Children's Hospitals' Solutions for Patient Safety
Every patient. Every day.

SPS PREVENTION BUNDLE

Central Line-associated Blood Stream Infections (CLABSI)

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I. Background & Team

CLABSI (Central Line-Associated Blood Stream Infections) is the largest contributor to harm caused across the SPS network. In 2011, approximately 97 children were harmed each month as a result of CLABSI across the Phase I SPS hospitals (n=33). The CLABSI team (formed in May of 2012 to develop strategies consistent with high reliability concepts to reduce harm caused by CLABSI) released the first recommended bundle to the network. In 2013, Phase II hospitals (n=55) joined the network and the number of children harmed per month increased to 159.

The network strategy has been successful with an 11% CLABSI reduction across the network as of May 2014. As we moved into 2019, we had 135+ hospitals aiming to reduce CLABSI harm to hospitalized children. Using data obtained from the SPS network, as well as external evidence in the medical literature, the CLABSI team has identified bundle elements that, when reliably implemented, are highly likely to result in decreased harm to hospitalized children.

As a result, SPS is stratifying bundle elements based on their level of evidence to assist hospitals in prioritizing their efforts at designing and implementing evidence-based bundles for CLABSI and the other aviator HACs:

- *Standard Element:* Strong evidence suggests that implementation of this element is associated with significant decrease in patient harm; **all SPS hospitals should implement and measure reliability of this element.**
- *Recommended Element*: Preliminary data and clinical expert opinion support the implementation of this element; **SPS hospitals should strongly consider implementing this element.**

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II. Prevention Bundle Elements – Overview

Insertion

SPS Standard Elements

- Hand Hygiene
- CHG Scrub
- No iodine ointment
- Prepackaged or filled insertion cart, tray, or box
- Insertion checklist with staff empowerment to stop non-emergent procedure
- Full sterile barrier for providers and patients
- Insertion training for all providers

SPS Recommended Elements

- Not applicable

Maintenance

SPS Standard Elements

- Daily discussion of line necessity, functionality and utilization including bedside and medical care team members
- Regular assessment of dressing to assure clean/dry/occlusive
- Standardized access procedure
- Standardized dressing, cap, and tubing change procedures/timing
- Daily CHG treatments for all patients > 2 months adjusted age with central venous catheters (SPS strongly recommends the use of 2% CHG wipes) (*Recommended element for Hem-Onc population* ***only***)

SPS Recommended Elements

- An in-depth review of all identified CLABSI with multidisciplinary involvement AND the intent to change the process if needed
- Daily linen changes

III. Prevention Bundle Elements – Evidence Reviewed

Prevention Bundle Element - Insertion	Level of Evidence CDC*/SPS**	Evidence Cited (Numbers refer to Reference Section)
Standard Elements		
Hand hygiene	*IB/**Scenario 4	3,4,5
CHG scrub	*IA/**Scenario 4	3,4,5
No iodine ointment	*IB/**Scenario 4	3,4,5
Prepackaged or filled insertion cart, tray, or box	NA/**Scenario 4	3,4,5
Insertion checklist with staff empowerment to stop non-emergent procedure	NA/**Scenario 4	3,4,5
Full sterile barrier for providers and patients	*IB/**Scenario 4	3,4,5
Insertion training for all providers	*IA/**Scenario 4	3,4,5

Prevention Bundle Element - Maintenance	Level of Evidence CDC*/SP	Evidence Cited (Numbers refer to Reference Section)
Standard Elements		
Daily discussion of line necessity, functionality, and utilization including bedside and medical care team members	*IB/**Scenario 4	3,4,5
Regular assessment of dressing to assure clean/dry/occlusive	*IB /**Scenario 4	3,4,5
Standardized access procedure	*IB/**Scenario 4	3,4,5
Standardized dressing, cap, and tubing change procedures/timing	*IB/**Scenario 4 & 2	3,4,5
Daily CHG treatments with 2% wipes *(recommended element for Hem-Onc population **only**)*	*1A (ICUs)	1,2,6,7,8,9,10,13,15,16
Recommended Elements		
An in-depth review of all identified CLABSI with multidisciplinary involvement AND the intent to change the process if needed	N/A	5
Daily linen changes		

***CDC Modified Recommendation Category**

- **IA** - A strong recommendation supported by high to moderate quality evidence suggesting net clinical benefits or harms
- **IB** - A strong recommendation supported by low quality evidence suggesting net clinical benefits or harms or an accepted practice (e.g., aseptic technique) supported by low to very low quality evidence
- **IC** - A strong recommendation required by state or federal regulation
- **II** - A weak recommendation supported by any quality evidence suggesting a trade-off between clinical benefits and harms

****SPS Evidence**

- **Scenario 1**: Reliably implementing element is associated with statistically significant improvement
- **Scenario 2**: Failing to implement element is associated with statistically significant failure to improve along with the system
- **Scenario 3**: In cases where all hospitals implement, implementing an element without measuring reliability of the element is associated with statistically significant failure to improve along with the system
- **Scenario 4**: Reliably implementing element is not associated with statistically significant improvement; however, literature supports adoption of element as an SPS standard

Additional Information on Daily CHG Treatments for the Hem-Onc Populations (Nov. 2021):

Beginning in 2019, SPS promoted Daily Chlorhexidine (CHG) Treatments from a recommended to standard element. Since that time, a new randomized controlled trial of CHG in the Hem-Onc population has been published, raising questions about mixed evidence regarding efficacy of this practice in this specific population. After careful consideration from our CLABSI/CLABSI Hem-Onc Co-leaders, SPS Clinical Steering Team, and SPS leadership, the CLABSI bundle element Daily Chlorhexidine (CHG) Treatments will transition back from standard (required) to recommended for only the Hem-Onc population starting in November 2021. For all other patient populations with a central line, daily CHG treatments will remain a standard SPS element. While this change allows for hospitals to defer to local expertise and guidelines regarding CHG bathing in Hem-Onc patients, SPS clinical leadership and the CLABSI Co-leaders still strongly encourage this practice.

IV. Prevention Bundle Elements – Care Descriptions

Prevention Bundle Element - Insertion	Care Descriptions
Standard Elements	
Hand hygiene	• Perform hand hygiene procedures, either by washing hands with conventional soap and water or with alcohol-based hand rubs (ABHR). Hand hygiene should be performed before and after palpating catheter insertion sites as well as before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter. Palpation of the insertion site should not be performed after the application of antiseptic, unless aseptic technique is maintained [CDC Reference]
CHG scrub	• Prepare clean skin with an antiseptic (70% alcohol, tincture of iodine, an iodophor or chlorhexidine gluconate) before peripheral venous catheter insertion [CDC Reference] • 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 [CDC Reference]
No iodine ointment	• Do not use topical antibiotic ointment or creams on insertion sites, except for dialysis catheters, because of their potential to promote fungal infections and antimicrobial resistance [CDC Reference]
Prepackaged or filled insertion cart, tray, or box	• Catheter cart that contains all the necessary supplies (CDC Reference]
Insertion checklist with staff empowerment to stop non-emergent procedure	• Include a checklist to ensure adherence to proper practices [CDC Reference] • Stoppage of procedures in non-emergent situations, if evidence-based practices were not being followed [CDC Reference]
Full sterile barrier for providers and patients	• Use maximal sterile barrier precautions, including the use of a cap, mask, sterile gown, sterile gloves, and a sterile full body drape for the insertion of CVCs, PICCs, or guidewire exchange 2. Use a sterile sleeve to protect pulmonary artery catheters during insertion [CDC Reference]
Insertion training for all providers	• Refer to CDC reference on education & training details (page e169)

Prevention Bundle Element - Maintenance	Care Descriptions
Standard Elements	
Daily discussion of line necessity, functionality and utilization including bedside and medical care team members	◦ Discuss with the medical team continued necessity of line ◦ Discuss with the medical team the function of the line and any problems ◦ Discuss with the medical team the frequency of access and utilization of line. Consider bundling labs and line entries ◦ Consider best practice is documentation that the discussion occurred in the medical record
Regular assessment of dressing to assure clean/dry/occlusive	◦ Replace catheter site dressing if the dressing becomes damp, loosened, or visibly soiled (CDC Reference) ◦ Replace dressings used on short-term central venous catheters sites every 2 days for gauze dressings and at least every 7 days for transparent dressings [CDC Reference]
Standardized access procedure	◦ Refer to Hand Hygiene details in CLABSI Insertion Bundle ◦ Disinfect cap before all line entries by scrubbing with an appropriate antiseptic and accessing the port only with sterile devices [CDC Reference] ◦ Alcohol (15 second scrub and allowed to dry) or an alcohol / CHG containing product per manufacturers' recommendations [CDC Reference] ◦ Sterile gloves used for needle access for all implanted permanent central lines (example: Portacath)
Standardized dressing, cap, and tubing change procedures/timing	◦ Scrub skin around site with CHG for 30 seconds (2 minutes for femoral site), followed by complete drying. (Note: institutional preference for CHG use for infant < 2 months of age) [CDC Reference] ◦ Change crystalloid tubing no more frequently than every 96 hours [CDC Reference] ◦ Change tubing used to administer blood products every 24 hours or more frequently per institutional standard [CDC Reference] ◦ Change tubing used for lipid infusions every 24 hours [CDC Reference] ◦ Document date dressing/cap/tubing was changed or is due for change [CDC Reference & SPS data] ◦ Consider when hub of catheter or insertion site are exposed, wear a mask (all providers and assistants) — shield patient's face, ETT, or trach with mask or drape ◦ Sterile gloves used for dressing/tubing/cap changes

Daily CHG treatments	⌄ CHG treatment performed daily on all patients >2 months adjusted age with central venous catheters (for Hem-Onc patients, this element is recommended) ⌄ Note: Those patients <2 months adjusted age* should be cared for based on institutional protocol. *Adjusted age is <48 weeks for premature infants or <2 months of age for full-term infants. For example, if a patient is born at 28 weeks, they would receive their first CHG treatment at 20 weeks chronological age (48 weeks adjusted). Note: SPS CLABSI Leaders have determined that the strongest available evidence suggests that the implementation specifically of 2% CHG wipe treatments are associated with a significant decrease in patient harm. However, there is some evidence supporting equivalent efficacy of other products, and therefore hospitals using other forms of CHG for daily CHG treatments will be considered compliant to this element in the process bundle. **Note: As of November 2021, this element is now a recommended element only for the Hem-Onc population.**
Recommended Elements	
An in-depth review of all identified CLABSI with multidisciplinary involvement AND the intent to change the process if needed	Utilize a systematic approach to review all hospital acquired CLABSIs
Daily linen changes	

V. Measurement – Prevention Bundle Reliability

Measurement	Formula	Standards	Reporting Period
CLABSI Prevention Bundle – Insertion and Maintenance to be measured separately	Number of audits totally compliant with SPS Prevention Bundle elements/ Number of audits completed* x 100	◦ Your bundle reliability data should include **all** the SPS standard elements ◦ SPS strongly encourages hospitals to also include the SPS Recommended elements. ◦ Measure your bundle as ALL or none. See Reference 7 for IHI description of all or none. ◦ Minimum of 20 audits per month. If procedures are fewer than 20, then include all procedures. November 2021: All hospitals should report the bundle elements as all-or-none. If local guidelines do not require CHG treatments for CLABSI prevention for Hem-Onc populations, then the audit can be considered compliant without a CHG treatment.	Monthly

VI. Spotlight Tools

We have asked hospitals to share their tools and have highlighted a few in this SharePoint folder (note: this folder is password protected and can only be accessed by SPS network member hospitals).

VII. References

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VIII. Revision History

Version	Primary Author(s)	Description of Version	Date Completed
Version 1	Sharyl Wooton	Initial draft	10/02/2012
Version 2	Erin Goodman & Sharyl Wooton	Format & release of new SPS Prevention Bundle content	06/10/2014
Version 3	CLABSI Co-leaders	Added use of sterile gloves to Maintenance Bundle elements: 1) assessment of dressing, 2) access procedure, 3) dressing, cap, tubing changes	12/30/2015
Version 4	SPS Staff	Contact information updated	04/05/2017
Version 5	CLABSI Co-leaders	Changed recommendation of crystalloid tubing from every 72 hours to every 96 hours	07/26/2017
Version 6	CLABSI Co-leaders	Changed CHG treatment from a recommended bundle element to a standard bundle element (added level of evidence and references)	01/11/2019
Version 7	CLABSI Co-leaders	Changed CHG treatments to a recommended element in the Hem-Onc population only	11/1/2021

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