

Healthcare-associated Infections: the big 5

Barbara DeBaun, MSN, RN, CIC

MHA IP Bootcamp 2024

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Disclosure of Conflicts of Interest

- Barbara DeBaun, MSN, RN, CIC is a clinical consultant to:
 - Magnolia Medical
 - SplashBlocker

Decision to order a test should be guided by:

Careful clinical
evaluation

Recognition of a
clinical
syndrome

Likelihood of the
patient having
the condition

Diagnostic Stewardship

Ordering (Pre-analytic)

- High pretest probability

Collection (Pre-analytic)

- Sample collection and transport

Processing (Analytic)

- Adjunctive lab tests to determine colonization vs infection

Reporting (Post-analytic)

- Report to guide practice

Diagnostic Stewardship Goals

1

REDUCE FALSE-
POSITIVE RESULTS

2

REDUCE OVER-
DIAGNOSIS

3

IDENTIFY TRUE-
POSITIVES

CAUTI



Guiding Principles



Insert only when clinically indicated



Practice aseptic technique while inserting

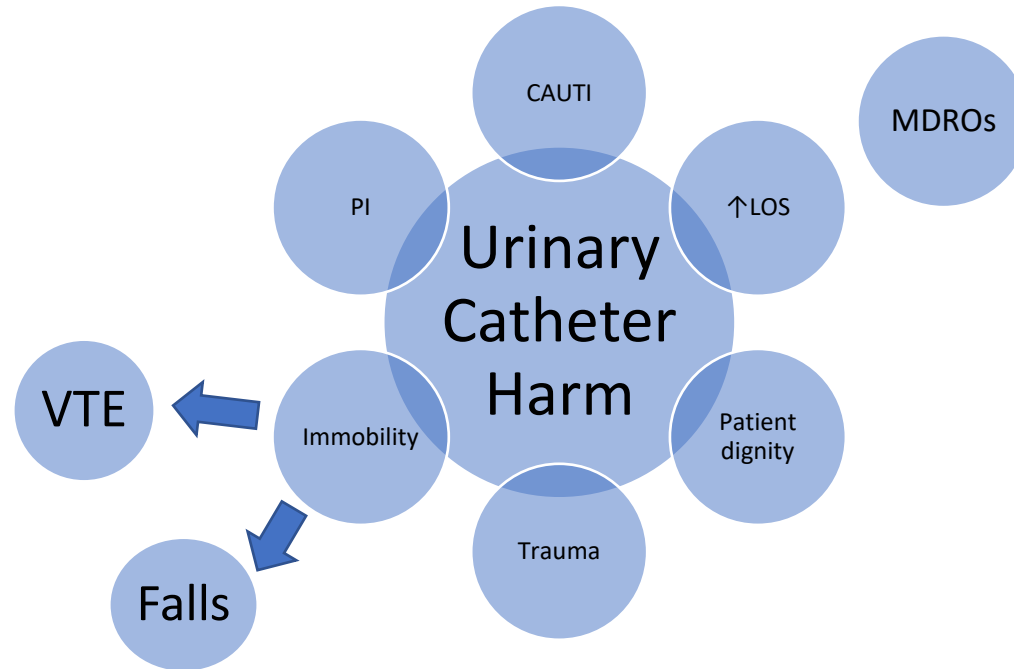


Take good care of it



Get it out when no longer needed

Urinary catheter harms are more than CAUTI



Saint S, Ann Intern Med 2002;137



What does YOUR policy say about indications for a urinary catheter?





Indications: can we challenge any of these?

- Perioperative use for selected procedures (e.g., urologic, large volume infusions, intraoperative monitoring)
- Hourly assessment of urine output in ICU
- Acute urinary retention or obstruction
- Open pressure sores or skin grafts
- End of life comfort care at request

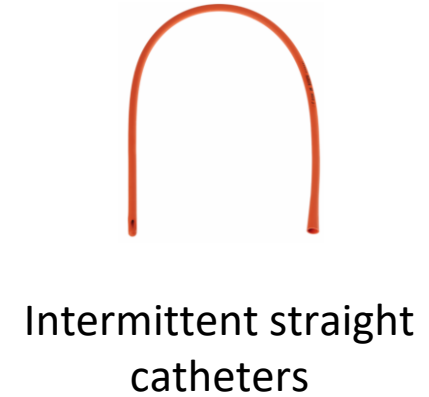
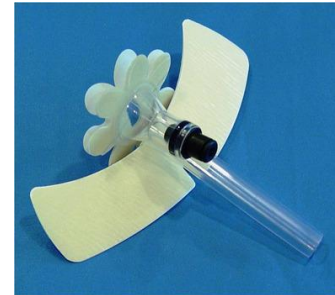
Alternatives to Indwelling Catheters



Male, female urinals



Male external catheters



Intermittent straight catheters

Bedside commode



Scale



Incontinence care supplies



Bladder ultrasound

Pictures are not intended to imply recommendations for specific products or brands.




Foley alternatives



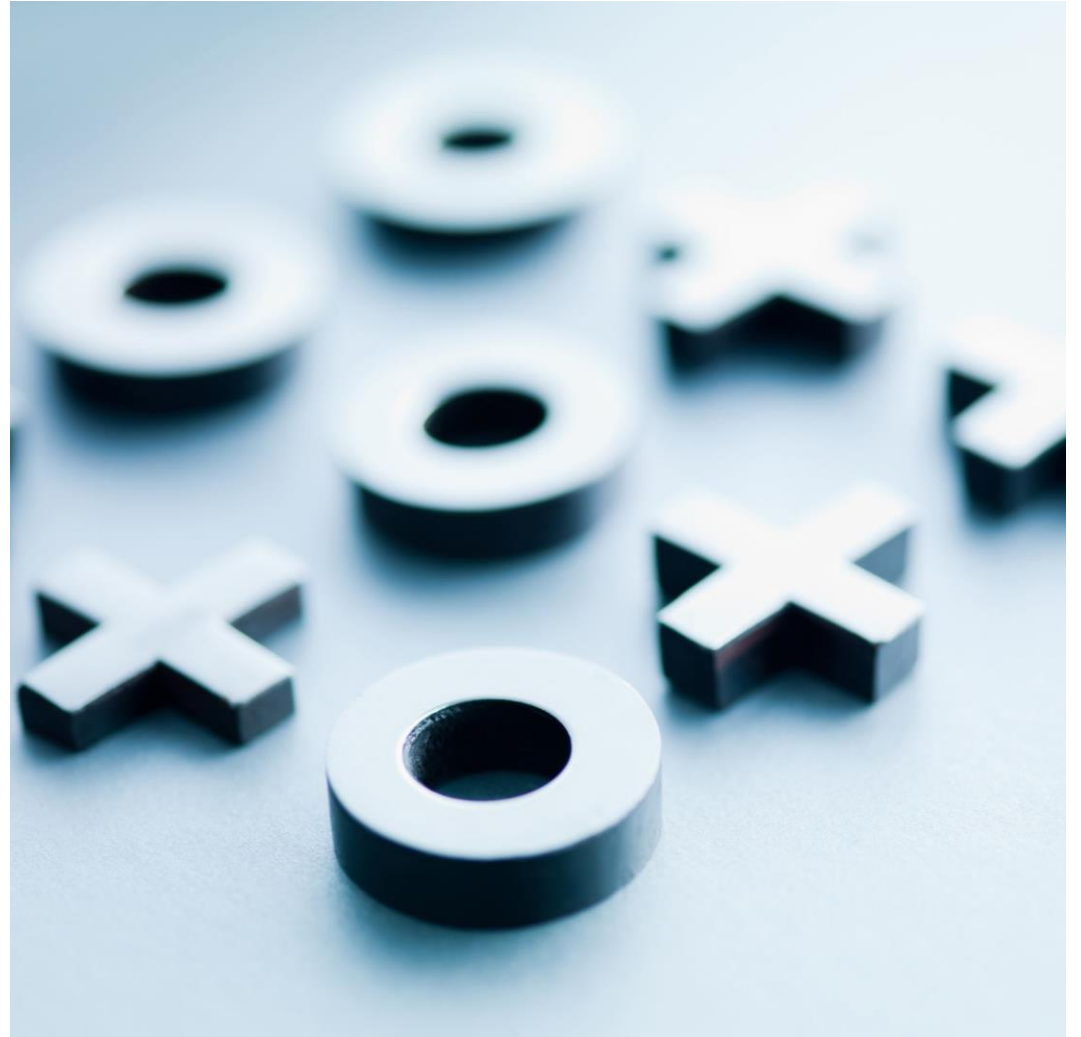
Two-person
insertion

||| Nurse-driven protocol (for real)





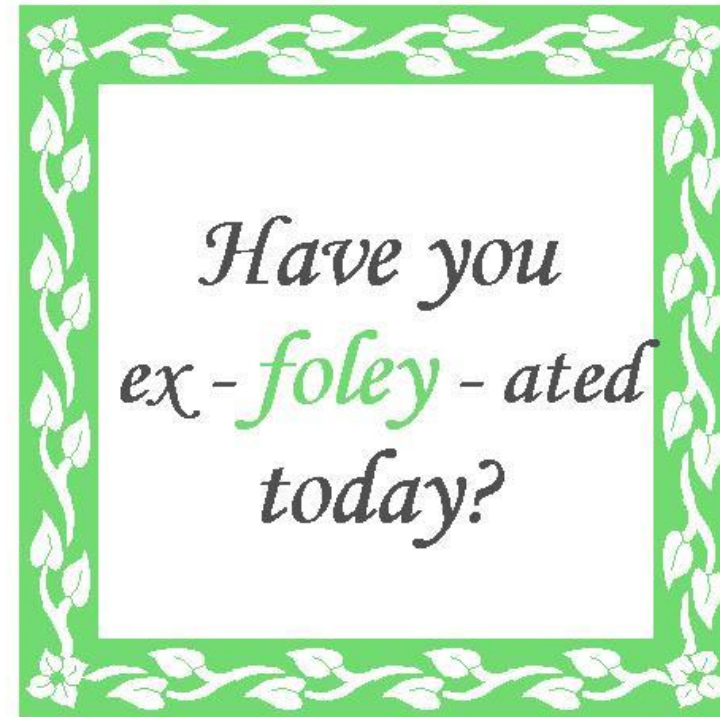
Change Idea:
remove urinary
insertion kits from
supply carts



GET Creative TO ENGAGE STAFF



WHY THE FOLEY?!



White Boards

UNIVERSITY OF SOUTH ALABAMA
MEDICAL CENTER
947

Today's Date: 1/29/2019

MD/Team: MICU service

Nurse: Chelsie

Patient Care Assistant: Karen

Diet: Diabetic Next Pain Med Available:

Activity: Turn Q2 Hr.

Goals:

- Wean O₂
- SBP < 160
- D/C Foley
- Foley Care Completed AM ✓ PM

Questions:

Can my Foley be D/C'd?
Days with Foley: 7

We help people lead longer, better lives.

UNIVERSITY OF SOUTH ALABAMA
MEDICAL CENTER
947

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- Foley Care Completed AM ✓ PM

Questions:

Why I need my Foley:

- Retention
- Receiving Diuretics
- Strict I+O

Days with Foley: 4

We help people lead longer, better lives.

Discourage Urine Culture Use

Urine quality: color, smell, sediments, turbidity (do not constitute signs of infection)

Screening urine cultures (whether on admission or before non-urologic surgeries)

Standing orders for urinalysis or urine cultures without an appropriate indication

“PAN” culturing (mindfulness in evaluating source is key)

Obtaining urine cultures based on pyuria in an asymptomatic patient

Asymptomatic elderly and diabetics (high prevalence of asymptomatic bacteriuria)

Repeat urine culture to document clearing of bacteriuria (no clinical benefit to patients)

CONNECT+PROTECT



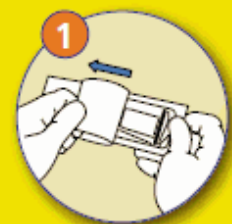
CONNECT and PROTECT

with BD Vacutainer® Luer-Lok™ Access Device

BD Reference #364902

Recommended Urine Collection Steps from a Foley Catheter:

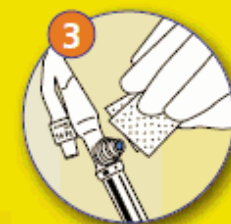
RECOMMENDED COLLECTION STEPS:



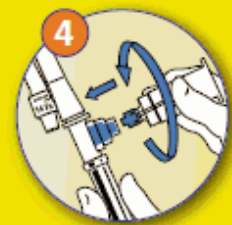
STEP 1
a. Open bag
b. Peel off paper backing from the BD Vacutainer® Luer-Lok™ Access Device package.
c. Remove from package.
d. Set aside.



STEP 2
a. Occlude drainage tubing a minimum of 12 inches below the sampling port by bending and securing the tubing.
b. Secure tubing with clamping device.
c. Allow time for the urine to fill the tubing from point of clamp to slightly above the sampling port.



STEP 3
Swab surface of the sampling port with antiseptic wipe.



STEP 4
Using aseptic technique, position the BD Vacutainer® Luer-Lok™ Access Device over the center of the sampling port. Push it in and rotate the Access Device clock-wise onto the sampling port until it fits securely.



STEP 5
a. To perform your urine collection, center the BD Vacutainer® Plus C&S Preservative Tube over the holder portion of the Access Device and push it in.
b. Once the tube is completely filled, remove the tube from the holder.
c. Invert the tube 8-10 times.



STEP 6
a. Repeat step 5 using the BD Vacutainer® Plus Conical UA Tube.
b. Once tube is completely filled, remove the tube from the holder.



STEP 7
After removing the last tube, hold the sampling port and remove the BD Vacutainer® Luer-Lok™ Access Device by rotating it counter clock-wise.



STEP 8
Unclamp the drainage tube.



STEP 9
Discard the BD Vacutainer® Luer-Lok™ device immediately into an approved sharps disposal container.

Best Practice Example

CAUTION: Handle all biological samples and blood collection "sharps" (lancets, needles, luer adapters, and blood collection sets) in accordance with the policies and procedures of your facility. Obtain appropriate medical attention in the event of a needlestick or other sharp injury.

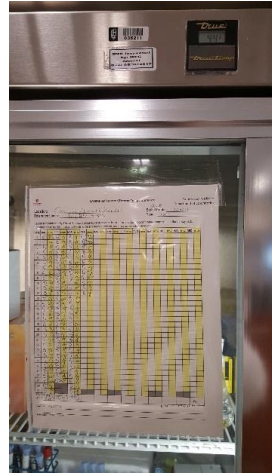
For more information contact us via:
E-mail: vacutainer_techsupport@bd.com

Also consider our full line of
BD Vacutainer® Urine Collection Products:



Urine Handling after Collection (w/in 2 hrs. of collection)

- Refrigeration (2°C-8°C)



Limitations: designated refrigerators not always available; temperature monitoring requirements; space; funding

- Preservation



4.0 mL, Boric Acid, Sodium Formate and Sodium Borate Preservative

Preservative maintains original organism load for 72h at room temperature

Reflex Urine Culturing

- Involves screening urine samples with a urinalysis (UA) first
- Urine is processed for culture only if pre-defined criteria are met

Examples of Triggers for reflexive urine cultures:

Leukocyte Esterase – moderate to large

Nitrite – positive

WBC - $\geq 5-10$ per hpf

Bacteria - positive



CultureofCulturing- Fakih.pdf

PRINCIPLES OF
HIGHLY RELIABLE CARE:

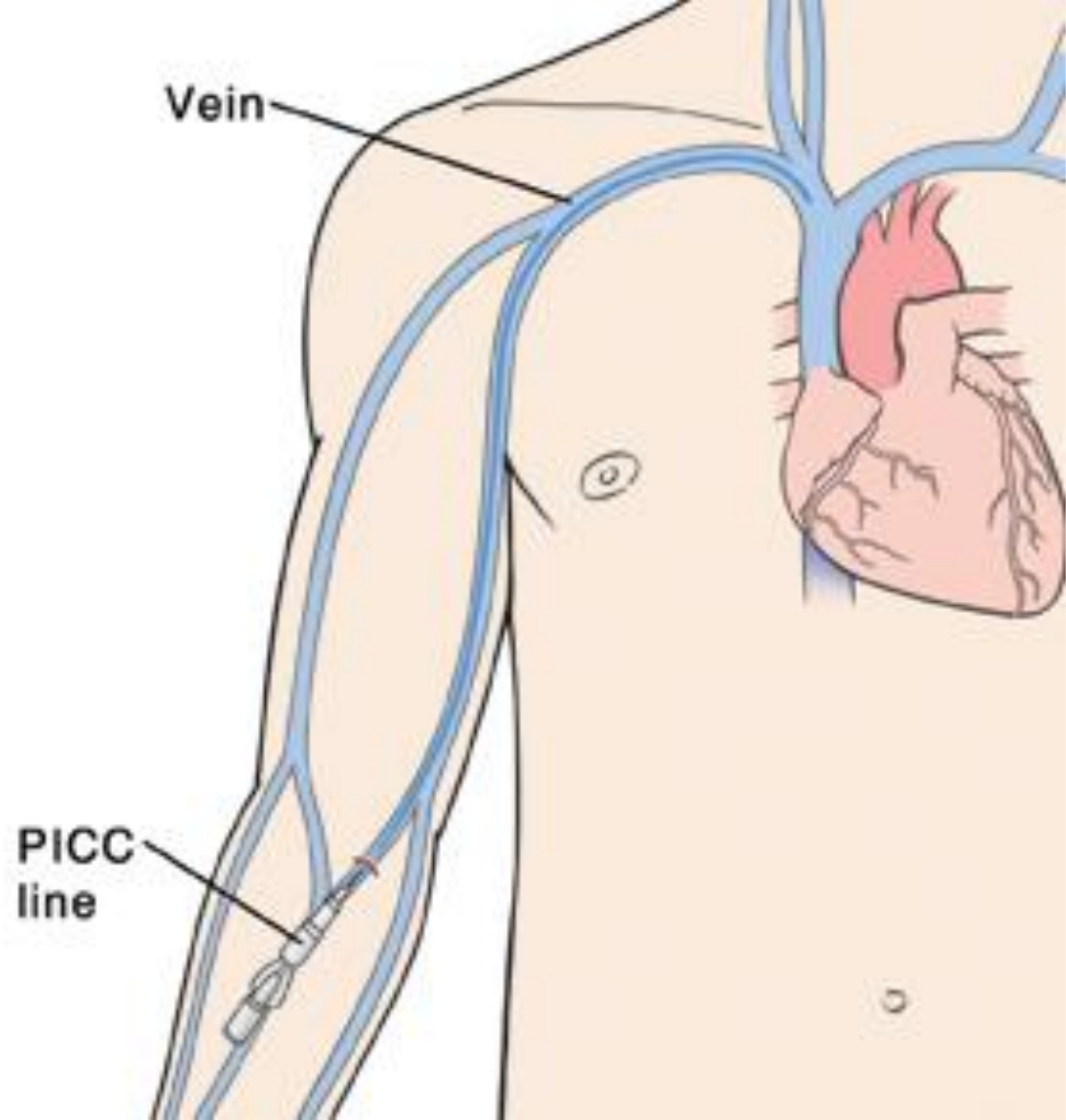
**IMPROVING THE
CULTURE OF CULTURING**
AVOIDING UNNECESSARY URINE
CULTURES IN CATHETERIZED PATIENTS

Mohamad Fakih, MD, MPH

CLABSI



What is a
central line?

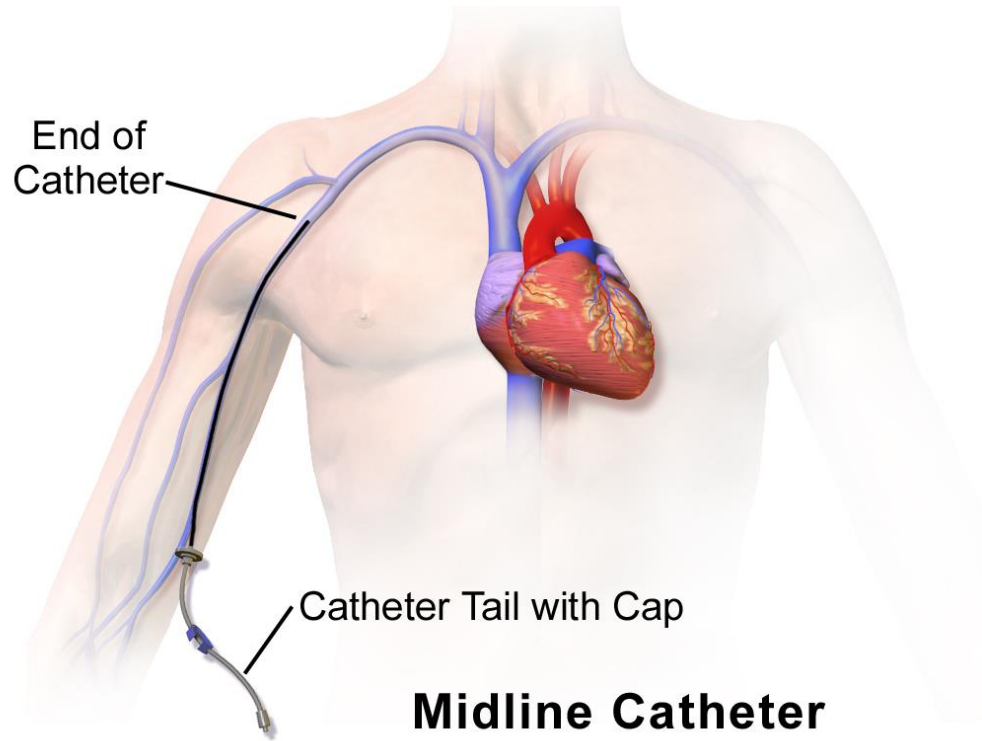


CLABSI Prevention

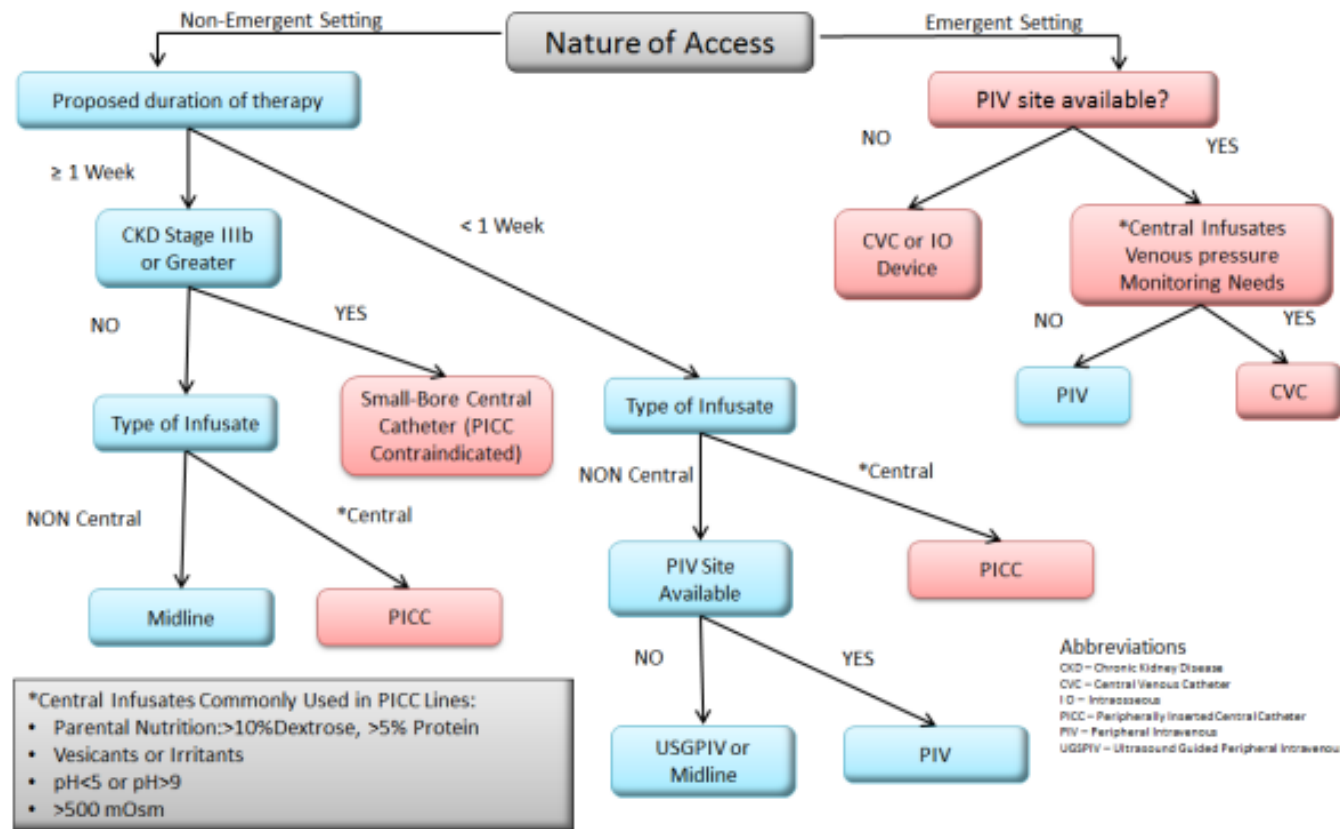
- Clinical Indication
- Insertion Technique
- Maintenance
- Culturing Practices
- Removal when no longer indicated

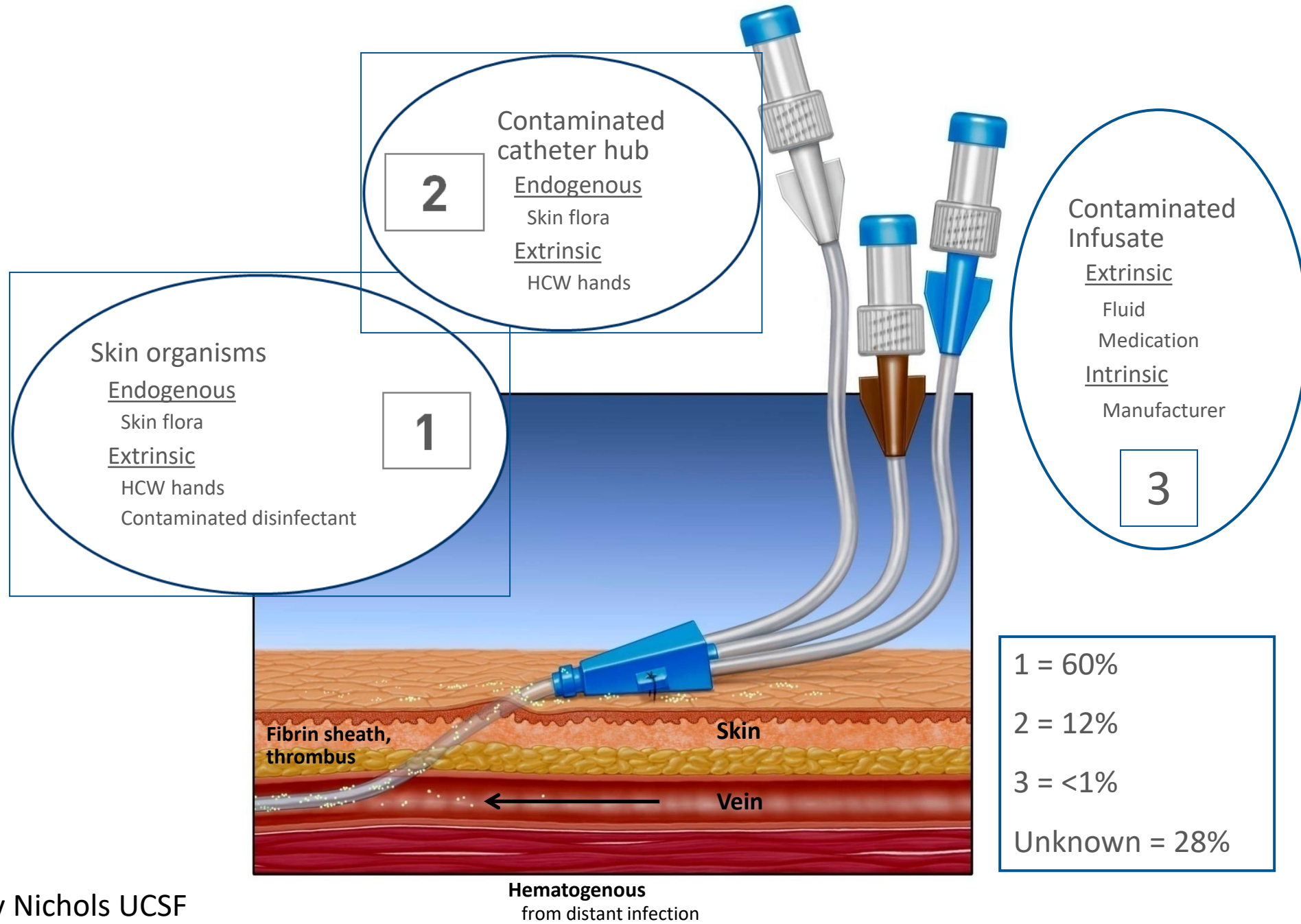


Alternatives to central lines



Decision Tree for Venous Access





Source: Amy Nichols UCSF

Safdar N, Maki DG. The pathogenesis of catheter-related bloodstream infection with noncuffed short-term central venous catheters. *Int Care Med.* 2004;30:62-67.

Strategies for CLABSI Prevention



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

1

Education and Insertion Bundles: Hand Hygiene, Maximal Barrier Precautions, CHG use, Optimal Site Selection, Observers, Checklists and Kits

2

Maintenance Bundles: CHG Bathing, Dressing, Connector and Tubing Protocols, Port Protectors, Assessing Catheter Necessity

3

Vascular Access Teams and Nurse/Patient Ratios

4

Daily Rounding and Auditing

Standardize insertion process

Implement
insertion checklist

Implement 'stop
the line'

Optimal site and
device selection

Hand hygiene and
aseptic technique

Skin antiseptis with
2% chlorhexidine
gluconate (CHG)

Review line necessity daily

Does the patient have a central line and if so, WHY?

WHO assesses? WHEN? HOW?

Incorporate into workflow

Multidisciplinary rounds and huddles

Standardize maintenance process



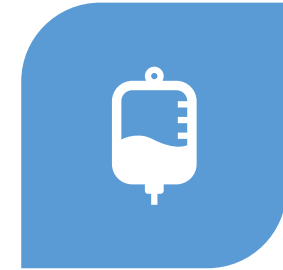
BUNDLE ELEMENTS
TOGETHER



INCORPORATE INTO
DAILY ASSESSMENT




SCRUB THE HUB



BLOOD CULTURE
COLLECTION

Central Venous Catheter Maintenance Bundle


Daily Screen for CVC Need



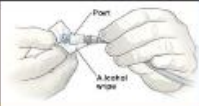
Hand Hygiene



Maintain a Closed System



Scrub the Hub



Assess Site



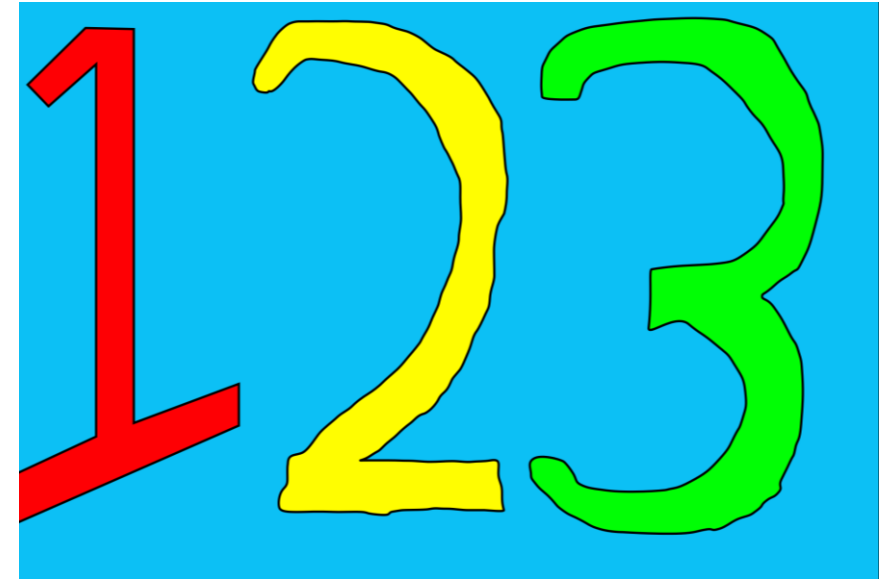
Site Care



BioPatch



Make “scrub the hub”
observable: UC Irvine
Approach to scrubbing
the hub is ‘1,2,3...count
with me’



Beyond the Bundles

Impregnated dressings

Bathing with antiseptic agents

Non-suture securement

Antimicrobial impregnated catheters

Involve patients and families

Are Cultures Drawn From CVC More Likely to Be Contaminated Than Cultures Obtained Via Venipuncture? YES.

Author	Journal	Year	Comment
Tonnesen	JAMA	1976	8% discordance: peripheral blood vs catheter
Felices	Crit Care Med	1979	6.5% discordance: peripheral blood vs catheter
Bryant	Am J Clin Path	1987	18% contamination rate, 83% of (+) Cx from catheters were contaminants
Souvenir	J Clin Micro	1998	2.0% vs 1.7% contamination rate (P=0.46)
DesJardin	Ann Intern Med	1999	9.1% False (+)
Ramsook	ICHE	2000	3.4% vs 2.0% contamination rate (P=0.04)
Everts	J Clin Micro	2001	3.8% vs 1.8% contamination rate (P=0.001)
Norberg	JAMA	2003	9.1% vs 2.8% contamination rate (P<0.001)

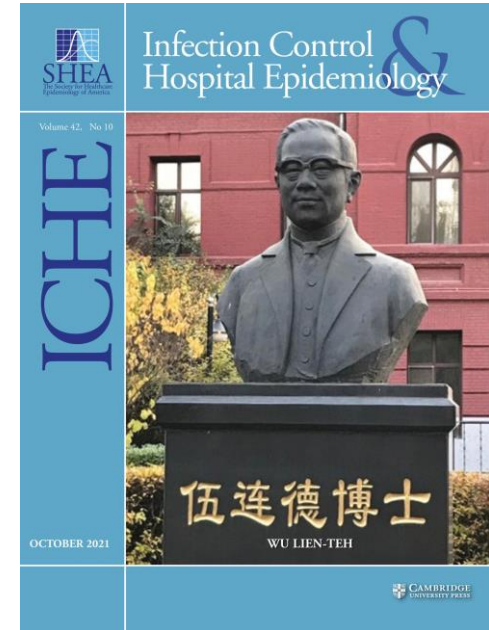
“

30% of reported CLABSIs were suspected to represent blood culture contamination¹

45% of reported CLABSIs most likely represented contaminated blood cultures rather than true CLABSIs”²

¹Boyce et al, ICHE 2010

²Shuman, EK et al. ICHE 2010



False Positive CLABSI Reporting
(CMS NHSN Surveillance Definition LCBI1)



60% of Infection Preventionist responders from 90 hospitals surveyed believe some reported CLABSIs were actually false positives due to blood culture contamination.”¹



False Positive CLABSI Reporting
(CMS NHSN Surveillance Definition LCBI1)

Evidence-Based Solutions

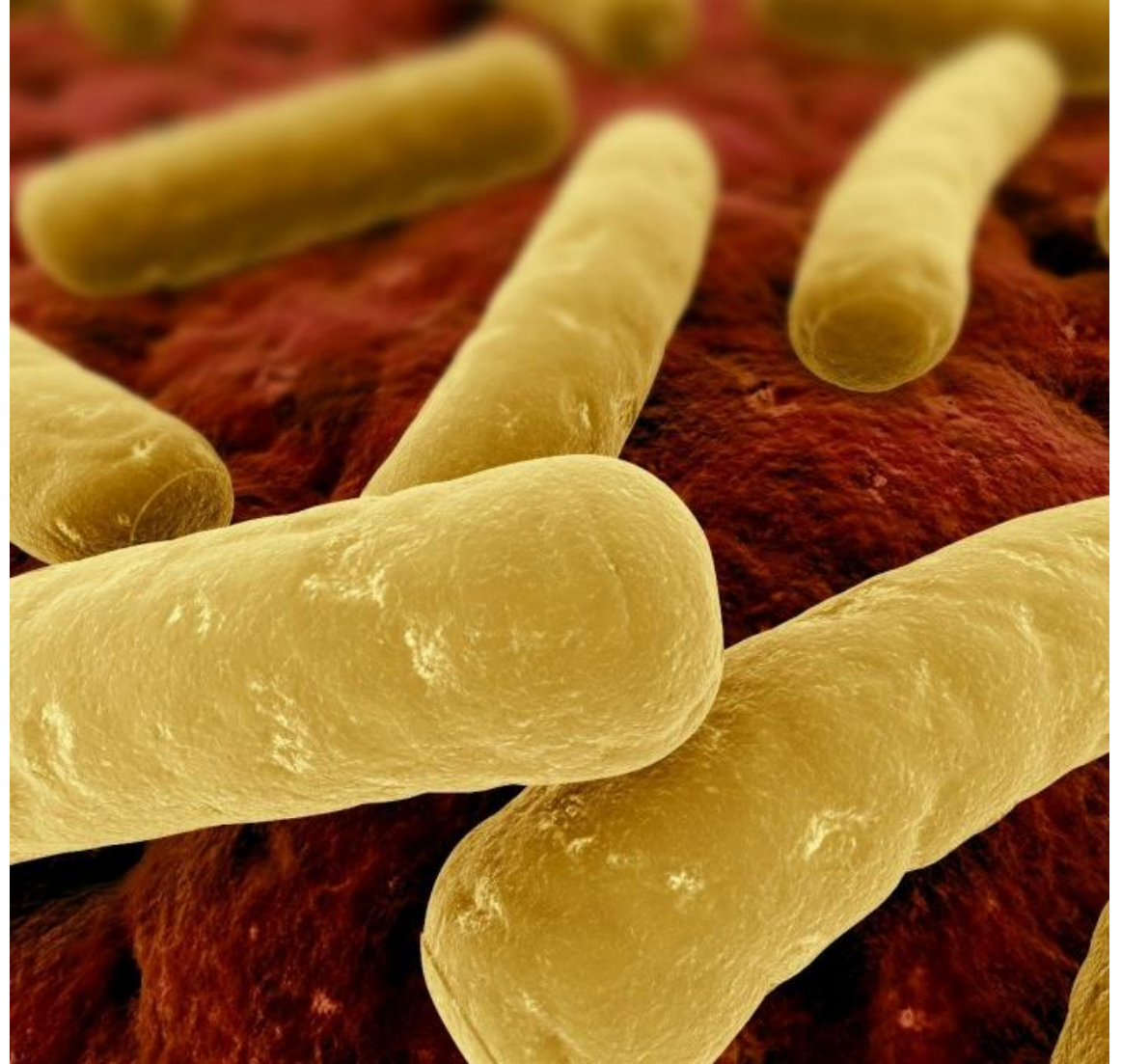
Patient Selection	Blood cultures should only be performed in patients with a reasonable likelihood of bacteremia/fungemia
Skin Disinfection	Use a CHG and alcohol-containing disinfectant to scrub the phlebotomy site; allow for adequate drying time
Blood Culture Bottle Top Disinfection	Disinfect blood culture vial caps with alcohol
Consideration	Leave an IPA pad on top of the BC bottle until ready to inoculate with blood; IPA takes 5 seconds to dry
Phlebotomy Site	Do not draw blood cultures through indwelling vascular catheters unless the catheter is thought to be the source of sepsis; draw a second set from a peripheral venipuncture; consider time to positivity
Sets	Always draw two sets from different sites
Volume	Is the single most important factor for organism detection
Standardized Kits	Use of standardized kits and procedures has proven helpful in preventing contamination
Phlebotomy Teams	Educate and train individuals who perform blood cultures in aseptic technique
Surveillance and Feedback	Monitor blood culture contamination and provide data to individuals and patient care units
Multidisciplinary Teams	Sustained improvement in blood culture contamination is best achieved through a team approach
Initial Specimen Diversion Device	Use of ISDD has been shown to decrease contamination rates to less than 1%



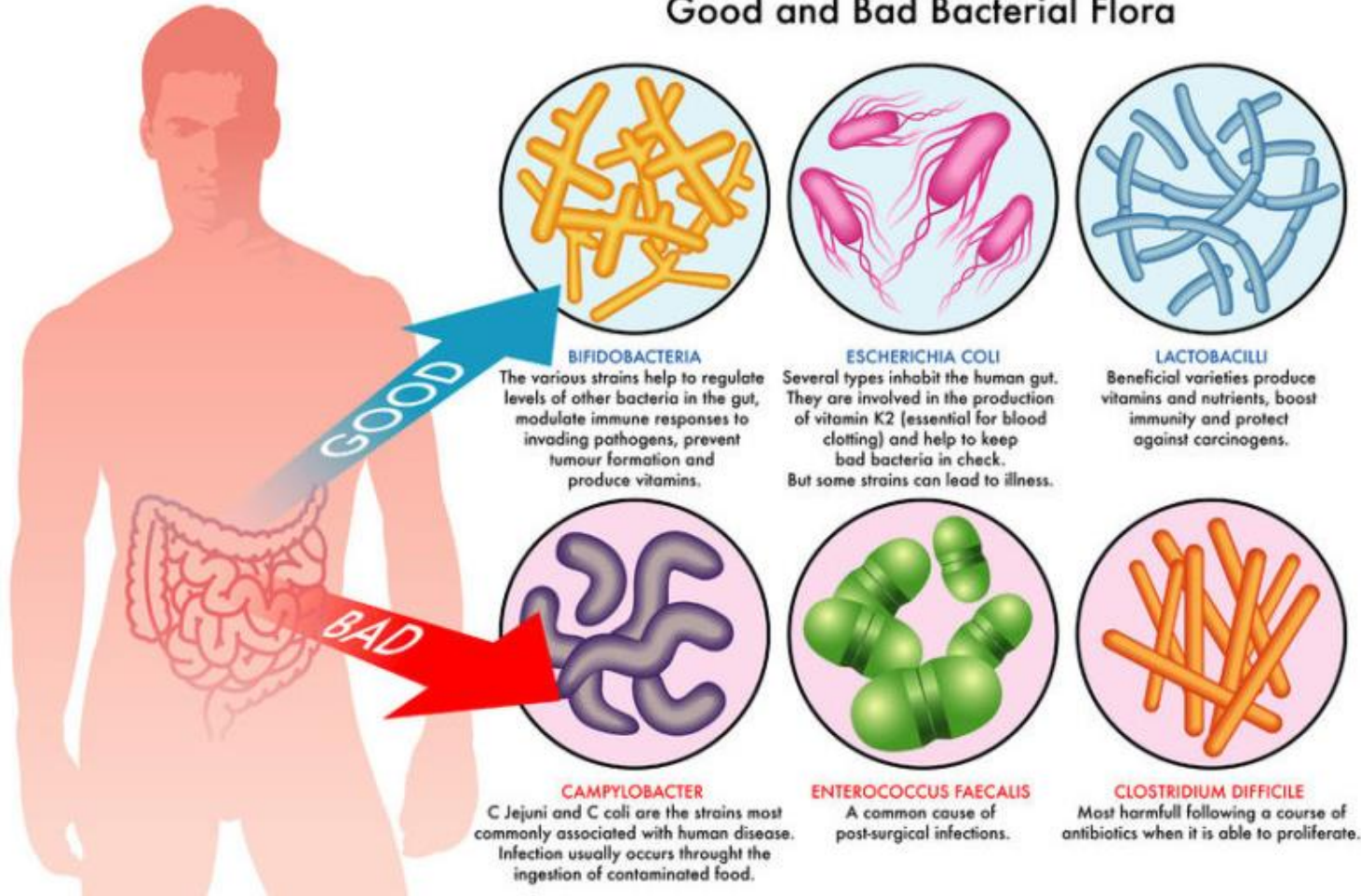
C. difficile

Clostridium or *Clostridioides difficile*

- Gram positive
- Spore forming
- Toxin producer



Good and Bad Bacterial Flora

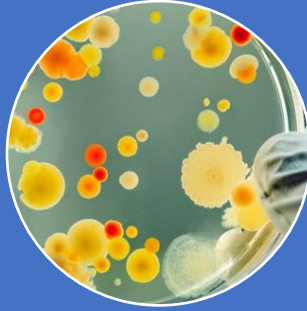


What is living in our intestines?

C. difficile: primary drivers



Antimicrobial
stewardship



Rapid
identification and
diagnosis



Prevention of
transmission



CDI Diagnostic Stewardship

- Considering CDI only if it makes clinical sense
 - Abdominal pain
 - Infectious symptoms
 - Unexplained loose stools (3 in 24 hours)
- Only sending stools if
 - Unformed
 - No other explanation of loose stools
 - *Laxatives, stool softeners, enemas, tube feeds*
- Interpreting lab results, but not letting the lab make the diagnosis of CDI
 - Recognition that + Lab ID is for data collection and not for diagnosis!

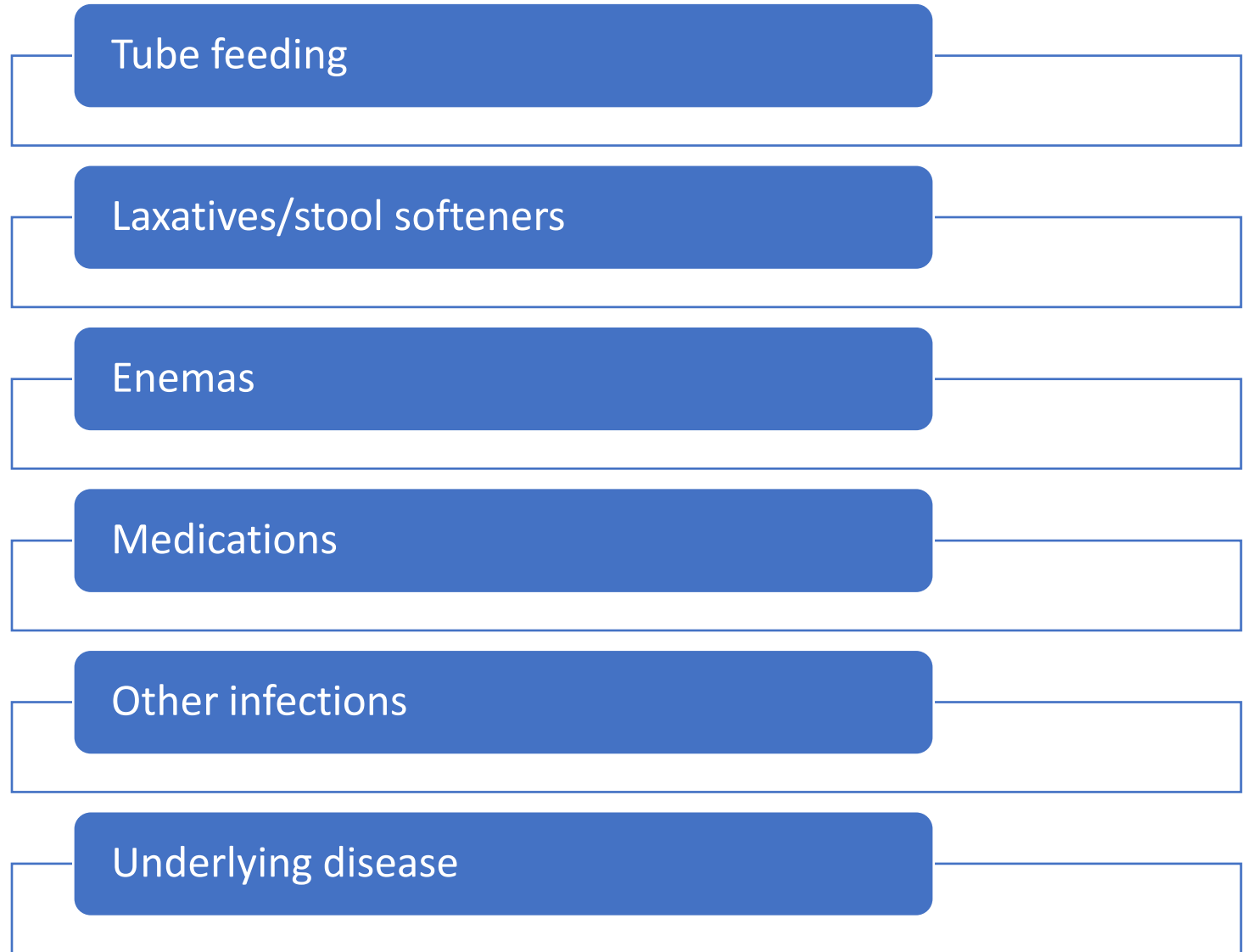


CDI Studies that included data



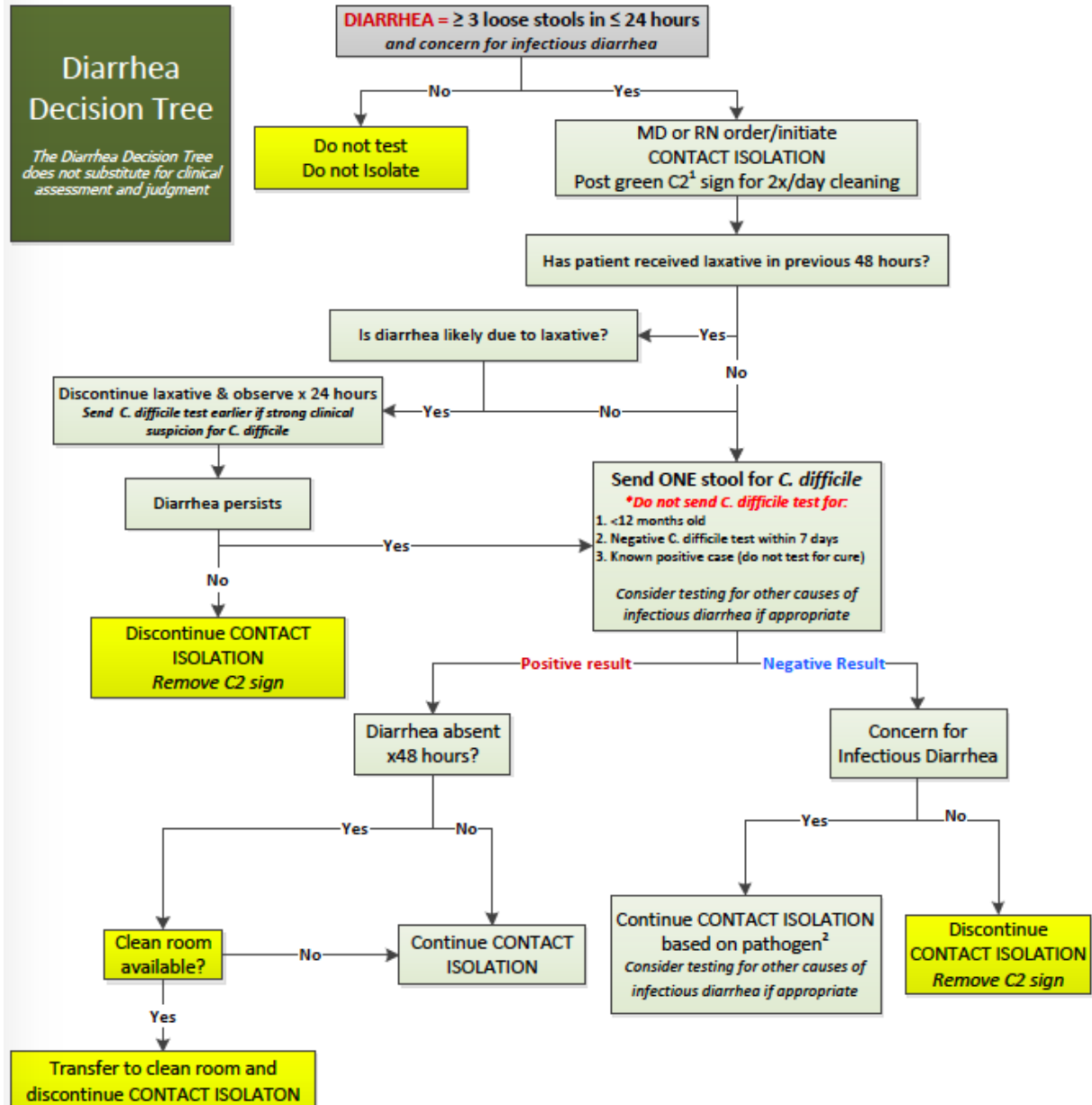
- 35% to 50% of patients tested for *C. difficile* do not have clinically significant diarrhea
- 20% to 40% of patients recently received a laxative

90% of
hospital-
onset
diarrhea is
due to:

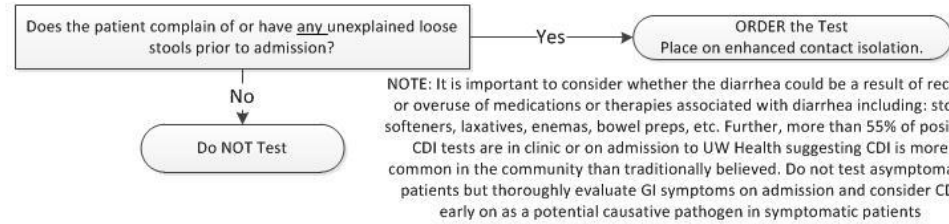


Diarrhea Decision Tree

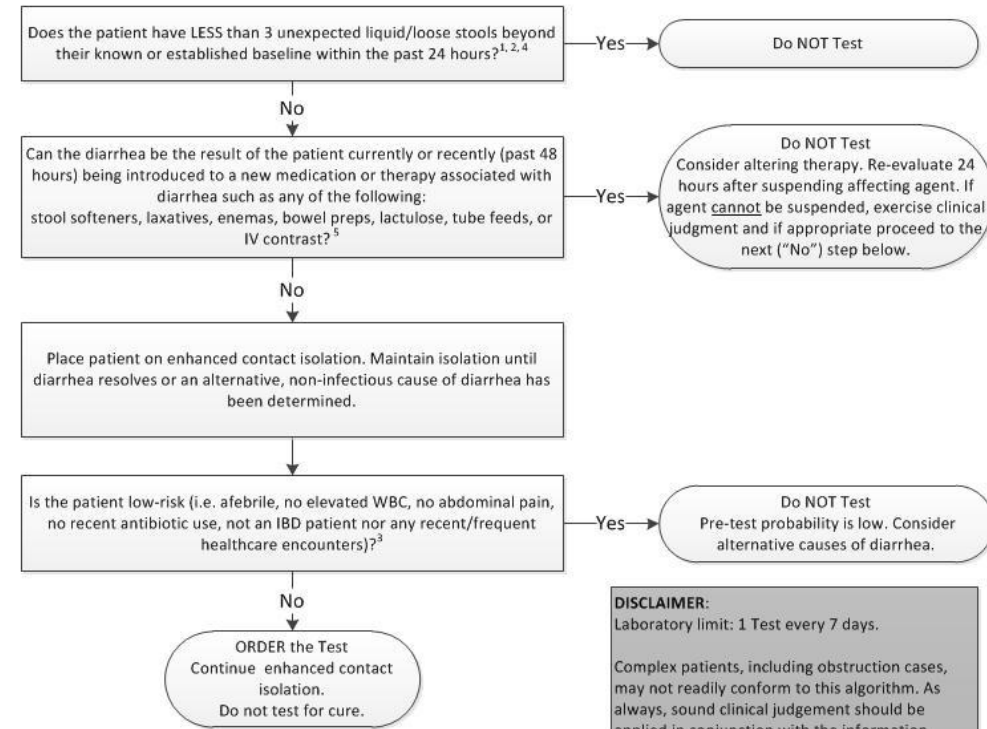
The Diarrhea Decision Tree does not substitute for clinical assessment and judgment



In the FIRST 48 hours of admission



AFTER 48 hours following admission



DISCLAIMER:
Laboratory limit: 1 Test every 7 days.

Complex patients, including obstruction cases, may not readily conform to this algorithm. As always, sound clinical judgement should be applied in conjunction with the information provided here. In some instances, expert opinion should be solicited.

References.
 1. Surawicz CM, et al. Am J Gastroenterol. 2013 Apr;108(4):478-98.
 2. Peterson, LR, Robicsek A. Ann Intern Med 2009; 151:176-179.
 3. http://www.wakehealth.edu/uploadedFiles/User_Content/SchoolOfMedicine/Departments/CAUSE/PPT_and_PDF_files/CDI%20Decision%20Support%20Tree%20Algorithm%20-%2006%2026%2014.pdf
 4. Cohen S, et al Infect Control Hosp Epidemiol. 2010 May;31(5):431-55.
 5. Brazier JS. J Antimicrob Chemother 1998; 41.
 6. <http://www.uptodate.com/contents/clostridium-difficile-in-adults-treatment>
 7. Bagdasarian N, Rao K, Malani PN. JAMA. 2015;313(4):398-408.

Clinical Infectious Diseases

IDSA GUIDELINE



Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA)

L. Clifford McDonald,¹ Dale N. Gerding,² Stuart Johnson,^{2,3} Johan S. Bakken,⁴ Karen C. Carroll,⁵ Susan E. Coffin,⁶ Erik R. Dubberke,⁷ Kevin W. Garey,⁸ Carolyn V. Gould,¹ Ciaran Kelly,⁹ Vivian Loo,¹⁰ Julia Shaklee Sammons,⁶ Thomas J. Sandora,¹¹ and Mark H. Wilcox¹²

The Brecher Guidelines

- If it ain't loose it's of no use
- If the stick falls, test them all
- If the stick stands, the test is banned












Bristol Stool Charts and Tarts



Bristol Stool Chart

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on the surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. Entirely Liquid



EHR Automatic Cancellation



Does your lab include *C. difficile* in
the 'stool panel'?



Surgical Site Infections

SSI: Background

- More than 15 million surgeries are performed in the US every year
- The US population is at increasing risk for a surgical site infection (SSI)
 - 8.3 % of US population has diabetes; 79 million are pre-diabetic
 - 35.7% of the US population is obese



SSI: The Problem

- 3-16% of patients undergoing surgery experience a major complication
- An SSI extends length of stay (7-10 days) and adds \$3,000 to \$29,000
- 75% of deaths in patients with an SSI are attributable directly to the SSI



Most Common Culprits

- *Staphylococcus aureus* and coagulase negative staphylococci are most associated with SSI's
- Pathogens vary by procedure
- Costs can exceed \$90,000 per infection when the SSI involves a prosthetic joint implant or antimicrobial resistant organism



HICPAC Strength of Evidence Categories

Category IA	A strong recommendation supported by high- to moderate-quality evidence suggesting net clinical benefits or harms.
Category IB	A strong recommendation supported by low-quality evidence suggesting net clinical benefits or harms, or an accepted practice, supported by low- to very low-quality evidence.
Category IC	A strong recommendation required by state or federal regulation.
Category II	A weak recommendation supported by any quality evidence suggesting a tradeoff between clinical benefits and harms.
No recommendation/unresolved issue	An unresolved issue for which there is either low- to very low-quality evidence with uncertain tradeoffs between benefits and harms or no published evidence on outcomes deemed critical to weighing the risks and benefits of a given intervention.

SSI Resource – Supplemental Guidance



**Wisconsin Division of Public Health Supplemental
Guidance for the Prevention of Surgical Site Infections:
An Evidence-Based Perspective**

January 2017 (Rev. 5/2017)



Interventions for ALL Procedures



antimicrobial
prophylaxis
(AMP)



glycemic
control



normothermia



oxygenation



antiseptic
prophylaxis



Additional Interventions

Prosthetic joint

- Staphylococcal screening and decolonization
- Blood transfusion
- Systemic immunosuppressive therapy, intra-articular corticosteroid injection, anticoagulation, orthopedic space suits, and biofilms

Colorectal

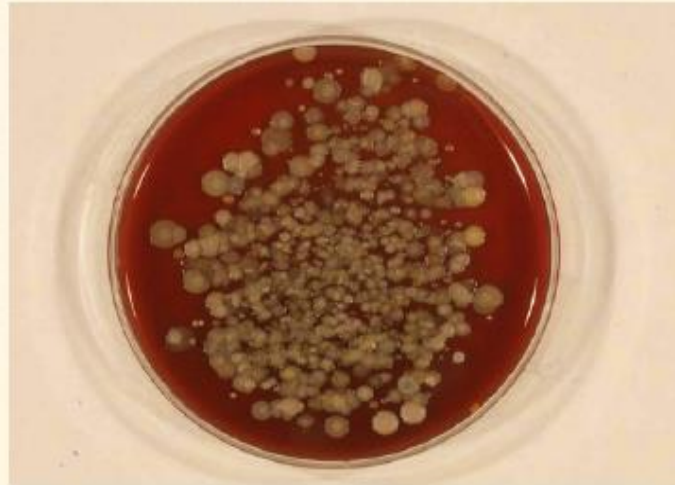
- Mechanical bowel preparation with antibiotics

The hair covering debacle

- Moderate Evidence



Staff hair containment does matter



uncovered hair – head shake



covered hair at 1 hr – head shake

* Blood agar cultures courtesy of Francis P. Mitrano, MS, RPh, Director of Pharmacy, Beth Israel Deaconess Medical Center, Boston, MA, November, 2005.



Creative
approaches to
traffic control

**Surgical Procedures – Hospital and Ambulatory (surgical = procedures involving an incision)
Observation Checklist for Assessment of Infection Prevention Efforts**

Date of Observation: _____ Observer: _____
Procedure(s): _____ Surgeon/MD: _____

STANDARDS	YES	NO	N/A	DESCRIPTION/COMMENTS
Environment:				
Room appears clean, dust free, uncluttered, no holes in walls, floors or ceiling				
Between case environmental cleaning performed – horizontal surfaces in patient zone				
Single-use items disposed between cases including O2 tubing, suction canisters				
Reusable patient equipment cleaned/disinfected between cases				
Clean, sterile, and soiled items are kept separate				
Supplies stored behind closed doors				
Pre-op:				
If indicated: pre-op antibiotic administered within 60 minutes prior to incision (should indicate this during time out prior to case) and re-dosed for long cases (e.g. > 2 hours)				
Hair removal: if needed should be done prior to entering OR use clipper with vacuum to contain clipped hair				
Skin prep: ⇒ Dual agent prep used (product containing alcohol plus iodine or CHG) and applied correctly – back and forth for 30 seconds for Chloraprep; concentric circles for Duraprep) and appropriate dry time. ⇒ CHG, Betadine or Technicare for mucous membranes (e.g. genitalia) per local policy				
Once opened sterile items are supervised to prevent contamination.				
Non sterile equipment covered by a clean barrier such as C-Arm; sterile handles for microscope, lights or other equipment touched by scrubbed team members				
Staff Attire:				
Non scrubbed staff: Hand hygiene prior to applying gloves and after glove removal				
Properly donned surgical masks				
All members of OR team wear long sleeves – no fleece				
All head hair covered				
Chest and beard hair fully covered				
For all staff, no artificial nails, no chipped nail polish, short natural nails				
Intra-operative:				
Doors closed, traffic in and out of room kept to minimum during case (count #)				
Patient temp maintained during case via fluid, underbody warming pad, forced air warming blanket, other.				
Items introduced onto sterile field are opened, dispensed, transferred by methods to maintain sterility/integrity.				

Developed by National Infection Prevention and Periop; based on a tool shared by Gwen Felizardo, RN, BSN, CIC, Group Health Cooperative, Tacoma, Washington - Revised National Infection Prevention and Control 2015

MRSA Bloodstream Infection

Healthcare-associated Infections

CDC > Healthcare-associated Infections (HAI) > Preventing HAIs



- Home Healthcare-associated Infections (HAI)
- HAI Data +
- Types of Infections +
- Diseases and Organisms +
- Preventing HAIs -**
 - Staph BSI Prevention Strategies**
 - CDI Prevention Strategies
 - Urine Culture Stewardship +
 - Targeted Assessment for +

Strategies to Prevent Hospital-onset *Staphylococcus aureus* Bloodstream Infections in Acute Care Facilities

Introduction

Purpose:

This document provides a summary of strategies for acute care facilities that want to implement interventions to prevent hospital-onset *Staphylococcus aureus* Bloodstream Infections (HO SA BSIs). The specific interventions listed below are not intended for use in response to an outbreak and are intended for adult inpatient units.

Infection control practices should be reinforced on an ongoing basis, including the use of competency-based training and monitoring of adherence with feedback of results for practices including hand hygiene, environmental cleaning

On This Page

- 1. IMPLEMENT INTERVENTIONS
- 2. IMPLEMENT SOURCE CONTROL STRATEGIES
- 3. IMPLEMENT INTERVENTIONS
- 4. DEVELOP INFRASTRUCTURE
- Table 1
- References

MRSA Bacteremia: Prevention

Reduced transmission

- Hand hygiene, isolation precautions, aseptic technique
- Prevention bundles
- Environmental cleaning

Reduced colonization

- Decolonization with CHG bathing ± mupirocin
- Screening for MRSA carriers with later isolation vs. universal decolonization

Reduced ecologic pressure to develop resistance

- Antimicrobial stewardship interventions

CHG Daily 'Bathing'

- Various outcomes assessed in clinical studies:
 - **MDRO (MRSA, VRE) acquisition**
 - **MDRO infection**
 - **CLABSI**
 - **Hospital-associated bloodstream infection (BSI)**
 - Catheter-associated UTI (CAUTI)
 - VAP
 - *C. difficile*
 - **Blood culture contamination**

Broadened surveillance
definition of BSI
Passed by NQF 2.23



HOBSSI

(Hospital Onset Blood Stream Infection)

Purpose: Surveillance for broader reduction of BSI regardless of organism (eg. MRSA) or association with Device (eg. CLABSI)

Definitions: HOB Blood culture collected on day 4 or later with pathogenic bacteria or fungi

Timeline: Voluntary Reporting Now



HAI Summary

- Barbara DeBaun, MSN, RN, CIC
- bdebaun@cynosurehealth.org

