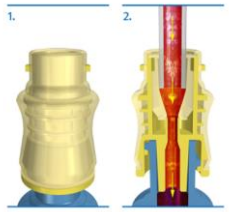
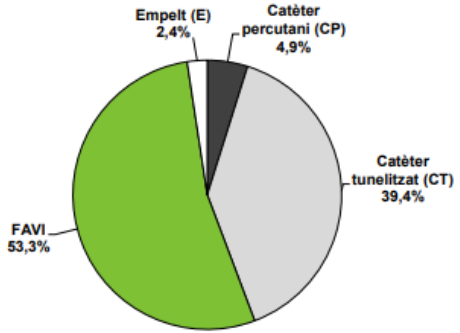


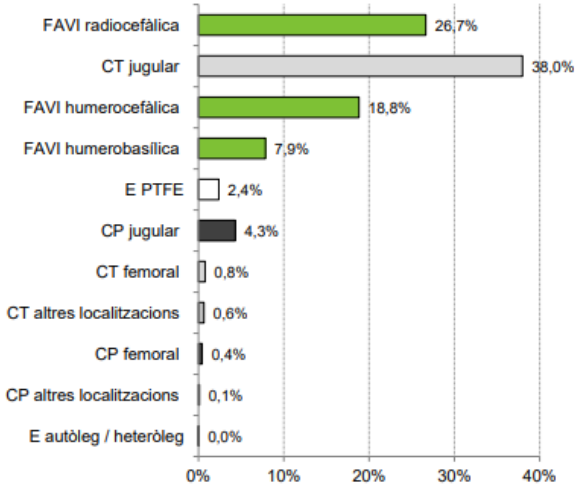
DISPOSITIVOS DE CONEXIÓN A LOS CATÉTERES: revisión de la literatura

MARIA CUFI VALLMAJOR

IX JORNADA SOBRE EL ACCESO VASCULAR PARA HEMODIÁLISIS
EN EL VALLÈS ORIENTAL 29/2/2024

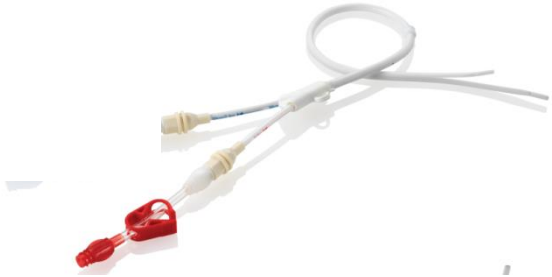
Figura 30. Distribució del tipus d'accés vascular prevalent a 31 de desembre. Any 2021
Figura 30. Distribución del tipo de acceso vascular prevalente a 31 de diciembre. Año 2021
***Figure 30**. Type of vascular access at 31st of December, 2021*





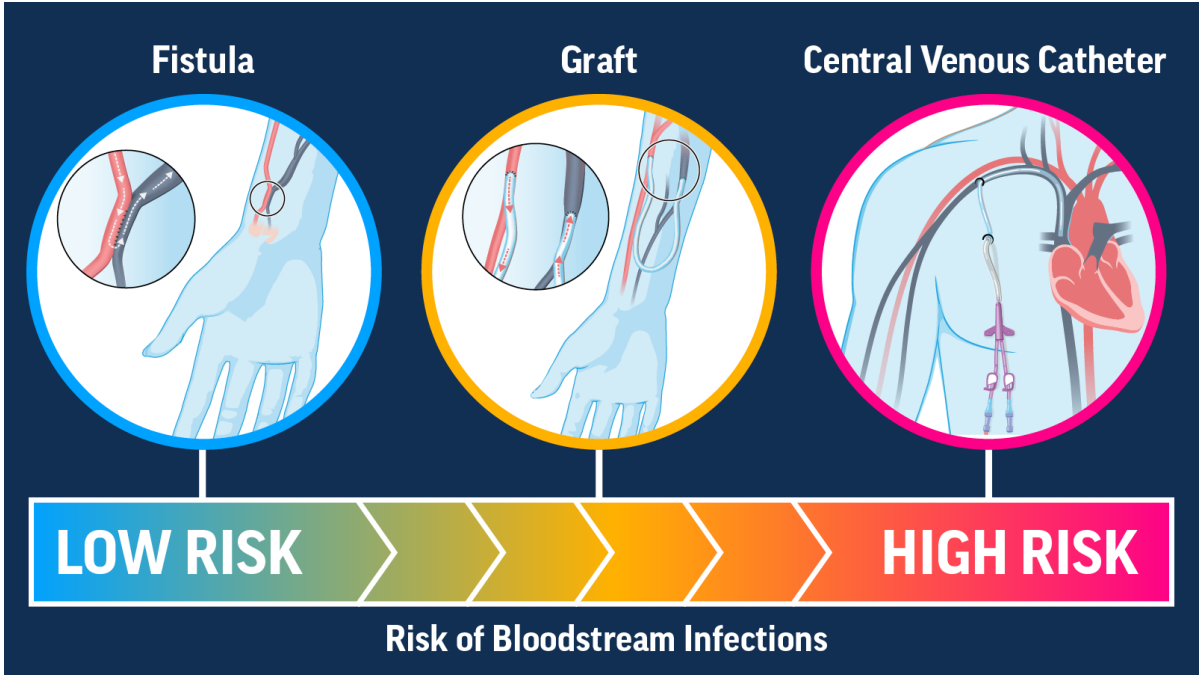
Manca informació en 413 casos (10%)
Falta información en 413 casos (10%)
Missing information in 413 cases (10%)

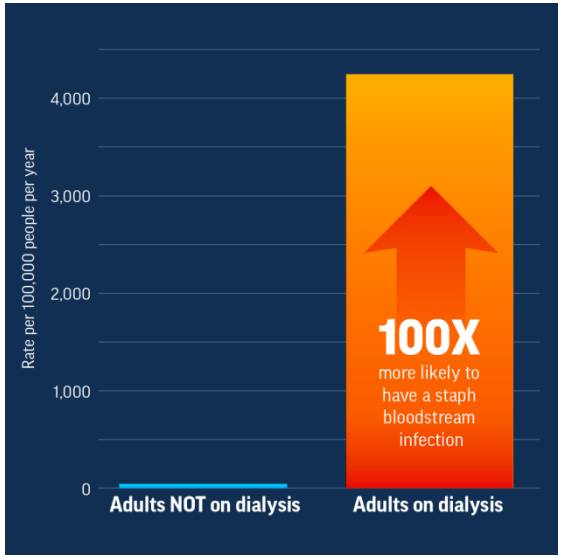
CATÉTERES



Informe estadístic del Registre de Malalts Renals de Catalunya 2021

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™



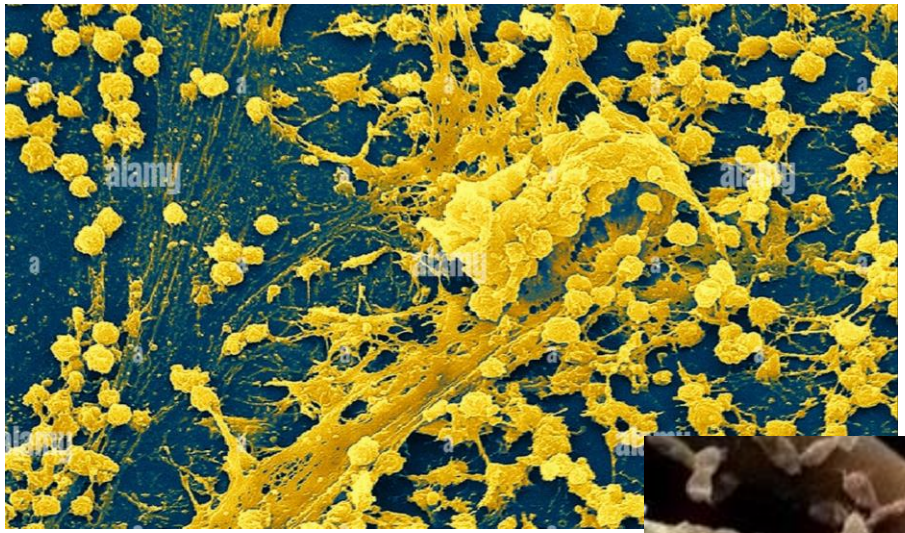


AUMENTO MORBIMORTALIDAD

PREVENCIÓN

La clave de la prevención de la bacteriemia está en el manejo del punto de conexión en la entrada y la salida del paciente de hemodiálisis y en las manipulaciones dentro del tratamiento, ya que supone la vía principal de entrada de los patógenos

BIOFILM



Sample Steps for Catheter Connect/Disconnect (CPG 11.9-11.16)

Table 11.2. Example of CVC Connect and Disconnect Procedures

Suggested Method to Access CVC
Step 1: Explain the procedure to the patient. Ask him/her to minimize talking and turn the head the opposite direction of the CVC.
Step 2: Perform hand hygiene. Remove any gauze or tape securing the CVC or covering CVC limbs.
Step 3: Ensure that both limbs of the CVC are clamped. Place clean or sterile pad/towel under the CVC so that the limbs are on top of the pad/towel.
Step 4: Perform hand hygiene and prepare supplies, maintaining sterility. Put on gloves.
Step 5: Ensure clamp on CVC is closed. Remove the Luer lock cap and clean the hub ("scrub the hub")[297] with chlorhexidine (or povidone if chlorhexidine not tolerated). Ensure that the disinfected hub does not touch nonsterile surfaces. If closed system, high-flow, needleless-style caps are used; follow the manufacturer's recommendations and CVC care for cleaning and changing of caps. Repeat with the second port. *Optional for Step 5:* Before removing the Luer lock cap, disinfect the caps and part of the hub with an antiseptic pad, using a separate antiseptic pad for each hub or catheter limb.
Step 6[a]: Attach syringe, unclamp CVC, and aspirate 2 to 5 mL of blood and CVC locking solution from lumen. Reclamp CVC. Detach syringe and attach to dialysis circuit. Repeat with second port. *Optional for Step 6*: If no resistance is felt with aspiration of blood and CVC locking solution, attach a 5- to 10-mL syringe of 0.9% normal saline and flush lumen using turbulent flushing technique.
Step 7[b]: Initiate dialysis.
Step 8: Discard the syringe and used materials.

NATIONAL KIDNEY FOUNDATION.

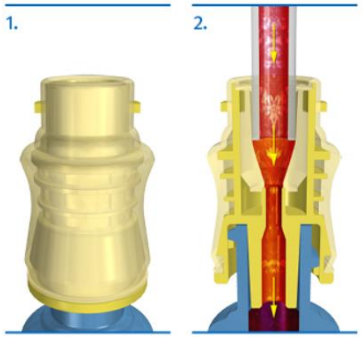
BARRERAS PROTECTORAS

CONOCEIS DISPOSITIVOS DE CONEXIÓN AL CATÉTER?

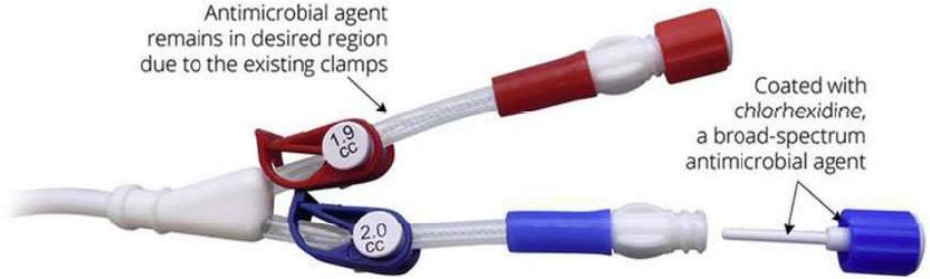
CONOCEIS EL SISTEMA CONECTOR TEGO O SIMILAR?

CONOCEIS TAPONES DE BARRERA ANTIMICROBIANA CLEARGUARD?

DISPOSITIVOS DE CONEXIÓN A LOS CATÉTERES

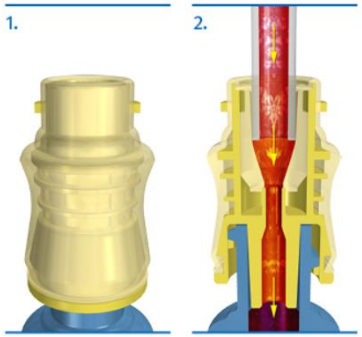


SISTEMA CONECTOR Tego/Safeflow



TAPONES DE BARRERA ANTIMICROBIANA *ClearGuard*

CUROS DESINFECTING PORT PROTECTOR

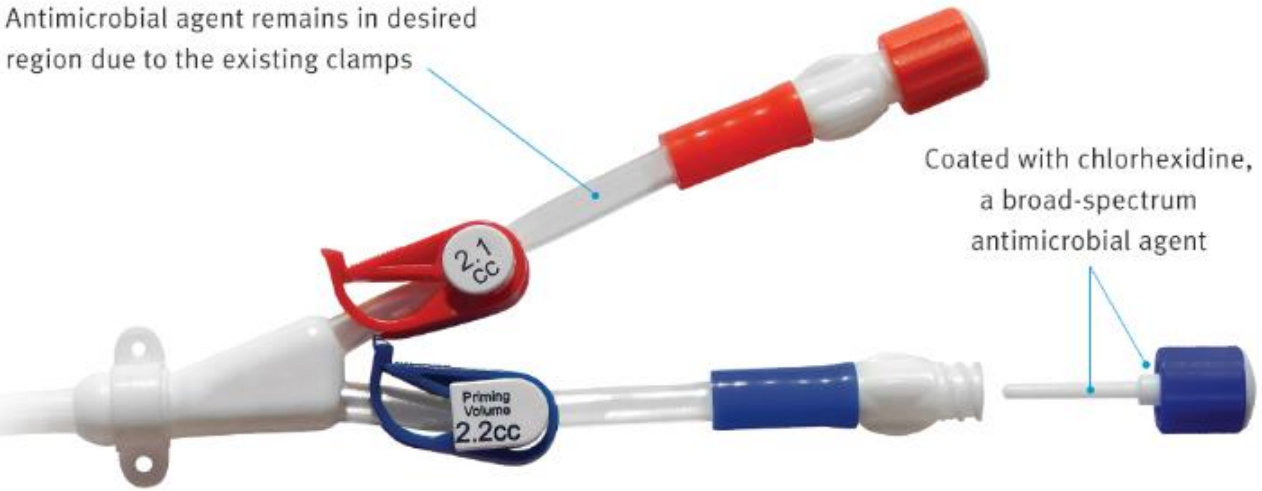


1 RECAMBIO A LA SEMANA

ClearGuard

3 RECAMBIOS A LA SEMANA

ClearGuard is a single-piece design that applies antimicrobial inside and outside the CVC



Disminuye la creación de BIOFILM gracias a la acción de la Clorhexidina

Table 1. Modes of action for the ClearGuard HD cap, Tego connector, and Curos cap

Attribute	ClearGuard	Tego	Curos
Kills bacteria inside of hub	✓		
Kills bacteria on outside of hub	✓		✓
"Closed" system (opened once per week)		✓	

✓, indicates attribute is present.

International Journal of Nephrology and Renovascular Disease Dovepress
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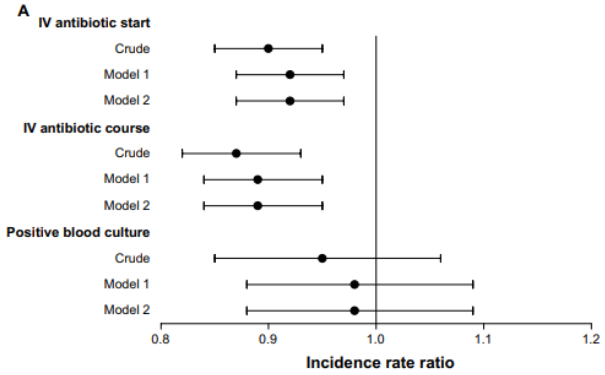
ORIGINAL RESEARCH

Use of the Tego needlefree connector is associated with reduced incidence of catheter-related bloodstream infections in hemodialysis patients



Materials and methods: This retrospective analysis compared outcomes among patients of a large dialysis organization receiving in-center hemodialysis using a central venous catheter with either the Tego connector or standard catheter caps between October 1 and June 30, 2013. Incidence rates for intravenous (IV) antibiotic starts, receipt of an IV antibiotic course, positive blood cultures, mortality, and missed dialysis treatments were calculated, and incidence-rate ratios (IRRs) were estimated using Poisson regression models. Utilization of erythropoiesis-stimulating agents (ESAs) and thrombolytics was described for each patient-month and compared using mixed linear models. Models were run without adjustment, adjusted for covariates that were imbalanced between cohorts, or fully adjusted for all potential confounders.

Results: The analysis comprised 10,652 Tego patients and 6,493 controls. Tego use was independently associated with decreased risk of CRBSI, defined by initiation of IV antibiotics (adjusted IRR 0.92, 95% confidence interval [CI] 0.87–0.97) or initiation of IV antibiotic course (adjusted IRR 0.89, 95% CI 0.84–0.95). Tego use was independently associated with decreased rate of missed dialysis treatments (adjusted IRR 0.98, 95% CI 0.97–1.00); no significant difference between Tego and control cohorts was observed with respect to mortality. Tego use was associated with decreased likelihood of thrombolytic use (adjusted per-month probability of 5.6% versus 6.2% for controls) and lower utilization of ESAs in study months 7–9.

Conclusion: Use of the Tego connector may reduce the risk of CRBSI and result in lower utilization of thrombolytics, antibiotics, and ESAs, as well as fewer missed dialysis treatments.

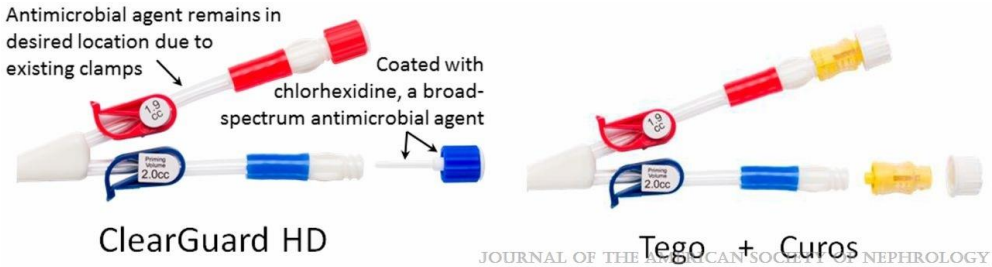
Keywords: catheter, dialysis, end-stage renal disease, ESA, infection, mortality

8 MESES

Steven M. Brunelli_ ***International Journal of Nefrology and Renovascular Disease*** _2014

Cluster-Randomized Trial Devices to Prevent Catheter-Related Bloodstream Infection

Brunelli, SM et al. Cluster-randomized trial of devices to prevent catheter-related bloodstream infection. *J Am Soc Nephrol* 2018 Apr; 29(4):1336-1343



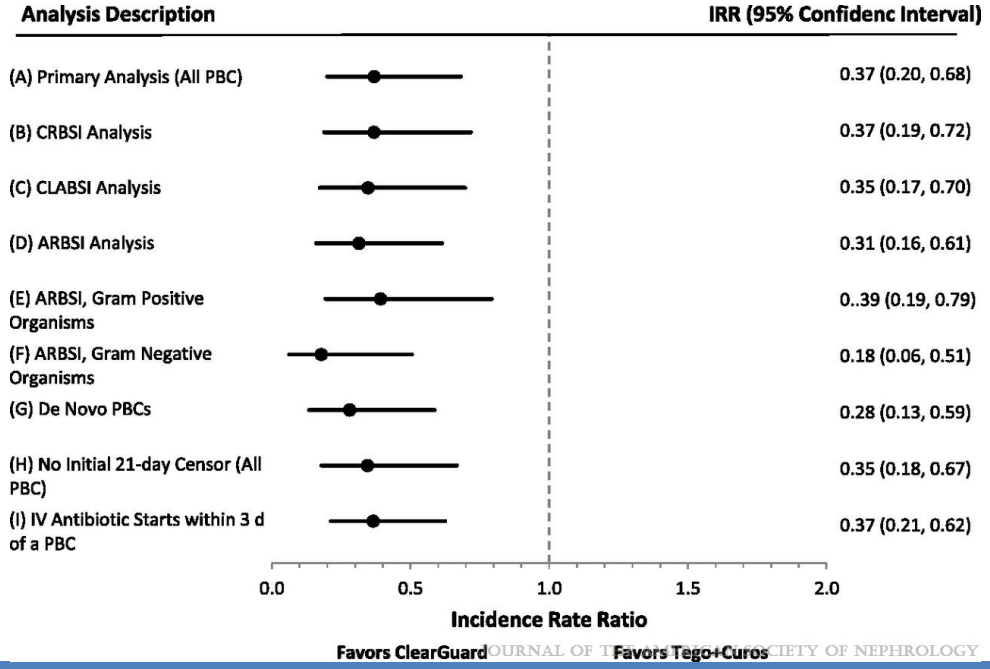
-13-month prospective, cluster-randomized, multicenter open-label trial

-1671 patients (826 treatment, 845 control) accruing ~183,000 CVC days
-40 centers across the US

Primary endpoint was PBC rate as an indicator of BSI rate.

Cluster-Randomized Trial Devices to Prevent Catheter-Related Bloodstream Infection

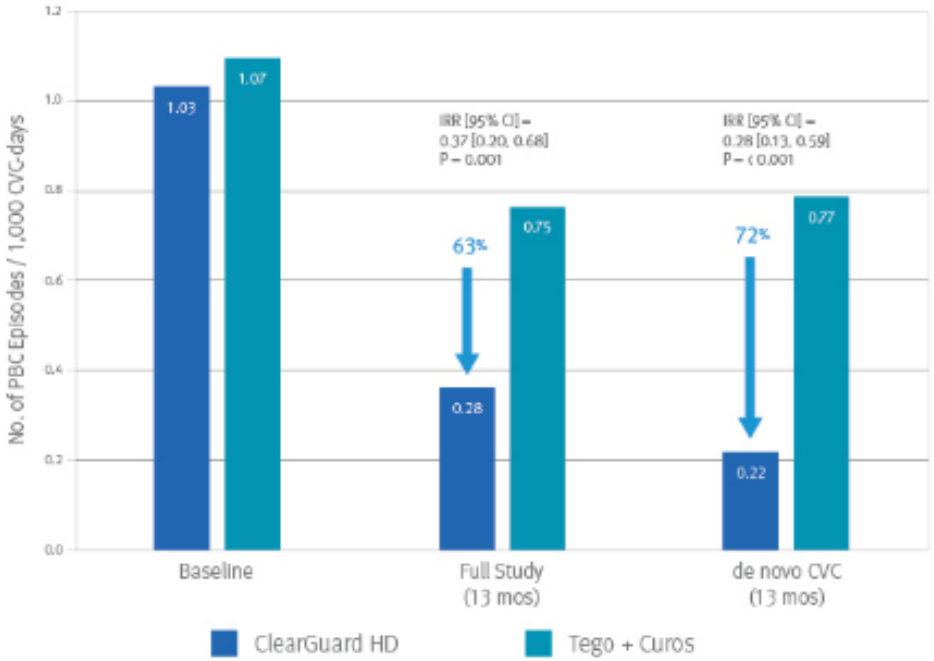
Brunelli, SM et al. Cluster-randomized trial of devices to prevent catheter-related bloodstream infection. *J Am Soc Nephrol* 2018 Apr; 29(4):1336-1343



Study results demonstrate that ClearGuard caps are superior to Tego +Curos for reducing bloodstream infection across all nine analyses

Cluster-Randomized Trial Devices to Prevent Catheter-Related Bloodstream Infection

Brunelli, SM et al. Cluster-randomized trial of devices to prevent catheter-related bloodstream infection. *J Am Soc Nephrol* 2018 Apr; 29(4):1336-1343



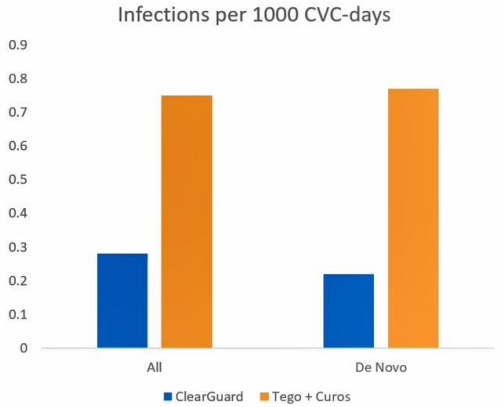
-Results: Use of the ClearGuard HD caps for 13 months was associated with a 63% lower BSI rate vs. use of Tego + Curos

Cluster-Randomized Trial Devices to Prevent Catheter-Related Bloodstream Infection

Brunelli, SM et al. Cluster-randomized trial of devices to prevent catheter-related bloodstream infection. *J Am Soc Nephrol* 2018 Apr; 29(4):1336-1343

	All		De Novo CVCs	
	ClearGuard	Tego + Curos	ClearGuard	Tego + Curos
CVC days	83,064	100,042	55,504	59,817
PBC	23	75	12	46
Rate *	0.28	0.75	0.22	0.77

*Rate per 1000 CVC days
Abbreviations: CVC, central venous catheter; PBC, positive blood culture



than that of the Tego+Curos group (0.28 versus 0.75 PBCs per 1000 CVC-days, respectively; *P*=0.001). No device-related adverse events were reported. In conclusion, compared with Tego connectors plus Curos caps, ClearGuard HD antimicrobial barrier caps significantly lowered the rate of catheter-related BSIs in patients undergoing hemodialysis using CVCs, representing an important advancement in hemodialysis patient care.

Dialysis Catheter-Related Bloodstream Infection: a Cluster-Randomized Trial of the ClearGuard HD Antimicrobial Barrier Cap

Hymes, JL et al. Dialysis catheter-related bloodstream infections: a cluster-randomized trial of the ClearGuard HD antimicrobial barrier cap. *Am J Kidney Dis.* 2017; 69(2):220-227

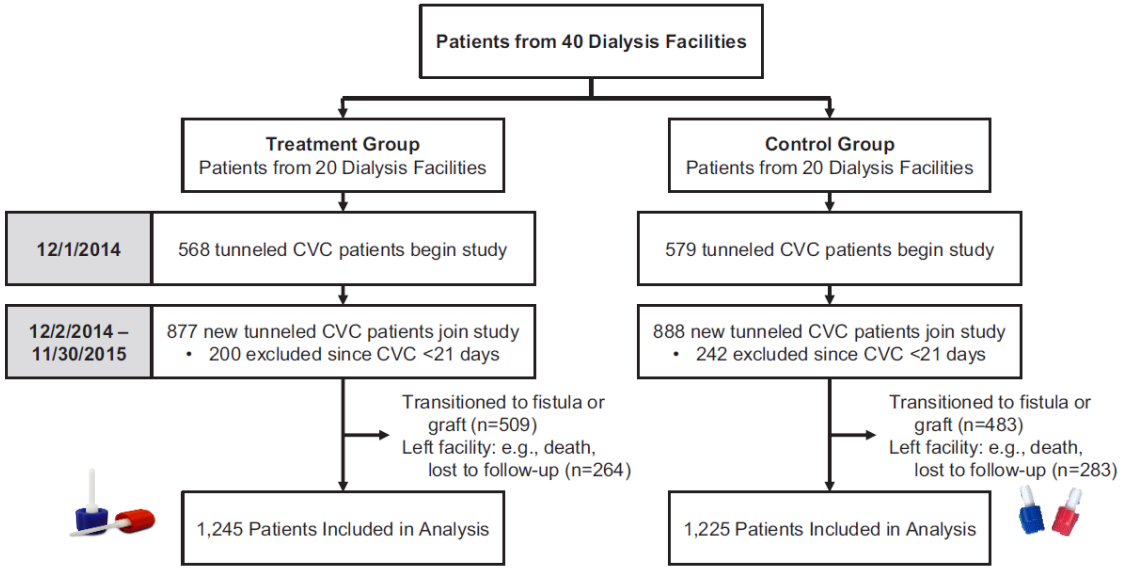


Figure 2. Patient count during follow-up period for the intervention and control groups. Abbreviation: CVC, central venous catheter.

-12-month prospective, cluster-randomized, multicenter, open-label comparative effectiveness trial in hemodialysis patients with central venous catheters

-2470 patients (1245 treatment, 1225 control) accruing ~350,000 CVC days
-40 centers across the US

Primary endpoint was PBC rate as an indicator of BSI rate.

Dialysis Catheter-Related Bloodstream Infection: a Cluster-Randomized Trial of the ClearGuard HD Antimicrobial Barrier Cap

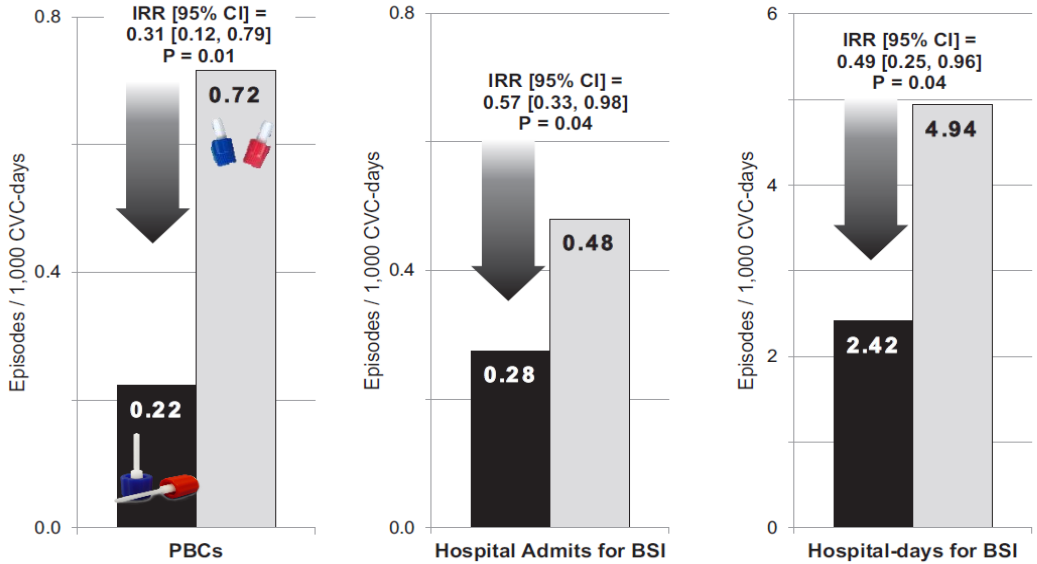
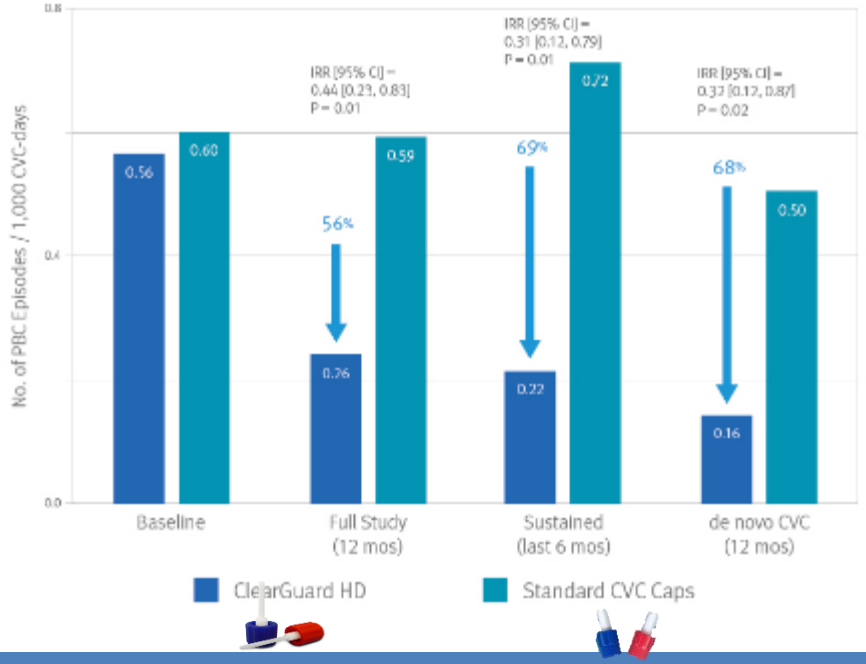


Figure 5. Comparison of sustained rates (last 6 months) for positive blood cultures (PBCs), hospital admissions for bloodstream infection (BSI), and hospitalization-days for BSI for the intervention and control groups. Abbreviations: CI, confidence interval; CVC, central venous catheter; IRR, incidence rate ratio.

Hymes, JL et al. Dialysis catheter-related bloodstream infections: a cluster-randomized trial of the ClearGuard HD antimicrobial barrier cap. *Am J Kidney Dis.* 2017; 69(2):220-227

Dialysis Catheter-Related Bloodstream Infection: a Cluster-Randomized Trial of the ClearGuard HD Antimicrobial Barrier Cap

Hymes, JL et al. Dialysis catheter-related bloodstream infections: a cluster-randomized trial of the ClearGuard HD antimicrobial barrier cap. *Am J Kidney Dis.* 2017; 69(2):220-227



Results: Use of the ClearGuard HD caps for 12 months was associated with a 56% lower BSI rate vs. use of standard caps. When considering sustained use (defined as 6 months of the study), the intervention vs. control was associated with a 69% lower BSI rate.

Dialysis Catheter-Related Bloodstream Infection: a Cluster-Randomized Trial of the ClearGuard HD Antimicrobial Barrier Cap

Hymes, JL et al. Dialysis catheter-related bloodstream infections: a cluster-randomized trial of the ClearGuard HD antimicrobial barrier cap. *Am J Kidney Dis.* 2017; 69(2):220-227

	Episodes/1,000 CVC-Days		Poisson Regression	
	Intervention Group	Control Group	IRR (95% CI)	*P*
Primary end point: positive blood culture episodes	0.26	0.59	0.44 (0.23-0.83)	0.01
Secondary end points				
No. of hospital admissions for BSI	0.28	0.47	0.60 (0.37-0.97)	0.04
No. of hospitalization-days for BSI	3.24	4.68	0.69 (0.41-1.16)	0.2
No. of IV antibiotic starts	1.68	1.78	0.94 (0.74-1.19)	0.6

Abbreviations: BSI, bloodstream infection; CI, confidence interval; IRR, incidence rate ratio; IV, intravenous.

Conclusions: The findings show that use of ClearGuard HD Antimicrobial Barrier Caps, when compared with standard CVC caps, significantly lowers rates of catheter-related BSIs and hospital admissions for BSI in HD patients using CVCs.

Evaluating a Novel Hemodialysis Central Venous Catheter Cap in Reducing Bloodstream Infections: A Quality Improvement Initative

Steven Weiss_ ***International Journal of Nephrology and Renovacular Disease*** _2021

- Retrospective observational.
- 13 dialysis clinics USA
- ClearGuard vs needlefree connectors.
- May 2018-June 2019.

Patients and Methods: A retrospective observational data analysis was conducted from 13 outpatient dialysis clinics in the United States to compare novel chlorhexidine-coated end caps to standard needlefree connectors for differences in CLABSI rates when utilizing CVCs for hemodialysis. There were two periods in this study: in the first study period over a 5-month period (May 2018 to September 2018), data were evaluated from a group of patients undergoing hemodialysis using chlorhexidine end-caps ('chlorhexidine group') as well as a group using standard needlefree connectors ('standard group'). An initial assessment found that a substantial CLABSI rate reduction was seen with use of chlorhexidine-coated end caps; therefore, most patients were switched to chlorhexidine by February 2019 and data continued to be collected till June 2019. The second study period spanned 9 months from October 2018 to June 2019.

Evaluating a Novel Hemodialysis Central Venous Catheter Cap in Reducing Bloodstream Infections: A Quality Improvement Initative

Steven Weiss_ ***International Journal of Nephrology and Renovacular Disease*** _2021

Table 1 Comparison of CLABSI Rates by Study Group

Study Group	Total Number of Patients (N)	CVC Days	CLABSI	CLABSI/1000 CVC Days	p-value
First Study Period					
Chlorhexidine	967	29,010	1	0.03	<0.0001
Standard Therapy	1044	31,320	22	0.70	
First + Second Study Periods					
Chlorhexidine	4614	138,420	13	0.09	<0.0001
Standard Therapy	1320	39,600	25	0.63	

Abbreviations: CLABSI, central line-associated bloodstream infection; CVC, central venous catheter.

Results: Across 13 dialysis centers, anonymized health records of 5934 patients who were dialyzed via CVCs between May 2018 and June 2019 were analyzed. The mean age was 61.3 and 47.1% of all patients were female. Study period one included 967 patients with chlorhexidine and 1044 patients with standard end caps, while there were 3647 chlorhexidine and 276 standard patients in the second period. The combined CLABSI rate in the chlorhexidine group was 0.09/1000 CVC days versus 0.63/1000 CVC days in the standard group ($p<0.0001$).

Evaluating a Novel Hemodialysis Central Venous Catheter Cap in Reducing Bloodstream Infections: A Quality Improvement Initative

Steven Weiss_ ***International Journal of Nephrology and Renovacular Disease*** _2021

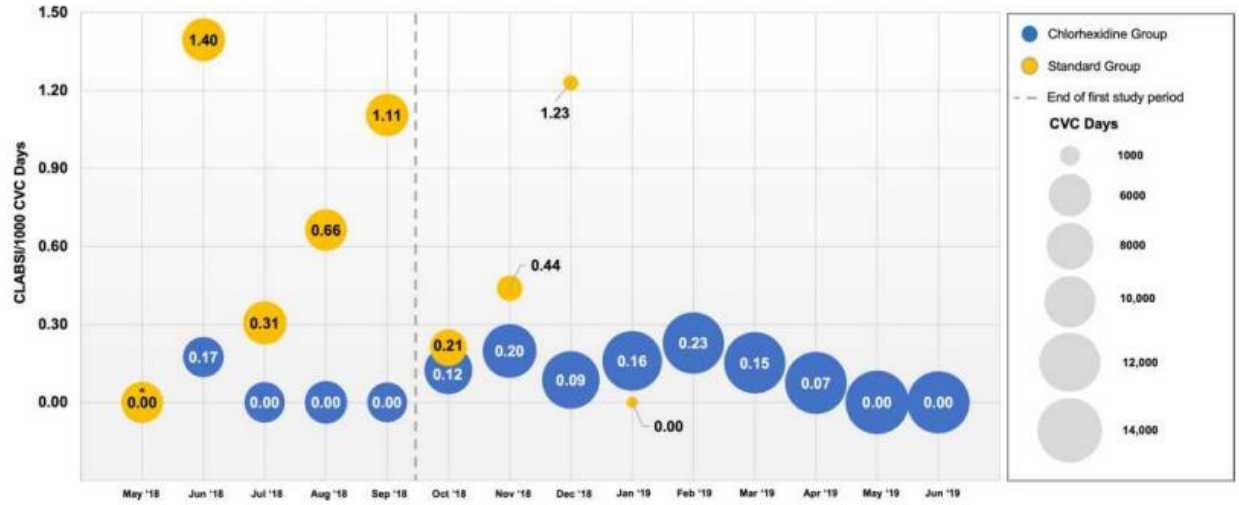
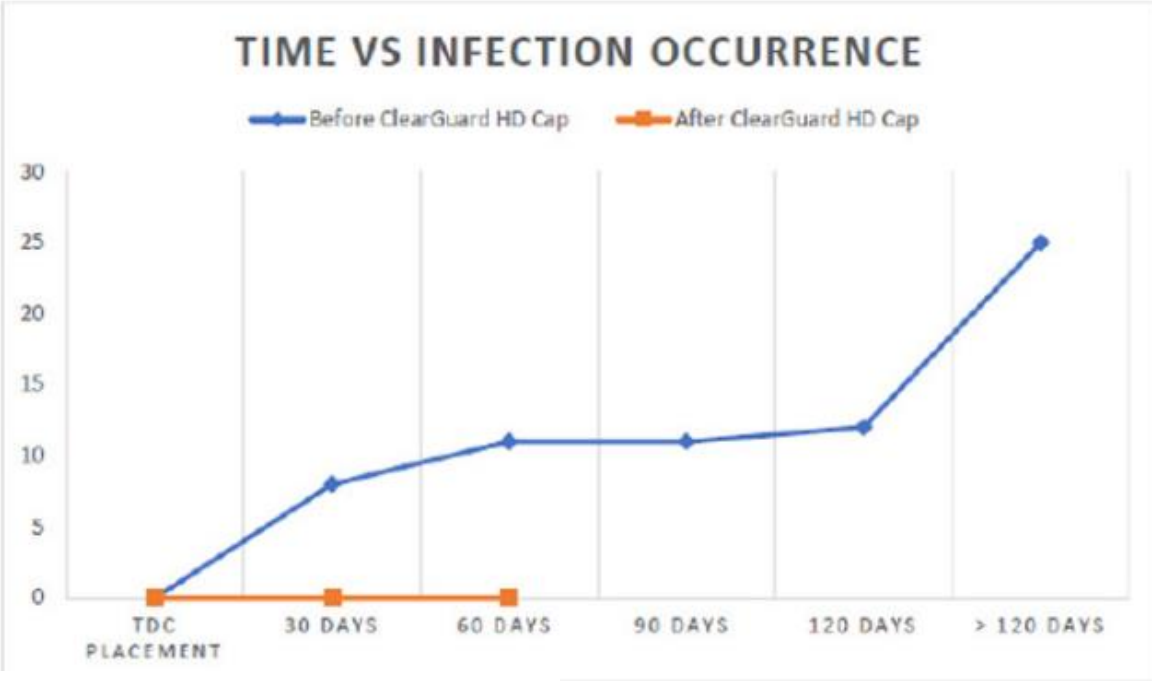


Figure 2 CLABSI/1000 CVC days by study group.
Notes: *Standard group had 0 CLABSIs out of 5970 CVC days and chlorhexidine group had 0 CLABSIs out of 5670 CVC days during May 2018.
Abbreviations: CLABSI, central line-associated bloodstream infection; CVC, central venous catheter.

Conclusion: Chlorhexidine-coated CVC caps may provide a therapeutic improvement in CVC hemodialysis management.

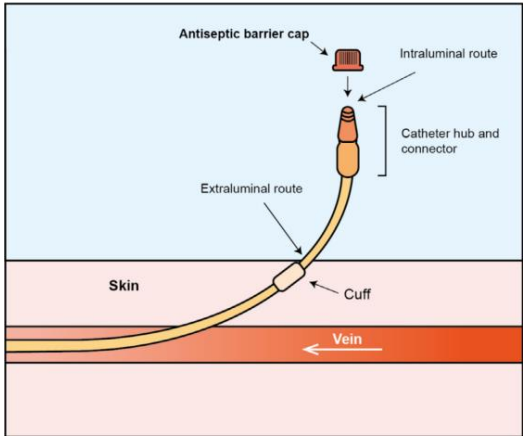
Dialysis-Related Bloodstream Infections: A Pre- and Post-ClearGuard HD Cap Conception Study

William Li_ ***Open Forum Infection Disease***_2019



Methods. Retrospective review of 150 patients receiving hemodialysis at a single outpatient center in Brooklyn, NY from January 1, 2015 to January 31, 2019. As of February 1, 2019, the ClearGuard cap was implemented for all patients. Poisson regres-

Antiseptic barrier caps to prevent central line-associated bloodstreams infection: A systematic review and meta-analysis



Characteristics of 16 included studies

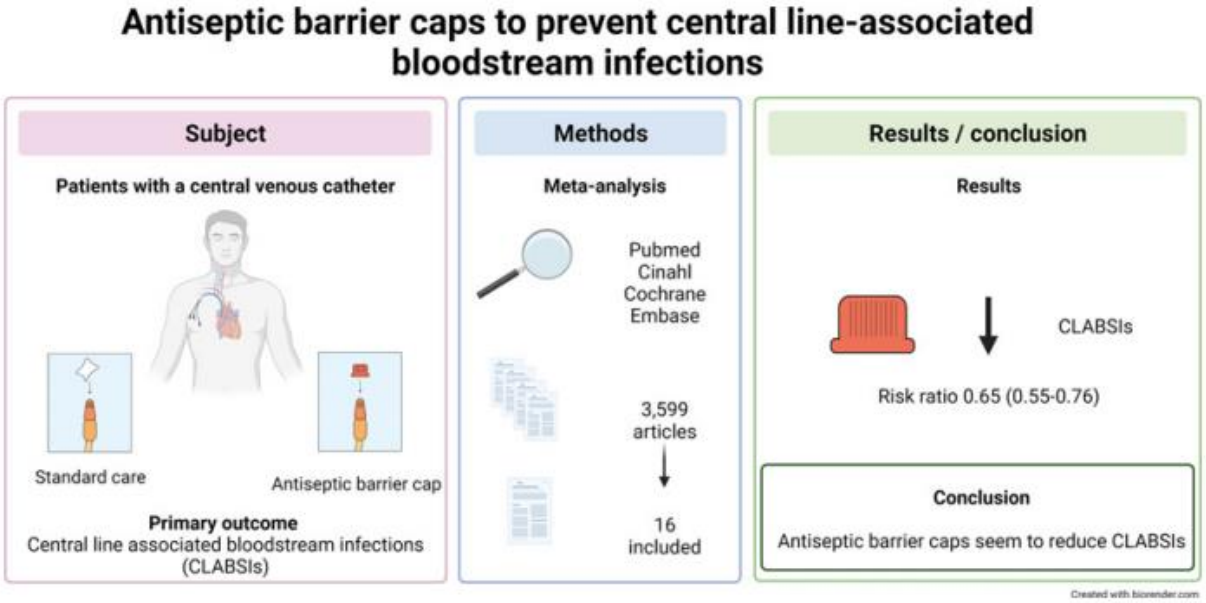
Study	Study design	Department (country)	Population	Study period	Number of patients	Number of line days	Type of catheters	Type of interventior
Cameron-Watson et al. (2016) [29]	Pre- post intervention design	ICU and non-ICU (United Kingdom)	Adults	SC: 6 mo I: 6 mo	SC: - I: -	SC: 6,046 I: 5,333	CVC, PICC and arterial VAD, PIV	Curos cap
Castello et al. (2011) [30]	Pre- post intervention design	Non-ICU (United states)	Children	SC: ≈17 mo I: ≈17 mo	SC: 5 I: 10	SC: 416 I: 392	CVC	SwabCap
Cruz (2021) [31]	Pre- post intervention design	ICU and non-ICU (Germany)	Adults	SC: 12 mo I: 12 mos	SC: 443 I: 431	SC: 4,189 I: 4,818	CVC	Curos cap
Helder et al. (2020) [5]	Pre- post intervention design	ICU (Netherlands)	Children	SC: 24 mo I: 12 mo	SC: 1,482 I: 766	SC: 15,225 I: 7,366	CVC	Curos cap
Inchingolo et al. (2019) [15]	Pre- post intervention design	ICU (Italie)	Adults	SC: 9 mo I: 9 mo	SC: 86 I: 21	SC: 1,041 I: 326	CVC	Curos cap
Kamboj et al. (2015) [16]	Pre- post intervention design	ICU and non-ICU (United states)	Adults	SC: 16 mo I: 16 mo	SC: - I: -	SC: 84,427 I: 83,659	CVC	SwabCap
Martino et al. (2017) [17]	Pre- post intervention design	ICU (United states)	Adults	SC: 6 mo I: 24 mo	SC: 107 I: 153	SC: 673 I: 1,272	CVC	Curos cap
Merrill et al. (2014) [18]	Pre- post intervention design	ICU and non-ICU (United states)	Adults and children	SC: 12 mo I: 12 mo	SC: - I: -	SC: 27,866 I: 26,489	CVC, PICC	Curos cap
Milstone et al. (2021) [32]	RCT	Non-ICU (United states)	Children	SC: 12 mo I: 12 mo	SC: - I: -	SC: 88,976 I: 88,421	CVC, PICC	Curos cap
Pavia and Mazza (2016) [13]	Pre- post intervention design	Non-ICU (United states)	Children	SC: 15 mo I: 6 mo	SC: -I: 20-25	SC: -I: -	CVC	SwabCap
Ramirez et al. (2012) [14]	Pre- post intervention design	ICU (United states)	Adults	SC: 12 mo I: 12 mo	SC: -I: -	SC: 2,105 I: 2,000	CVC, PICC, ports	Curos cap
Rickard et al. (2021) [33]	RCT	Non-ICU (Australia)	Adults	SC: 20 mo I: 20 mo	SC: 61 I: 60	SC: 725 I: 588	CVC	SwabCap
Stango et al. (2014) [11]	Pre- post intervention design	ICU and non-ICU (United states)	Adults	SC: 21 mo I: 21 mo	SC: - I: -	SC: 25,000 I: 22,892	CVC	SwabCap
Sweet et al. 2012 [27]	Pre- post intervention design	Non-ICU (United states)	Adults	SC: 12 mo I: 6 mo	SC: 472 I: 282	SC: 6,851 I: 3,005	CVC, PICC, implanted port	Curos cap
Taşdelen Öğülmen et al. 2020 [25]	RCT	ICU (Turkey)	Adults	SC: 5 mo I: 5 mo	SC: 48 I: 47	SC: 10.218 I: 8,460	CVC	Curos cap
Wright et al. (2013) [28]	Pre- post intervention design	ICU and non-ICU (United states)	Adults	SC: 9 mo I: 18 mo	SC: 1,977 I: 2,860	SC: 11,154 I: 18,972	PICC	SwabCap

Abbreviations: '-', not mentioned; *BSI*, bloodstream infection; *CLABSI*, central line-associated bloodstream infection; *CRBSI*, catheter-related bloodstream infection; *CVC*, central venous cathe *PICC*, peripherally inserted central catheter; *PIV*, peripheral intravenous catheter; *RCT*, randomized controlled trial; *VAD*, vascular access device; *I*, intervention (antiseptic barrier caps).
*CLABSI or CRBSI.
†ROB2 or ROBINS-II.

Veerle E.L.M. Gillis_ ***American Journal of Infection Control***_2023

Antiseptic barrier caps to prevent central line-associated bloodstreams infection: A systematic review and meta-analysis

Veerle E.L.M. Gillis_ ***American Journal of Infection Control*** _2023



KDOQI

KIDNEY DISEASE OUTCOMES QUALITY INITIATIVE

National Kidney Foundation

KDOQI CLINICAL PRACTICE GUIDELINE FOR VASCULAR ACCESS: 2019 UPDATE

Due to literature search timeline criterion, the ClearGuard studies and data were not retrieved or reviewed by the ERT[524,525]; however, the KDOQI Work Group believed it was important to include in this document. The most recent study by Brunelli et al was a large, 13-month, cluster-randomized, comparative-effective study that evaluated ClearGuard HD barrier cap (single-piece device that applies antimicrobial inside and outside the hub) versus Tego plus Curos (2-piece device that applies antimicrobial to the outside of the Tego cap only). The study outcome was positive blood culture rate as an indicator of bloodstream infection rate. A total of 40 dialysis facilities were enrolled (20 facilities in each group). After a 3-month run-in phase, 1,671 patients (826 control group, 845 Tego plus Curos) qualified for the 13-month intervention phase. The ClearGuard group had 23 positive blood cultures compared with 75 in the Tego plus Curos group (83,064 vs 100,042 CVC days, 0.28 vs 0.75 per 1,000 CVC days, respectively). The incidence rate ratio for CRBSI analysis and access-related blood stream analysis favored the ClearGuard group (0.37; $P = 0.003$ and 0.32; $P < 0.001$, respectively).[525] Guideline Statements 21.2 and 21.3 may be relevant to consider in the context of this study until a formal ERT review and analysis for the next

CVC Connectors to Prevent CVC Dysfunction or Bacteremia

21.2 KDOQI considers it reasonable to have an individualized approach to use special CVC connectors based on the clinician's discretion and best clinical judgment. *(Expert Opinion)*

21.3 KDOQI considers it reasonable to use an antimicrobial barrier cap to help reduce CRBSI in high-risk patients or facilities; the choice of connector should be based on clinician's discretion and best clinical judgment. *(Expert Opinion)*

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ClearGuard HD antimicrobial barrier caps for preventing haemodialysis catheter-related bloodstream infections

Medical technologies guidance [MTG62] Published: 13 December 2021 Register as a stakeholder

Next

1 Recommendations

1.1 ClearGuard HD antimicrobial barrier caps are recommended as a cost-saving option for preventing catheter-related bloodstream infections in people with central venous catheters having haemodialysis.

1.2 Data should be collected on any long-term effect of chlorhexidine exposure, in particular in children.

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ClearGuard HD antimicrobial barrier caps for preventing haemodialysis catheter-related bloodstream infections

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Why the committee made these recommendations

ClearGuard HD caps are used with central venous catheters in haemodialysis. They are different from standard caps because they contain a rod coated in the antimicrobial chlorhexidine acetate to prevent infection. Other options for preventing infection are the Curos disinfecting cap, used with Tego needleless connectors, and antimicrobial line lock solutions.

Clinical evidence shows that using ClearGuard HD caps instead of standard caps, Tego plus Curos, or line lock solutions reduces the risk of catheter-related bloodstream infections.

CONCLUSIONES

- LOS DISPOSITIVOS DE CONEXIÓN A LOS CATÉTERES REDUCEN LAS BACTERIEMIAS EN PACIENTES EN HEMODIALSIS.

- NO OLVIAR LA ASEPSIA EN LA TÉCNICA DE CONEXIÓN.

- CLEARGUARD HA DEMOSTRADO LA DISMINUCIÓN DE LAS BACTERIEMIAS RELACIONADAS CON CATÉTER FRENTE A TAPONES CONVENCIONALES Y EL SISTEMA CONECTOR TEGO.


MOLTES GRÀCIES