower compliance rates. Notably, the NICU unit, which consistently maintained high compliance with use of the product during random audits, sustained a rate of zero infections throughout the entire post-intervention period.

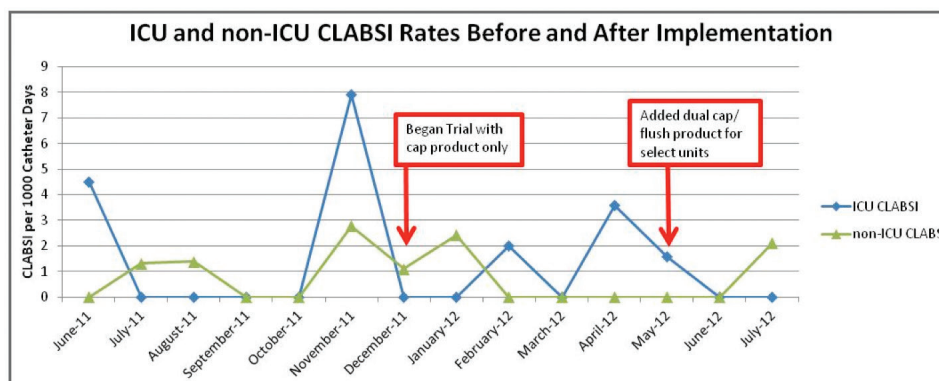
Further, when comparing infection rates from the pre-intervention period, initial post-intervention (stand-alone cap technology for central lines only) and second post-intervention (stand-alone cap and flush technology for all lines) periods, it was found that as cap compliance rose, CLABSI rates dropped. At the end of the pre-intervention period (housewide), the CLABSI rate was 1.13 per 1000 catheter days. From January – May 2012 (standalone cap technology on central lines only), the rate was 0.93 CLABSI per 1000 catheter days (17.9% reduction), and after expansion of intervention to all lines with cap and flush technology on selected units, the rate dropped housewide to 0.64 per 1000 catheter days (31.1% reduction from initial post-intervention period, and 43.5% reduction from pre-intervention period).



% Swabcaps being used = [# ports covered with cap / total # ports available on lines]\*100;

% Compliance = [# patients with all available ports covered with cap / total # patients observed]\*100

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CLABSI Rates and Cap Compliance for 7 months pre- and post-implementation of disinfection cap/flush technology (June 2011 – July 2012)

Unit	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Pre-Intervention Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Post-Intervention Period	Pre/Post % Change
<b>All ICUs</b>	4.18	2.06	0	0	0	4.96	0	<b>1.61</b>	0	1.96	0	3.28 (48.7%)	1.51	0 (84.9%)	0 (92.4%)	<b>0.90</b>	<b>-44.1%</b>
<b>Adult ICUs</b>	4.51	0	0	0	0	7.92	0	<b>1.78</b>	0 (45.0%)	2.00	0	3.59 (46.4%)	1.58	0 (84.3%)	0 (91.9%)	<b>1.02</b>	<b>-42.7%</b>
<b>NICU</b>	0	41.67	0	0	0	24.10	0	<b>9.40</b>	0 (N/A)	0	0	0 (85.7%)	0	0 (100%)	0 (100%)	<b>0.00</b>	<b>-100%</b>
<b>All Other Units</b>	0	1.31	1.38	0	0	2.76	1.10	<b>0.94</b>	2.42 (45.5%)	0	0	0 (50.0%)	0	0 (61.9%)	2.09 (79.2%)	<b>0.64</b>	<b>-31.9%</b>
<b>All Units</b>	1.47	1.60	0.81	0	0	4.13	0.64	<b>1.13</b>	1.34 (45.2%)	0.81	0	2.94 (49.2%)	0.66	0 (68.2%)	1.23 (83.4%)	<b>0.84</b>	<b>-26.2%</b>

Rates calculated as # CLABSI per 1000 central line days; Post-implementation period data presented as:

CLABSI Rate
(% Compliance caps being used)

Note that compliance rates noted for July were conducted on August 14, 2012)

## CONCLUSION

The combined implementation of disinfection cap and flush technology significantly increased compliance with routine hub disinfection. Implementation of the technology was associated with a decrease in CLABSI throughout the facility. A larger decrease in CLABSI was observed with implementation of both cap and flush disinfection technology on all lines housewide when compared to implementation of only cap technology on central lines.

Note that this data is not reflective of the methods to sustain compliance with alcohol cap technology over an extended period of time, but rather the immediate compliance response and impact based upon the mode of technology delivery. In addition, based on the sequence of events, its not possible for researchers to determine what proportion of the increase in compliance during phase II of the post-implementation period was due to expansion of product use on all lines (versus just central lines) and what proportion may have been due to use of the cap/flush disinfection technology.

## Takeaways for practical application:

- Implementation of disinfection cap technology is associated with reduction in CLABSI rates
- Universal application (on all intravenous lines) of disinfection cap technology is more effective than selective application (e.g., only central lines)
- Use of disinfection cap technology to reduce bloodstream infections may benefit from implementation of supplemental flush technology to boost compliance.

## DISCLOSURES

The facility conducted the initial trials with products supplied to it free of charge by the manufacturer. The manufacturer additionally provided assistance in poster preparation. The abstract authors prepared and are solely responsible for the abstract data and text.