



PICCDAY2025

Prevenzione delle infezioni durante la gestione

Daniele G. Biasucci

Roma



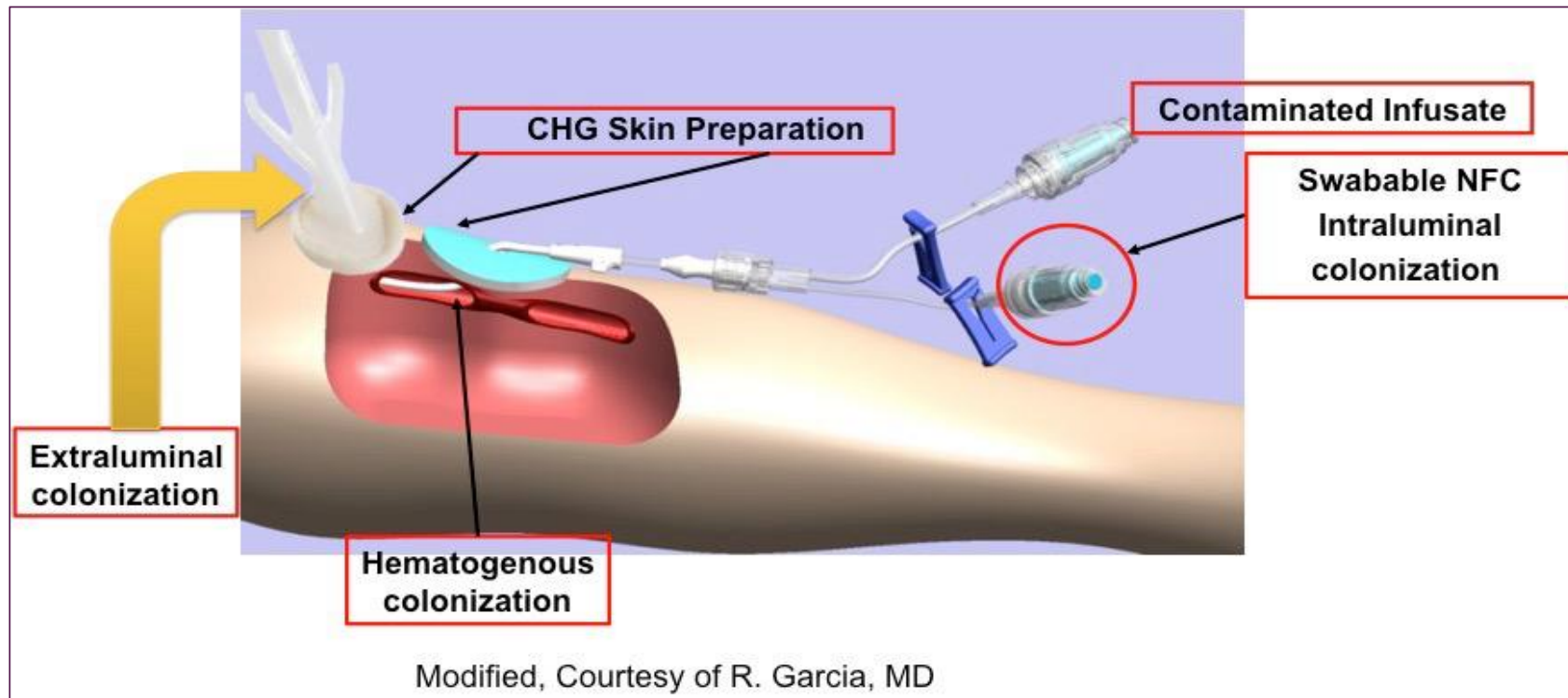
SIAARTI
PRO VITA CONTRA DOLOREM SEMPER



TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA



European Society of
Anaesthesiology and
Intensive Care



- Bacteria can colonize a catheter by different mechanisms:
 - *contamination of the catheter during insertion*
 - *contamination of the catheter hub during maintenance*
 - *spread of skin organisms along the external catheter surface*
 - *hematogenous spread from infection at another site*
 - *infusion of a contaminated fluid (rarely)*

**VAD SELECTION
AND HEALTHCARE WORKERS
EDUCATION AND TRAINING**

INSERTION

CRBSI Prevention

CARE OF EXITE SITE

**DISINFECTION OF CATHETER HUBS,
CONNECTORS AND INJECTION PORTS**

Effectiveness and Safety of Methods to Prevent Bloodstream and Other Infections and Noninfectious Complications Associated With Peripherally Inserted Central Catheters: A Systematic Review and Meta-Analysis

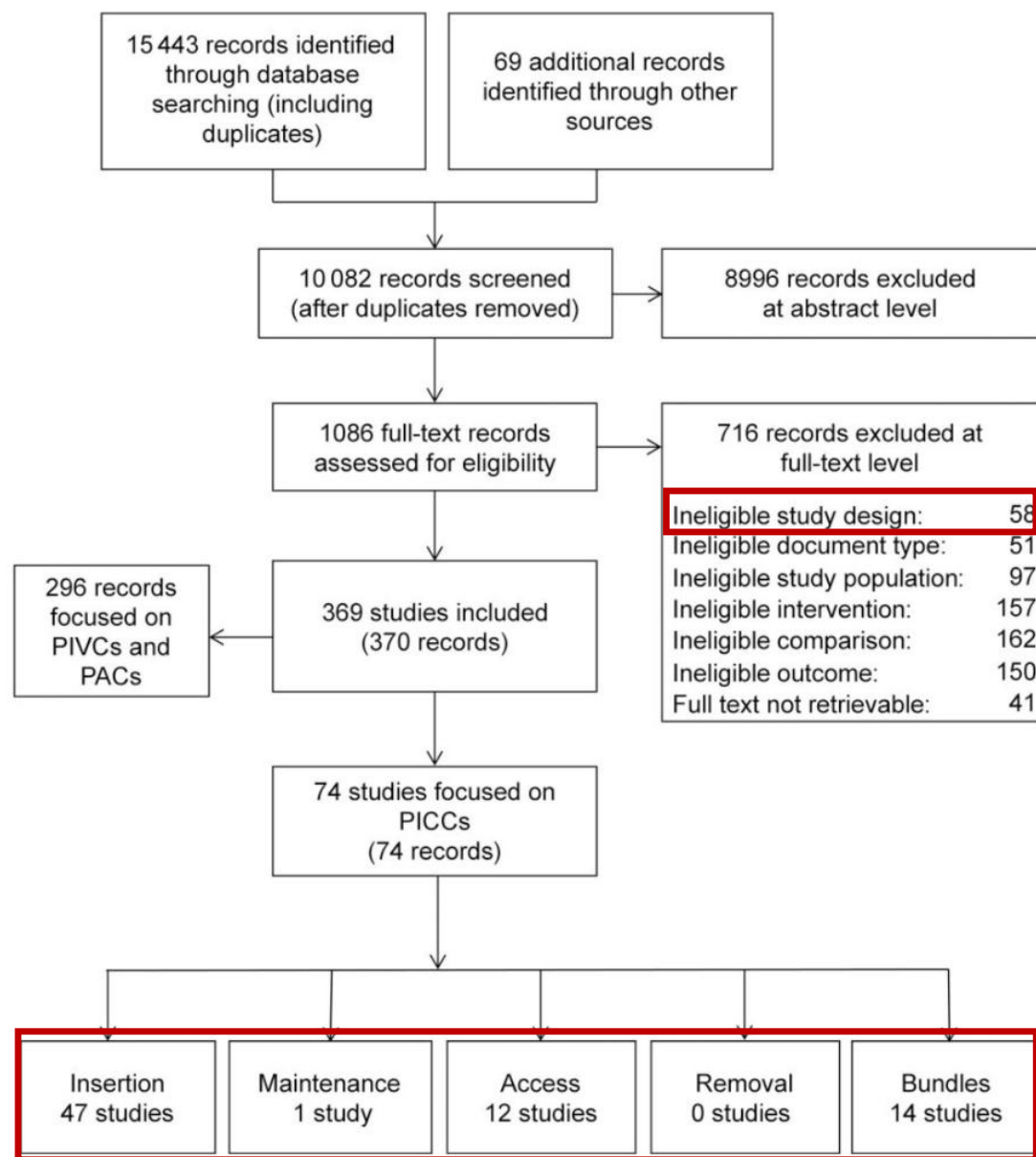
Andreea Dobrescu,^{1,6} Alexandru Marian Constantin,² Larisa Pinte,² Andrea Chapman,^{1,6} Piotr Ratajczak,^{2,6} Irma Klerings,¹ Robert Emprechtinger,⁴ Benedetta Allegranzi,⁵ Michael Lindsay Grayson,^{5,6,7} Joao Paulo Toledo,^{8,9} Gerald Gartlehner,^{1,9} and Barbara Nussbaumer-Streit¹

• 25 Clinical Questions

- Insertion
- Maintenance
- Access
- Removal
- *Bundles*

		Study type	Insertion														Maintenance					Access			Removal	
			Insertion technique	CHD	Training	Gloves	Sterile gloves	Insertion pack/kit	Ultrasound	Below cubital fossa	Upper limb	Silicone	Occlusive dressing	Insertion team	Soap and water	Anesthesia	Scalp	Sterile dressing	Continuous infusion	Flushing	Saline flushing	Reg. tubing change	Sterile protocol	Closed-access	Single lumen	Scheduled removal
Population	Adults	RCT						3 2			1	1				/										
		NRSI			3 2				2 1	1						/								2 1	1 2	
	Children and adolescents	RCT														/										
		NRSI											1			/								1		
	Neonates	RCT		1		1			1											1				1		
		NRSI		1	1					1	3 2	1		2			1								1	
	Mixed ages or age NR	RCT																								
		NRSI			1				2		1	1					1								1	

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• Study Design Included

- RCTs
- Non-RCTs
- Controlled observational studies
- Controlled before-after studies
- Interrupted time series and repeated measures studies
- Before/after studies

• Excluded

- Case series
- Case reports
- Systematic or nonsystematic reviews
- **Studies without a comparison (or incidence/prevalence studies and surveys)**
- Pooled data analyses

Effectiveness and Safety of Methods to Prevent
Bloodstream and Other Infections and Noninfectious
Complications Associated With Peripherally Inserted
Central Catheters: A Systematic Review and Meta-Analysis

Andreea Dobrescu,^{1,2} Alexandru Marian Constantin,³ Larisa Pinto,⁴ Andrea Chapman,^{1,2} Piotr Ratajczak,^{5,6} Irma Klerings,⁷ Robert Emprechtinger,⁸
Benedetta Allegranti,⁹ Michael Lindsay Grayson,^{10,11} Joao Paulo Toledo,¹² Gerald Gartlehner,¹³ and Barbara Nussbaumer-Streit¹⁴

- 14 studies (2 RCT, 12 non-RCT); 9613 participants (adults + neonates)
- Most compared bundles vs routine care; 2 compared catheter types

- **Key findings – Adults**

- **Multimodal/bundle strategies:**

- ↓ Local infections: 3.96% vs 8.44% (RR 0.47; low COE)
- ↓ Phlebitis/thrombophlebitis: 3.14% vs 8.97% (RR 0.35; low COE)
- ↓ CLABSI: 1.8% vs 5.8% (0.31; low COE)
- May ↓ overall adverse events: 4.5% vs 18% (RR 0.22; very low COE)

An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A.,
Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Sexton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D.,
Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.

- **Implementation of a 5-element CDC-based bundle:**

- Hand hygiene
- Full barrier precautions during insertion
- Skin antisepsis with chlorhexidine
- Avoiding the femoral site
- Removing unnecessary central lines

- Additional system-level interventions:

- Standardized central-line carts
- Checklists with nurse empowerment to stop non-sterile procedures
- Daily discussion of catheter necessity
- Regular data feedback
- Designated physician–nurse safety team leaders

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- Dramatic and sustained reduction of CRBSI
- ***Median CRBSI rate decreased from 2.7/1000 catheter-days (baseline) to 0 within 3 months of bundle implementation ($P \leq 0.002$)***
- Reduction sustained for 18 months:
 - Mean rate: 1.4/1000 catheter-days
- Incidence Rate Ratios (IRR) vs baseline:
- 0–3 months: IRR 0.62
- 16–18 months: IRR 0.34

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Bundle

- Hand hygiene
- Skin antisepsis with 2% chlorhexidine in alcohol
- Use of chlorhexidine-impregnated sponge dressings
- Catheter stabilization and site protection using:
 - Sutureless securement device
 - Transparent semipermeable membrane
- Disinfection of needle-free connectors
- Immediate removal if no longer required

Hand Hygiene

- Most effective strategy to reduce catheter-related infections
- Essential before any manipulation of PICC line or dressing

Effectiveness of a hospital-wide programme to improve compliance with hand hygiene

Didier Pittet, Stéphane Hugonnet, Stephan Harbarth, Philippe Mourouga, Valérie Sauvan, Sylvie Touveneau, Thomas V Perneger, and members of the Infection Control Programme

THE LANCET

Antisepsis with 2% Chlorhexidine in Alcohol

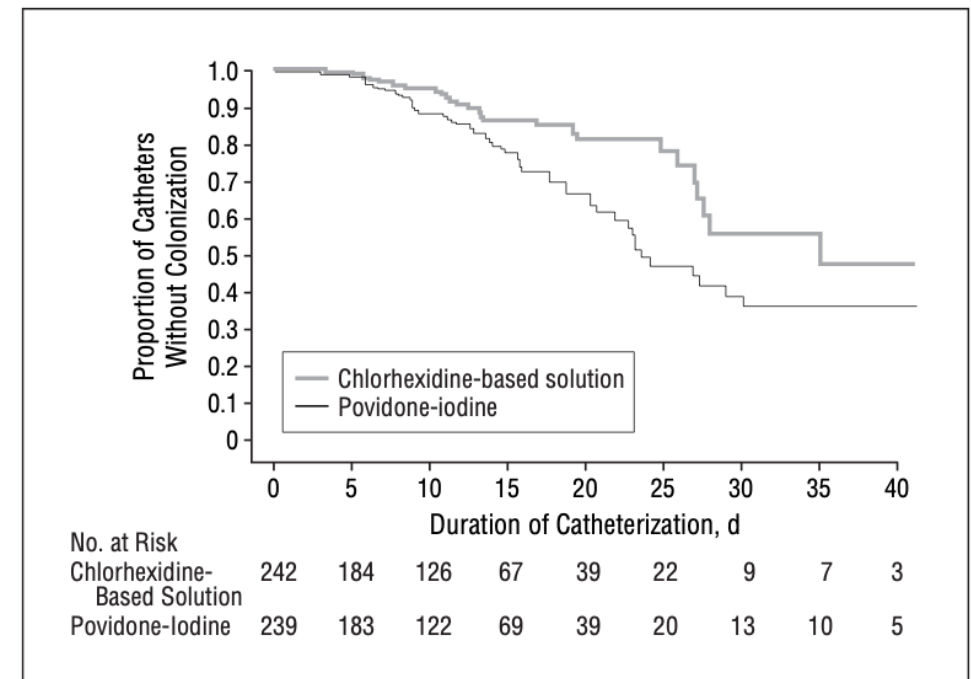
- 2% chlorhexidine in alcohol superior to povidone-iodine
- Reduces catheter colonization and bloodstream infections

ORIGINAL INVESTIGATION

Chlorhexidine-Based Antiseptic Solution vs Alcohol-Based Povidone-Iodine for Central Venous Catheter Care

Olivier Mimoz, MD, PhD; Stéphanie Villeminey, MD; Stéphanie Ragot, PharmD, PhD;
Claire Dahyot-Fizelier, MD; Leila Laksiri, MD; Franck Petitpas, MD; Bertrand Debaene, MD, PhD

JAMA Internal Medicine

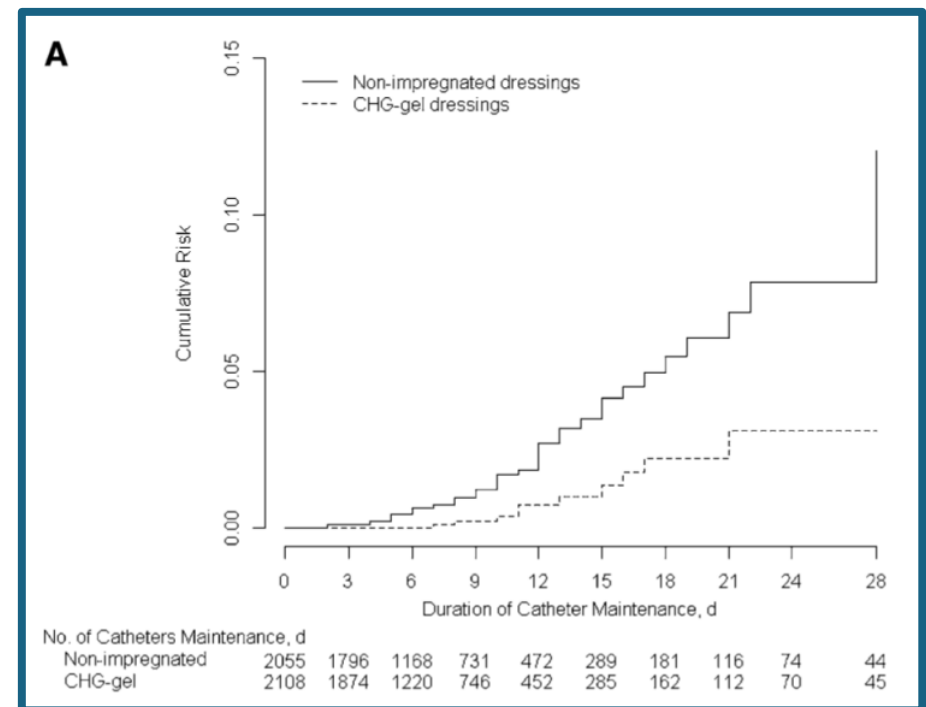


Chlorhexidine-Impregnated Sponge

- Decrease colonization and CRBSI
- Recommended for high-risk or long-term catheters

Randomized Controlled Trial of Chlorhexidine Dressing and Highly Adhesive Dressing for Preventing Catheter-related Infections in Critically Ill Adults

Jean-François Timsit^{1,2}, Olivier Mimoz³, Bruno Mourvillier⁴, Bertrand Souweine⁵, Maité Garrouste-Orgeas⁶, Serge Alfandari⁷, Gaétan Planteveve⁸, Régis Bronchard⁹, Gilles Troche¹⁰, Remy Gauzit¹¹, Marion Antona¹², Emmanuel Canet¹³, Julien Bohe¹⁴, Alain Lepape¹⁴, Aurélien Vesin¹, Xavier Arrault¹⁵, Carole Schwebel², Christophe Adrie¹⁶, Jean-Ralph Zahar¹⁷, Stéphane Ruckly¹, Caroline Tournegros², and Jean-Christophe Lucet¹⁸



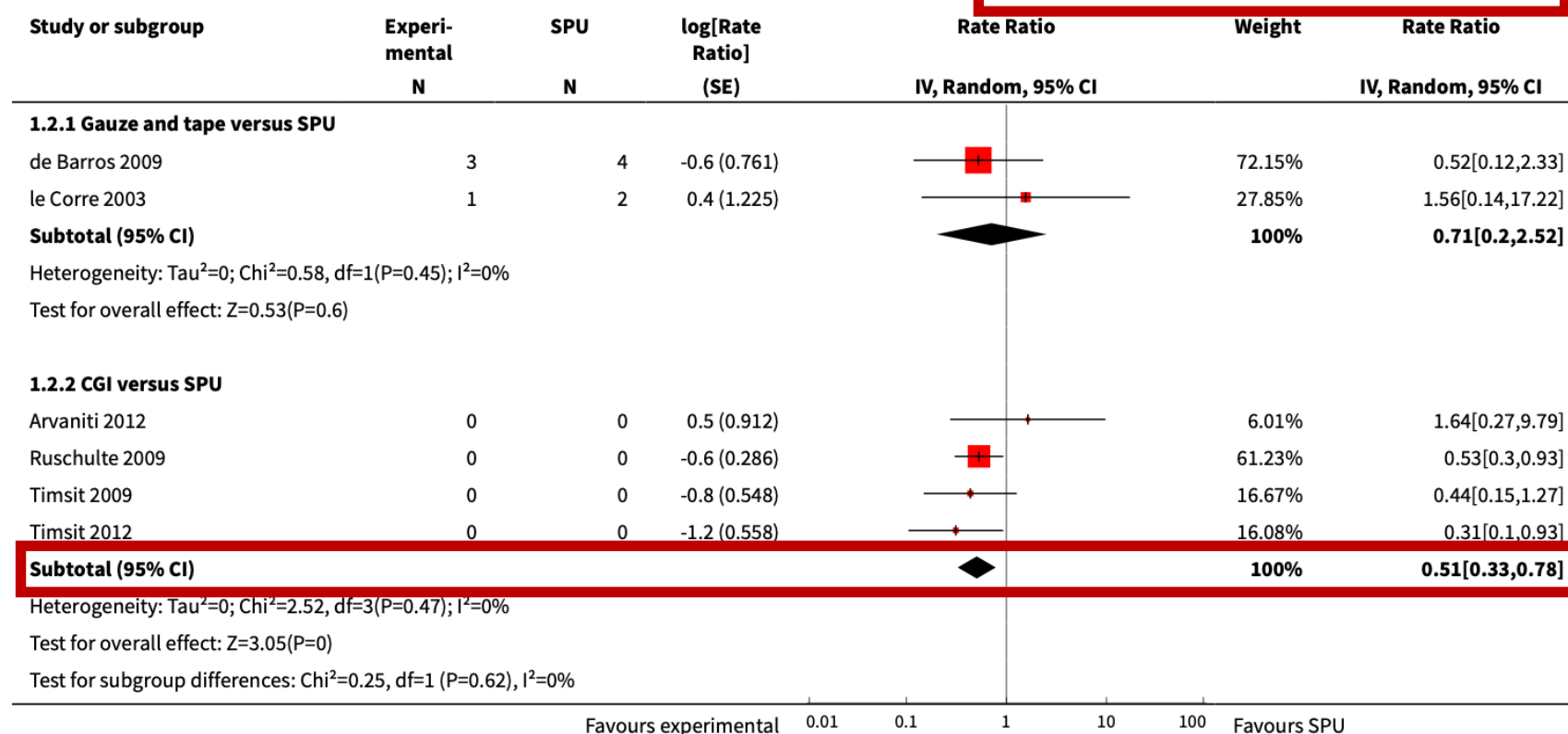
Dressings and securement devices for central venous catheters (CVC) (Review)



Cochrane Database of Systematic Reviews

Ullman AJ, Cooke ML, Mitchell M, Lin F, New K, Long DA, Mihala G, Rickard CM

Analysis 1.2. Comparison 1 Primary analysis, Outcome 2 Frequency of catheter-related BSI per 1000 patient days.



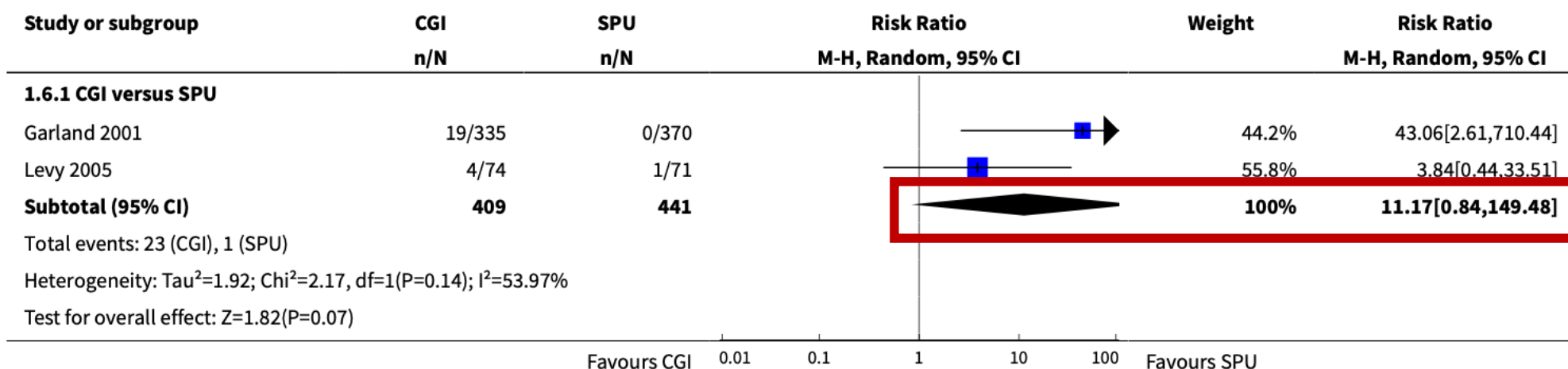
Dressings and securement devices for central venous catheters (CVC) (Review)



Cochrane Database of Systematic Reviews

Ullman AJ, Cooke ML, Mitchell M, Lin F, New K, Long DA, Mihala G, Rickard CM

Analysis 1.6. Comparison 1 Primary analysis, Outcome 6 Skin irritation or damage.



Sutureless Securement Device

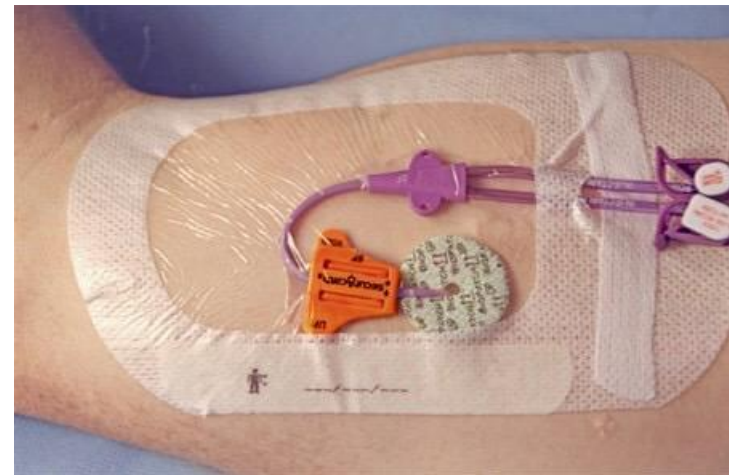
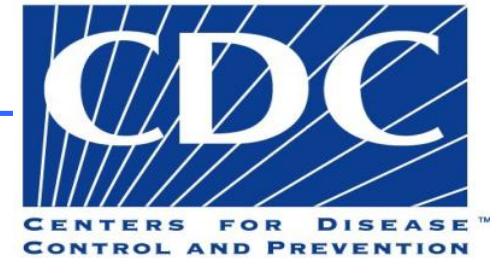
- Avoid Sutures!
 - Sutures disrupt the skin around the catheter exit site, causing inflammation and heavy colonization



Sutureless Securement Device

Catheter Securement Devices

Use a sutureless securement device to reduce the risk of infection for intravascular catheters [105]. **Category II**



Transparent Semipermeable Membrane

- Protects insertion site while allowing visual inspection
- Standard component of catheter maintenance bundles

Review

Transparent Polyurethane Film as an Intravenous Catheter Dressing

A Meta-analysis of the Infection Risks

Karen K. Hoffmann, MS; David J. Weber, MD, MPH; Gregory P. Samsa, PhD; William A. Rutala, PhD, MPH

Table 2.—Infection Risks of Transparent vs Gauze Dressings Used on Central Venous Catheters

Statistical Test	Catheter-Tip Infection	Bacteremia	Catheter Sepsis
Sample size			
Cases	712	454	937
Controls	506	222	647
Relative risk	1.78	1.63	1.69
95% confidence interval	1.38-2.30	0.76-3.47	0.97-2.95
P	<.001	.2	.06
Interaction	.075	.745	.106

Table 4.—Infection Risks of Transparent vs Gauze Dressings Used on Peripheral Venous Catheters

Statistical Test	Catheter-Tip Infection	Phlebitis	Infiltration	Skin Colonization
Sample size				
Cases	1739	2112	2166	1488
Controls	1935	1933	2007	1593
Relative risk	1.53	1.02	1.12	0.99
95% confidence interval	1.18-1.99	0.86-1.20	0.92-1.37	0.90-1.09
P	.002	.8	.3	.8
Interaction	.056	.02	.301	.102

Comparative efficacy of 13 antimicrobial dressings and different securement devices in reducing catheter-related bloodstream infections
A Bayesian network meta-analysis

Fang-Ping Dang, MD^a, Hui-Ju Li, BD^{a,*}, Jin-Hui Tian, PhD^{a,b}

CRBSI Prevention

- Best dressing: Transparent Dressing (TD)
 - 92.5% highest rank probability
 - OR 0.35 (95% CrI 0.14–0.89) vs. others
 - 65% reduction in 92.5% of cases

Disinfection of Needle-Free Connectors

- Connector disinfection ("scrub the hub")
- Scrub for 5 to 15 seconds before each access
- Prevents intraluminal contamination and CABS

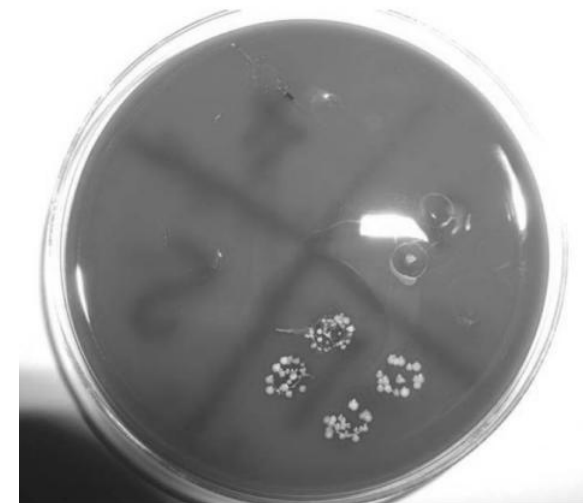


INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JULY 2012, VOL. 33, NO. 7

ORIGINAL ARTICLE

Adequate Disinfection of a Split-Septum Needleless Intravascular Connector with a 5-Second Alcohol Scrub

Mark E. Rupp, MD;^{1,2} Stephanie Yu;¹ Tomas Huerta;¹ R. Jennifer Cavalieri, RN;¹ Roxanne Alter, MS;³ Paul D. Fey, PhD;³
Trevor Van Schooneveld, MD;^{1,2} James R. Anderson, PhD⁴



Removal of Unnecessary Catheters

- Prompt removal of unnecessary PICCs
 - Daily evaluation of line necessity
 - Strong reduction in catheter-related bloodstream infections

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Conclusions

- Adoption of a structured "bundle" is strongly effective and evidence-supported
 - Significant reduction in local infections, phlebitis, and CLABSI
 - Sustained effect over time, with infection rates approaching zero
- Integrate checklists, ongoing training, and data feedback to support bundle adherence
- Promote a safety culture with dedicated teams and staff empowerment
- Current Limitations: bundles and data heterogeneity



Grazie

danielebiasucci@gmail.com