# Central Line-Associated Bloodstream Infection (CLABSI) Surveillance in Oncology and Bone Marrow/Solid Organ Transplant

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# CME Disclosure

Dr. Srigley does not report any conflict of interest and does not intend to make therapeutic recommendations for medications that have not received regulatory approval (i.e. “off-label” use of medication).

# Objectives

To understand the importance of CLABSI surveillance in oncology/bone marrow transplant (BMT)/solid organ transplant (SOT) settings

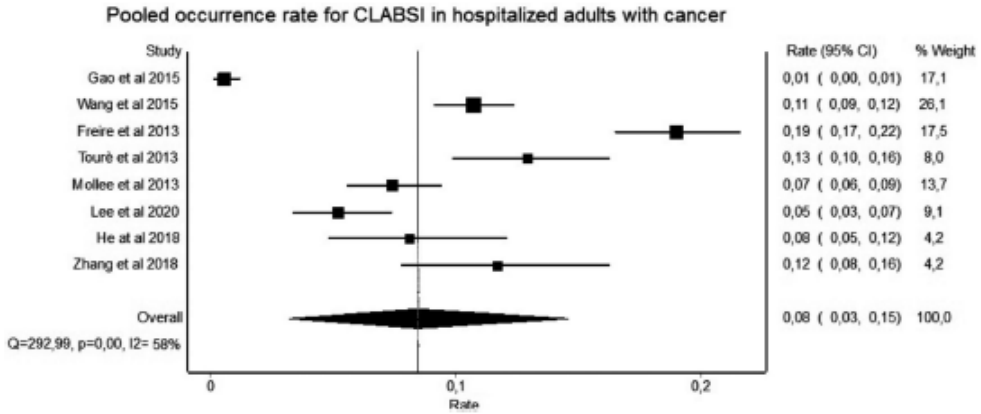
To review the surveillance definitions of CLABSI

To discuss best practices for CLABSI prevention and surveillance

# Importance of CLABSI Surveillance in Oncology/BMT/SOT

# Burden of CLABSIs in Oncology

BELLONI *ET AL*, *WORLDV EVID-BASED NU* 2022;19:100–111




BAIER *ET AL*, *PLOS ONE* 2020;15(1): E0227772

10.6 cases per 10,000 CVC days

# Impacts of CLABSI

Patient outcomes

- Study in hematology-oncology population found non-statistically significant increase in mortality (7% vs. 4%, p = 0.115)
  - *Systematic review found overall odds ratio of in-hospital death associated with CLABSI = 2.75 (CI 1.86–4.07)*
- Length of stay was double for patients with CLABSI (30 vs.15 days, p<0.01)

Financial costs

- Median costs attributable to CLABSI = EUR 8,810

Ziegler *et al* , *Infection* 2015;43:29-36
Baier *et al*, *PLoS ONE* 2020;15(1): e0227772

# CLABSI Is Preventable

Overall incidence rate ratio of 0.459 (95% CI, 0.381-0.554)

Changes in CLABSI rates up to 100%

CLABSI has the highest number of preventable deaths and the highest cost impact of any HAI

Umscheid *et al*, *Infect Control Hosp Epidemiol* 2011;32:101–114
Schreiber *et al*, *Infect Control Hosp Epidemiol* 2018;39:1277-95

# CLABSI Definitions

# Laboratory-Confirmed Bloodstream Infection (LCBI)

1) Recognized bacterial or fungal pathogen, not included on the NHSN common commensal list, identified from one or more blood specimens by culture or non-culture based microbiologic testing methods
2) The same NHSN common commensal is identified by a culture from two or more blood specimens collected on separate occasions AND patient has at least one of the following signs or symptoms: fever (>38.0°C), chills, or hypotension
3) The same NHSN common commensal is identified by a culture from two or more blood specimens collected on separate occasions AND patient ≤ 1 year of age has at least one of the following signs or symptoms: fever (>38.0°C), hypothermia (<36.0°C), apnea, or bradycardia

https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf

# Common Commensals

*Actinomyces* spp.

*Aerococcus* spp.

*Bacillus* spp.

*Corynebacterium* spp.

*Cutibacterium acnes*

Diphtheroids

*Kocuria* spp.

*Micrococcus* spp.

*Paenibacillus* spp.

*Propionibacterium* spp.

*Rothia* spp.

Coagulase-negative staphylococci

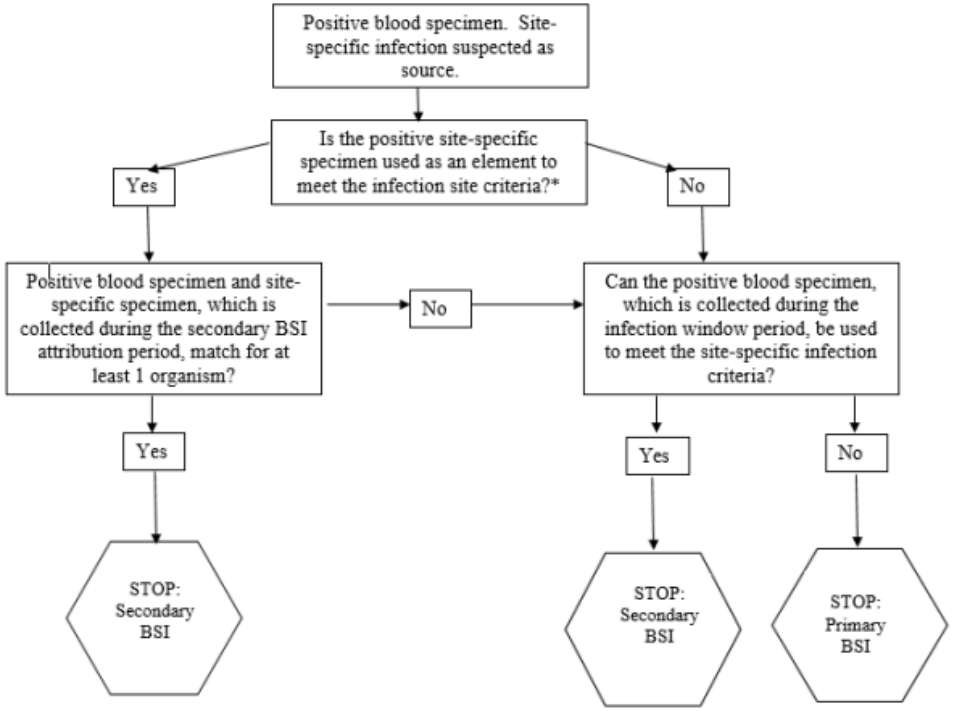
Viridans group streptococci

http://www.cdc.gov/nhsn/xls/master-organism-com-commensals-lists.xlsx

# Primary vs. Secondary BSI

Primary: LCBI that is not secondary to an infection at another body site

Secondary: BSI thought to be seeded from a site-specific infection




https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf

# CLABSI Definition

Primary LCBI where an eligible central line is present on the day of LCBI diagnosis or the day before

CL must have been in place for more than 2 consecutive calendar days following the first access of the central line, in an inpatient location, during the current admission

Types of CL

- Permanent central line, which includes:
  - *Tunneled catheters, including tunneled dialysis catheters*
  - *Implanted catheters (including ports)*
- Temporary central line: A non-tunneled, non-implanted catheter
- Umbilical catheter: A vascular catheter inserted through the umbilical artery or vein in a neonate. All umbilical catheters are central lines

https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf

# Mucosal Barrier Injury LCBI

Patient meets at least one of the following:

- Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood specimen:
  - *a. Grade III or IV gastrointestinal graft versus host disease [GI GVHD] OR*
  - *b. ≥1-liter diarrhea in a 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 y/o) with onset within the 7 calendar days before collection date of the positive blood specimen OR*
- Is neutropenic, defined as at least two separate days with ANC and/or WBC values <500 cells/$mm^3$ collected within a 7-day time period

AND

LCB1 + at least one blood specimen with ONLY intestinal organisms from the NHSN MBI organism list, OR

LCBI 2 or 3 + at least 2 matching blood specimens with ONLY viridans group *Streptococcus* and/or *Rothia* spp. alone but no other organisms

https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf

# Best Practices for CLABSI Prevention and Surveillance

*Infection Control & Hospital Epidemiology* (2022), **43**, 553–569
doi:10.1017/ice.2022.87

SHEA

**SHEA/IDSA/APIC Practice Recommendation**

# Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update

Niccolò Buetti MD, MSc, PhD[1,2,a], Jonas Marschall MD, MSc[3,4,a], Marci Drees MD, MS[5,6], Mohamad G. Fakih MD, MPH[7], Lynn Hadaway MEd, RN, NPD-BC, CRNI[8], Lisa L. Maragakis MD, MPH[9], Elizabeth Monsees PhD, MBA, RN, CIC[10,11], Shannon Novosad MD MPH[12], Naomi P. O'Grady MD[13], Mark E. Rupp MD[14], Joshua Wolf MBBS, PhD, FRACP[15,16], Deborah Yokoe MD, MPH[17] and Leonard A. Mermel DO, ScM[18,19]

# Before Insertion

List of indications for CVC use to avoid unnecessary CVC placement

Education and competency assessment of HCP involved in insertion, care, and maintenance of CVCs

Daily chlorhexidine bathing (ICU patients aged >2 months)

- Some studies suggest benefit among adult hematology-oncology patients but not for pediatric patients; need to consider risks (e.g. increased resistance) and costs

Buetti *et al*, *Infect Control Hosp Epidemiol* 2022;43:553-69

# At Insertion

Checklist to ensure adherence to CLABSI prevention practices

Hand hygiene prior to insertion or manipulation

Subclavian site is preferred

All-inclusive catheter cart or kit

Ultrasound guidance for insertion

Maximum sterile barrier precautions

Alcoholic chlorhexidine antiseptic for skin preparation

Buetti *et al*, *Infect Control Hosp Epidemiol* 2022;43:553-69

# After Insertion

Ensure appropriate nurse-to-patient ratio and limit use of float nurses in ICUs

Chlorhexidine-containing dressings for CVCs

Change transparent dressings and perform site care with chlorhexidine at least q 7 days; change gauze dressings q 2 days

Disinfect catheter hubs, needleless connectors, and injection ports before access

Remove nonessential catheters

Routine replacement of administration sets can be performed at intervals up to 7 days

Perform surveillance for CLABSI

Buetti *et al*, *Infect Control Hosp Epidemiol* 2022;43:553-69

# Additional Approaches

Use antiseptic- or antimicrobial-impregnated CVCs

Use antimicrobial lock therapy for long-term CVCs

Utilize infusion or vascular access teams for reducing CLABSI rates

Use an antiseptic-containing hub/connector cap/port protector to cover connectors

Do not use antimicrobial prophylaxis for short-term or tunneled catheter insertion or while catheters are in situ

Do not routinely replace CVCs or arterial catheters

Buetti *et al*, *Infect Control Hosp Epidemiol* 2022;43:553-69

# Surveillance Best Practices

Use consistent methods and definitions to allow comparison to benchmark data

Denominator data collection

- Methods
  - *Manual, daily*
  - *Manual, once/week (not recommended for oncology/specialty care areas)*
  - *Electronic*
- For oncology/specialty care areas, separate counts for permanent vs temporary CLs
- Only 1 CL per patient is counted per day regardless of # of CLs present
- All CLs should be included in device day counts regardless of access

Buetti *et al*, *Infect Control Hosp Epidemiol* 2022;43:553-69
https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf

# CLABSI Prevention in BMT

GUIDELINES

## Guidelines for Preventing Infectious Complications among Hematopoietic Cell Transplantation Recipients: A Global Perspective

*Marcie Tomblyn, Tom Chiller, Hermann Einsele, Ronald Gress, Kent Sepkowitz, Jan Storek, John R. Wingard, Jo-Anne H. Young, Michael A. Boeckh*

*Biol Blood Marrow Transplant 15: 1143-1238 (2009)* © *2009 American Society for Blood and Marrow Transplantation*

# MBI-LCBI Prevention

Standard CLABSI prevention bundles

Oral care bundles

- E.g. sodium bicarbonate mouthwash, artificial saliva, lip balm, scheduled nursing oral assessments, dental hygiene

Maintaining a healthy orogastrointestinal microbiome?

- E.g. antimicrobial stewardship, probiotics, dietary interventions

Vaughan *et al*, *Infect Control Hosp Epidemiol* 2017;38:1385-7
Dandoy *et al*, *Bone Marrow Transplant* 2019;54:1932-9
Kemp *et al*, *J Ped Hematol/Oncol Nurs* 2019;36:321-6
Reed *et al*, *JCO Oncol Practice* 2020;16:e306-12

# Questions?

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