### Table of Contents

**Antiseptic barrier cap effective in reducing central line-associated bloodstream infections: A systematic review and meta-analysis.**

**A bundled approach to decrease the rate of primary bloodstream infections related to peripheral intravenous catheters.**

**Strategies for the successful implementation of disinfecting port protectors to reduce CLABSI in a large tertiary care teaching hospital.**

**Educational interventions alone and combined with port protector reduce the rate of central venous catheter infection and colonization in respiratory semi-intensive care unit.**

**Impact of universal disinfectant cap implementation on central line-associated bloodstream infections.**

**Use of alcohol containing caps for preventing bloodstream infections: A randomized controlled trial.**

**Port protectors in clinical practice: an audit.**

---

**Outcomes Key**

- Infection and/or contaminated blood cultures
- Compliance and/or patient/staff satisfaction
- Staff time and/or length of stay
- Cost

Population: Multiple Specialties
Population: Hospital Wide
Population: Respiratory Semi-Intensive Care
Population: Multiple Specialties
Population: Multiple Specialties
Population: Intensive Care
Population: Multiple Specialties

Updated 2022
<table>
<thead>
<tr>
<th>Population: Intensive Care</th>
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<tr>
<th>Population: Long Term Acute Care</th>
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<th>Population: Hematology &amp; Oncology</th>
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<th>Population: Intensive Care</th>
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<tr>
<th>Population: Hematology &amp; Oncology</th>
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<tr>
<th>Population: Oncology</th>
<th>20</th>
</tr>
</thead>
</table>
### Table of Contents, Continued

#### PEER REVIEWED

**Alcohol-impregnated caps and ambulatory central line-associated bloodstream infections (CLABSI): A randomized clinical trial.**

**Microbial colonization of intravascular catheter connectors in hospitalized patients.**

**A comparative study of disinfecting catheter caps and their effectiveness in the reduction of equine IV catheter-related thrombophlebitis.**

#### PEER REVIEWED – VETERINARY STUDY

**Successful decrease of central line-associated bloodstream infections in an urban neonatal intensive care unit using a pediatric-specific interdisciplinary approach.**

**Systematic review on impact of use of disinfectant caps protectors for intravenous access ports on central line-associated bloodstream infections (CLABSI).**

**A significant decline in central line-associated blood stream infections using alcohol-impregnated port protectors at a large non-profit acute care hospital.**

---

### Outcomes Key

- Infection and/or contaminated blood cultures
- Compliance and/or patient/staff satisfaction
- Staff time and/or length of stay
- Cost

### ABSTRACTS

**Successful decrease of central line-associated bloodstream infections in an urban neonatal intensive care unit using a pediatric-specific interdisciplinary approach.**

**Systematic review on impact of use of disinfectant caps protectors for intravenous access ports on central line-associated bloodstream infections (CLABSI).**

**A significant decline in central line-associated blood stream infections using alcohol-impregnated port protectors at a large non-profit acute care hospital.**
ABSTRACTS

Alcohol-impregnated disinfectant caps reduce the rate of central-line associated bloodstream infections and nosocomial bacteremia.

Decreasing the incidence of central line-associated blood stream infections using alcohol-impregnated port protectors (AIPPS) in a neonatal intensive care unit.

Decreasing CLABSI rates and cost following implementation of a disinfectant cap in a tertiary care hospital.

Impact of alcohol-impregnated protectors on incidence of catheter-associated blood stream infections.
Mayfield J, Alasmari F, Kittur ND, et al. Presented at: IDWeek annual meeting; October 18, 2012; San Diego, CA.

Reduction in central line associated bloodstream infection (CLABSI) in a neonatal intensive care unit with use of access site disinfection caps.
Pong A, Salgado C, Speziale M, Grimm P, Abe C. Presented at: Infectious Disease Society of America annual meeting; October 21, 2011; Boston, MA.

PTH-195 Curos™ line caps are effective in reducing catheter related sepsis in inpatients receiving parenteral nutrition.

863 reduction in CLABSIs with alcohol port protectors.
Antiseptic cap protects stopcocks from internal bacterial contamination.


Impact of disinfectant cap implementation on peripherally-inserted central catheter (PICC) associated bloodstream infection rates.


Outcomes Key

- Infection and/or contaminated blood cultures
- Compliance and/or patient/staff satisfaction
- Staff time and/or length of stay
- Cost
“...use of the antiseptic barrier cap can lower the occurrence of CLABSIs and is cost saving.”


**DESIGN**

Systematic review and meta-analysis

**METHODS**

Studies conducted in the hospital setting that compared 3M™ Curos™ Disinfecting Cap for Needleless Connectors and SwabCap® Disinfecting Caps to manual disinfection on the incidence of central line associated bloodstream infection (CLABSI) per 1000 catheter days were included.

**RESULTS**

Relative Pooled CLABSI Incidence (per 1000 catheter days)

<table>
<thead>
<tr>
<th>Manual Disinfection (Scrub the Hub)</th>
<th>Antiseptic Barrier Caps*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>0.59</td>
</tr>
</tbody>
</table>

*(p<0.001)

There were **41% fewer** CLABSIs associated with use of the antiseptic barrier cap (IRR = 0.59, 95% CI = 0.45-0.77 p<0.001)

Overall median rate of compliance with barrier cap = **82.5%**

Net cost savings ranged from **$39,050 – $3,268,990**

Nine studies were included in the systematic review and seven within the meta-analysis.

*Curos Disinfecting Cap for Needleless Connectors and SwabCap Disinfecting Caps
“Using a PIV maintenance bundle including disinfecting caps and tips can effectively lower the rate of primary bloodstream infections attributable to PIV lines.”


**RESULTS**

Before and after intervention study comparing hospital wide peripheral line-associated bloodstream infections (PLABSI) and intervention compliance.

**METHODS**

Pre-Intervention: Primary bloodstream infection and IV catheter data collected

Intervention: PIV bundle implemented. 3M™ Curos Tips™ Disinfecting Cap for Male Luers added to existing Central Line-Associated Bloodstream Infection (CLABSI) bundle for all disconnected IV tubing. Compliance monitored for PIV and CLABSI bundles.

PIV Bundle elements:
- Prohibit disconnecting IV tubing for convenience
- 3M™ Curos™ Disinfecting Cap for Needleless Connectors on all ports for all patients
- 3M™ Curos Tips™ Disinfecting Cap for Male Luers on all disconnected tubing
- Assessment of IV site, removing IV catheters with indication of phlebitis
- Assessment of dressing, changing if nonocclusive or blood is present

Compliance with protecting all needleless connectors was near 90%.

Compliance with protecting male ends of disconnected IV tubing was near 90%.

*Because CLABSI bundle was implemented prior to study, no significant change to CLABSI rate was anticipated or observed during study time period.
“Inclusion of the alcohol impregnated disinfecting port protectors (AIDPP), as a component of the CLABSI bundle, hardwired adherence by audit accountability.”


**DESIGN**

Quasi-experimental study comparing hospital-wide central line-associated bloodstream infection (CLABSI) rates at a 1009-bed tertiary hospital using an evidence-based, multidisciplinary approach.

**METHODS**

Pre-Intervention: Standard central line bundle of care

Intervention:
- Standard central line bundle of care
- 3M™ Curos™ Disinfecting Port Protectors implementation plan
- Curos Disinfecting Port Protectors 21-Day Challenge
- 3M™ Curos Jet™ Disinfecting Cap for Needleless Connectors
- 3M™ Curos Stopper Disinfecting Cap for Open Female Luers
- 3M™ Curos Tips™ Disinfecting Cap for Male Luers

**RESULTS**

Potential saved an adjusted $1.6M in eight months, accounting for added cost of port protectors.

CLABSI (per 1000 device days)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.36</td>
<td></td>
<td>0.87</td>
</tr>
</tbody>
</table>

36% reduction trend*

*The authors did not statistically test if the reduction in CLABSI was significant between the periods.

Reduction of 1.36 to 0.87 CLABSI per 1000 device days

Used 21-Day Challenge to increase adherence rate from 67% to 94%
**3M™ Curos™ Disinfecting Cap for Needleless Connectors combined with educational interventions led to zero rate of CLABSIs.**


**DESIGN**
Prospective randomized study, assessing the rate of CLABSIs, central venous catheter (CVC) colonizations and contaminated blood cultures before and after introduction of educational interventions alone and combined with Curos Disinfecting Cap for Needleless Connectors.

**METHODS**

**Pre-Intervention:**
Standard central line bundle of care (n=86)

**Intervention:**
Randomized patients into two groups:
- Group 1: Educational intervention (n=25)
- Group 2: Curos Disinfecting Cap for Needleless Connectors plus educational intervention (n=21)

**RESULTS**

Contaminated blood cultures decreased to **ZERO** with Curos Disinfecting Cap for Needleless Connectors plus educational interventions

67% reduction of CVC colonizations with Curos Disinfecting Cap for Needleless Connectors plus educational interventions

CLABSI Rate (per 1000 central line days)

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>CLABSI Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 0 (Obs)</td>
<td>8.6</td>
</tr>
<tr>
<td>(April 2013 – January 2014)</td>
<td></td>
</tr>
<tr>
<td>Group 1 (Edu)</td>
<td>2.6</td>
</tr>
<tr>
<td>(January 2014 – October 2014)</td>
<td>70% reduction (p=0.0568)</td>
</tr>
<tr>
<td>Group 2 (Curos cap + Edu)</td>
<td>0</td>
</tr>
<tr>
<td>(January 2014 – October 2014)</td>
<td>100% reduction (p=0.096)</td>
</tr>
</tbody>
</table>
“Disinfectant cap use was associated with an estimated savings of almost $300,000 per year in the hospital studied.”


**DESIGN**
Before and after intervention study comparing CLABSI rates and estimated costs in patients (newborn to adult) with CVCs and PIVs from 13 units at a Level 1 Trauma Center.

**METHODS**
Pre-Intervention:
Standard central line bundle of care

Intervention:
3M™ Curos™ Disinfecting Cap for Needleless Connectors placed on central, peripheral and IV tubing needleless connectors

**RESULTS**
Mean CLABSI Rate (per 1000 catheter days)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>&gt;40% reduction (p=0.004)</td>
<td>0.88</td>
<td></td>
</tr>
</tbody>
</table>

10% Increase in compliance was associated with 7% drop in infection rates

Estimated decrease of 68 patient hospital days after cap implementation

Estimated annual savings = $282,840
Alcohol containing caps were found to be a beneficial addition to a bundle helping to prevent CLABSI.


**DESIGN**

Randomized controlled trial investigating the effect of disinfecting caps on CLABSI in ICU patients with jugular or subclavian catheters.

**METHODS**

95 patients between July and December 2018 who met inclusion criteria were in the study.

CVC insertion:
2% chlorhexidine in IPA skin prep, gauze and/or chlorhexidine-impregnated dressing

Pre-Intervention:
Sterile end caps and active disinfection with 70% IPA wipes (not explicitly stated in study, per author clarification)

Intervention:
Addition of needleless connectors were covered with 3M™ Curos™ Disinfecting Cap for Needleless Connectors

**RESULTS**

Infection risk in the pre-intervention group was 13.7x higher than in the intervention group

Significant difference between groups regarding fever (p<0.001) and chills distribution (p=0.016)
The number of vascular access device (VAD) related bacteraemias was reduced by 69% when compliance with Curos™ cap placement was 80% or more.


**DESIGN**

Before and after intervention study comparing VAD related bacteraemia for CVCs, PIVs and arterial lines from four wards at two hospital sites.

**METHODS**

**Pre-Intervention:**
Scrub the hub using CHG/IPA wipes prior to IV access

**Intervention:**
3M™ Curos™ Disinfecting Cap for Needleless Connectors placed on all needleless devices

**Post intervention:**
Scrub the hub protocol resumed

**RESULTS**

Catheter-related Bloodstream Infections
(per 1000 line days)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Infection rates</td>
<td>4.3</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Infection rates began to increase when scrub the hub was resumed in the post-intervention period (October 2014 – March 2015).

Estimated potential time savings from passive disinfection compared to scrub the hub equated to 82.4 working days/yr

Estimated cost savings with passive disinfection = £387,366.22

Compliance to protocol increased from 27% to 80% during the intervention period

100% of staff surveyed preferred disinfecting caps

92% of patients provided positive feedback
“The implementation of the port protector cap system resulted in lower infection rates compared with an alcohol swab technique.”


**DESIGN**

Before and after intervention study comparing CLABSI rates in patients with CVCs from two ICUs.

**METHODS**

**Pre-Intervention:**
Scrub the hub protocol

**Intervention:**
3M™ Curos™ Disinfecting Cap for Needleless Connectors placed on all CVC and IV tubing needleless connectors

**RESULTS**

CLABSI Rate (per 1000 catheter days)

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1.9</td>
<td>0.5</td>
</tr>
</tbody>
</table>

>73% reduction (p=0.1260)

Compliance increased from 63% to 80% after moving from single caps to multiple cap strips to hang on IV pole for bedside access

The trial resulted in a calculated net savings of $39,050

REQUEST FULL CLINICAL STUDY

RETURN TO TABLE OF CONTENTS – 14
“Application of the bundle resulted in a significant and sustained reduction in CLABSI rates in long-term acute care hospitals (LTACHs) for 14 months.”


**DESIGN**
Before and after intervention study comparing CLABSI in patients with CVCs from 30 LTACHs.

**METHODS**

Pre-Intervention: No formal standardized CVC maintenance protocol in place

Intervention: Implementation of CVC maintenance bundle and care team trained on CVC care

CVC bundle:
- CDC guideline recommendations
- Mandatory use of 3M™ Curos™ Disinfecting Cap for Needleless Connectors on all IV needleless connectors
- Chlorhexidine gluconate dressings

![CLABSI Standardized Infection Ratio (SIR)](chart)

The study concluded that the mean number of CLABSIs per LTACH decreased by 4.5 in the 14 months after the intervention. The infection reduction could have potentially saved 20 patients’ lives.*

*assuming a 15% mortality rate

Estimated potential savings of approximately $3.7 million for the LTACHs studied.

The number of central line days was 120,137 before and 119,412 after bundle implementation.
Implementation of port protectors and needleless neutral pressure connectors was associated with a significant reduction in the rate of CLABSIs and contaminated blood cultures (CBCs).


**DESIGN**

Before and after intervention study comparing CLABSI and CBC rates in adult hematology and oncology patients with CVCs.

**METHODS**

Pre-Intervention:
Scrub the hub protocol

Intervention:
Needleless neutral pressure connectors and 3M™ Curos™ Disinfecting Cap for Needleless Connectors placed on CVC hubs

**RESULTS**

The number of central line days was 6,851 in the pre-intervention and 3,005 in the intervention period.

CLABSI Rate (per 1000 catheter days)
- Pre-Intervention (2009): 2.3
- Intervention (January 2010 – July 2010): 0.3
- 87% reduction (p=0.03)

CBC Rate (†)
- Pre-Intervention (2009): 2.5
- Intervention (January 2010 – July 2010): 0.2
- 92% reduction (p=0.002)

Compliance to the intervention = 85.2%
“Following implementation of the caps, the rates of CLABSI within the burn ICU were significantly reduced...”


**BACKGROUND**

Despite > 90% compliance to the CVC bundle, the CLABSI rate in the burn ICU was higher than benchmark.

**DESIGN**

Prospective before and after intervention study comparing CLABSI rates in burn patients with CVCs.

**METHODS**

Pre-Intervention:
CDC recommended CVC bundle and scrub the hub protocol

Intervention:
3M™ Curos™ Disinfecting Cap for Needleless Connectors added to CVC bundle as a standard of care January 2012

**RESULTS**

CLABSI Rate (per 1000 central line days)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Pre-Intervention</td>
<td>7.43</td>
<td>2.36</td>
</tr>
<tr>
<td>68% reduction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The number of central line days was 673 in the pre-intervention and 1272 in the intervention period.

"... ease of use with the caps simplified daily tasks, leading to higher compliance."
“Reducing the number of IV attempts and extending the functionality of a PIVC without complications are keys to reducing waste, improving efficiency, and increasing patient satisfaction of services.”


**DESIGN**

A prospective comparator single-center study compared peripheral intravenous catheter (PIVC) outcomes and dwell time in adult patients in a medical surgical unit.

**METHODS**

**Control (Group 1):** Staff nurses inserting PIVCs, no ultrasound, variability in placement location and supplies/technology including: neutral needleless connectors

**Intervention (Group 2):** Infusion team nurses inserting PIVCs, using ultrasound as needed, preferred insertion site was in forearm, and supplies/technology included:

- IV kit
- CHG/alcohol skin prep
- 22g catheter
- Anti-reflux needleless connector
- Antimicrobial bordered securement dressing
- 3M™ Curos™ Disinfecting Cap for Needleless Connectors and 3M™ Curos Jet™ Disinfecting Cap for Needleless Connectors

**RESULTS**

![Complication Rate (%)](chart)

- **Group 1:** 94 PIVCs
- **Group 2:** 113 PIVCs

- 89% of Group 2 PIVCs reached end of treatment, while only 15% reached end of treatment in Group 1 *(p<0.001)*

- Group 2 had an average daily increased dwell time of 66.7% (more than twice as long as Group 1 dwell times) *(p<0.001)*

- Group 2 had a 71% reduction in cost per bed per year, or $3,376 per bed savings
Introduction of 70% alcohol-impregnated antiseptic barrier catheter caps (ABCs) led to a non-statistically significant decrease in CLABSI incidence rates in a high-risk hematology and oncology population.


**DESIGN**

Before and after single center intervention study comparing CLABSI rates in high-risk hematology and oncology patients with jugular, femoral, or subclavian central venous catheters (CVCs).

**RESULTS**

CLABSI Rate (per 1000 catheter days)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>CLABSI Rate</td>
<td>15.28</td>
<td>10.38</td>
</tr>
<tr>
<td>p-value</td>
<td>(p=0.120)</td>
<td></td>
</tr>
</tbody>
</table>

The pre-intervention group had 309 patients with 443 catheters (4,189 catheter days) and the intervention group had 289 patients with 431 catheter placements (4,818 catheter days).

A decrease in CLABSI rate was demonstrated; however, in the Cox proportional hazard model the effect of ABCs on the CLABSI incidence was not statistically significant.

**METHODS**

**Control:** Standard catheter caps

**Intervention:**
3M™ Curos™ Stopper Disinfecting Cap for Open Female Luers placed on all CVC catheter hubs
"The data show overall reduction in CLABSI, improvements in patient outcomes, and increased staff satisfaction."


**BACKGROUND**

The CLABSI rate in the Oncology Service was rising and prompted a performance improvement strategy and interventions.

**METHODS**

Pre-Intervention:
Standard central line bundle of care

Intervention:
- Staff education related to standards of insertion, dressing changes and maintenance
- Use of 3M™ Curos™ Disinfecting Cap for Needleless Connectors on all CVC needleless connectors
- Oncology central line management checklist
- Peer-to-peer program

**RESULTS**

**CLABSI Rate (per 1000 patient days)**

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone Marrow Transplantation</td>
<td>6.01</td>
<td>2.23</td>
<td>0.32</td>
</tr>
<tr>
<td>Medical Oncology</td>
<td>2.17</td>
<td>0.62</td>
<td>0.89</td>
</tr>
<tr>
<td>Surgical Oncology</td>
<td>3.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N/A
Use of isopropyl alcohol-impregnated caps, as part of a care bundle, led to a statistically significant reduction in positive blood cultures in a per protocol analysis.


**DESIGN**

24-month, cluster-randomized, two period, crossover trial comparing ambulatory CLABSI rates at 16 pediatric hematology-oncology clinics.

**METHODS**

Control: Standard central-line maintenance care bundle per institutional policy

Intervention: 3M™ Curos™ Disinfecting Cap for Needleless Connectors placed on all external central line needleless connectors (Hickman, Broviac, central PICC, or non tunneled central lines)

**RESULTS**

In the per protocol analysis, the incidence of positive blood cultures decreased by **28%** (p=0.045)

CLABSI Rate (per 1000 at-risk days)

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>1.38</td>
<td>1.23</td>
</tr>
<tr>
<td>(p-value)</td>
<td>0.22</td>
<td>0.045</td>
</tr>
</tbody>
</table>

123 CLABSI events occurred in Control Clinics
109 CLABSI events occurred in Intervention Clinics
Switching from a split septum IV connector to a luer lock connector and passive alcohol disinfecting cap reduced colonization rates.

doi:10.1016/j.ajic.2019.05.024

**DESIGN**
Prospective, two phase, quality improvement study to assess colonization of catheter connector systems in adult patients receiving active infusions through peripheral or central catheters.

**METHODS**

**Intervention:**
- Phase 1: Split septum IV connector
- Phase 2: Luer lock needleless connector with 3M™ Curos™ Disinfecting Cap for Needleless Connectors

**RESULTS**

<table>
<thead>
<tr>
<th>Catheter Colonization (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 (2016)</td>
</tr>
<tr>
<td>Phase 2 (2017)</td>
</tr>
</tbody>
</table>

41.9 (p<0.0001)
22.2

Phase 1: Total of 234 catheter connectors cultured, of which 98 were colonized
Phase 2: Total of 243 catheter connectors cultured, of which 54 were colonized
Reduction, not statistically significant, in occurrence of thrombophlebitis in equine patients when using disinfecting catheter caps.


**DESIGN**

Retrospective pilot study comparing the incidence of catheter-related thrombophlebitis in equine (horse) patients with indwelling over-the-wire catheters.

**METHODS**

**Control:**
14-gauge polyurethane over-the-wire catheters and needleless connector without disinfecting cap

**Intervention:**
Addition of 3M™ Curos™ Disinfecting Cap for Needleless Connectors

**RESULTS**

Percent of Thrombophlebitis Cases

- **Control (2012):** 17.50%
- **Intervention (2013):** 5.00%

12.5% reduction (p=0.071)

Data was collected via electronic randomization of data from 40 equine patients recorded during the pre-intervention and 40 equine patients during the intervention period.
Post intervention CLABSI rate improved from 5.2 to 0.4 per 1000 line days in 2014 (p<0.05).


**Before and after intervention study comparing CLABSI in NICU patients.**

**DESIGN**

**INTERVENTION**

Implementation of an interdisciplinary pediatric CLABSI committee and multiple interventions including:

- Insertion checklist, placement of non-emergent lines in dedicated procedure room
- Daily assessment of line necessity
- Daily assessment of dressing, exit site and presence of 3M™ Curos™ Disinfecting Cap for Needleless Connectors

**RESULTS**

![CLABSI Infections (per 1000 line days)](chart.png)

- **Pre-Intervention (2012):** 5.2
- **Intervention (2013):** 1.0
- **Post-Intervention (2014):** 0.4

92% overall reduction (p<0.05)
By utilizing disinfecting caps, compliance is more accurate and a significant reduction can be seen in the burden of CLABSIs.


METHODS
A systematic review was conducted according to the MOOSE guidelines using MEDLINE, EMBASE, CINAHL, Scopus and the Cochrane Database without any limits. Searches were conducted to identify articles needing inclusion criteria and were independently screened by the authors.

RESULTS
CLABSI reduction ranged from 30% – 87% in the nine studies included in the systematic review.

Nine quasi-experimental studies examining the effect of 3M™ Curos™ Disinfecting Cap for Needleless Connectors and Swabcap® Disinfecting Caps on CLABSI were included.
Implementation of disinfecting caps was associated with a reduced rate of hospital wide CLABSI, cost savings and increased nursing satisfaction.


**DESIGN**

Before and after intervention study comparing hospital wide CLABSI standardized infection ratios (SIR).

**METHODS**

Pre-Intervention: 15 second scrub the hub protocol

**Intervention:** Implemented 3M™ Curos™ Disinfecting Cap for Needleless Connectors hospital wide

**RESULTS**

**Adult CLABSI SIR**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Adult CLABSI SIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Intervention (January 2012 – October 2012)</td>
<td>0.85</td>
</tr>
<tr>
<td>Intervention (November 2012 – August 2013)</td>
<td>0.27</td>
</tr>
</tbody>
</table>

68% reduction (p=0.003)
“When disinfectant caps were used on all IV ports, the rate of both CLABSI and nosocomial BSI fell significantly.”


**RESULTS**

The number of line days was 10,441 in the baseline and 9,536 in the intervention period.

In units that did not implement disinfectant caps, there was no significant difference in CLABSI or nosocomial BSI rates.

**DESIGN**

Before and after intervention study comparing CLABSI and nosocomial bloodstream infections (BSI) in four hospital units (ICU, step down, two med/surg units).

**INTERVENTION**

3M™ Curos™ Disinfecting Cap for Needleless Connectors or Swabcap® Disinfecting Caps placed on all needleless IV access ports of peripheral and central lines.
A significant decline in the incidence of CLABSIs was observed after the addition of Curos™ disinfecting caps to an existing central line bundle.


**RESULTS**

**CLABSI SIR**

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SIR</td>
<td>1.723</td>
<td>1.013*</td>
<td>0.722**</td>
</tr>
</tbody>
</table>

*Intervention began Q1 2011; Results included Q4 2011 when Curos disinfecting cap not in use

**Use of Curos disinfecting cap resumed January 2012

***Comparison is between 2010 and 2012
“The use of a disinfectant cap is effective in reducing the rate of CLABSI and contaminated blood cultures and provides a substantial cost savings.”


**DESIGN**

Before and after intervention study comparing CLABSI and nursing compliance in a Level I Trauma Center.

**METHODS**

**Pre-Intervention:** Baseline data found that 55% of nurses scrub the needleless connector for less than five seconds.

**Intervention:** 3M™ Curos™ Disinfecting Cap for Needleless Connectors implemented on all central and peripheral needleless connectors in all inpatient departments (excluding women’s services).

**RESULTS**

- **CLABSI Rate (per 1000 line days):**
  - Pre-Intervention (2011): 2.4
  - Intervention (2012): 0.87
  - 64% reduction (p=0.02)

- **Total estimated cost savings per month:** $95,000

- **Nursing compliance to the disinfecting cap increased significantly from 73% to 88% during the study (p=0.01).**

- **There was a non-significant decrease in contaminated blood cultures from 2.5% before to 1.4% after intervention.**
Following discontinuation of disinfecting caps, the CABS1 rate returned to the pre-intervention rate.


**DESIGN**

Before and after intervention study comparing catheter-associated bloodstream infection (CABS1) between a control and intervention unit caring for acute leukemia and stem cell transplant patients.

**INTERVENTION**

Implementation of 3M™ Curos™ Disinfecting Cap for Needleless Connectors on CVC needleless connectors.

**RESULTS**

Median CABS1 Rate (per 1000 central line days)

- **Pre-Intervention (2010):** 5.3
- **Intervention (2011):** 3.7

30% reduction

The number of central line days was 20,126 in the pre-intervention and 20,206 in the intervention period.

Analysis of CABS1 rates in a control unit during the same time periods were 5.6 (2010) and 5.4 (2011) per 1000 central line days.
The CLABSI rate decreased 68% the first year after implementation of Curos™ disinfecting cap, used in conjunction with other CLABSI prevention measures.

Pong A, Salgado C, Speziale M, Grimm P, Abe C. Reduction in central line associated bloodstream infection (CLABSI) in a neonatal intensive care unit with use of access site disinfection caps. Presented at: Infectious Disease Society of America annual meeting; October 21, 2011; Boston, MA.

DESIGN

Before and after intervention study comparing CLABSI and blood culture contaminants in level 4 NICU patients.

METHODS

Pre-Intervention: CLABSI prevention measures in place:
- Sterile insertion technique
- Hand hygiene
- Hub cleansing with access
- Standards for dressing and tubing changes
- Prompt catheter removal

Intervention: 3M™ Curos™ Disinfecting Cap for Needleless Connectors added to all CVC needleless connectors

RESULTS

CLABSI Rate (per 1000 line days)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>CLABSI Rate</td>
<td>0.93</td>
<td>0.3</td>
</tr>
</tbody>
</table>

68% reduction

Contaminated Blood Culture Isolates (per 1000 line days)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Isolates</td>
<td>3.6</td>
<td>2.7</td>
</tr>
</tbody>
</table>

25% reduction

The number of central line days was 7,533 in the pre-intervention and 6,782 in the intervention period.
Clinically significant fall in Catheter Related Sepsis (CRS) rates related to Parenteral Nutrition (PN) following introduction of a disinfecting cap.


**DESIGN**
Before and after intervention study comparing CRS rates in inpatients receiving PN through either a PICC or dedicated port of a CVC.

**METHODS**

**Pre-Intervention:**
Standard aseptic non-touch technique

**Intervention:**
Addition of 3M™ Curos™ Disinfecting Cap for Needleless Connectors (implemented on Aug. 9, 2014)

**RESULTS**

Catheter Related Sepsis (events per 1000 catheter days)

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Pre-intervention</td>
<td>6.17</td>
<td>0</td>
</tr>
</tbody>
</table>

Pre-intervention (no Curos Disinfecting Cap for Needleless Connectors) total PN days: 1617
Intervention group (Curos Disinfecting Cap for Needleless Connectors) total PN days: 521

(p=0.014)
The introduction of 3M™ Curos™ Disinfecting Cap for Needleless Connectors, in a care bundle with CHG bathing, was associated with a significant reduction in CLABSI.


**DESIGN**
Before and after intervention study comparing infection rates in multiple levels of care (acute care, ICU, and a community living center) for patients with peripheral and central catheters.

**METHODS**

**Pre-Intervention:**
CVC best practice bundle

**Intervention:**
- Use of Curos Disinfecting Cap for Needleless Connectors on central and peripheral line needleless connectors
- Added chlorhexidine bathing in ICUs in November 2012

**RESULTS**

CLABSI Rates (per 1000 line days)

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Pre-intervention</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Intervention</td>
<td>0.4</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Pre-intervention: 22 infections, 14,308 line days
Intervention group: 5 infections, 12,263 line days

\( p=0.0033 \)
Sustained compliance with disinfecting protocol seen with intervention implementation.


**DESIGN**

Prospective study assessing the impact of implementing disinfecting caps on CLABSI rates for PICC lines in four inpatient wards.

**METHODS**

**PICC Maintenance Bundle Education:**
- Insertion site care
- Dressing recommendations
- Application of CHG disk (BIOPATCH®)

**Intervention:**
- PICC maintenance bundle education
- Addition of 3M™ Curos™ Disinfecting Cap for Needleless Connectors to PICC line needleless connectors

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**RESULTS**

**Number of CLABSIs**

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Number</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>

Control group (infection rate of 1.11/1000 catheter days)
Intervention group (infection rate of 0.74/1000 catheter days)

*Not statistically significant

Compliance with use of disinfecting caps ≥95% for 15 out of the 16 months tracked
Use of antiseptic caps on CVC main stopcocks demonstrated protection from contamination and increased compliance over standard practice.


**DESIGN**

A cluster randomized trial assessed the contamination rates of stopcocks and incidence of CLABSI in an ICU.

**METHODS**

**Pre-Intervention:**
Manual disinfection of stopcock hubs, which included the use of Octeniderm® spray and use of Combi-Stopper caps

**Intervention:**
3M™ Curos™ Stopper Disinfecting Cap for Open Female Luers placed on all primary IV infusion stopcocks

**RESULTS**

Contamination rates of stopcocks dropped from 15.9% to 5.6% during the study (p<0.03)

Compliance rates to disinfecting caps was 98% compared to 60% for standard disinfection

The mean dwell time in the pre-intervention was 10.6 days and 12.7 days in the intervention.
Additional Resources

ABSTRACTS


Kelleher J, Almeida R, Cooper H, Stauffer S. Achieving Zero CoN CLBSI in the NICU. Providence Sacred Heart Medical Center and Children’s Hospital, Spokane, WA, 2013.


Davis M. Forcing the function: implementation and evaluation of an IV port protector to decrease CLABSI. Legacy Health, Portland, OR, 2013.


Doherty M, Heys P. Clinical support for all patients, all lines, all the time (AAA). Temple University Hospital case study, Philadelphia, PA, 2013.


**DISSERTATIONS**

