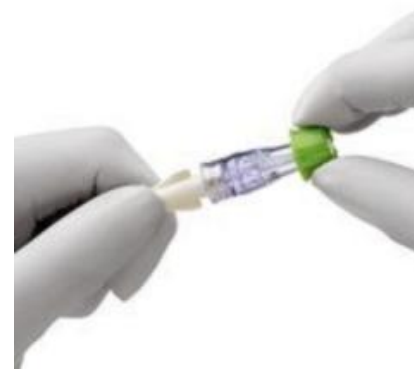
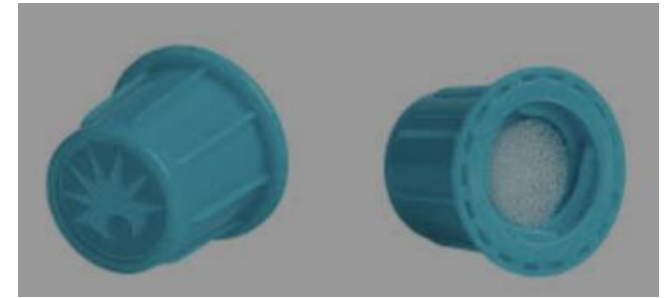




The Role of the Port Protector in Infection Prevention

AMY BARDIN

What are port protectors?



Passive vs. Active

- ▶ Active is using the alcohol prep pad to scrub the hub of the device with friction or motion
- ▶ Passive is having an alcohol cap in place
- ▶ Human factors



Current agencies with strategies

- ▶ Institute for Healthcare Improvement
- ▶ Center for Disease Control
- ▶ Infusion Nursing Standards
- ▶ SHEA
- ▶ Epic3 – Hand hygiene and asepsis
- ▶ Joint Commission 2002 – Post insertion bundle

Catheter injection ports

Open lumens (such as catheter hubs or stopcocks) are covered by injection ports, sterile end-caps or needleless connectors.

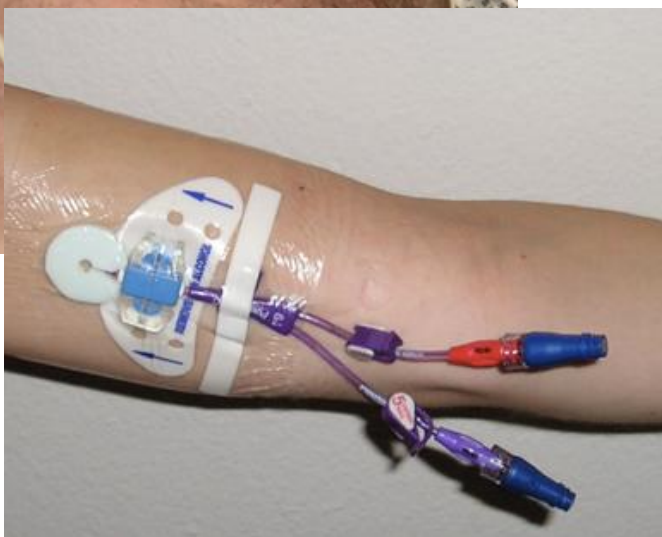
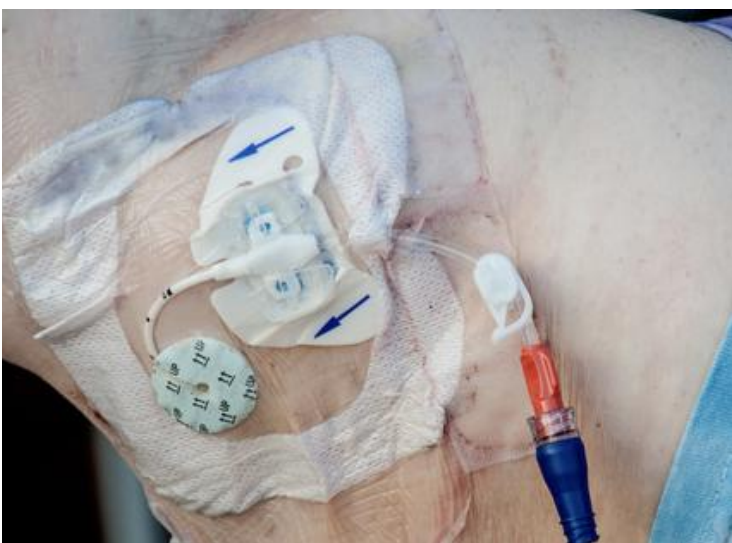
Access ports are sanitized with alcohol, chlorhexidine/alcohol, povidone-iodine, and iodophors before and after each use, a method known as the "Scrub the Hub" protocol.

Caps are changed no more often than 72 hours (or according to the manufacturer's recommendations and whenever the administration set is changed)

International Society Infectious Disease

▶ Maintenance Bundle:

- ▶ - Daily review of central line necessity.
- ▶ - Prompt removal of unnecessary lines.
- ▶ - Disinfection prior to manipulation of the line.
- ▶ - Daily chlorhexidine washes (in ICU, patients > 2 months).
- ▶ - Disinfect catheter hubs, ports, connectors, etc., before using the catheter.
- ▶ - Change dressings and disinfect site with alcohol-based chlorhexidine every 5-7 days (change earlier if soiled).
- ▶ - Replace administration sets within 96 hours (immediately if used for blood products or lipids).
- ▶ - Ensure appropriate nurse-to-patient ratio in ICU (1:2 or 1:1).



epic3

- ▶ Loveday, H. P., Wilson, J., Pratt, R. J., Golsorkhi, M., Tingle, A., Bak, A., ... & Wilcox, M. (2014). epic3: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *Journal of Hospital Infection*, 86, S1-S70.
- ▶ IVAD 30 A single-use application of 2% chlorhexidine gluconate in 70% isopropyl alcohol (or povidone iodine in alcohol for patients with sensitivity to chlorhexidine) should be used to decontaminate the access port or catheter hub. The hub should be cleaned for a minimum of 15 s and allowed to dry before accessing the system. *Class D/GPP*
- ▶ IVAD 40 Use quality improvement interventions to support the appropriate use and management of intravascular access devices (central and peripheral venous catheters) and ensure their timely removal. These may include:
 - protocols for device insertion and maintenance;
 - reminders to review the continuing use or prompt the removal of intravascular devices;
 - audit and feedback of compliance with practice guidelines; and
 - continuing professional education. *Class C/GPP*

SHEA 2014

- ▶ Marschall, J., Mermel, L. A., Fakih, M., Hadaway, L., Kallen, A., O'Grady, N. P., ... & Yokoe, D. S. (2014). Strategies to prevent central line-associated bloodstream infections in acute care hospitals: 2014 update. *Infection Control & Hospital Epidemiology*, 35(S2), S89-S107.
 - ▶ Use an antiseptic-containing hub/connector cap/port protector to cover connectors
 - ▶ Audit tools
 - ▶ Compliance/ education
 - ▶ Leadership engagement

INS 2016

Perform a vigorous mechanical scrub for manual disinfection of the needleless connector prior to each VAD access and allow it to dry.

Length of contact time for scrubbing and drying depends on the design of the needleless connector and the properties of the disinfecting agent. For 70% isopropyl alcohol, reported scrub times range from 5 to 60 seconds with biocide activity occurring when the solution is wet and immediately after drying.

Use vigorous mechanical scrubbing methods even when disinfecting needleless connectors with antimicrobial properties (eg, silver coatings). 19-24 (IV)

G. Use of passive disinfection caps containing disinfecting agents (eg, isopropyl alcohol) has been shown to reduce intraluminal microbial contamination and reduce the rates of central line-associated bloodstream infection (CLABSI). Use of disinfection caps on peripheral catheters has limited evidence but should be considered.

1. The length of exposure time to be effective depends upon product design; consult manufacturers' directions for use. 18 (V)

2. Once removed, these used caps are discarded and are never reattached to the needleless connector. 3,18 (II)

3. After removal, multiple accesses of the VAD may be required to administer a medication (eg, flush syringes and administration sets) and require additional disinfection before each entry. Scrubbing time, technique, and agents for disinfection of the needleless connector between subsequent connections are unknown due to a lack of research. Consider using a vigorous 5- to 15-second scrub time with each subsequent entry into the VAD, depending upon the needleless connector design. (Committee Consensus)



Current Evidence

- ▶ Moureau, N. L., & Flynn, J. (2015). Disinfection of needleless connector hubs: clinical evidence systematic review. *Nursing research and practice*, 2015.
- ▶ Systematic review evaluated 140 studies and 34 abstracts on NC disinfection practices, the impact of hub contamination on infection, and measures of education and compliance.



What we know

- ▶ Greatest risk for contamination of the catheter after insertion is the NC with 33–45% contaminated
- ▶ Compliance with disinfection as low as 10%
- ▶ Optimal technique or disinfection time has not been identified
- ▶ Scrubbing with 70% alcohol for 5–60 seconds is recommended
- ▶ Statistically significant results in infection reduction when passive alcohol disinfection caps are used (48–86% reduction)
- ▶ Colonization of NC is considered the cause of 50% of postinsertion catheter-related infections.

Jimenez et al., 2015

- ▶ Jimenez, A., Barrera, A., & Madhivanan, P. (2015, December). Systematic Review on Impact of Use of Disinfectant Caps Protectors for Intravenous Access Ports on Central Line-Associated Bloodstream Infections (CLABSI). In *Open Forum Infectious Diseases* (Vol. 2, No. suppl_1). Oxford University Press.
 - ▶ This systematic review was performed to evaluate the effects of alcohol impregnated cap protectors to prevent CLABSI in the inpatient population by passively disinfecting the access port of central venous lines.
 - ▶ Nine quasi-experimental studies were included. All studies accessed CLABSI rates pre and post implementation of disinfectant caps. All studies reported reduction of CLABSI rates after the intervention (30-87%). One study reported decrease of 68 days on LOS.
- ▶ When comparing the protector caps with scrubbing the hub, the caps demonstrated to be more efficient. The use of alcohol impregnated port protector's caps is associated with reduction of CLABSI rates.

Kamboj et al., 2015

- ▶ Kamboj, M., Blair, R., Bell, N., Son, C., Huang, Y. T., Dowling, M., ... & Sepkowitz, K. (2015). Use of disinfection cap to reduce central-line-associated bloodstream infection and blood culture contamination among hematology-oncology patients. *infection control & hospital epidemiology*, 36(12), 1401-1408.
 - ▶ Multiphase prospective study, tertiary Cancer Center
 - ▶ 34% decrease in hospital-wide HA-CLABSI rates
 - ▶ Reduction occurred only among high-risk patients and not among general oncology patients. In addition, the use of the passive disinfection cap resulted in decreases of 63% (HRUs) and 51% (general oncology units) in blood culture contamination, with an estimated reduction of 242 BCCs with CONS. The reductions in HA-CLABSI and BCC correspond to an estimated annual savings of \$3.2 million in direct medical costs.

What about PIVs

- ▶ Ray-Barruel, G., Xu, H., Marsh, N., Cooke, M., & Rickard, C. M. (2019). Effectiveness of insertion and maintenance bundles in preventing peripheral intravenous catheter-related complications and bloodstream infection in hospital patients: a systematic review. *Infection, disease & health*.
- ▶ This systematic review aimed to: (i) systematically critique (and meta-analyze, if possible) evidence for the effectiveness of PIVC insertion and maintenance bundles to prevent BSI and [catheter-related complications](#) in hospital patients of all ages, and (ii) describe components of bundles, implementation strategies, and reported compliance.
- ▶ 14,456 , 10,295 records were screened by title or abstract. Of 45 full-text articles assessed for eligibility, 32 were excluded and 13 studies were included in the final review.
- ▶ Implementing an evidence-based bundle could lead to improved guideline adherence for PIVC care and better patient outcomes, but wide variation currently exists among PIVC bundles reported in the literature. Current PIVC insertion and maintenance bundles include diverse components (not all evidence-based), and study quality is low to fair. The effect of PIVC care bundles on PIVC-related [bloodstream infection](#) rates appears promising but remains uncertain. Standardization of evidence-based bundle components, and more rigorous studies with compliance, sustainability and cost reporting are needed.

Advantages

- ▶ Saves time
- ▶ Provides physical barrier
- ▶ Provides visual confirmation
- ▶ 7days (when not removed)
- ▶ 1 – 5 min kill depending on brand
- ▶ Increases compliance
- ▶ Cost effective strategy in high risk areas



Disadvantage

- ▶ Cost
- ▶ Complacency
- ▶ Availability
- ▶ Ongoing auditing/education
- ▶ Standardization





Summary

It is critical for healthcare facilities and clinicians to take responsibility for compliance with basic principles of asepsis compliance, to involve frontline staff in strategies, to facilitate education that promotes understanding of the consequences of failure, and to comply with the standard of care for hub disinfection. Moureau 2015

References

- ▶ Moureau, N. L., & Flynn, J. (2015). Disinfection of needleless connector hubs: clinical evidence systematic review. *Nursing research and practice*, 2015
- ▶ Loveday, H. P., Wilson, J., Pratt, R. J., Golsorkhi, M., Tingle, A., Bak, A., ... & Wilcox, M. (2014). epic3: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *Journal of Hospital Infection*, 86, S1-S70.
- ▶ Jimenez, A., Barrera, A., & Madhivanan, P. (2015, December). Systematic Review on Impact of Use of Disinfectant Caps Protectors for Intravenous Access Ports on Central Line-Associated Bloodstream Infections (CLABSI). In *Open Forum Infectious Diseases* (Vol. 2, No. suppl_1). Oxford University Press.
- ▶ https://www.jointcommission.org/assets/1/6/CLABSI_Toolkit_Tool_3-22_CVC_Maintenance_Bundles.pdf
- ▶ Kamboj, M., Blair, R., Bell, N., Son, C., Huang, Y. T., Dowling, M., ... & Sepkowitz, K. (2015). Use of disinfection cap to reduce central-line-associated bloodstream infection and blood culture contamination among hematology-oncology patients. *infection control & hospital epidemiology*, 36(12), 1401-1408.
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- ▶ Marschall, J., Mermel, L. A., Fakih, M., Hadaway, L., Kallen, A., O'Grady, N. P., ... & Yokoe, D. S. (2014). Strategies to prevent central line-associated bloodstream infections in acute care hospitals: 2014 update. *Infection Control & Hospital Epidemiology*, 35(S2), S89-S107.