CLABSI Prevention: 2022 Guideline Updates and Strategies

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Disclosure

- I am an employee of the clinical team of PDI Healthcare. The content of this presentation is not representative of the views of PDI or its ownership.
- Presentation will incorporate best practices from a variety of information sources that bridge medical disciplines.
- There will be NO discussion of any PDI products and/or solutions in accordance with CE Requirements.

Objectives

Upon completion of this program, the participant will be able to:

- Understand how the COVID-19 pandemic has negatively impacted CLABSI infections
- Review central line audits and provide industry concern examples
- List the new SHEA CLABSI prevention practices
- Discuss the CDC core strategies for CLABSI prevention with a focus on nasal decolonization
- State the current CDC recommendations for the use of CHG to prevent HAI's for both skin and needleless connectors

Impact of the COVID-19 Pandemic on CLABSI Rates

+CLABSI RATES

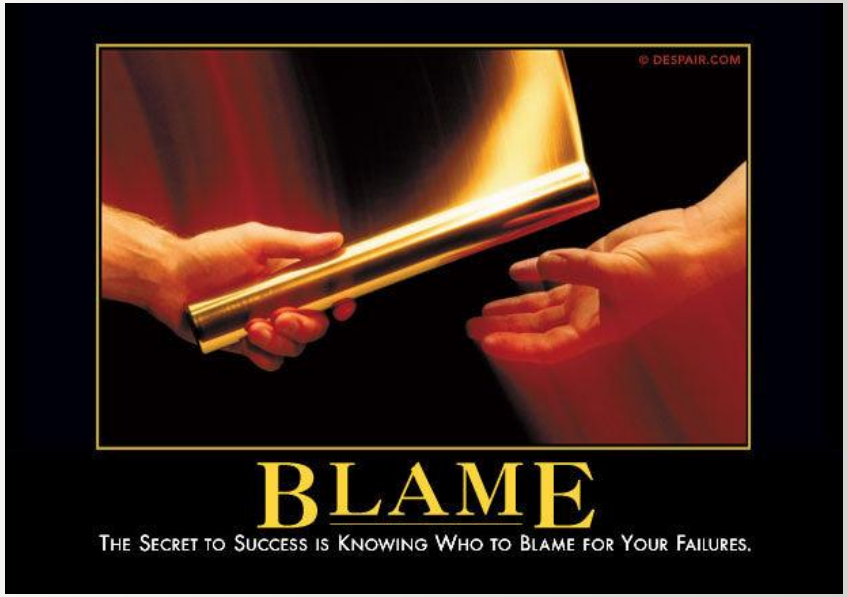
[1] Fakih, M., Bufalino, A., Sturm, L., Huang, R., Ottenbacher, A., Saake, K., Cacchione, J. (2021). COVID-19 Pandemic, CLABSI, and CAUTI: The Urgent Need to Refocus on Hardwiring Prevention Efforts. Infection Control & Hospital Epidemiology, 1-22. doi:10.1017/ice.2021.70

[2] Impact of SARS-CoV-2 on hospital acquired infection rates in the United States: Predictions and early results McMullen, Kathleen M. et al. American Journal of Infection Control, Volume 48, Issue 11, 1409 – 1411

[3] LeRose, J., Sandhu, A., Polistico, J., Ellsworth, J., Cranis, M., Jabbo, L., Chopra, T. (2020). The Impact of COVID-19 Response on Central Line Associated Bloodstream Infections and Blood Culture Contamination Rates at a Tertiary Care Center in Greater Detroit Area. Infection Control & Hospital Epidemiology, 1-15. doi:10.1017/ice.2020.1335

Answering the “Why”

- COVID-19 patients were very ill and more inclined to develop CLABSIs (1)
- COVID-19 patients required longer hospitalizations.
- Many COVID-19 patients needed to be in the prone position for better oxygenation.
- Overall, there was an increase in patient acuity.
- Critically ill patients also have an increased use of central venous access lines overall.(2)



[1] Fakih, M., Bufalino, A., Sturm, L., Huang, R., Ottenbacher, A., Saake, K., Cacchione, J. (2021). COVID-19 Pandemic, CLABSI, and CAUTI: The Urgent Need to Refocus on Hardwiring Prevention Efforts. Infection Control & Hospital Epidemiology, 1-22. doi:10.1017/ice.2021.70
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Answering the “Why”

Nursing and provider-related practice changes due to COVID-19 patients potentially led to an increase in CLABSI. These changes that affected traditional CLABSI prevention efforts included:

- Moving medication pumps and dialysis machines out of patient’s rooms into hallways. [1] [2]
- A reduction of time in patient’s rooms[1] [2]
- There were reported increases in blood cultures being drawn from central lines. The increase also led to higher blood culture contamination rates with commensal organisms in patients with COVID-19. [1]
- Broad spectrum antimicrobials were used in an increasing amount during the COVID-19 pandemic.
- Universal decolonization including nasal and skin decolonization practices likely were not performed as frequently due to priorities shifting and the decreased amount of time in patients’ rooms. [1]

[1] Fakih, M., Bufalino, A., Sturm, L., Huang, R., Ottenbacher, A., Saake, K., Cacchione, J. (2021). COVID-19 Pandemic, CLABSI, and CAUTI: The Urgent Need to Refocus on Hardwiring Prevention Efforts. Infection Control & Hospital Epidemiology, 1-22. doi:10.1017/ice.2021.70
[2] Impact of SARS-CoV-2 on hospital acquired infection rates in the United States: Predictions and early results McMullen, Kathleen M. et al. American Journal of Infection Control, Volume 48, Issue 11, 1409 – 1411

Answering the “Why”

- Staffing issues have also been a potential influencer on increases in CLABSIs. [2]
- Compliance with CLABSI prevention efforts by using “line rounds” suffered during the COVID-19 pandemic. [1]
- The Centers for Medicare & Medicaid Services (CMS) waived reporting requirements for HAIs through June 2020.[2]
- Investigating and “ruling out” CLABSIs also changed during the pandemic.[2]
- An overall increase in demands placed on the healthcare system in general, regardless of COVID-19 patients, led to an increase in CLABSIs.[3]

[1] Fakih, M., Bufalino, A., Sturm, L., Huang, R., Ottenbacher, A., Saake, K., Cacchione, J. (2021). COVID-19 Pandemic, CLABSI, and CAUTI: The Urgent Need to Refocus on Hardwiring Prevention Efforts. Infection Control & Hospital Epidemiology, 1-22. doi:10.1017/ice.2021.70
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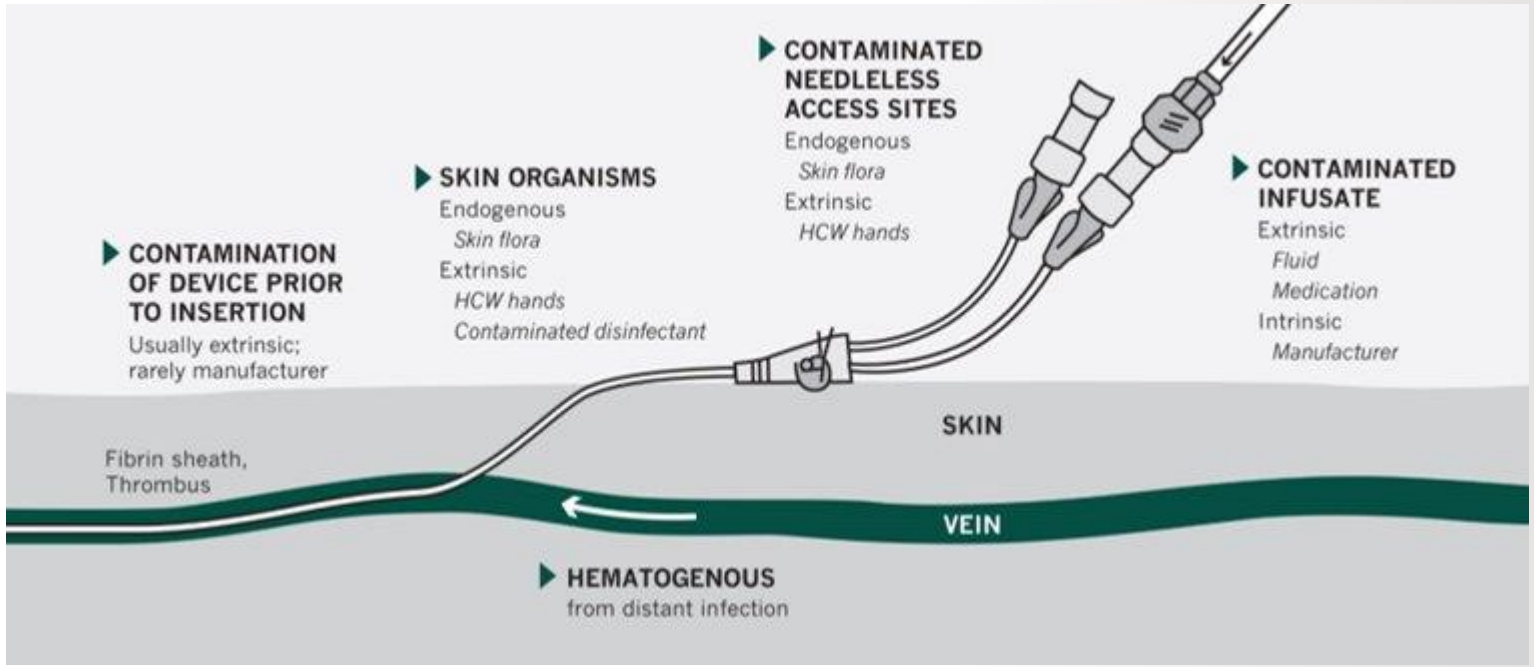
Pathogenesis of Intravascular Device-Related Bloodstream Infections (BSI)



- Microorganisms gain access to the device surface, adhere and become incorporated into a biofilm
- Access to the extraluminal surface of the device
- Cutaneous origin from skin flora at the insertion site or from healthcare worker's hands; percutaneous tract invaded
- Density of skin flora at the insertion site is a major risk factor for CLABSI
- Access to the intraluminal surface of the device
- Catheter hub and lumen contamination from device manipulation

Central Line Assessment/Audit:

The assessment usually includes the following activities/tasks:

- Observations on compliance with current facility policy/protocols.
- Central line insertion, maintenance, and dressing change observations (bundle adherence).
- Medication administration observations through central lines.
- Hand hygiene and PPE compliance observations.
- Overall environment of care cleaning and disinfection practice observations.
- Lab overview and blood culture collection process observations.
- Dialysis observations.
- Availability, placement, and correct use of needleless disinfection efforts.
- Query of staff to determine knowledge, use, and competence with CLABSI prevention products.
- Discussion of criteria for central line placement, insertion and dressing change protocols, assessment for ongoing central line necessity.
- Discuss CLABSI concerns with specific patient care areas, and CLABSI trend identification.
- Utilization of central line insertion, dressing change, and point prevalence audit tools for pre-/post-implementation compliance.
- Vascular access team efforts and interventions.
- Round table discussions with unit champions to identify and discuss any concerns or trends they see.

Actual Results from Multiple Assessments

Top noted issues included:

- Needleless connection disinfection gaps: Not scrubbing, scrubbing for too short of a time, not scrubbing when using caps.
- Location of (central) lines not optimal
- Multiple unnecessary PIV's
- Compromised dressings
- Hubbing of lines: (line is completely inserted all the way up to the hub of the line).
- Poor EOC disinfection practices – example IPHONES
- Poor central line insertion practices
- The use of sutures
- Not performing nasal decolonization as a CLABSI intervention

US Clinical Guideline for Disinfection of Needleless Access Devices

Organization and guideline	Port/hub cleansing recommendations
Centers for Disease Control and Prevention: Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011 www.cdc.gov	Minimize contamination risk by scrubbing the access port with an appropriate antiseptic (chlorhexidine, povidone iodine, an iodophor, or 70% alcohol) and accessing the port only with sterile devices.
Infusion Nurses Society (INS): Infusion Nursing Standards of Practice (#36), 2021 www.ins1.org	Perform active disinfection by a vigorous mechanical scrub using a flat swab pad containing 70% isopropyl alcohol or alcohol-based chlorhexidine suitable for use with medical devices. Studies comparing active and passive methods of disinfection show both processes to be effective. Active disinfection with alcohol-based chlorhexidine gluconate swab pads or passive disinfection with caps containing 70% isopropyl alcohol were associated with lower rates of CABSI, while swab pads containing 70% isopropyl alcohol were the least effective according to a meta-analysis of quasi-experimental studies. A recent RCT on disinfection of needleless connectors on central vascular access devices (CVADs) compared 70% isopropyl alcohol wipes, alcohol-based chlorhexidine gluconate wipes, and caps with 70% isopropyl alcohol. CABSI rates were low in both groups using isopropyl alcohol and zero in the group using alcohol-based chlorhexidine gluconate. Disinfect the connection surface before each entry.
Society for Healthcare Epidemiology or America (SHEA): Strategies to Prevent Central-Line Associated Bloodsteam Infections in Acute Care Hospitals, 2022 www.shea-online.org	Disinfect catheter hubs, needleless connectors and injection ports before accessing- Essential practice. *"Despite currently being supported by high level evidence, antiseptic containing caps remain an additional practice because they are not considered superior to the manual disinfection, and essential practice."*
The Joint Commission: Preventing Central Line-Associated Bloodstream Infections: Useful Tools, An International Perspective, Nov 20, 2013 www.jointcommission.org/CLABSIToolkit	To scrub the hub: Use a scrubbing device with an alcohol product such as chlorhexidine with alcohol or 70% alcohol to disinfect catheter hub and stopcocks. Rub for 10 to 15 seconds (unless directed otherwise by the manufacturer's instructions), generating friction by scrubbing in a twisting motion as if you were juicing an orange. Make sure you scrub the top of the hub well, not just the sides.
APIC: Guide to Preventing Central Line-Associated Bloodstream Infections, 2015 Apic.org/Resource	Scrub the injection site of needleless connector attached to the hub (or injection site on an IV administration set) for 15 seconds with alcohol or chlorhexidine gluconate (CHG)/alcohol prior to accessing central line (e.g. withdrawing blood, administering IV medication or fluids).
CDC: Hemodialysis Central Venous Catheter Scrub-The-Hub Protocol, 2016 www.cdc.gov/dialysis/prevention-tools/scrub-protocols.html	Remove the caps and disinfect the hub with a new antiseptic pad for each hub. Scrub the sides (threads) and end of the hub thoroughly with friction, making sure to remove any residue (e.g. blood).

2022 SHEA Essential Guidelines for CLABSI Prevention

- In 2022 SHEA released an update of CLABSI prevention strategies. These are the strategies they list as ESSENTIAL (must do).

Table 1. Summary of Recommendations to Prevent CLABSI

Essential Practices
Before insertion
1. Provide easy access to an evidence-based list of indications for CVC use to minimize unnecessary CVC placement (Quality of Evidence: LOW)
2. Require education and competency assessment of HCP involved in insertion, care, and maintenance of CVCs about CLABSI prevention (Quality of Evidence: MODERATE)[74–78]
3. Bathe ICU patients aged >2 months with a chlorhexidine preparation on a daily basis (Quality of Evidence: HIGH)[86–90]
At insertion
1. In ICU and non-ICU settings, a facility should have a process in place, such as a checklist, to ensure adherence to infection prevention practices at the time of CVC insertion (Quality of Evidence: MODERATE)[101]
2. Perform hand hygiene prior to catheter insertion or manipulation (Quality of Evidence: MODERATE)[102–107]
3. The subclavian site is preferred to reduce infectious complications when the catheter is placed in the ICU setting (Quality of Evidence: HIGH)[33,37,108–110]
4. Use an all-inclusive catheter cart or kit (Quality of Evidence: MODERATE)[118]
5. Use ultrasound guidance for catheter insertion (Quality of Evidence: HIGH)[119,120]
6. Use maximum sterile barrier precautions during CVC insertion (Quality of Evidence: MODERATE)[123–128]
7. Use an alcoholic chlorhexidine antiseptic for skin preparation (Quality of Evidence: HIGH)[42,129–134]
After insertion
1. Ensure appropriate nurse-to-patient ratio and limit use of float nurses in ICUs (Quality of Evidence: HIGH)[34,35]
2. Use chlorhexidine-containing dressings for CVCs in patients over 2 months of age (Quality of Evidence: HIGH)[45,135–142]
3. For non-tunneled CVCs in adults and children, change transparent dressings and perform site care with a chlorhexidine-based antiseptic at least every 7 days or immediately if the dressing is soiled, loose, or damp. Change gauze dressings every 2 days or earlier if the dressing is soiled, loose, or damp (Quality of Evidence: MODERATE)[145–148]
4. Disinfect catheter hubs, needleless connectors, and injection ports before accessing the catheter (Quality of Evidence: MODERATE)[150–154]
5. Remove nonessential catheters (Quality of Evidence: MODERATE)
6. Routine replacement of administration sets not used for blood, blood products, or lipid formulations can be performed at intervals up to 7 days (Quality of Evidence: HIGH)[164]
7. Perform surveillance for CLABSI in ICU and non-ICU settings (Quality of Evidence: HIGH)[13,165,166]

Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update | Infection Control & Hospital Epidemiology | Cambridge Core.

2022 SHEA Additional Approaches Guidelines for CLABSI Prevention

- The 2022 SHEA CLABSI prevention guideline also includes “additional approaches” (recommended but not essential).

Additional Approaches
1. Use antiseptic- or antimicrobial-impregnated CVCs (Quality of Evidence: HIGH in adult patients[38,39,169–171] and Quality of Evidence: MODERATE in pediatric patients)[172,173]
2. Use antimicrobial lock therapy for long-term CVCs (Quality of Evidence: HIGH)[177–184]
3. Use recombinant tissue plasminogen activating factor (rt-PA) once weekly after hemodialysis in patients undergoing hemodialysis through a CVC (Quality of Evidence: HIGH)[192]
4. Utilize infusion or vascular access teams for reducing CLABSI rates (Quality of Evidence: LOW)[193,194]
5. Use antimicrobial ointments for hemodialysis catheter insertion sites (Quality of Evidence: HIGH)[197–201]
6. Use an antiseptic-containing hub/connector cap/port protector to cover connectors (Quality of Evidence: MODERATE)[202–208]
Approaches that Should Not Be Considered a Routine Part of CLABSI Prevention
1. Do not use antimicrobial prophylaxis for short-term or tunneled catheter insertion or while catheters are *in situ* (Quality of Evidence: HIGH)[209–213]
2. Do not routinely replace CVCs or arterial catheters (Quality of Evidence: HIGH)[214]
Unresolved Issues
1. Routine use of needleless connectors as a CLABSI prevention strategy before an assessment of risks, benefits, and education regarding proper use[215–219]
2. Surveillance of other types of catheters (eg, peripheral arterial or peripheral venous catheters)[11,21,22]
3. Standard, nonantimicrobial transparent dressings and CLABSI risk.
4. The impact of using chlorhexidine-based products on bacterial resistance to chlorhexidine
5. Sutureless securement
6. Impact of silver zeolite-impregnated umbilical catheters in preterm infants (applicable in countries where it is approved for use in children)[227]
7. Necessity of mechanical disinfection of a catheter hub, needleless connector, and injection port before accessing the catheter when antiseptic-containing caps are being used

Note. CLABSI, central line-associated bloodstream infection; CVC, central venous catheter; HCP, healthcare personnel; ICU, intensive care unit.

Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update | Infection Control & Hospital Epidemiology | Cambridge Core.

A SHEA Callout

Additional approaches

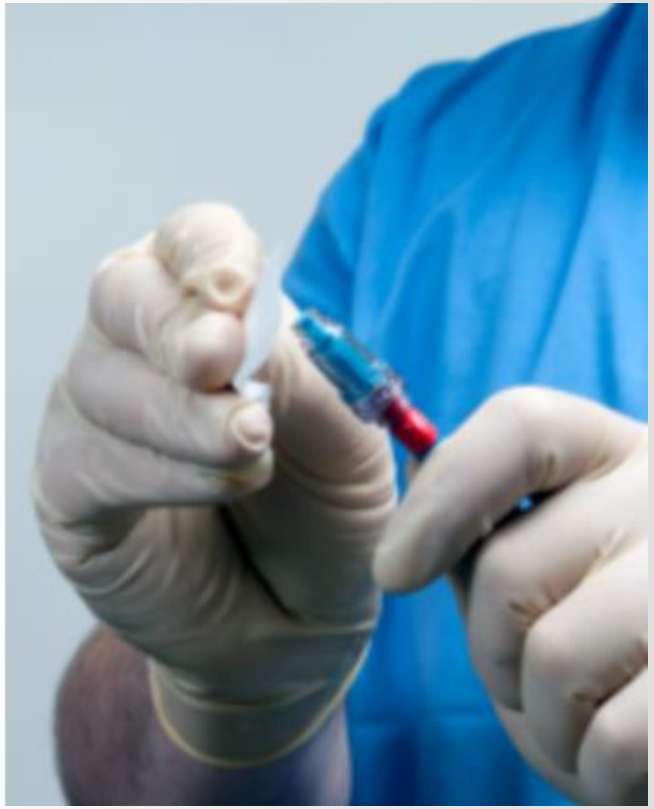
- Antimicrobial ointment for the catheter site, which is geared toward the population of hemodialysis patients, has been moved to "additional practices" given the focus on a specific population.
- Despite currently being supported by high-level evidence, antiseptic-containing caps remain an "additional practice" because they are not considered superior to the manual disinfection, an essential practice.
- The importance of infusion teams has been highlighted by listing it under "additional practices" (previously considered unresolved).

+ Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update | Infection Control & Hospital Epidemiology | Cambridge Core.

Updated 2021 INS Guidelines: Needleless Connectors

- The Infusion Nurses Society or INS is one of the leading organizations in the guidance of vascular access. The Standards of Practice Committee updated the standards in 2021.

National Guidelines or Best Practices:
1. “Perform active disinfection by a vigorous mechanical scrub using a flat swab pad containing 70% isopropyl alcohol or alcohol-based chlorhexidine suitable for use with medical devices”. (Standard #36- page s105)
2. “Disinfect the connection surface and sides of the needleless connector attached to any VAD to reduce introduction of intraluminal microbes”. (Standard # 36 page s-105)
3. “Standardize the type of needleless connector within the organization to reduce the risk for confusion and improve clinical outcomes”. (Standard #36- page s104)
4. “Disinfect the connection surface before each entry.” (Standard # 36 page s-105).



INS 2021 standards must be purchased and can be found at this link: https://www.ins1.org/infusion-therapy-standards-of-practice-landing-page/

INS Callouts for Needleless Connectors

3. Studies comparing active and passive methods of disinfection show both processes to be effective.
   a. Active disinfection with alcohol-based chlorhexidine gluconate swab pads or passive disinfection with caps containing 70% isopropyl alcohol were associated with lower rates of CABSI, while swab pads containing 70% isopropyl alcohol were the least effective according to a meta-analysis of quasi-experimental studies. A quasi-experimental study did not show a significant CABSI reduction in a pediatric critical care setting, probably associated with a short duration of catheter dwell in this population.
   b. A recent RCT on disinfection of needleless connectors on central vascular access devices (CVADs) compared 70% isopropyl alcohol wipes, alcohol-based chlorhexidine gluconate wipes, and caps with 70% isopropyl alcohol. CABSI rates were low in both groups using isopropyl alcohol and zero in the group using alcohol-based chlorhexidine gluconate.[30,37,38] (I)
4. Disinfect the connection surface before each entry.
   a. Studies focus on disinfection practices before the initial entry into the needleless connector; however, studies do not address the need for disinfection before subsequent entries required to administer an intermittent medication (eg, saline flushing before and after the medication, locking the VAD). Although the need for a full disinfection process before subsequent entries is unknown, removal of organic and inorganic debris (eg, blood-tinged fluid, dried medication, clothing lint, inadvertent touch contamination) with a disinfection pad between each entry may provide additional protection for the intraluminal fluid pathway. (Committee Consensus)

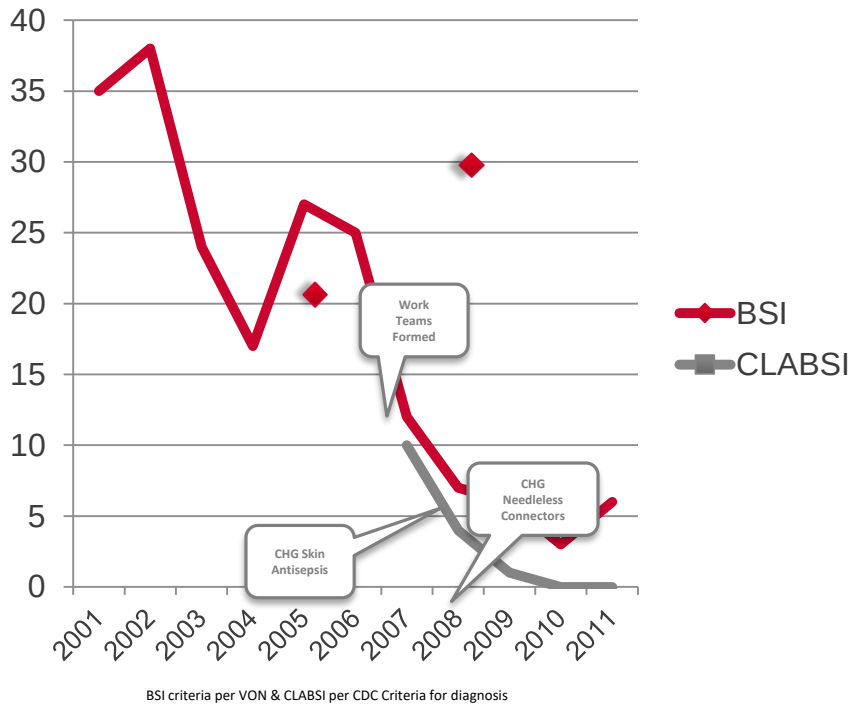
- Standard #36- “Needleless connectors” on page S-105
- When comparing alcohol pads, CHG and alcohol or disinfection caps, the group with the CHG and alcohol and zero infections.
- Continuing to recommend scrubbing before each and every entry
- Overall; alcohol pads perform the worst as a disinfection method when compared to alcohol with CHG pads or disinfection caps.

INS 2021 standards must be purchased and can be found at this link: https://www.ins1.org/infusion-therapy-standards-of-practice-landing-page/

Chlorhexidine Gluconate (CHG): A Key Piece of the BSI Puzzle

- Historically high BSI rate in a 35-bed community level III NICU
- Historically CHG was not used in very low birth weight infants due to an FDA contraindication.
- The language was changed in 2012 from “do not use” to “use with care in premature infants or infants under 2 months of age”
- Practice change implemented: Use of CHG and alcohol for skin antisepsis as well as cleaning of needleless connectors on all peripheral and central vascular access devices from an alcohol wipe to an alcoholic CHG (3.15%) wipe.
- CLABSI rate dropped from 7.1/1000 catheter days in 2008 to 0.56/1000 catheter days in 2009.
- CLABSI rate continued to decrease to ZERO CLABSI’s in 2010 and sustained zero to 2017.
- No significant skin irritation with CHG/IPA use.

Our NICU Journey to Zero Central Line-Associated Bloodstream Infections: Special Patients Require Special Interventions



BSI criteria per VON & CLABSI per CDC Criteria for diagnosis

RESULTS

- Sustained zero CLABSI for twenty (24) months consecutively, then again for 7 years
- Zero incidence of skin breakdown or erythema associated with the use of the CHG

CONCLUSIONS

- CLABSIs can be prevented and is sustainable in the NICU
- The CHG/ALC swab for disinfecting hubs and needleless connectors was the crucial intervention.
- Evolving clinical evidence suggests the use of CHG/ALC as best practice for needleless connectors
- Staff buy-in along with clinical best practices make zero possible.

Janet Pettit, MSN, NNP-BC, CNS, Neonatal Nurse Practitioner, Doctor's Medical & Kaiser Permanente Medical Center. Presented at APIC 2011.
Presented at the Association for Professionals in Infection Control and Epidemiology Annual Conference, June 27-29, 2011. Baltimore, MD. Abstract 7-062

CHG: Preventing Intraluminal Entry of Microorganisms: Scrub the Hub

Brief report

Disinfection of needleless connectors with chlorhexidine-alcohol provides long-lasting residual disinfectant activity

Haeyeon Hong BA [a], Debra Forbes Morrow RN, BSN [b], Thomas J. Sandora MD, MPH [c,d], Gregory P. Priebe MD [a,c,e,*]

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Key Words:
Central line-associated bloodstream infection
Line maintenance bundle

The optimal disinfection method for needleless connectors (NCs) is unclear. We used an experimental model of microbial NC contamination to test different scrub times (swipe, 5, 15, 30 seconds) of chlorhexidine-alcohol versus alcohol and for residual disinfectant activity. Swipe with alcohol did not adequately disinfect NCs, particularly when contaminated with *Staphylococcus aureus* or *Pseudomonas aeruginosa*. With ≥5-second scrub, chlorhexidine-alcohol and alcohol performed similarly, but chlorhexidine-alcohol showed residual disinfectant activity for up to 24 hours.

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Hong H et al. Am J Infect Control 2013:41

Hot Off the Press!

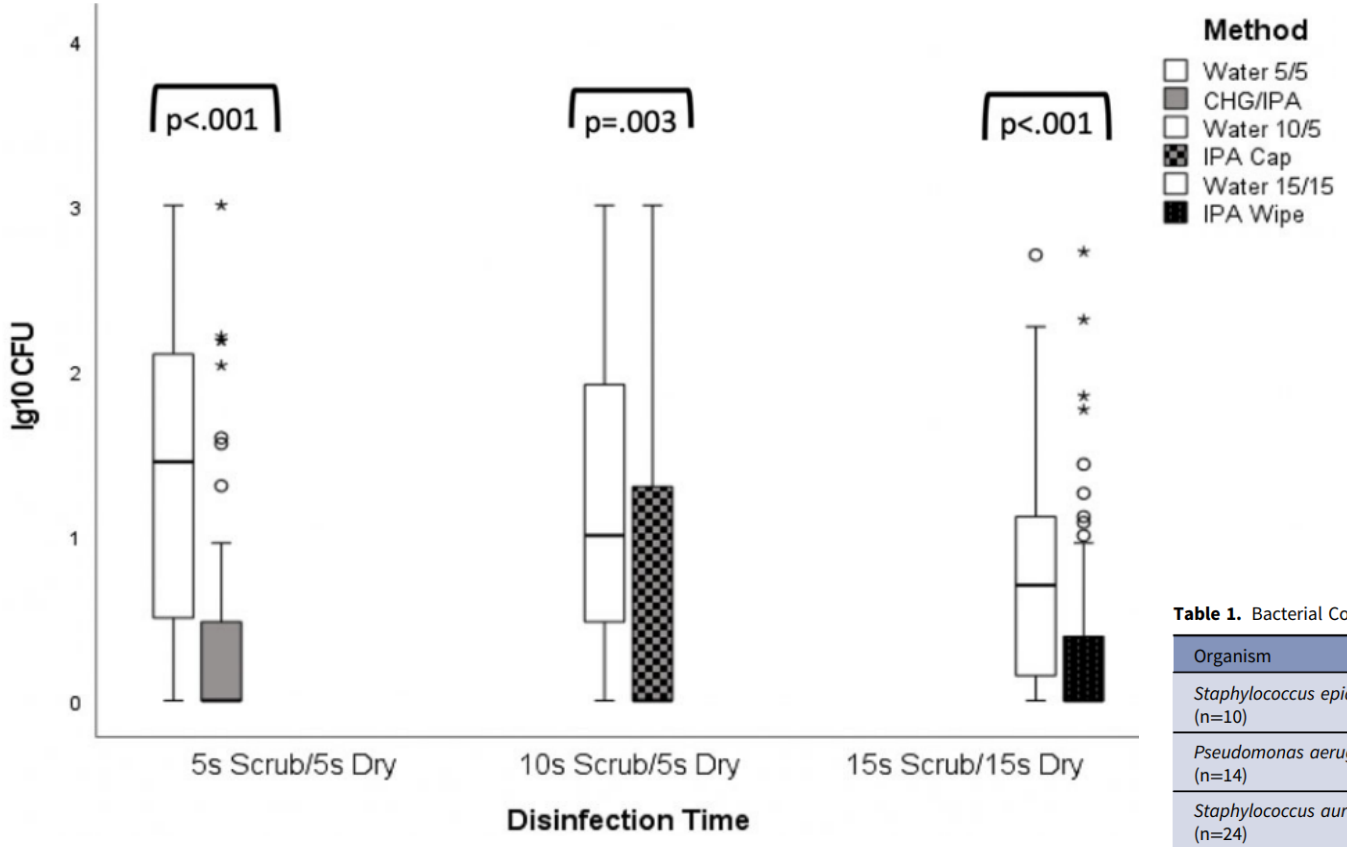


Table 1. Bacterial Colonization of Needleless Connectors After Experimental Contamination and Scrubbing by Raw CFU Counts

Organism	Inoculum (CFUs)	Dry time[a]	H_2O (5/5)[b]	H_2O (10/5)[b]	H_2O (15/15)[b]	IPA Wipe	IPA Cap	CHG/IPA Wipe
Staphylococcus epidermidis (n=10)	60,000 (38,250–297,500)	120 (75–120)	33 (13.75–131)	11.5 (0–138.75)	6 (3–8)	0 (0–1)	38 (0–216)	1 (0–19)
Pseudomonas aeruginosa (n=14)	97,500 (43,000–122,500)	120 (120–120)	7 (0–34)	4 (2.5–6.25)	3 (0.5–9.5)	0 (0–0)	0 (0–0)	0 (0–0)
Staphylococcus aureus (n=24)	160,000 (90,000–550,000)	120 (120–120)	72.5 (19.5–294)	32 (4–81)	3 (0–43.5)	0 (0–4.5)	1.5 (0–9.25)	0 (0–2)
Overall (n=48)	100,000 (59,250–352,500)	120 (120–120)	38 (4–189)	9 (2–81)	4 (0.5–12)	0 (0–1)	0 (0–8.5)	0 (0–3)

Note. CFU, colony-forming units; H_2O, sterile water; IPA, 70% isopropyl alcohol; CHG, chlorhexidine. CFU counts are reported as median (interquartile range).
[a]Dry time in minutes and reflects dry time after organism inoculation.
[b]Scrub time/dry time in seconds.

A mixed-methods evaluation on the efficacy and perceptions of needleless connector disinfectants. Infection Control & Hospital Epidemiology (2023), 44, 230–233 doi:10.1017/ice.2022.72

New Results Round 2

35 nurses from 5 intensive care units tested the 3 products for NC disinfection in unit break room via cross-sectional, observational and qualitative assessment.

89.7% of nurses **self reported** 15 sec s/d compliance
But….10% said their peers were compliant ☺

68.6% of nurses reported CHG/IPA wipe preference due to shorter scrub/dry times, swab size and wipe wetness.

Environmentally conscious

A mixed-methods evaluation on the efficacy and perceptions of needleless connector disinfectants. Infection Control & Hospital Epidemiology (2023), 44, 230–233 doi:10.1017/ice.2022.72

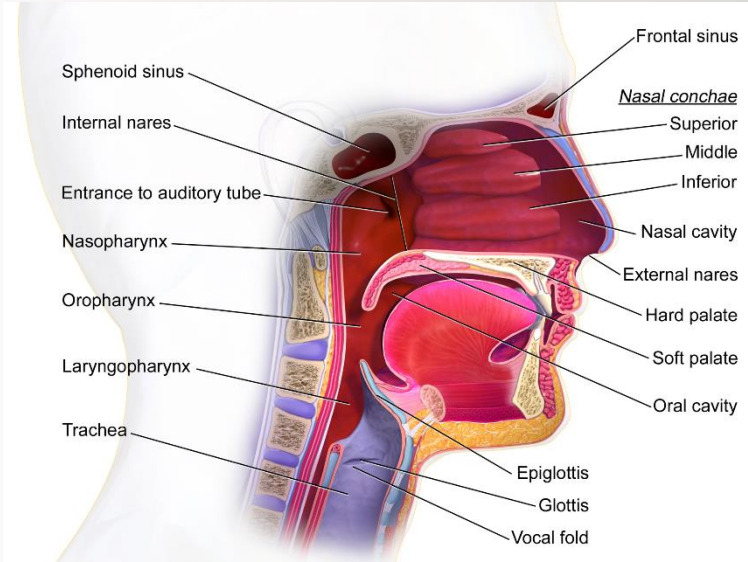
An outnumbered species

30 trillion human cells
39 trillion microrganisms in/on

PLoS Biol 14(8): e1002533.

The Nose Knows (proportion in healthy adults)

Staphylococcus epidermidis (79%)
Propionibacterium species (74.5%)
Staphylococcus aureus (34%)
Streptococcus pneumoniae (0.5%)
Haemophilus influenzae (5%)
Corynebacterium species (41%)



S. aureus bloodstream infections, the relatedness between nares and blood was 82.2% (*N Engl J Med.* 344(1):11-6)

Rhinology. 1986 Dec;24(4):249-55 and mBio Feb 2011, 2 (1) e00245-10; **DOI:** 10.1128/mBio.00245-10.

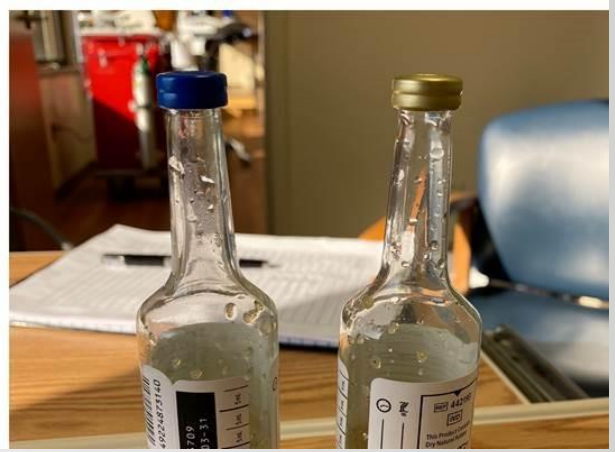
Decolonization and Bloodstream Infections

2003 meta analysis: *Staphylococcus aureus* bacteremia reduced by 78% in dialysis patients (Clin Infect Dis. 2003 Dec)

2013 REDUCE MRSA trial: 44% reduction in bloodstream infections due to any pathogen with universal decolonization (N Engl J Med 2013; 368:2255-2265)

2016 in 95 community hospitals: 23.5% reduction in CLABSI (Clin Infect Dis. 2016 Jul 15;63(2):172-7.)

2019 53 hospitals, 339,000 patients: 32% reduction in all cause bloodstream infections (Lancet 2019; 393(10177): 1205-1215)



CDC Core Strategies for CLABSI Prevention: Nasal Decolonization

- ICU : The CDC recommends as a Core Strategy to prevent *Staphylococcus aureus* bloodstream infections to reduce carriage of *S. aureus* among all ICU patients through CHG bathing in conjunction with nasal decolonization.
- High-risk patients: The CDC further recommends as a Core Strategy to prevent *Staphylococcus aureus* bloodstream infections by decolonizing patients outside of the ICU who have intravascular catheters (e.g. central lines).

National Guidelines or Best Practices:

1. **Core Strategy**:
   "Pursue a strategy to reduce carriage of *S. aureus* among all patients admitted to intensive care units (ICUs) including:
   Apply intranasal mupirocin twice a day to each nare for 5 days in conjunction with daily chlorhexidine bathing for duration of ICU admission. Intranasal iodophor could be considered as an alternative to intranasal mupirocin."

2. **Supplemental Strategy**
   "Pursue a strategy to reduce carriage of *S. aureus* for patients hospitalized with CVCs or midline catheters outside the ICU
   Apply intranasal mupirocin twice a day to each nare for 5 days in conjunction with daily chlorhexidine bathing while CVC or midline catheter is present
   Intranasal iodophor could be considered as an alternative to intranasal mupirocin."

CDC strategies available at: https://www.cdc.gov/hai/prevent/staph-prevention-strategies.html

Why Choose Nasal Decolonization Using an Antiseptic vs an Antibiotic? (PVP-I vs mupirocin?)

- Due to concerns over antibiotic resistant strains, antiseptics are emerging as an alternatives to mupirocin with an antiseptic iodophor (PVP-I).
- Studies have shown that up to 30% of MRSA strains have become resistant to mupirocin in some states.
- Mupirocin has less kill-coverage for organisms than antiseptics, which are broad spectrum.
- Antiseptics have no known resistance patterns from organisms as of yet.
- Re-colonization after application of Mupirocin is thought to occur as soon as two to three weeks after application, thus necessitating a re-application for any longer stays in the hospital. This can contribute to emerging resistance patterns within the hospital and the community.
- Antiseptics for decolonization fall into line with the goals of facilities towards antibiotic stewardship.

Optimal Site Placement for Central Lines and Number of Ports

National Guidelines or Best Practices:

1. “The subclavian site is the preferred site for central line insertion while the femoral site should be avoided except in an emergency”. (1) Joint Commission, National Patient Safety Goals

2. “Use a subclavian site, rather than a jugular or a femoral site, in adult patients to minimize infection risk for non-tunneled CVC placement”. (2) Category IB, CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections.

3. “Several non-randomized studies show that the subclavian vein site is associated with a lower risk of CLABSI than the internal jugular vein”. (3) IHI guide to prevent CLABSI, 2012, page 15.

4. “Use a CVC with the minimum number of ports or lumens essential for the management of the patient”. (2)Category IB, CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections.

5. “Studies have shown that multi-lumen IVD’s are associated with a higher risk of infection than are single lumen catheters”. (3) APIC text 2019 chapter 35, Intravascular Device Infection.

6. “The lowest risk of IVDA BSI is seen with subclavian vein insertion, and the highest risk is seen with femoral vein insertion, with an intermediate level of risk associated with jugular vein insertion”. (3) APIC text 2019 chapter 35, Intravascular Device Infection.

7. “The subclavian site is preferred to reduce infectious complications when the catheter is placed in the ICU setting”- SHEA 2022 guideline update

CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections can be found at this link: https://www.cdc.gov/infectioncontrol/guidelines/bsi/recommendations.html
The IHI guide to prevent CLABSI can be found at this link: http://www.ihi.org/resources/Pages/Tools/HowtoGuidePreventCentralLineAssociatedBloodstreamInfection.aspx
The APIC 2019 text can be found here: https://apic.org/resources/topic-specific-infection-prevention/central-line-associated-bloodstream-infections/
Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update | Infection Control & Hospital Epidemiology | Cambridge Core

Line Necessity and Removal of Lines (Including PIV)

National Guidelines or Best Practices:

1. “The necessity of the VAD is routinely assessed and is removed upon unresolved complication and when no longer necessary for treatment”. (1) INS guideline #42, page s-119

2. “Promptly remove any intravascular catheter that is no longer essential and perform daily audits.” (2) [69–72]. Category IA, CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections.

3. Line maintenance “bundle” includes the removal of central lines as soon as possible. (4) APIC text 2019 chapter 35, Intravascular Device Infection. (3)

4. In addition to CVCs, short-term peripheral catheters, peripherally inserted central venous catheters (PICCs), midline catheters, and peripheral arterial catheters also carry a risk of infection. –SHEA updated 2022 CLABSI guidelines (4)

5. Independent risk factors for CLABSI include not only multi-lumen catheters but the use of multiple IV’s/catheters at the same time. –SHEA updated 2022 CLABSI guidelines. (4)

INS 2021 standards must be purchased and can be found at this link: https://www.ins1.org/infusion-therapy-standards-of-practice-landing-page/
CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections can be found at this link: https://www.cdc.gov/infectioncontrol/guidelines/bsi/recommendations.html
The APIC 2019 text can be found here: https://apic.org/resources/topic-specific-infection-prevention/central-line-associated-bloodstream-infections/
Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update | Infection Control & Hospital Epidemiology | Cambridge Core.

Sutures and Suture Removal

- Sutures have been identified more and more to contribute to potential line infections as they harbor bacteria and biofilms, allowing the colonization of the exterior of the line, which can migrate into the blood stream. Best practice is to insert the line and use a sutureless securement device. If sutures are removed that should be done within approximately 7-14 days after the insertion of the line.

National Guidelines or Best Practices:

1. “Avoid use of sutures as they are not effective alternatives to a securement method; sutures are associated
with needlestick injury, support the growth of biofilm, and increase the risk of CABSI”.(1) INS 2021 standard #38 page s-109

2. “For Catheter securement devices; Use a sutureless securement device to reduce the risk of infection for intravascular catheters”. (2) Evidence level II. CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections 2011.

INS 2021 standards must be purchased and can be found at this link: https://www.ins1.org/infusion-therapy-standards-of-practice-landing-page/
CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections can be found at this link: https://www.cdc.gov/infectioncontrol/guidelines/bsi/recommendations.html

Digital Screens (Including Cell Phones): Cleaning & Disinfection

- Evidence suggests that cell phones, tablets, and other personal hand-held devices are highly contaminated with microorganisms, some potentially pathogenic. Researchers recommended regular cleaning of these devices and implementing hand hygiene before and after use. Reducing the numbers of microorganisms present on the devices may protect patients from the risk of HAIs resulting from the transfer of microorganisms from the devices or hands of health care workers to patients

National Guidelines or Best Practices:

1. “Clean cell phones, tablets, and other personal communication or hand-held electronic equipment according to the device manufacturer’s IFU before these items are brought into the OR and perform hand hygiene.” (1) AORN guidelines for surgical attire, 2020.

2. Researchers recommended regular cleaning of cell phones and other hand-held electronic devices to reduce the number of microorganisms present on the devices which helps to protect patients from the risk of HAIs. (2)

AORN Guideline For Surgical Attire, Section 9. Personal Items, Recommendation 9.2, page 12
Datta P, Rani H, Chandler J, Gupta V. Bacterial contamination of mobile phones of health care workers. Indian J Med Microbiol. 2009;27(3):279-281. [IB]

Blood Culture Collection

National Guidelines or Best Practices:

1. The venipuncture site should be prepared by first vigorously cleansing for 30 s back and forth across the site with 70% isopropyl alcohol followed by either 1 to 2% tincture of iodine, which is allowed to dry for at least 30 s, or 2% chlorhexidine, which is allowed to dry for at least 30 s, before inserting the needle". Cumitech guideline.

2. "Skin preparation for obtaining percutaneously drawn blood samples should be performed carefully, with use of either alcohol or tincture of iodine or alcoholic chlorhexidine greater than 0.5% CHG, rather than povidone-iodine. Skin preparation with either alcohol, alcoholic chlorhexidine (>0.5%), or tincture of iodine (10%) leads to lower blood culture contamination rates than does the use of povidone-iodine". Infectious Diseases Society of America (IDSA):

3. "Use a CVAD for drawing blood cultures only when the catheter is suspected of being the source of infection. Draw a set of blood cultures from a peripheral vein simultaneously with the CVAD sample to confirm the BSI diagnosis". INS 2021 guidelines Standard #44 page s-127.

4. "It is recommended to avoid drawing blood from a venous or arterial catheter, since these devices are often associated with higher contamination rates". Blood culture best practices from Biomerieux.

5. "Use a dedicated phlebotomy team to reduce blood culture contamination". INS 2021 guidelines Standard #44 page s-127

6. "Obtaining blood cultures from short PIVCs at insertion or during the dwell is not recommended". INS 2021 guidelines Standard #44 page s-129

7. "Additionally, the needleless connector should be changed in the following circumstances including prior to drawing a sample for blood culture from the VAD". INS 2021 guidelines Standard #36 page s-106

8. "It is indefensible to start anti-infective drugs for suspected or presumed infection in the critically ill patient without first obtaining blood cultures from two separate sites, at least one of which is drawn from a peripheral vein by percutaneous venipuncture". APIC 2019 text, Intravascular device infection, page18/66.

Hand Hygiene Guidelines

- The World Health Organization recommends hand hygiene for specific moments during patient care. These include before and after entering a patient room, however they also specifically mention other times to perform hand hygiene when in the room itself, such as before a clean/aseptic task, or after exposure to body fluids or after contact with patient surroundings. Many times, when hand hygiene is missed, it is in the patient room between such tasks.

1 BEFORE PATIENT CONTACT	**WHEN?** Clean your hands before touching a patient when approaching him or her **WHY?** To protect the patient against harmful germs carried on your hands
2 BEFORE AN ASEPTIC TASK	**WHEN?** Clean your hands immediately before any aseptic task **WHY?** To protect the patient against harmful germs, including the patient's own germs, entering his or her body
3 AFTER BODY FLUID EXPOSURE RISK	**WHEN?** Clean your hands immediately after an exposure risk to body fluids (and after glove removal) **WHY?** To protect yourself and the health-care environment from harmful patient germs
4 AFTER PATIENT CONTACT	**WHEN?** Clean your hands after touching a patient and his or her immediate surroundings when leaving **WHY?** To protect yourself and the health-care environment from harmful patient germs
5 AFTER CONTACT WITH PATIENT SURROUNDINGS	**WHEN?** Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving - even without touching the patient **WHY?** To protect yourself and the health-care environment from harmful patient germs

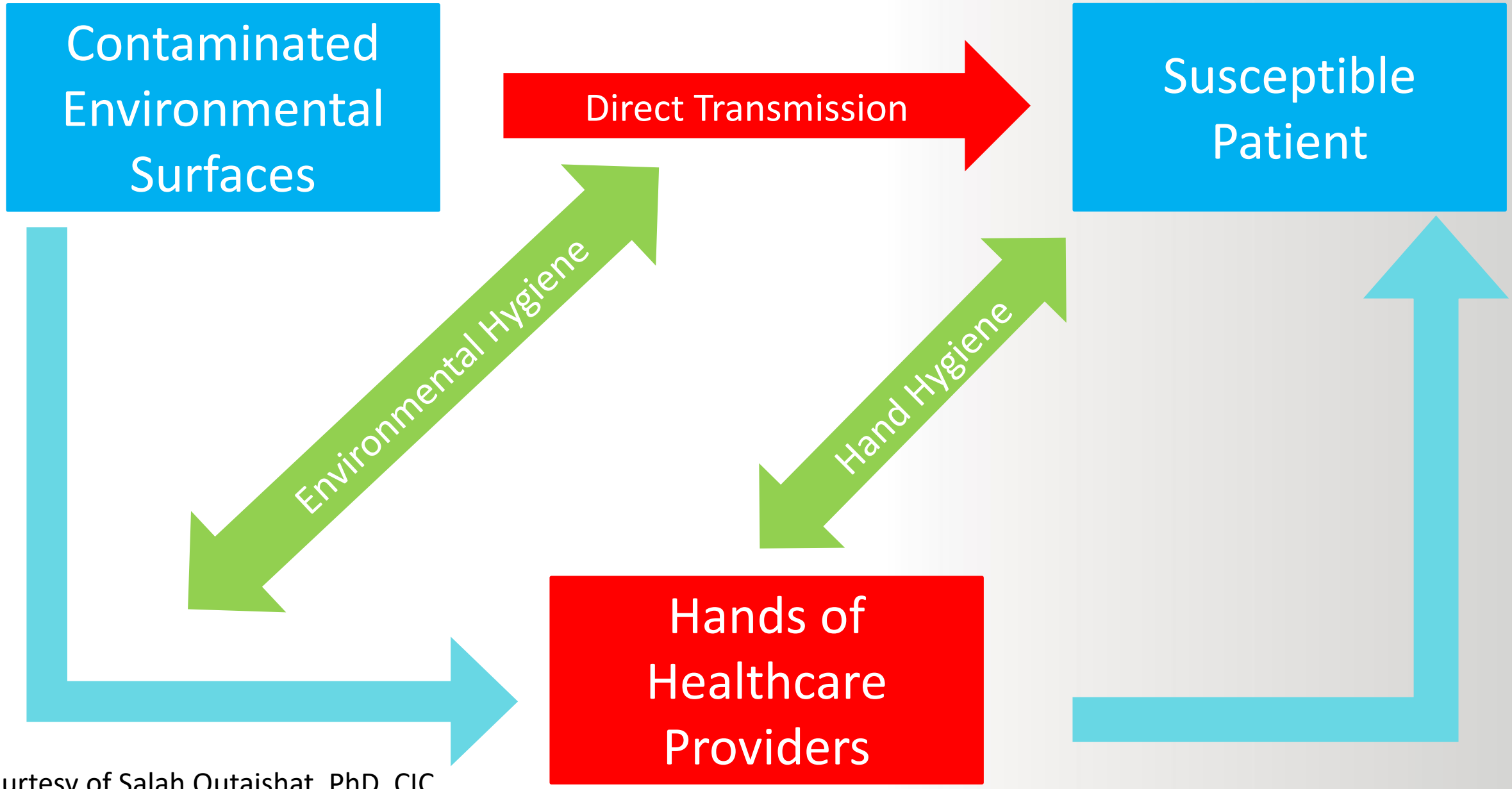
WHO Hand Hygiene Strategies are available at: https://www.who.int/gpsc/tools/5momentsHandHygiene_A3.pdf?ua=1

Environment of Care: Cleaning and Disinfection

- Studies have found that the environment can be a source of contamination and contribute to hospital acquired infections. A focus on the cleaning and disinfection of the environment is a key component to any infection control program. By placing disinfectant wipes in an easy to find and easy to access area for healthcare workers, facilities ensure that the environment of care is a focus for infection prevention efforts.

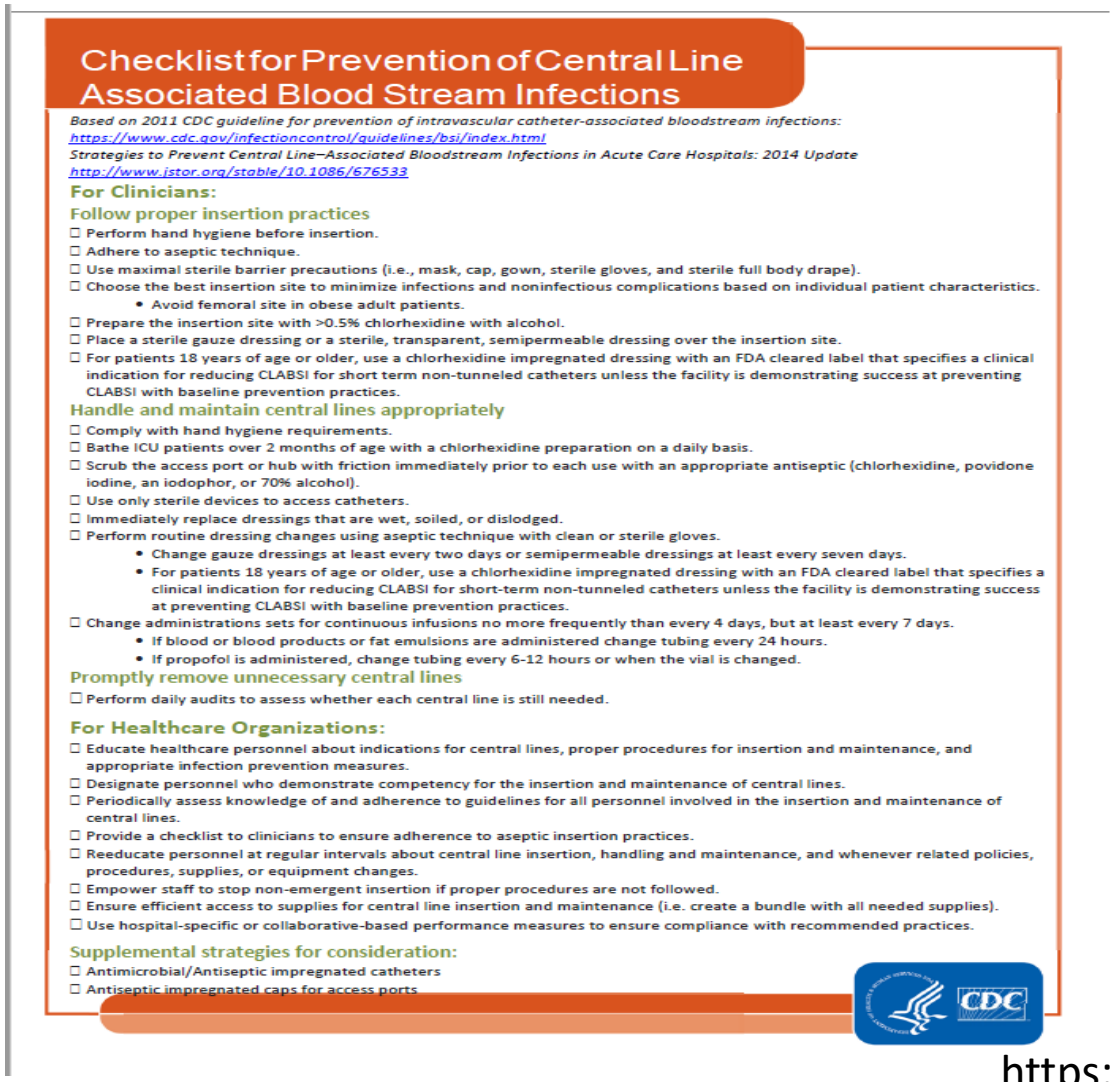
National Guidelines or Best Practices:
1. “Containers with multiple disposable wipes impregnated with disinfectant can make cleaning and disinfection of small spills and surfaces easier and more convenient. These wipes combine cleaning and disinfection into a one step process at the point of care.” (1) APIC 2019 text; Environmental services page 7/52.
2. “To protect patients, staff and visitors from potential exposure, it is vitally important to prevent the healthcare environment from becoming a reservoir of pathogenic (harmful) microorganisms.” (2)AHE practice guidance 2nd edition, page 17.
3. “The transfer of microorganisms from environmental surfaces to patients is largely via hand contact with the surface. Although HH is important to minimize the impact of this transfer, cleaning and disinfecting of environmental surfaces as appropriate is fundamental in reducing their potential contribution to the incidence of healthcare associated infections”. (3)CDC environmental guidelines page 85 of 240.

The APIC 2019 text can be found here: https://apic.org/resources/topic-specific-infection-prevention/central-line-associated-bloodstream-infections/
AHE practice guidance for healthcare environmental cleaning must be purchased and can be found here: https://www.ahe.org/ahe-practice-guidance-health-care-environmental-cleaning-2nd-edition
CDC environmental guidelines for cleaning and disinfection can be found at this link: https://www.cdc.gov/infectioncontrol/guidelines/environmental/background/services.html



Courtesy of Salah Qutaishat, PhD, CIC

CDC Central Line Insertion Checklist



Checklist for Prevention of Central Line Associated Blood Stream Infections

Based on 2011 CDC guideline for prevention of intravascular catheter-associated bloodstream infections:
https://www.cdc.gov/infectioncontrol/guidelines/bsi/index.html
Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update
http://www.istor.org/stable/10.1086/676533

For Clinicians:

Follow proper insertion practices

- ☐ Perform hand hygiene before insertion.
- ☐ Adhere to aseptic technique.
- ☐ Use maximal sterile barrier precautions (i.e., mask, cap, gown, sterile gloves, and sterile full body drape).
- ☐ Choose the best insertion site to minimize infections and noninfectious complications based on individual patient characteristics.
  - Avoid femoral site in obese adult patients.
- ☐ Prepare the insertion site with >0.5% chlorhexidine with alcohol.
- ☐ Place a sterile gauze dressing or a sterile, transparent, semipermeable dressing over the insertion site.
- ☐ For patients 18 years of age or older, use a chlorhexidine impregnated dressing with an FDA cleared label that specifies a clinical indication for reducing CLABSI for short term non-tunneled catheters unless the facility is demonstrating success at preventing CLABSI with baseline prevention practices.

Handle and maintain central lines appropriately

- ☐ Comply with hand hygiene requirements.
- ☐ Bathe ICU patients over 2 months of age with a chlorhexidine preparation on a daily basis.
- ☐ Scrub the access port or hub with friction immediately prior to each use with an appropriate antiseptic (chlorhexidine, povidone iodine, an iodophor, or 70% alcohol).
- ☐ Use only sterile devices to access catheters.
- ☐ Immediately replace dressings that are wet, soiled, or dislodged.
- ☐ Perform routine dressing changes using aseptic technique with clean or sterile gloves.
  - Change gauze dressings at least every two days or semipermeable dressings at least every seven days.
  - For patients 18 years of age or older, use a chlorhexidine impregnated dressing with an FDA cleared label that specifies a clinical indication for reducing CLABSI for short-term non-tunneled catheters unless the facility is demonstrating success at preventing CLABSI with baseline prevention practices.
- ☐ Change administrations sets for continuous infusions no more frequently than every 4 days, but at least every 7 days.
  - If blood or blood products or fat emulsions are administered change tubing every 24 hours.
  - If propofol is administered, change tubing every 6-12 hours or when the vial is changed.

Promptly remove unnecessary central lines

- ☐ Perform daily audits to assess whether each central line is still needed.

For Healthcare Organizations:

- ☐ Educate healthcare personnel about indications for central lines, proper procedures for insertion and maintenance, and appropriate infection prevention measures.
- ☐ Designate personnel who demonstrate competency for the insertion and maintenance of central lines.
- ☐ Periodically assess knowledge of and adherence to guidelines for all personnel involved in the insertion and maintenance of central lines.
- ☐ Provide a checklist to clinicians to ensure adherence to aseptic insertion practices.
- ☐ Reeducate personnel at regular intervals about central line insertion, handling and maintenance, and whenever related policies, procedures, supplies, or equipment changes.
- ☐ Empower staff to stop non-emergent insertion if proper procedures are not followed.
- ☐ Ensure efficient access to supplies for central line insertion and maintenance (i.e. create a bundle with all needed supplies).
- ☐ Use hospital-specific or collaborative-based performance measures to ensure compliance with recommended practices.

Supplemental strategies for consideration:

- ☐ Antimicrobial/Antiseptic impregnated catheters
- ☐ Antiseptic impregnated caps for access ports

https://www.cdc.gov/infectioncontrol/guidelines/bsi/index.html

Audit Tool: Central Line Insertion

Central Line Placement Protocol:	Yes	No	N/A	Comments:
BEFORE the procedure:				
Patient is educated about the need for and implications of the central line as well as the processes of insertion and maintenance				
Patient's latex/adhesive allergy assessed (modify supplies)				
Patient's infection risk assessed. If at greater risk, why?				
Patient's anticoagulation therapy				
Consent form and other relevant documents complete and in chart (Exception: Emergent Procedure)				
Clean and disinfect surface prior to placing procedure supplies				
Operator and Assistant used appropriate hand hygiene immediately				
Is hand hygiene readily accessible to operator during procedure?				
Equipment assembled and verified—materials, medications, syringes, dressings, and labels				
Patient identified with 2 sources of				
Procedural time-out performed				
Site assessed and marked				

Summary of US Clinical Guidelines for Skin Antisepsis

- Guidelines and best practice for skin antisepsis for CLABSI prevention is to use a chlorhexidine-alcohol based skin antiseptic prior to central line insertion, lab draws, skin punctures and during dressing changes.

Organization and Guideline	Skin Antisepsis Recommendations
Centers for Disease Control and Prevention: Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2017. www.cdc.gov	Prepare clean skin with a >0.5% chlorhexidine preparation with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes. If there is a contraindication to chlorhexidine, tincture of iodine, an iodophor, or 70% alcohol can be used as alternatives. *Category IA* Prepare clean skin with an antiseptic (70% alcohol, tincture of iodine, or alcoholic chlorhexidine gluconate solution) before peripheral venous catheter insertion. *Category IB*
Infusion Nurses Society (INS): Infusion Nursing Standards of Practice, 2016. www.ins1.org	Perform skin antisepsis using the preferred skin antiseptic agent of >0.5% chlorhexidine in alcohol solution. If there is a contraindication to alcoholic chlorhexidine solution, tincture of iodine, an iodophor (povidone-iodine), or 70% alcohol may also be used. Use chlorhexidine with caution in prematureinfants and infants under 2 months of age due to risks of skin irritation and chemical burns.
Society for Healthcare Epidemiology of America (SHEA): Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update	Use an alcoholic chlorhexidine antiseptic for skin preparation (quality of evidence: I). Before catheter insertion, apply an alcoholic chlorhexidine solution containing more than 0.5%CHG to the insertion site. The optimal choice of antiseptic agents is unresolved for children under 2 months of age. However, chlorhexidine is widely used in children under 2 months of age.
The Joint Commission: 2011 National Patient Safety Goals for Hospitals- 2020 NPSG released with no update to 2011	Use an antiseptic for skin preparation during central venous catheter insertion that is cited in scientific literature or endorsed by professional organizations.
Infectious Diseases Society of America (IDSA): Clinical Practice Guidelines for the Diagnosis and Management of Intravascular Catheter-Related Infection- no update to 2009	Skin preparation for obtaining percutaneously drawn blood samples should be performed carefully, with use of either alcohol or tincture of iodine or alcoholic chlorhexidine greater than 0.5% CHG, rather than povidone iodine. Skin preparation with either alcohol, alcoholic chlorhexidine (>0.5%), or tincture of iodine (10%) leads to lower blood culture contamination rates than does the use of povidone-iodine.
APIC Guide to Preventing Central Line-Associated Bloodstream Infections, 2015.	Use of a CHG-alcohol product for skin antisepsis has demonstrated lower contamination rates than aqueous povidone-iodine.28,29 In neonatal patients, this product can be used safely with caution. Skin preparation for obtaining percutaneously drawn blood samples should be performed carefully, with use of either alcohol or tincture of iodine or alcoholic chlorhexidine (> 0.5 percent) rather than povidone iodine, allowing adequate skin contact and drying times to mitigate blood culture contamination (A-I). Appropriate skin prep - Chlorhexidine gluconate (CHG) for patients > 60 days old - Povidone iodine, alcohol, CHG, or other specified for children < 60 days old
APIC Guide to the Elimination of Infections in Hemodialysis- no update to 2010	For patients older than 2 months, a skin preparation solution containing greater than 0.5% chlorhexidine gluconate and 70% isopropyl alcohol should be applied to the insertion site and allowed to dry before the skin is punctured.

Audit Tool: Central Line Dressing Change

Central Line Dressing Change Protocol:	Yes	No	N/A	Comments:
BEFORE the procedure:				
Equipment gathered that is needed for dressing change				
Surface is disinfected appropriately prior to setting equipment down				
Patient identified with 2 sources of				
Operator assisted the patient to a 30 degrees position or a position that allows easy access to the dressing				
Operator applied surgical mask to patient				
Operator performed hand hygiene				
Is hand hygiene readily accessible to the operator during the procedure				
Others in room wearing mask				
Sterile dressing change kit opened, mask removed and operator placed mask on themselves				
Operator put on clean, non-sterile, gloves				
Remove old dressing without dislodging catheter				
Operator removed and disposed of gloves, and performed hand hygiene				
Operator inspected site for erythema, infection, suture stability				
Operator opened and properly set up sterile kit				
Operator correctly donned sterile gloves				

Audit Tool: Central Line Point Prevalence

Central Line Maintenance Audit

Date		CSL audi	
Facility		Unit	

		Line Typ	Dressing condition			Tubing	Needleless connectors					Orders/ Daily Needs		CHG bathing	Comments:
Room	Patient identifier (if available)	See list	Dressing Intact	Dated & changed according to policy	CHG patch or dressing placed correctly	Labeled & changed according to policy	HH performed prior to access	Scrubbing hub according to policy	Covered with cap (defined by policy)	Changed according to policy	Visibly soiled?	Line assessed daily for necessity	Orders in place for use, maintenance and daily assessment (per policy); flushing protocol	Performed per policy	

Summary

CLABSI rates increased dramatically starting in 2020 for reasons related to patient acuity, staffing and the general inability to maintain some of the more time/resource intense prevention activities (rounds) among others

A “return to basics” is warranted in order to reclaim the celebrated gains in CLABSI reductions in recent pre-pandemic years

2021 INS Guidelines: scrub using active disinfection noting that alcohol is less effective than CHG+alcohol and standardize the connectors

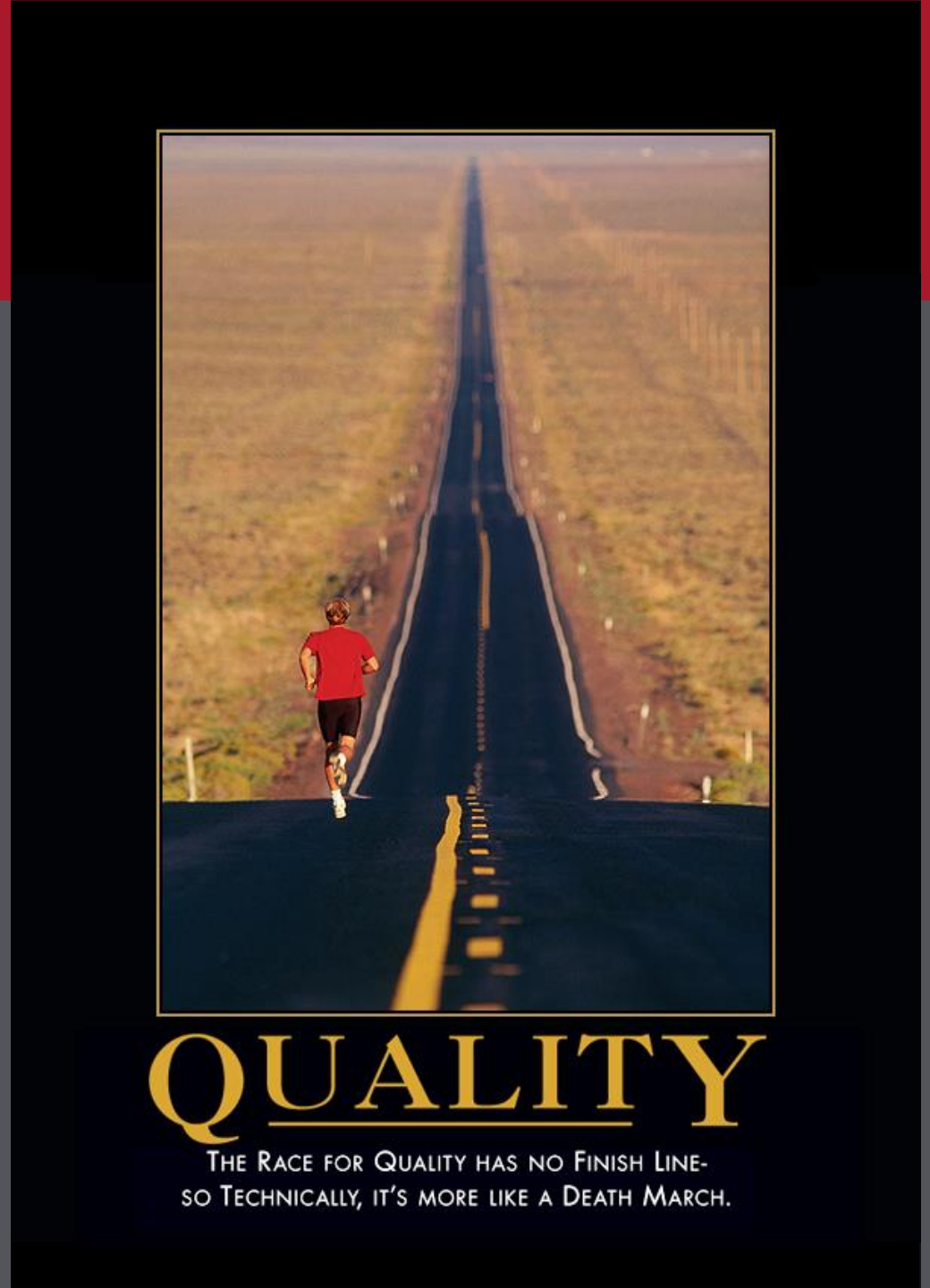
Decolonization (nares and skin) a CDC Core Strategy to prevent bloodstream infections

Pay attention to fomites in the environment and in your pocket.

Summary

- SHEA Guideline updates
  - A preference for subclavian placement
  - Essential practices
    - Ultrasound guidance during placement
    - CHG dressings
    - Replace administration sets every 7 days (not 4)
  - Deploy VAT teams as an additional approach category
  - Antiseptic caps are an additional practice but not superior to the essential practice of manual disinfection.

Thank You!


QUALITY
The Race for Quality has no Finish Line-
so Technically, it's more like a Death March.