3M curos™
Disinfecting Port Protectors

Clinical Evidence Summary

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1-800-228-3957

Table of Contents

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

PEER REVIEWED

Antiseptic barrier cap effective in reducing central line-associated bloodstream infections: A systematic review and meta-analysis.
Voor in 't holt AF, Helder OK, Vos MC, et al. *Int J Nurs Stud.* 2017;69:34-40. — 7
Population: Multiple Specialties

A bundled approach to decrease the rate of primary bloodstream infections related to peripheral intravenous catheters.
Duncan M, Warden P, Bernatchez S, Morse D. *J Assoc Vasc Access.* 2018;23(1):15-22. — 8
Population: Hospital Wide

Strategies for the successful implementation of disinfecting port protectors to reduce CLABSI in a large tertiary care teaching hospital.
Beeler C, Kerley D, Davis C, et al. *Am J Infect Control.* 2019;47(12):1505-1507. doi:10.1016/j.ajic.2019.05.016 — 9
Population: Hospital Wide

Educational interventions alone and combined with port protector reduce the rate of central venous catheter infection and colonization in respiratory semi-intensive care unit.
Inchingolo R, Pasciuto G, Magnini D, et al. *BMC Infect Dis.* 2019;19(1):215. — 10
Population: Respiratory Semi-Intensive Care

Impact of universal disinfectant cap implementation on central line-associated bloodstream infections.
Merrill KC, Sumner S, Linford L, Taylor C, Macintosh C. *Am J Infect Control.* 2014;42:1274-1277. — 11
Population: Multiple Specialties

Use of alcohol containing caps for preventing bloodstream infections: A randomized controlled trial.
Taşdelen Öğülmen D, Ateş S. *J Vasc Access.* 2021 Nov;22(6):920-925. doi:10.1177/1129729820952961 — 12
Population: Intensive Care

Port protectors in clinical practice: an audit.
Cameron-Watson C. *Br J Nurs.* 2016;25(8):S25-S31. — 13
Population: Multiple Specialties

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Outcomes Key

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	Cost

PEER REVIEWED

Central venous catheter protective connector caps reduce intraluminal catheter-related infection.
Ramirez C, Lee AM, Welch K. *J Assoc Vasc Access.* 2012;17(4):210-213.
14
Population: Intensive Care

Use of a central catheter maintenance bundle in long-term acute care hospitals.
Grigonis AM, Dawson AM, Burkett M, et al. *Am J Crit Care.* 2016;25(2):165-172.
15
Population: Long Term Acute Care

Impact of alcohol-impregnated port protectors and needleless neutral pressure connectors on central line-associated bloodstream infections and contamination of blood cultures in an inpatient oncology unit.
Sweet MA, Cumpston A, Briggs F, Craig M, Hamadani M. *Am J Infect Control.* 2012;40(10):931-934.
16
Population: Hematology & Oncology

Efforts of a unit practice council to implement practice change utilizing alcohol impregnated port protectors in a burn ICU.
Martino A, Thompson L, Mitchell C, et al. *Burns.* 2017;43(5):956-964.
17
Population: Burn Intensive Care

Reaching one peripheral intravenous catheter (PIVC) per patient visit with lean multimodal strategy: the PIV5Rights™ Bundle.
Steere L, Ficara C, Davis M, Moureau N. *J Assoc Vasc Access.* 2019;24(3):31-43. doi:10.2309/j.java.2019.003.004
18
Population: Intensive Care

A quality improvement study on the reduction of central venous catheter-associated bloodstream infections by use of self-disinfecting venous access caps (STERILE).
Cruz-Aguilar R, Carney J, Mondaini V, et al. *Am J Infect Control.* 2021;49(5):586-592. doi:10.1016/j.ajic.2020.09.002
19
Population: Hematology & Oncology

Reducing central line-associated bloodstream infections on inpatient oncology units using peer review.
Zavotsky KE, Malast T, Festus O, Riskie V. *Clin J Oncol Nurs.* 2015;19(6):655-658. doi:10.1188/15.CJON.655-658
20
Population: Oncology

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

PEER REVIEWED

Alcohol-impregnated caps and ambulatory central line-associated bloodstream infections (CLABSIs): A randomized clinical trial.
Milstone AM, Rosenberg C, Yenokyan G, Koontz DW, Miller MR, CCLIP Authorship Group. *Infect Control Hosp Epidemiol.* 2021;42(4):431-439. doi:10.1017/ice.2020.467

21
Population: Pediatric Oncology & Hematology

Microbial colonization of intravascular catheter connectors in hospitalized patients.
Hankins R, Majorant OD, Rupp ME, et al. *Am J Infect Control.* 2019;47(12):1489-1492. doi:10.1016/j.ajic.2019.05.024

22
Population: Intensive Care

PEER REVIEWED – VETERINARY STUDY

A comparative study of disinfecting catheter caps and their effectiveness in the reduction of equine IV catheter-related thrombophlebitis.
Fisk N. *Vet Nurs J.* 2018;33(3):74-78. doi:10.1080/17415349.2017.1414781

23
Population: Veterinary, Equine

ABSTRACTS

Successful decrease of central line-associated bloodstream infections in an urban neonatal intensive care unit using a pediatric-specific interdisciplinary approach.
Karam-Howlin R, Fede A, Gibbs K, Bravo N, Wallach F, Patel G. *Am J Infect Control.* 2015;43(6):S58.

24
Population: Neonatal Intensive Care

Systematic review on impact of use of disinfectant caps protectors for intravenous access ports on central line-associated bloodstream infections (CLABSI).
Jimenez A, Barrera A, Madhivanan P. *Open Forum Infectious Diseases.* 2015;2(1):281.

25
Population: Multiple Specialties

A significant decline in central line-associated blood stream infections using alcohol-impregnated port protectors at a large non-profit acute care hospital.
Danielson B, Williamson S, Kaur G, Johnson N. *Am J Infect Control.* 2014;42(6):S16.

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Population: Hospital Wide

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

ABSTRACTS

Alcohol-impregnated disinfectant caps reduce the rate of central-line associated bloodstream infections and nosocomial bacteremia. 27
Shelly M, Greene L, Brown L, Romig S, Pettis AM. *Open Forum Infect Dis.* 2014 Dec;1(Suppl 1):S248. doi:10.1093/ofid/ofu052.570
Population: Multiple Specialties

Decreasing the incidence of central line-associated blood stream infections using alcohol-impregnated port protectors (AIPPS) in a neonatal intensive care unit. 28
Danielson B, Williamson S, Kaur G, Brooks C, Scholl P, Baker A. *Am J Infect Control.* 2013;41(6):S97-S98.
Population: Neonatal Intensive Care

Decreasing CLABSI rates and cost following implementation of a disinfectant cap in a tertiary care hospital. 29
Sumner S, Merrill KC, Linford L, Taylor C. *Am J Infect Control.* 2013;41(6):S37.
Population: Hospital Wide

Impact of alcohol-impregnated protectors on incidence of catheter-associated blood stream infections. 30
Mayfield J, Alasmari F, Kittur ND, et al. Presented at: IDWeek annual meeting; October 18, 2012; San Diego, CA.
Population: Oncology and Stem Cell Transplant

Reduction in central line associated bloodstream infection (CLABSI) in a neonatal intensive care unit with use of access site disinfection caps. 31
Pong A, Salgado C, Speziale M, Grimm P, Abe C. Presented at: Infectious Disease Society of America annual meeting; October 21, 2011; Boston, MA.
Population: Neonatal Intensive Care

PTH-195 Curos™ line caps are effective in reducing catheter related sepsis in inpatients receiving parenteral nutrition. 32
Wheatley DJ, Rowlands S, Chapman J, et al. *Gut.* 2015;64(Suppl 1):A495.1-A495. doi:10.1136/gutjnl-2015-309861.1083
Population: Inpatient Parenteral Nutrition

863 reduction in CLABSIs with alcohol port protectors. 33
Russo N, Gupta K, Tibert C, Strymish J. *Open Forum Infect Dis.* 2014;1(Suppl-1):S248. doi:10.1093/ofid/ofu052.571
Population: Multiple Specialties

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POSTERS

Impact of disinfectant cap implementation on peripherally-inserted central catheter (PICC) associated bloodstream infection rates.
Cabahug T, Jie L, Meng QS, Tang M, Wang Y, Foo SY, Wu T. Poster presented at: APSIC Congress. 2019; Vietnam. Abstract available at: https://www.researchgate.net/publication/333679803_Impact_of_disinfectant_cap_implementation_on_peripherally-inserted_central_catheter_PICC_associated_bloodstream_infection_rates

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Population: General Units

SHORT COMMUNICATION

Antiseptic cap protects stopcocks from internal bacterial contamination.
Guyot A, Lorf S, van Stein C, Hünger F, Schaaf B. *J Hosp Infect.* 2021 Feb;108:212-214. doi:10.1016/j.jhin.2020.11.026

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Population: Intensive Care

ADDITIONAL RESOURCES

Abstracts / Articles / Dissertations 36

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

PEER REVIEWED

“...use of the antiseptic barrier cap can lower the occurrence of CLABSIs and is cost saving.”

Voor in ‘t holt AF, Helder OK, Vos MC, et al. Antiseptic barrier cap effective in reducing central line-associated bloodstream infections: a systematic review and meta-analysis. *Int J Nurs Stud*. 2017;69:34-40.

DESIGN

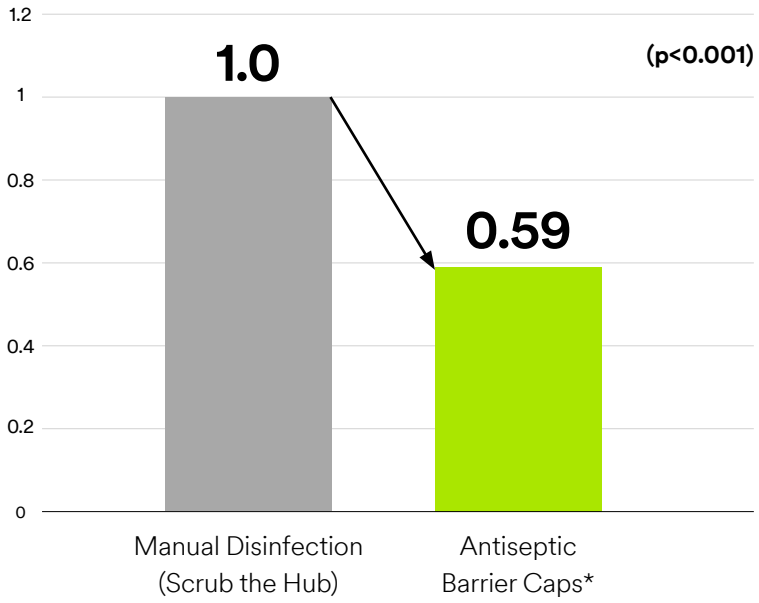
Systematic review and meta-analysis

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)



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

*Curos Disinfecting Cap for Needleless Connectors and SwabCap Disinfecting Caps

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

PEER REVIEWED

“Using a PIV maintenance bundle including disinfecting caps and tips can effectively lower the rate of primary bloodstream infections attributable to PIV lines.”

Duncan M, Warden P, Bernatchez S, Morse D. A bundled approach to decrease the rate of primary bloodstream infections related to peripheral intravenous catheters. *J Assoc Vasc Access.* 2018;23(1):15-22.

DESIGN

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

METHODS

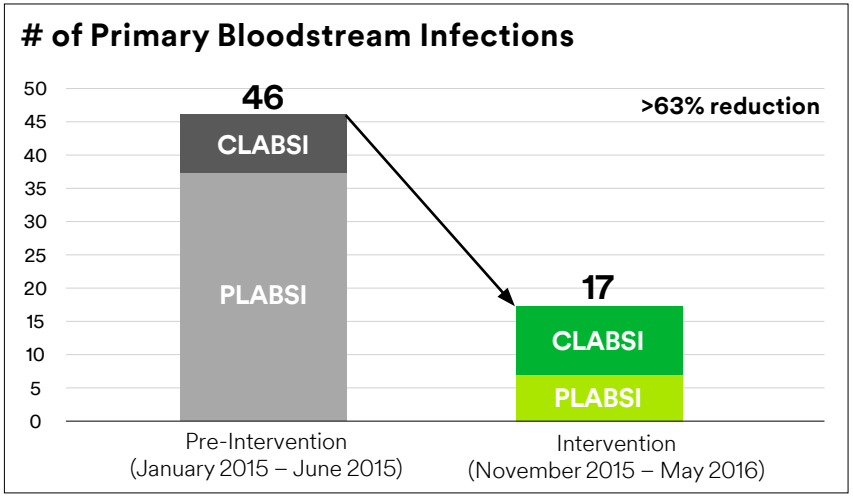
Pre-Intervention: Primary bloodstream infection and IV catheter data collected

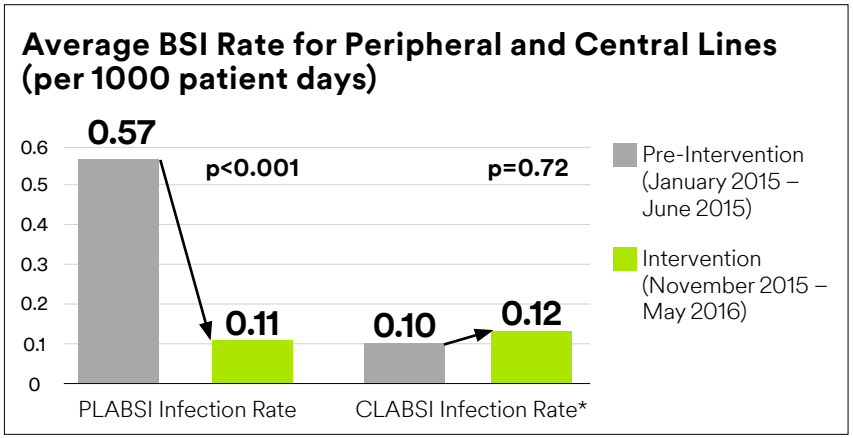
Intervention: PIV bundle implemented. 3M™ Curos Tips™ Disinfecting Cap for Male Luers added to existing Central Line-Associated Bloodstream Infection (CLABSI) bundle for all disconnected IV tubing. Compliance monitored for PIV and CLABSI bundles.

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

RESULTS





*Because CLABSI bundle was implemented prior to study, no significant change to CLABSI rate was anticipated or observed during study time period.

Compliance with protecting all needleless connectors was near

90%

Compliance with protecting male ends of disconnected IV tubing was near

90%

PEER REVIEWED

“Inclusion of the alcohol impregnated disinfecting port protectors (AIDPP), as a component of the CLABSI bundle, hardwired adherence by audit accountability.”

Beeler C, Kerley D, Davis C, et al. Strategies for the successful implementation of disinfecting port protectors to reduce CLABSI in a large tertiary care teaching hospital. *Am J Infect Control.* 2019;47(12):1505-1507. doi:10.1016/j.ajic.2019.05.016

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

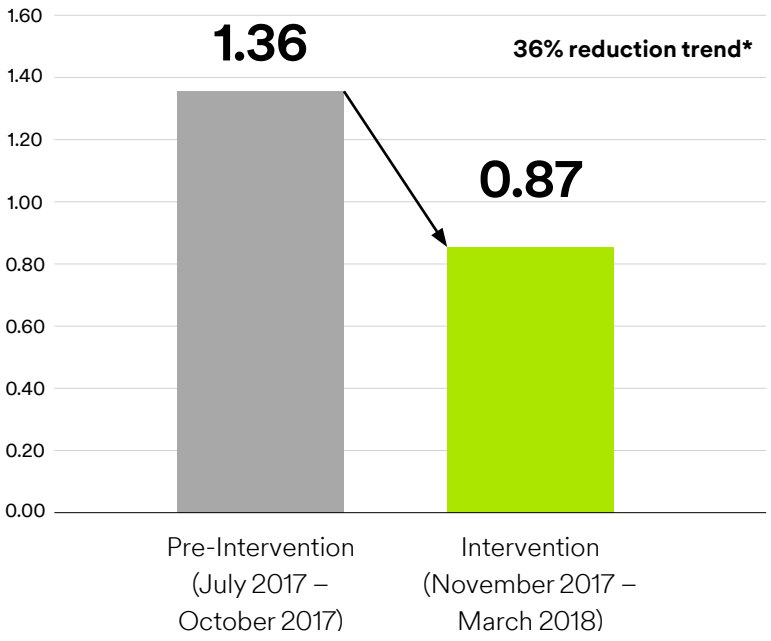
Pre-Intervention:
Standard central line bundle of care

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

CLABSIs (per 1000 device days)



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

Reduction of
1.36 to 0.87
CLABSIs per 1000 device days

Used 21-Day Challenge to increase adherence rate from
67% to 94%

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

PEER REVIEWED

3M™ Curos™ Disinfecting Cap for Needleless Connectors combined with educational interventions led to zero rate of CLABSIs.

Inchingolo R, Pasciuto G, Magnini D, et al. Educational interventions alone and combined with port protector reduce the rate of central venous catheter infection and colonization in respiratory semi-intensive care unit. *BMC Infect Dis.* 2019;19(1):215.

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

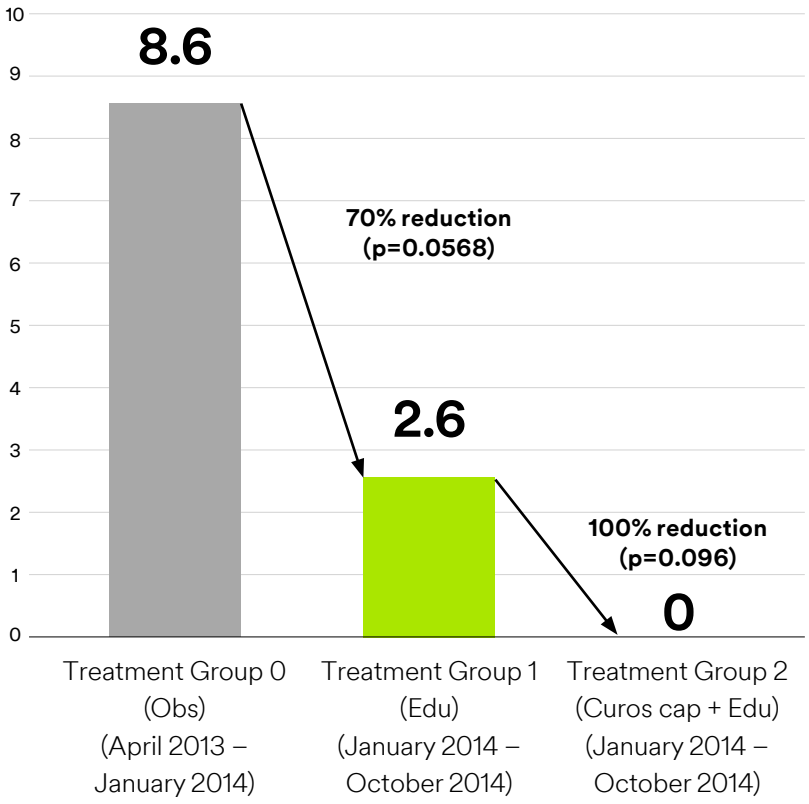
Pre-Intervention:
Standard central line bundle of care (n=86)

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

CLABSI Rate (per 1000 central line days)



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

VIEW ABSTRACT

PEER REVIEWED

“Disinfectant cap use was associated with an estimated savings of almost $300,000 per year in the hospital studied.”

Merrill KC, Sumner S, Linford L, Taylor C, Macintosh C. Impact of universal disinfectant cap implementation on central line-associated bloodstream infections. *Am J Infect Control.* 2014;42:1274-1277.

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.

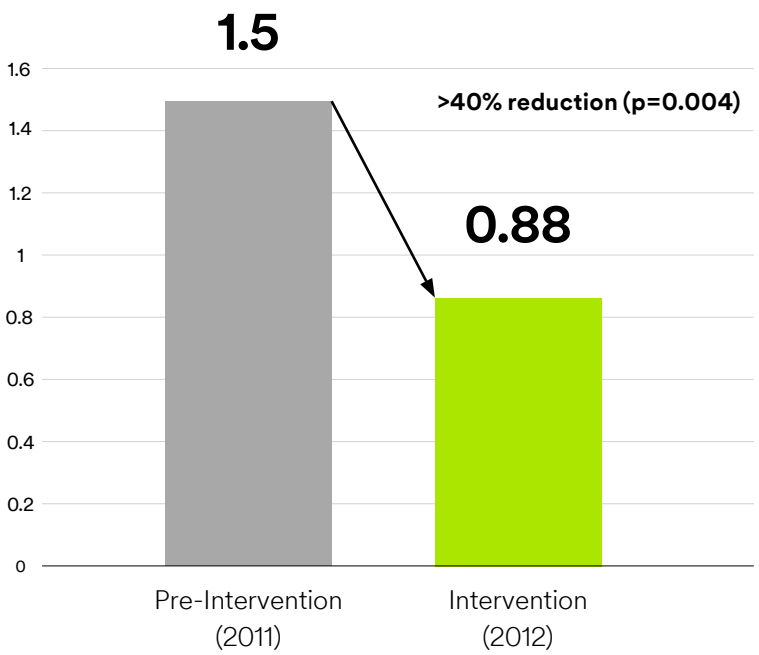
METHODS

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)



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

PEER REVIEWED

Alcohol containing caps were found to be a beneficial addition to a bundle helping to prevent CLABSI.

Taşdelen Öğülmen D, Ateş S. Use of alcohol containing caps for preventing bloodstream infections: A randomized controlled trial. *J Vasc Access.* 2021 Nov;22(6):920-925. doi:10.1177/1129729820952961

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.

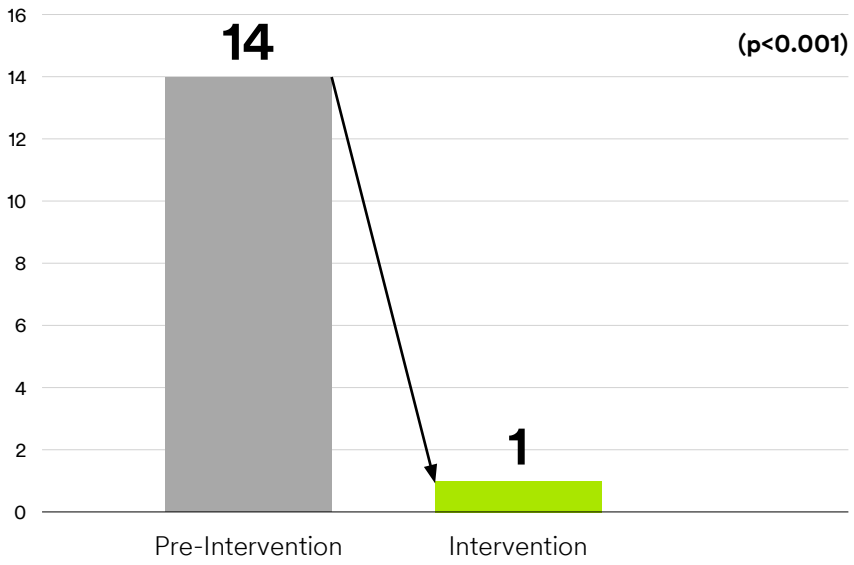
CVC insertion:
2% chlorhexidine in IPA skin prep, gauze and/or chlorhexidine-impregnated dressing

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

Number of CLABSIs



Pre-intervention group (n=48)
Intervention group (n=47)

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)**

VIEW ABSTRACT

PEER REVIEWED

The number of vascular access device (VAD) related bacteraemias was reduced by 69% when compliance with Curos™ cap placement was 80% or more.

Cameron-Watson C. Port protectors in clinical practice: an audit. *Br J Nurs.* 2016;25(8):S25-S31.

DESIGN

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

METHODS

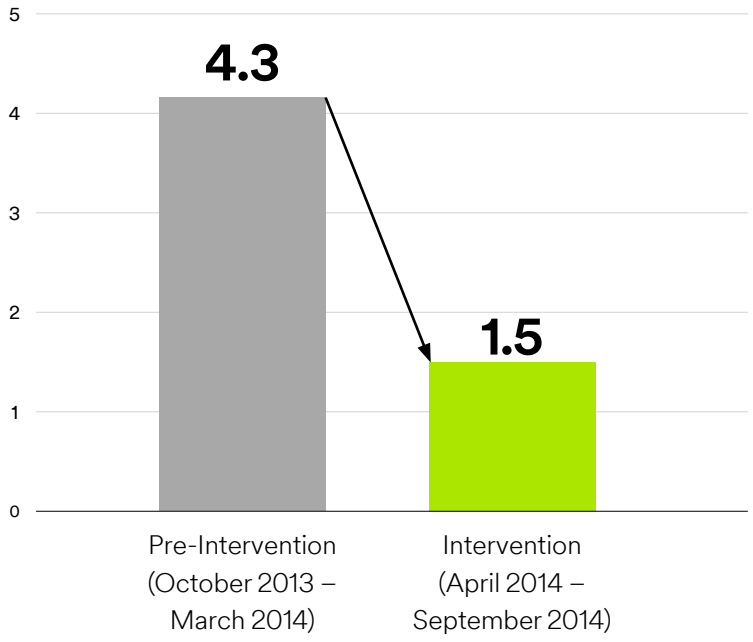
Pre-Intervention:
Scrub the hub using CHG/IPA wipes prior to IV access

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)



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

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

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

PEER REVIEWED

“The implementation of the port protector cap system resulted in lower infection rates compared with an alcohol swab technique.”

Ramirez C, Lee AM, Welch K. Central venous catheter protective connector caps reduce intraluminal catheter-related infection. *J Assoc Vasc Access.* 2012;17(4):210-213.

DESIGN

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

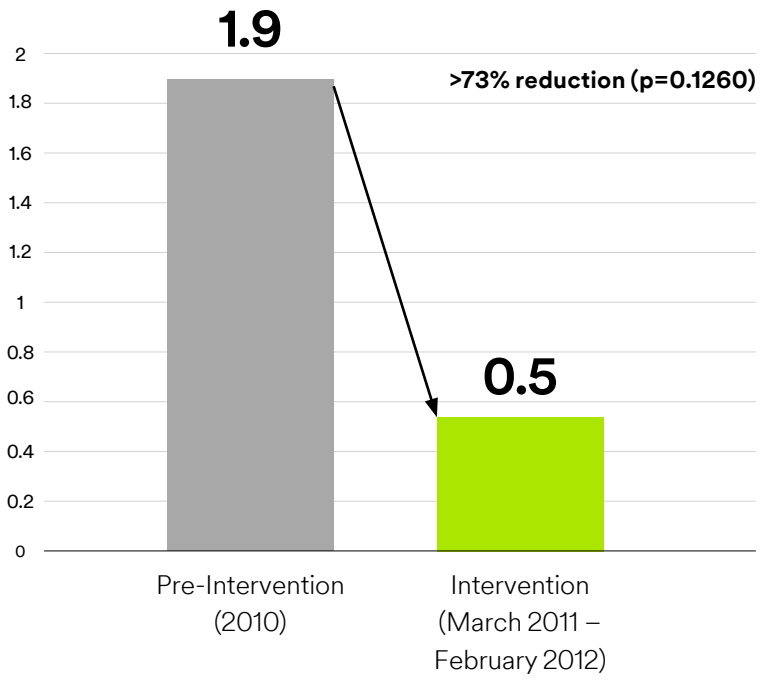
METHODS

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)



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

PEER REVIEWED

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

Grigonis AM, Dawson AM, Burkett M, et al. Use of a central catheter maintenance bundle in long-term acute care hospitals. *Am J Crit Care*. 2016;25(2):165-172.

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

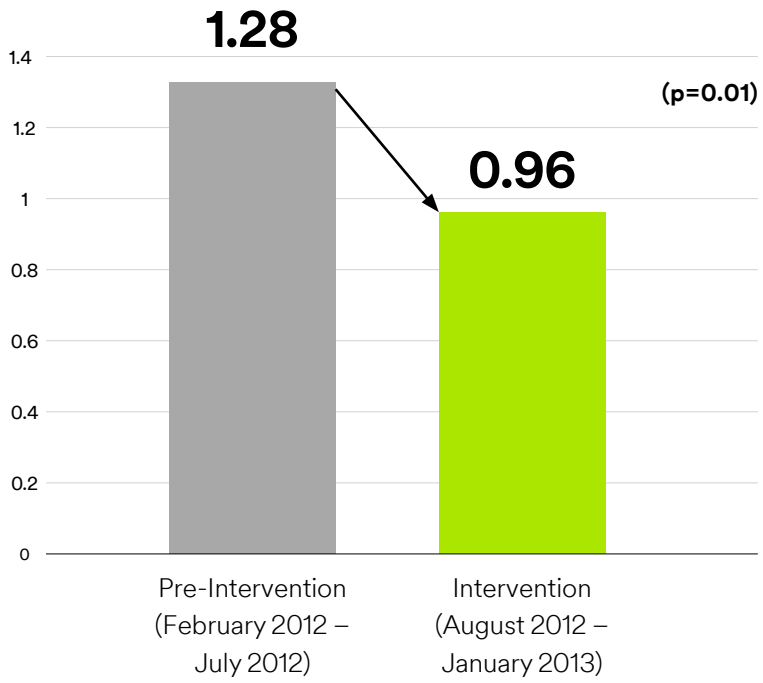
Intervention:
Implementation of CVC maintenance bundle and care team trained on CVC care

CVC bundle:

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

RESULTS

CLABSI Standardized Infection Ratio (SIR)



The number of central line days was 120,137 before and 119,412 after bundle implementation.

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

PEER REVIEWED

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).

Sweet MA, Cumpston A, Briggs F, Craig M, Hamadani M. Impact of alcohol-impregnated port protectors and needleless neutral pressure connectors on central line-associated bloodstream infections and contamination of blood cultures in an inpatient oncology unit. *Am J Infect Control.* 2012;40(10):931-934.

DESIGN

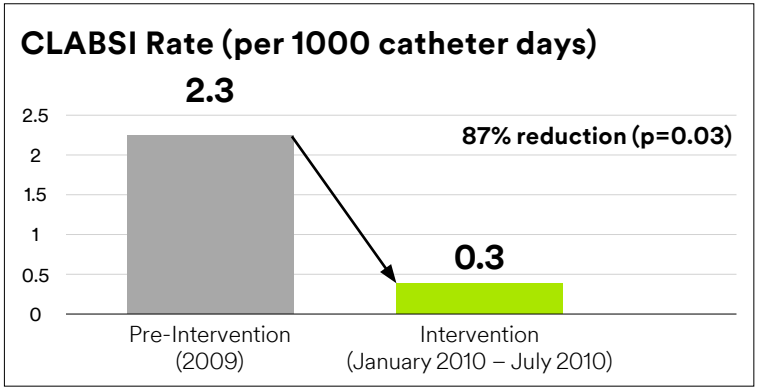
Before and after intervention study comparing CLABSI and CBC rates in adult hematology and oncology patients with CVCs.

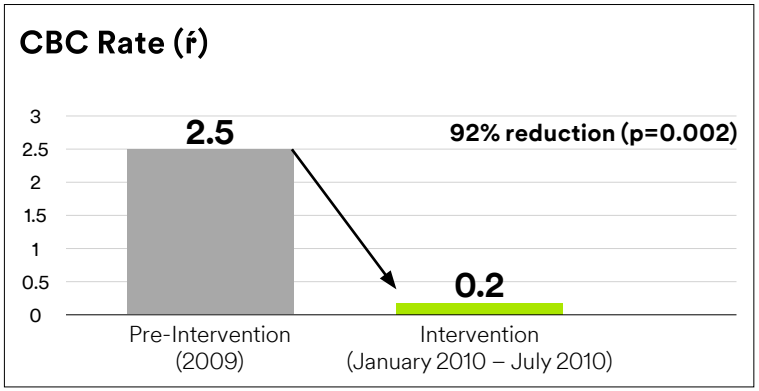
METHODS

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

Compliance to the intervention =
85.2%

PEER REVIEWED

“Following implementation of the caps, the rates of CLABSI within the burn ICU were significantly reduced...”

Martino A, Thompson L, Mitchell C, et al. Efforts of a unit practice council to implement practice change utilizing alcohol impregnated port protectors in a burn ICU. *Burns.* 2017;43(5):956-964.

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.

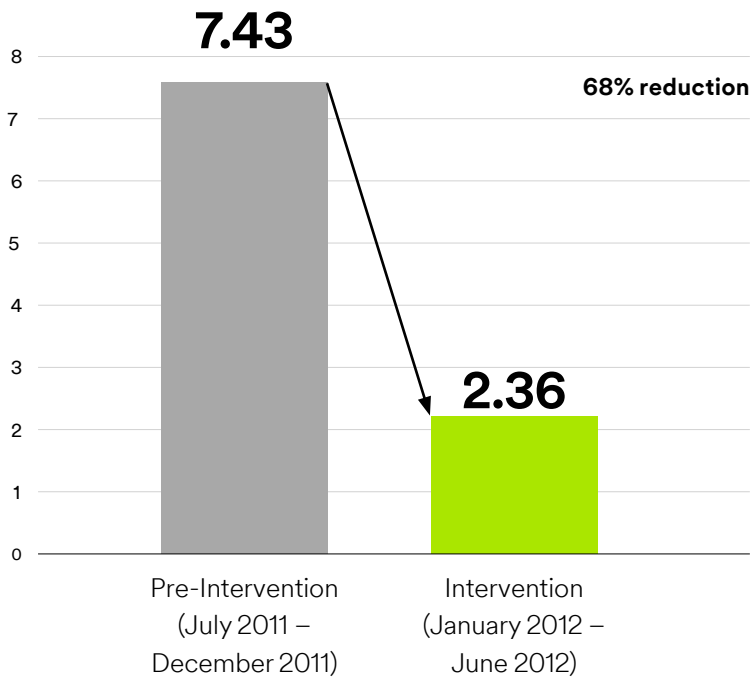
METHODS

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)



”... ease of use with the caps simplified daily tasks, leading to higher compliance.”

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

PEER REVIEWED

“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.”

Steere L, Ficara C, Davis M, Moureau N. Reaching one peripheral intravenous catheter (PIVC) per patient visit with lean multimodal strategy: the PIV5Rights™ bundle. *J Assoc Vasc Access.* 2019;24(3):31-43. doi:10.2309/j.java.2019.003.004

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

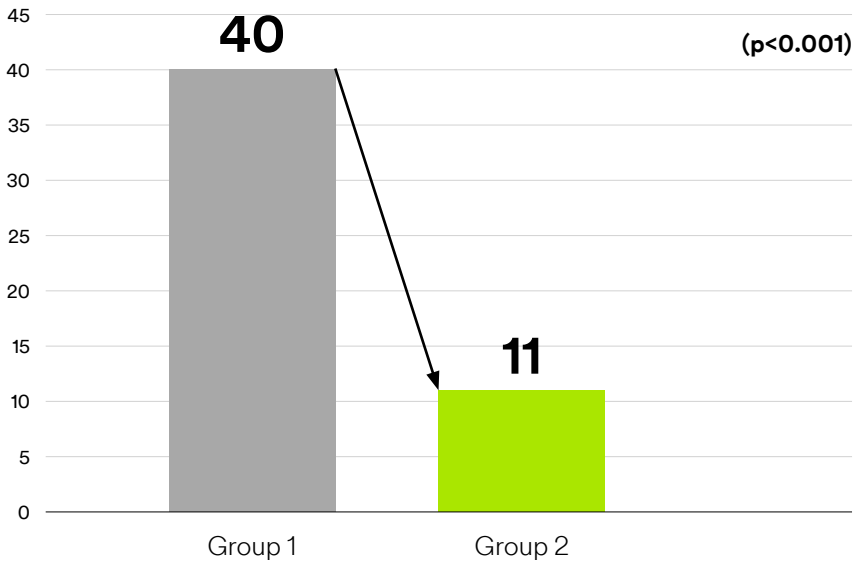
Control (Group 1): Staff nurses inserting PIVCs, no ultrasound, variability in placement location and supplies/technology including: neutral needleless connectors

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 (%)



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

DOWNLOAD FULL CLINICAL STUDY

PEER REVIEWED

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.

Cruz-Aguilar R, Carney J, Mondaini V, et al. A quality improvement study on the reduction of central venous catheter-associated bloodstream infections by use of self-disinfecting venous access caps (STERILE). *Am J Infect Control.* 2021;49(5):586-592. doi:10.1016/j.ajic.2020.09.002

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).

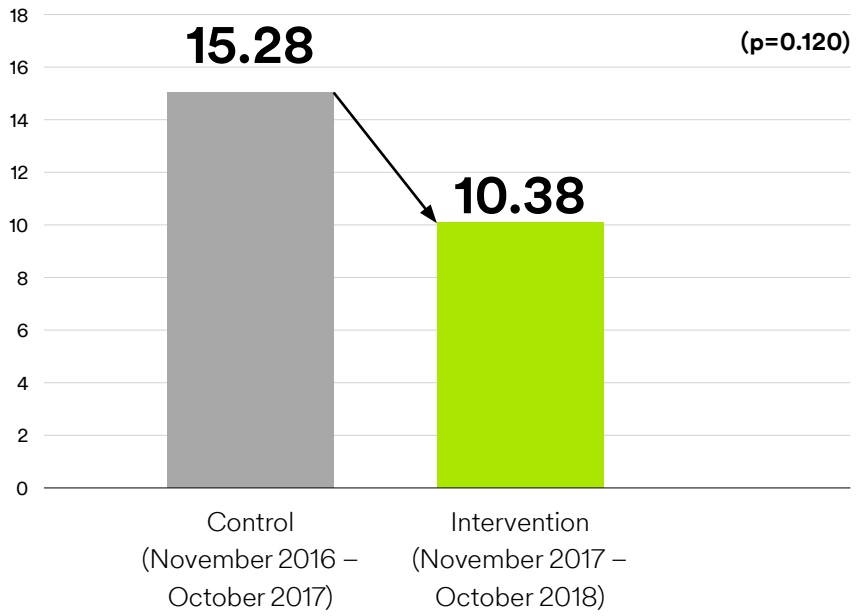
METHODS

Control:
Standard catheter caps

Intervention:
3M™ Curos™ Stopper Disinfecting Cap for Open Female Luers placed on all CVC catheter hubs

RESULTS

CLABSI Rate (per 1000 catheter days)



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

VIEW ABSTRACT

PEER REVIEWED

“The data show overall reduction in CLABSI, improvements in patient outcomes, and increased staff satisfaction.”

Zavotsky KE, Malast T, Festus O, Riskie V. Reducing central line-associated bloodstream infections on inpatient oncology units using peer review. *Clin J Oncol Nurs*. 2015;19(6):655-658. doi:10.1188/15.CJON.655-658

BACKGROUND

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

METHODS

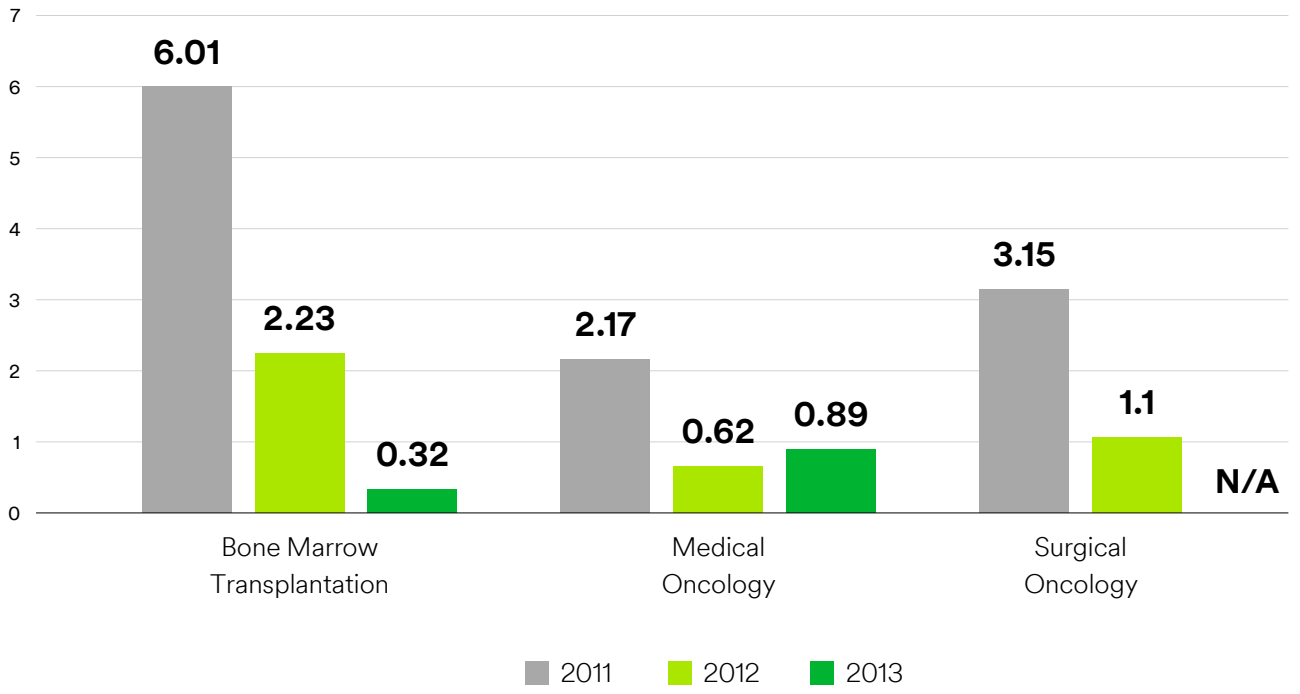
Pre-Intervention:
Standard central line bundle of care

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)



VIEW ABSTRACT

PEER REVIEWED

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.

Milstone AM, Rosenberg C, Yenokyan G, Koontz DW, Miller MR, CCLIP Authorship Group. Alcohol-impregnated caps and ambulatory central-line-associated bloodstream infections (CLABSIs): A randomized clinical trial. *Infect Control Hosp Epidemiol.* 2021;42(4):431-439. doi:10.1017/ice.2020.467

DESIGN

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

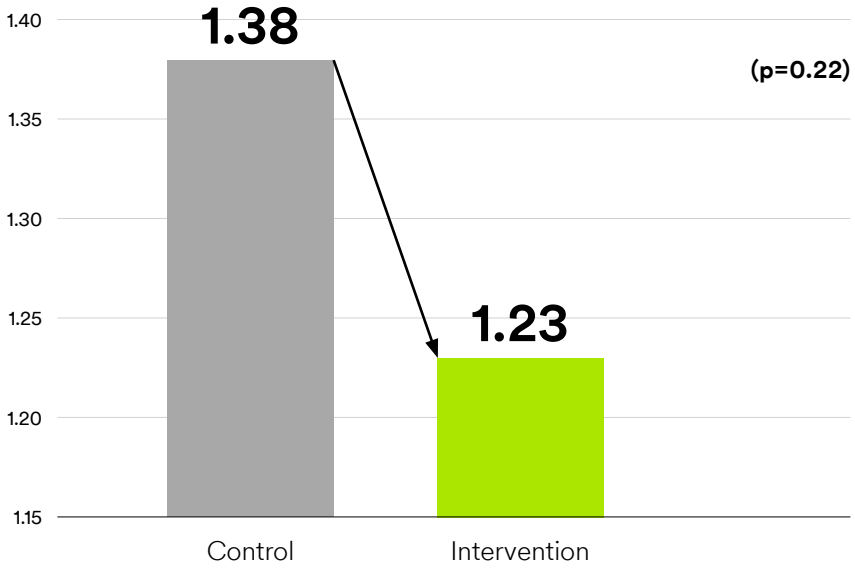
METHODS

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

CLABSI Rate (per 1000 at-risk days)



123 CLABSI events occurred in Control Clinics
109 CLABSI events occurred in Intervention Clinics

In the per protocol analysis, the incidence of positive blood cultures decreased by

28%

(p=0.045)

VIEW ABSTRACT

PEER REVIEWED

Switching from a split septum IV connector to a luer lock connector and passive alcohol disinfecting cap reduced colonization rates.

Hankins R, Majorant OD, Rupp ME, et al. Microbial colonization of intravascular catheter connectors in hospitalized patients. *Am J Infect Control.* 2019;47(12):1489-1492. 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.

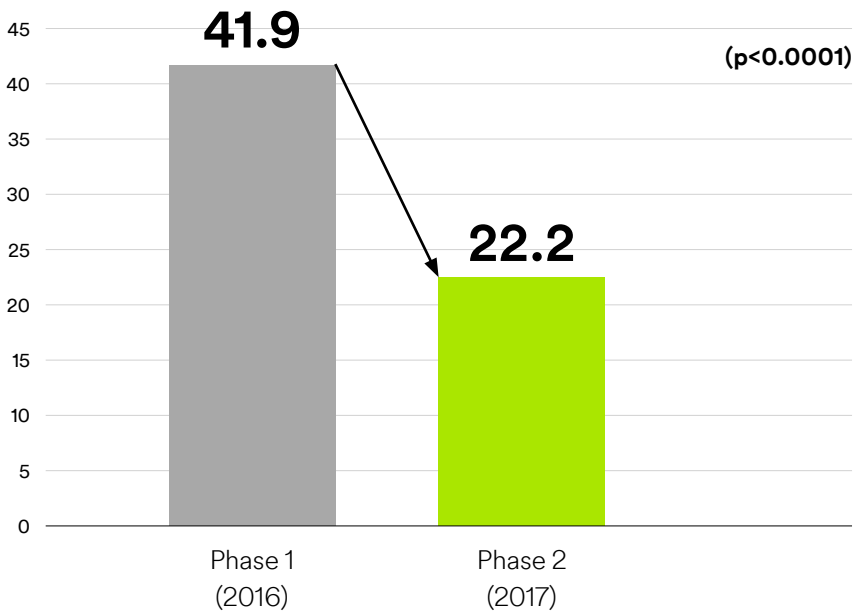
METHODS

Intervention:

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

RESULTS

Catheter Colonization (%)



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

VIEW ABSTRACT

PEER REVIEWED – VETERINARY STUDY

Reduction, not statistically significant, in occurrence of thrombophlebitis in equine patients when using disinfecting catheter caps.

Fisk N. A comparative study of disinfecting catheter caps and their effectiveness in the reduction of equine IV catheter-related thrombophlebitis. *Vet Nurs J.* 2018;33(3):74-78. doi:10.1080/17415349.2017.1414781

DESIGN

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

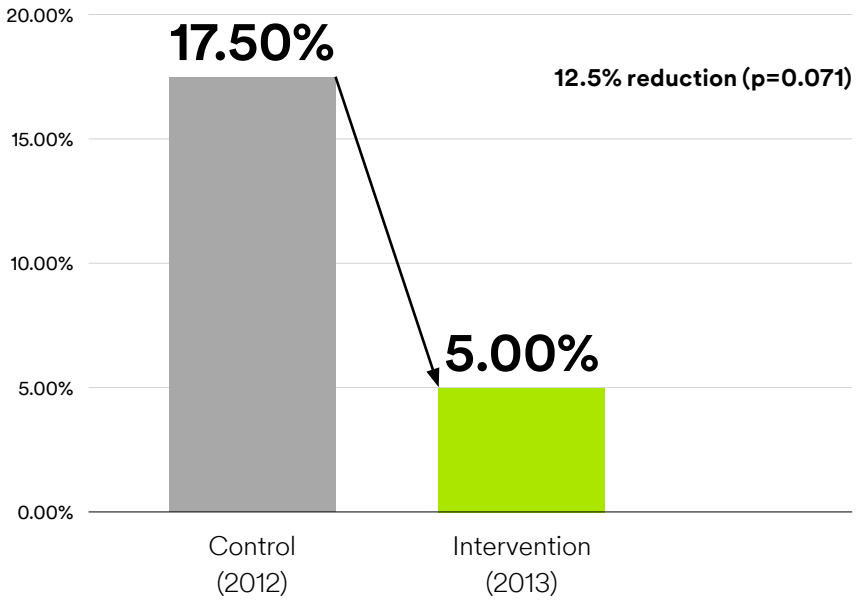
METHODS

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



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.

VIEW ABSTRACT

Post intervention CLABSI rate improved from 5.2 to 0.4 per 1000 line days in 2014 (p<0.05).

Karam-Howlin R, Fede A, Gibbs K, Bravo N, Wallach F, Patel G. Successful decrease of central line-associated bloodstream infections in an urban neonatal intensive care unit using a pediatric-specific interdisciplinary approach. *Am J Infect Control.* 2015;43(6):S58.

DESIGN

Before and after intervention study comparing CLABSI in NICU patients.

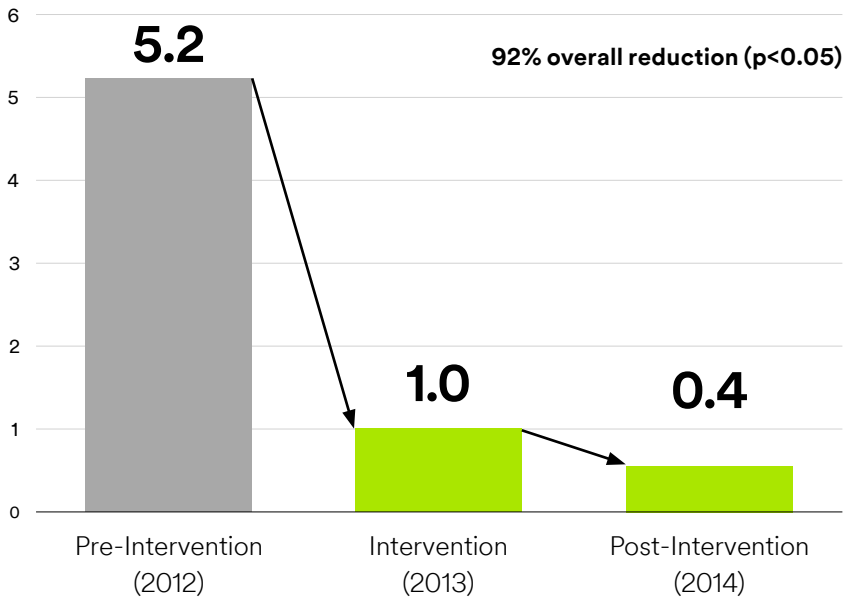
INTERVENTION

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)



VIEW ABSTRACT

By utilizing disinfecting caps, compliance is more accurate and a significant reduction can be seen in the burden of CLABSIs.

Jimenez A, Barrera A, Madhivanan P. Systematic review on impact of use of disinfectant caps protectors for intravenous access ports on central line-associated bloodstream infections (CLABSI). *Open Forum Infectious Diseases.* 2015;2(1):281.

DESIGN

Systematic review

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.

VIEW ABSTRACT

Implementation of disinfecting caps was associated with a reduced rate of hospital wide CLABSI, cost savings and increased nursing satisfaction.

Danielson B, Williamson S, Kaur G, Johnson N. A significant decline in central line-associated blood stream infections using alcohol-impregnated port protectors at a large non-profit acute care hospital. *Am J Infect Control.* 2014;42(6):S16.

DESIGN

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

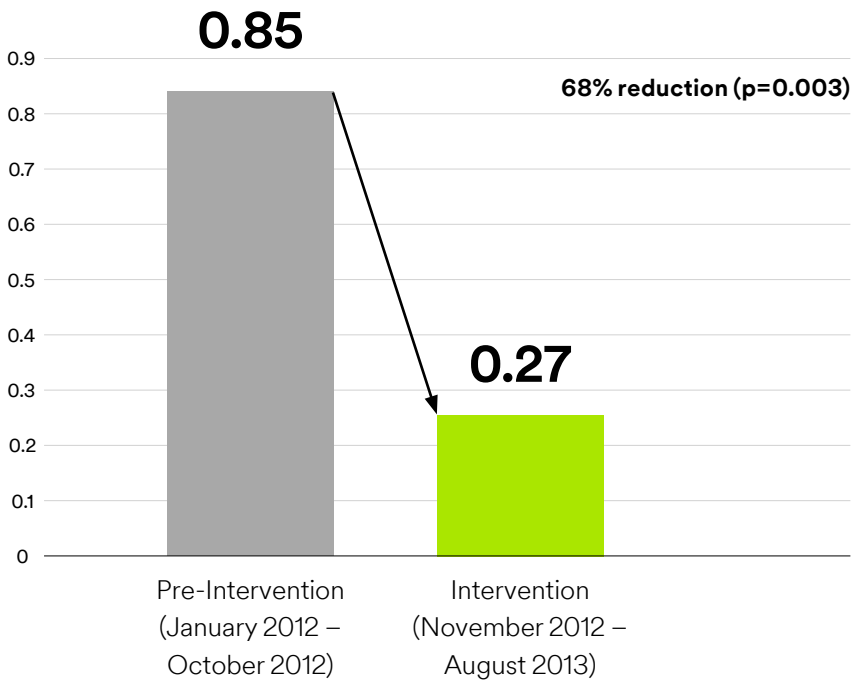
METHODS

Pre-Intervention: 15 second scrub the hub protocol

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

RESULTS

Adult CLABSI SIR



“When disinfectant caps were used on all IV ports, the rate of both CLABSI and nosocomial BSI fell significantly.”

Shelly M, Greene L, Brown L, Romig S, Pettis AM. Alcohol-impregnated disinfectant caps reduce the rate of central-line associated bloodstream infections and nosocomial bacteremia. *Open Forum Infect Dis.* 2014 Dec;1(Suppl 1):S248. doi:10.1093/ofid/ofu052.570

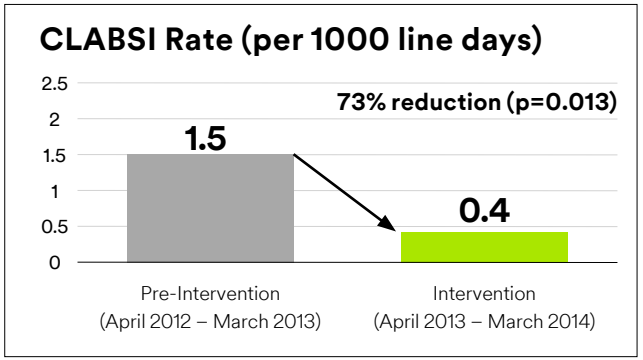
DESIGN

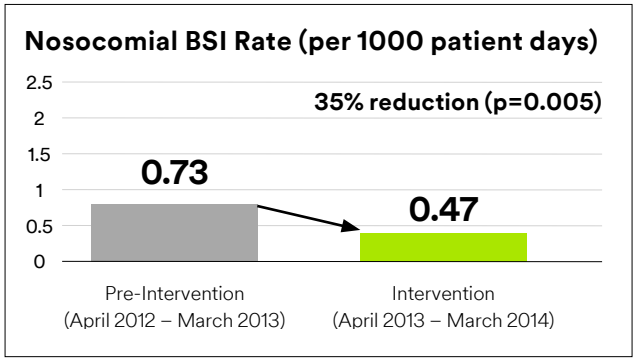
Before and after intervention study comparing CLABSI and nosocomial bloodstream infections (BSI) in four hospital units (ICU, step down, two med/surg units).

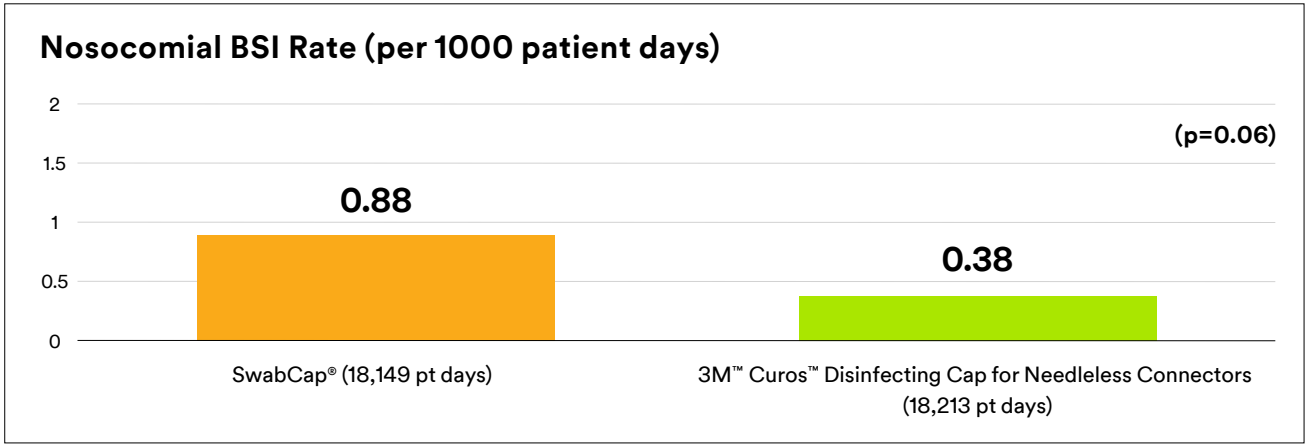
INTERVENTION

3M™ Curos™ Disinfecting Cap for Needleless Connectors or Swabcap® Disinfecting Caps placed on all needleless IV access ports of peripheral and central lines.

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.

VIEW ABSTRACT

A significant decline in the incidence of CLABSIs was observed after the addition of Curos™ disinfecting caps to an existing central line bundle.

Danielson B, Williamson S, Kaur G, Brooks C, Scholl P, Baker A. Decreasing the incidence of central line-associated blood stream infections using alcohol-impregnated port protectors (AIPPS) in a neonatal intensive care unit. *Am J Infect Control.* 2013;41(6):S97-S98.

DESIGN

Before and after intervention study comparing CLABSI standardized infection ratios (SIR) in level 3 NICU patients.

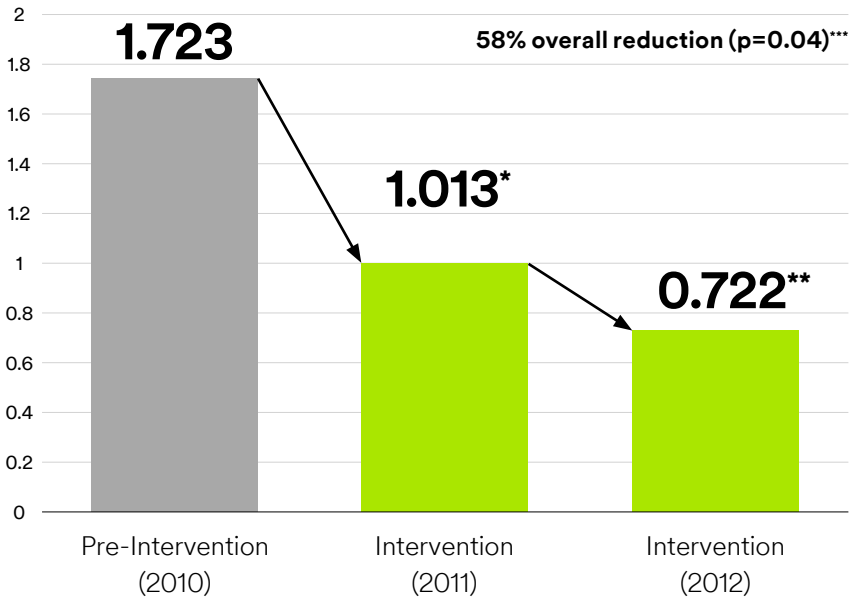
METHODS

Pre-Intervention: Evidence-based central line bundle including 15 second scrub the hub protocol

Intervention: Implemented 3M™ Curos™ Disinfecting Cap for Needleless Connectors on IV access ports

RESULTS

CLABSI SIR



*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

VIEW ABSTRACT

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

Sumner S, Merrill KC, Linford L, Taylor C. Decreasing CLABSI rates and cost following implementation of a disinfectant cap in a tertiary care hospital. *Am J Infect Control.* 2013;41(6):S37.

DESIGN

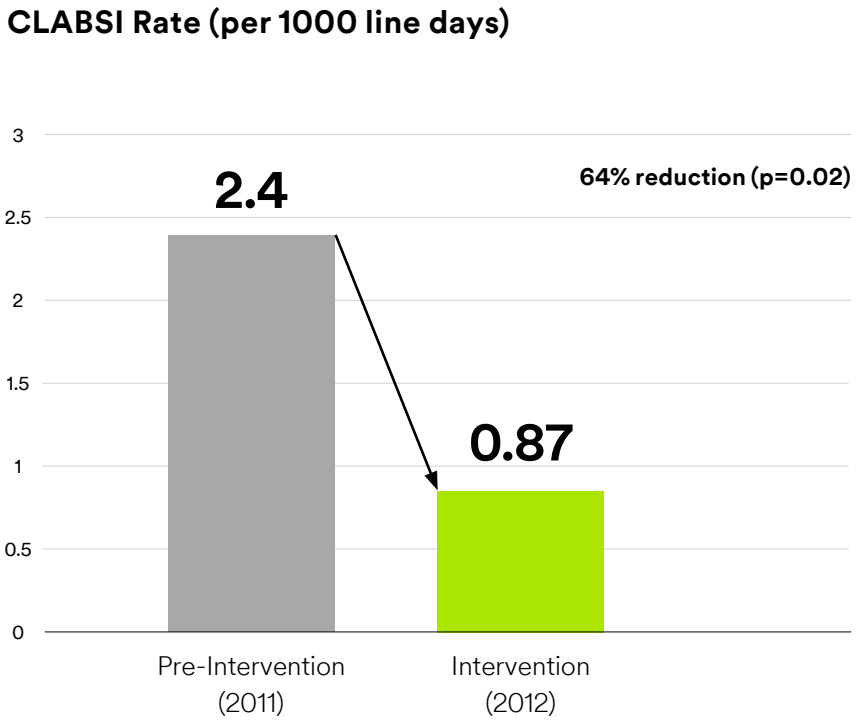
Before and after intervention study comparing CLABSI and nursing compliance in a Level I Trauma Center.

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



There was a non-significant decrease in contaminated blood cultures from **2.5%** before to **1.4%** after intervention

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

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

VIEW ABSTRACT

Following discontinuation of disinfecting caps, the CABSI rate returned to the pre-intervention rate.

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

DESIGN

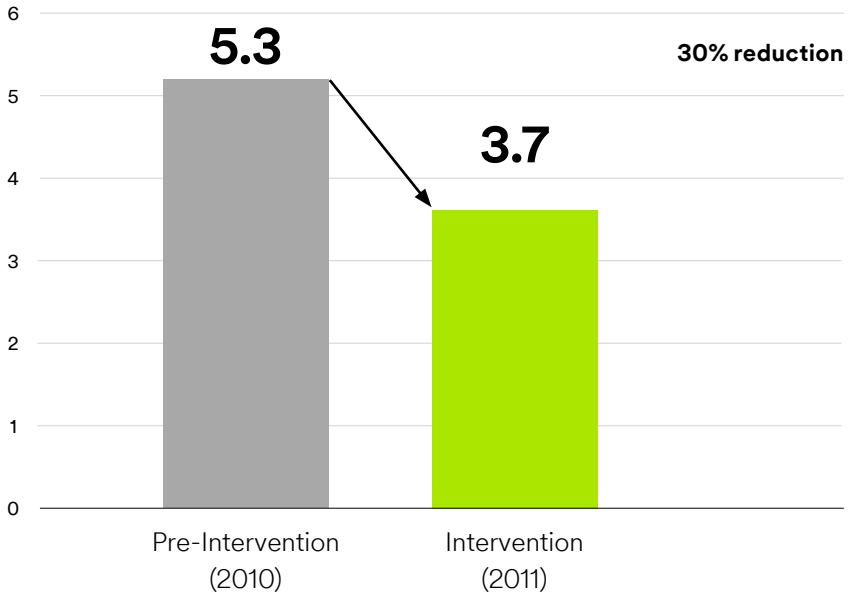
Before and after intervention study comparing catheter-associated bloodstream infection (CABSI) between a control and intervention unit caring for acute leukemia and stem cell transplant patients.

INTERVENTION

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

RESULTS

Median CABSI Rate (per 1000 central line days)



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

Analysis of CABSI rates in a control unit during the same time periods were 5.6 (2010) and 5.4 (2011) per 1000 central line days.

VIEW ABSTRACT

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.

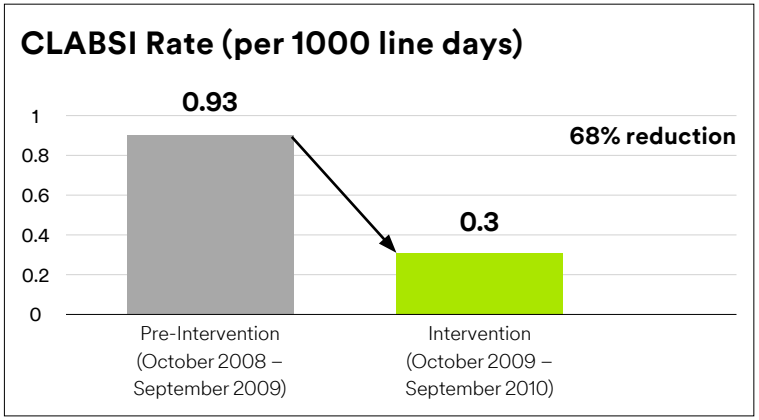
METHODS

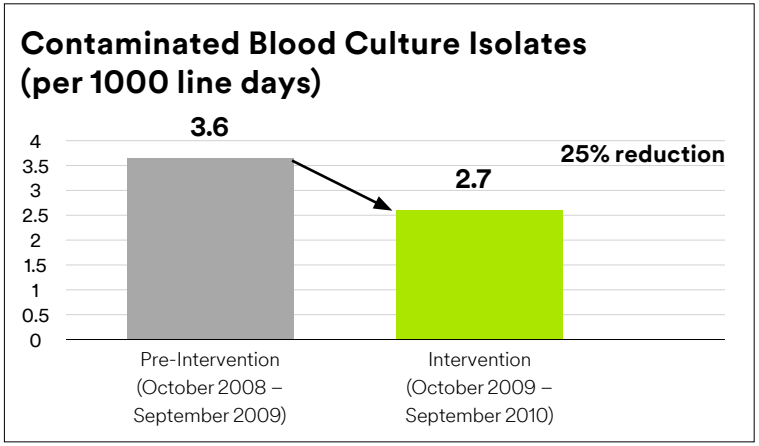
Pre-Intervention: CLABSI prevention measures in place:

- 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





The number of central line days was 7,533 in the pre-intervention and 6,782 in the intervention period.

VIEW ABSTRACT

Clinically significant fall in Catheter Related Sepsis (CRS) rates related to Parenteral Nutrition (PN) following introduction of a disinfecting cap.

Wheatley DJ, Rowlands S, Chapman J, et al. PTH-195 Curos™ line caps are effective in reducing catheter related sepsis in inpatients receiving parenteral nutrition. *Gut.* 2015;64(Suppl 1):A495.1-A495. doi:10.1136/gutjnl-2015-309861.1083

DESIGN

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

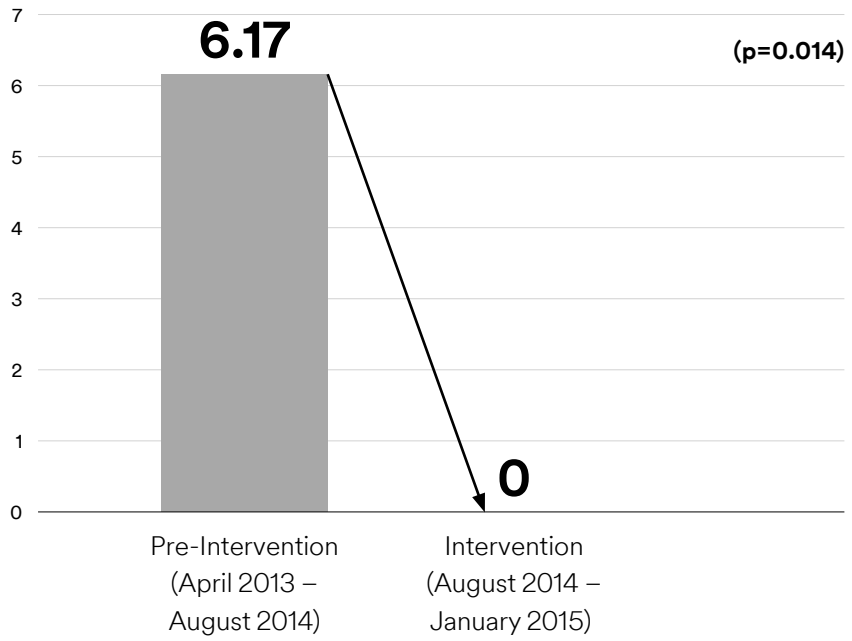
METHODS

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)



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

VIEW ABSTRACT

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.

Russo N, Gupta K, Tibert C, Strymish J. 863 reduction in CLABSIs with alcohol port protectors. *Open Forum Infect Dis.* 2014;1(Suppl-1):S248. doi:10.1093/ofid/ofu052.571

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

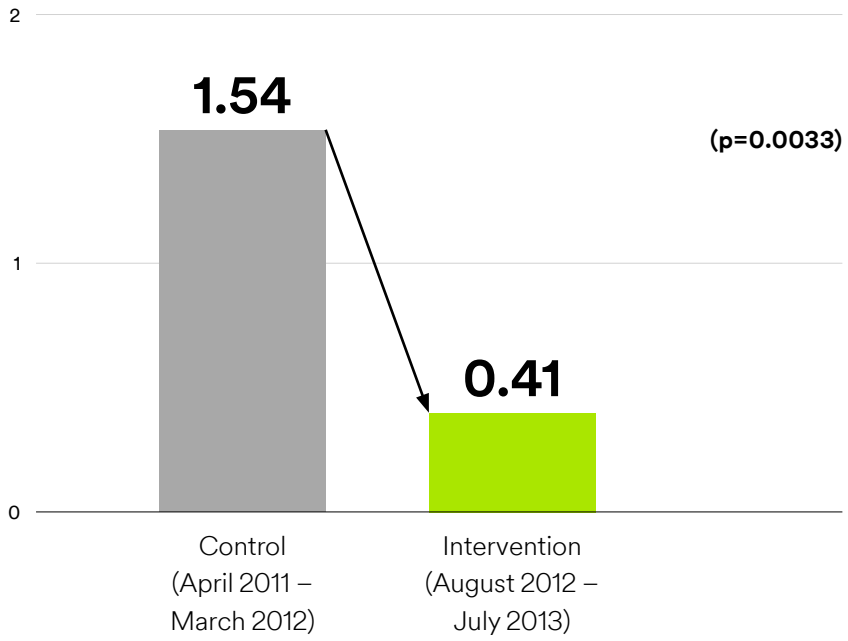
Pre-Intervention:
CVC best practice bundle

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)



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

VIEW ABSTRACT

Sustained compliance with disinfecting protocol seen with intervention implementation.

Cabahug T, Jie L, Meng QS, Tang M, Wang Y, Foo SY, Wu T. Impact of disinfectant cap implementation on peripherally-inserted central catheter (PICC) associated bloodstream infection rates. Poster presented at: APSIC Congress. 2019; Vietnam. Abstract available at: https://www.researchgate.net/publication/333679803_Impact_of_disinfectant_cap_implementation_on_peripherally-inserted_central_catheter_PICC_associated_bloodstream_infection_rates

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:

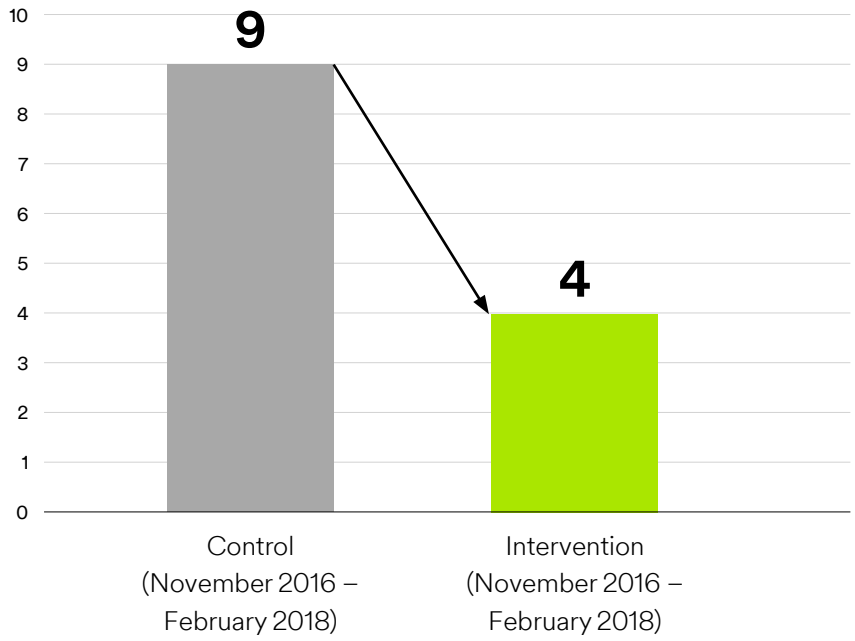
- Insertion site care
- Dressing recommendations
- Application of CHG disk (BIOPATCH®)

Intervention:

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

RESULTS

Number of CLABSIs*



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

SHORT COMMUNICATION

Use of antiseptic caps on CVC main stopcocks demonstrated protection from contamination and increased compliance over standard practice.

Guyot A, Lorf S, van Stein C, Hünger F, Schaaf B. Antiseptic caps protect stopcocks from internal bacterial contamination. *J Hosp Infect.* 2021 Feb;108:212-214. doi:10.1016/j.jhin.2020.11.026

DESIGN

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

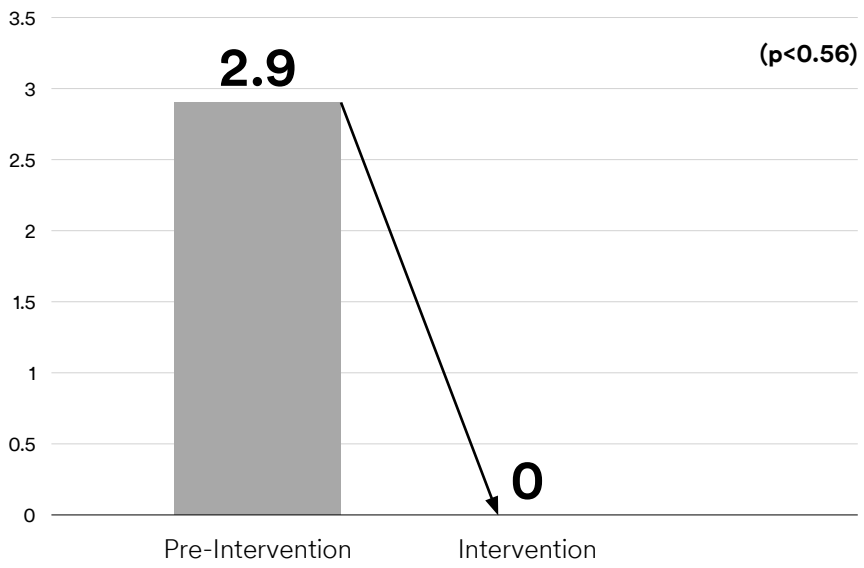
METHODS

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

CLABSI Rate (per 1000 CVC days)



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

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

Additional Resources

ABSTRACTS

Hignell P. Improving customer quality experience and outcomes with use of alcohol-impregnated disinfection caps. Presented at: Fraser Health Canada Patient Experience Conference; November 2017; Surrey, British Columbia.

Levy ZD, Ledoux DE, Lesser ML, et al. Rates of iatrogenic ventriculitis before and after the use of an alcohol-impregnated external ventricular drain port cap. *Am J Infect Control.* 2017;45(1):92-93.

Kaur G. An interdisciplinary approach to reduce intensive care unit (ICU) central line associated bloodstream infections (CLABSIs) using LEAN Six Sigma. *Am J Infect Control.* 2015;43(6):S64.

Shiber J, Jolicoeur G, Crouchet T. Reducing central line-associated bloodstream infections through the addition of disinfecting port protectors. Presented at: Ochsner Research Day; May 20, 2014; New Orleans, LA.

Miskill M, Bellard E. Implementing alcohol impregnated port protectors as a means to decrease CLABSI's. Carolinas HealthCare System, Charlotte, NC, 2014.

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.

Cole M, Kennedy K. Decreasing central line associated blood stream infections (CLABSI) in adult ICUs through teamwork and ownership. Grady Health System, Atlanta, GA, 2013.

Moore MJ, Gripp K, Cooper H, Almeida R. Impact of port protectors on incidence of central line infections. Providence Sacred Heart Medical Center, Spokane, WA, 2013.

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

Beauman S, Chance K, Dalsey M, et al. California Children's Services (CCS) neonatal infection prevention project phase 3: 2009 (Oct)-2011 (June) in association with California Perinatal Quality Care Collaborative (CPQCC).

Bolt B, Shuka C, De Jong K, Young M. Efficacy of Curos Caps in infection reduction. Poster presented at: Celebration of Research. 2019; Orange City, IA. Abstract available at: https://nwcommons.nwciowa.edu/celebrationofresearch/2019/researchprojects2019/18/

Page J, Tremblay M, Nicholas C, James TA. Reducing oncology unit central line-associated bloodstream infections: initial results of a simulation-based educational intervention. *J Oncol Pract.* 2016 Jan;12(1):e83-e87. doi:10.1200/JOP.2015.005751

Butcher C, Kramer C, Moore C, Cole L, Wanstall K, Allen M. A successful approach to decreasing central line associated blood stream infections. *Biol Blood Marrow Transplant.* 2016;22(3):S268-S269.

Madden W, Dockery J, Smith J, Bowman WB, Macke M. Alcohol impregnated caps: are they effective for preventing CLABSI? *Biol Blood Marrow Transplant.* 2013;19(2):S371.

Additional Resources, Continued

ARTICLES

Casey A, Karpanen T, Nightingale P, Elliott T. An *in vitro* comparison of standard cleaning to a continuous passive disinfection cap for the decontamination of needle-free connectors. *Antimicrob Resist Infect Control.* 2018;7:50. doi:10.1186/s13756-018-0342-0

Kaler, W. Making it easy for nurses to reduce the risk of CLABSI. *Patient Safety & Quality Healthcare.* 2014;11(6):46–49. https://www.psqh.com/analysis/making-it-easy-for-nurses-to-reduce-the-risk-of-clabsi/

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