Prevention of Central Line-Associated Bacteremia

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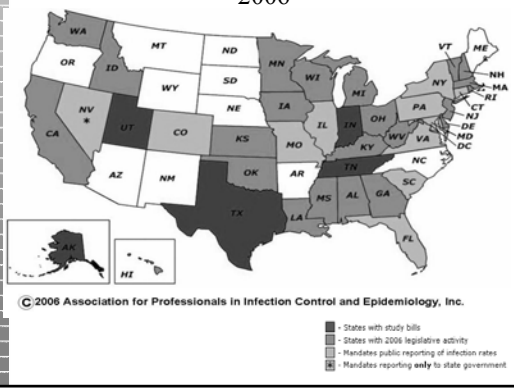
Background

Response to a Nationally Recognized Problem

- *Institute for Healthcare Improvement: 100,000 Lives Campaign*
- National initiative to reduce healthcare errors, infections, and associated death
- >3000 hospitals currently participating
- Addresses specific healthcare-acquired infections
  - Central line-associated BSI (CLAB)
  - "Central line bundle"
    - Hand hygiene
    - Maximal sterile barriers
    - Chlorhexidine skin antisepsis
    - Daily assessment for line necessity

http://ihi.org/IHI/Programs/Campaign/Campaign.htm

Mandatory Reporting of Infection Data 2006



Measurement & Pay-for-Performance

- *"….all-or-none measurements more closely reflects the interests and likely desires of patients. This is especially true when process components interact with each other synergistically….violation of a single step in the sterile technique in [in a medical procedure] may vitiate the benefits of proper execution of all other steps…"*
  – *Nolan, Berwick. JAMA 2006*
- *The Take Away Message:* in CLAB prevention, it makes little sense to assure that 2 or 3 interventions are performed *if for example, the patient's skin has not had optimal prepping, or the physician has not used maximal sterile barriers, or has not washed his hands, or……..*
- *Beyond 2007: CMS will begin to institute system of payment for procedures ONLY IF accepted scientific interventions have been performed and documented*

Nolan T, Berwick DM. All-or-None measurement raises the bar on performance. JAMA 2006; 295:1168-70.

Magnitude of the Problem

Severe Consequences

- 75% of all catheter related infections are due to the use of a central line
- >250,000 CVC related infections per year
- Mortality may be up to 35%
- The CDC estimates that attributable costs due to catheter associated infections range from $34,508 to $56,000.

HICPAC. CDC Guideline on the Prevention of Intravascular Associated Infections, 2002.

Evaluating the Cost to Treat Bloodstream Infections

Author	Year	Cost Calculation	Incremental Cost
Pittet	1994	SICU admissions, total costs of hospitalizations for survivors and non-survivors	$28,690
DiGivone	1999	MICU admission, total direct costs	$34,508
Dominquez	2001	PICU admission, total charges for hospitalization	$40,000
Slonim	2001	PICU admissions, total hospital charges	$46,133
Dimick	2001	SICU admissions, total hospital and ICU charges	$56,167
Elward	2005	PICU admissions, total direct costs of hospitalization	$60,108

Benchmark Rates for Intravascular Lines

	Studies	Mean no. BSIs per 100 devices	Mean no. BSIs per 1000 device days
Peripheral IVCs	13	0.2	0.6
Arterial	6	1.5	2.9
Central venous catheters			
♦ Standard, uncuffed	63	3.7	2.2
♦ Swan Ganz	17	2.5	4.3
♦ Hemodialysis	15	15.7	2.6
♦ Tunneled (e.g., Hickman)	30	10.4	1.2
♦ Surgically implanted	13	5.1	0.2
♦ PICCs (in-hospital)	9	1.9	0.4

Maki DG. A meta-analysis of the risk of intravascular device-related bloodstream infection based on 223 published prospective studies. Abstract, 4th Decennial, 2000

PICC-Associated Infections

- Study of 251 PICCs in 115 hospital inpatients
- Mean duration of catheterization = 11.3 days
- 42% of patients had been in ICU
- Results:
  - Six infections
  - Coagulase negative staph (4), *S. aureus* (1), *K. pneumoniae* (1)
  - Rate: 2.1 per 1000 catheter days
  - *Comparative Outpatient Rate: 0.4 per 1000 catheter days*

Safdar N, Maki DG. Risk of catheter-related bloodstream infection with peripherally-inserted central venous catheters used in hospitalized patients. Chest, 2005;128:489-95.

Definition & Diagnosis

Terms

- CVC = central venous catheter
- CRBSI = catheter-related bloodstream infection
- CABSI = catheter-associated bloodstream infection
- CLAB = Central line-associated infection

Definition of a Central Line

Central Line

Definition: **A vascular infusion device that terminates at or close to the heart or in one of the great vessels.**

Central Lines include the following **if** the line meets the definition of a central line:
Implantable-ports, Non-tunneled TLC, Swan Ganz catheter, Tunneled-Broviac, Groshong, Quinton, Hickman, ASHE catheter, PICC, Umbilical lines, Dialysis catheter, Permanent shunts, Balloon pumps, Temporary (Quinton) or Tunneled (ASHE) Hemodialysis catheters

INCLUDE THE FOLLOWING FOR PURPOSES OF REPORTING CENTRAL LINES:

Do NOT include:
•Pacemaker Wires
•Other Non-infusion devices inserted into central blood vessels or the heart

Great Vessels | **Lines for Hemodialysis** | **Lines for Chemotherapy**

Great Vessels include:
- Aorta
- Pulmonary Artery
- Superior Vena Cava
- Inferior Vena Cava
- Brachiocephalic Veins
- Internal Jugular Veins
- Subclavian Veins
- External Iliac Veins
- Common Femoral Veins

In Neonates count, Umbilical Artery/Vein

Can NOT be used to determine if a line qualifies as a Central Line:
• Location of the insertion site
• Type of device

The device must terminate in one of these vessels or in or near the heart to qualify it as a central line.

Definition from: CDC National Nosocomial Infections Surveillance (NNIS) System.

Clinical Features of Line Sepsis

- *Nonspecific*
- Fever
- Chills, shaking rigors
- Hypotension, shock
- Hyperventilation
- Gastrointestinal
  - abdominal pain
  - vomiting
  - Diarrhea
- Neurologic
  - confusion
  - seizures

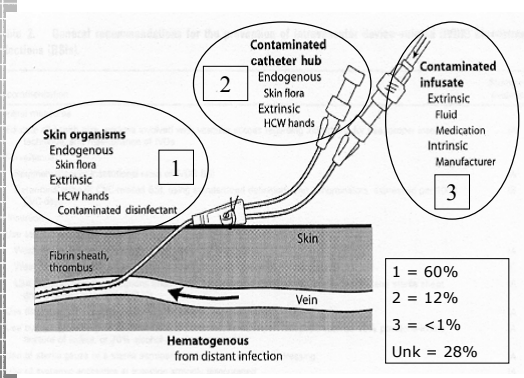
- *Highly Suggestive of Line Sepsis*
- Source of sepsis inapparent
- Patient unlikely candidate for sepsis
- Intravascular line in place (or recently in place)
- Inflammation or purulence at site
- Abrupt onset, with shock
- Sepsis response to antimicrobial therapy or dramatic improvement after removal of device

Definition of a CLAB

- Primary CLAB – major site of infection is a bloodstream infection and is either laboratory confirmed or clinical sepsis.
- Vascular access device present, no other source
- 48-hour period after initial insertion

CDC, MMWR Aug. 9, 2002/51 (RR10);27-28

Pathogenesis

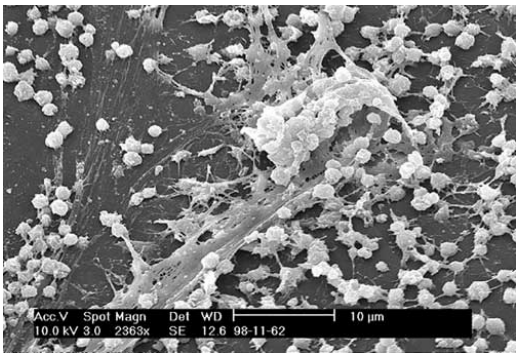


Safdar N, Maki DG. The pathogenesis of catheter-related bloodstream infection with noncuffed short-term central venous catheters. Int Care Med 2004;30:62-7.

Sources of CVC-Related Infection

Potential source	No. catheter-related infections associated with the source: Local (>15 CFU) (n = 40)	With bacteremia (n = 6)
Colonization of skin of insertion site	36	6
Contamination of catheter hub	4	2
Contaminated IV fluid	1	1
Colonization from remote site	4	0
Unknown	1	0

Maki DG, Cobb L, Garman JK, et al. An attachable silver-impregnated cuff for prevention of infection with central venous catheters. A prospective randomized multi-center trial. Am J Med 1988;85:307-314



Ryder MA. Catheter-related infections: It's all about biofilm. Topics Adv Prac Nurs eJourn 2005;5:posted 8/18/05.

Microbial Profile of IVD-Related BSI

		% of Total			
	No. IVD-Related BSIs	CNS	*S. Aureus*	GNRs	Yeasts
Shot-term, percutaneous: PIVCs, non-cuffed CVCs, Art lines	592	40	26	15	11
Long-term CVCs: Hickmans, ports, PICCS, cuffed HD	865	25	13	50	3

Kluger DM, Maki DG, 2000, Meta-analysis of 159 studies

Prevention Strategies

Current Prevention Recommendations

Component	IHI	CDC
•Hand hygiene	✓	✓(IA)
•Maximal sterile barriers	✓	✓(IA)
•Chlorhexidine skin antisepsis	✓	✓(IA)
•Optimal catheter site selection	✓	✓(IA)
•Daily review of line necessity	✓	✓(IA)
•Weekly dressing changes unless damp, loosened, or visibly soiled	NA	✓(IB)
•Do not routinely replace CVCs solely for purposes of reducing the incidence of infection	NA	✓(IB)
•Use an antimicrobial or antiseptic-impregnated CVC	NA	✓ (IB)
•Use of mechanical IV valves	NA	NA
•Minimize contamination risk by wiping the access port with an appropriate antiseptic	NA	✓(IB)

IHI 100K Lives Campaign. Getting Started Kit: Prevent Central Line Infections How-to Guide; CDC Guideline for Prevention of Intravascular Catheter Related Infections, 2002.

UI = unresolved issue; NA = not addressed

CDC (HICPAC) Guidelines

- Issued 8/9/02
- Evidence based
- Recommendations categorized
- Peer reviewed

www.cdc.gov/mmwr/preview/mmwrhtml/rr5110a1.htm

Are U.S. Hospitals Implementing Recommendations?

- A survey of 95 VA hospitals and 421 non-VA hospitals
- Only 72% use maximal sterile barriers
- Only 70% use CHG skin antisepsis
- 16% use routine catheter changes
- Barriers to change:
  - Not enough resources to implement recommendations
  - Lack of a physician champion
  - The economic cost of the practice

Klein SL, et al. Are U.S. hospitals applying evidence to prevent central venous catheter-associated bloodstream infection? [abstract 228] SHEA 16th Annual Conference, March 2006, Chicago, IL

Surveys of Internists on Guideline Adherence

- Only 28.8% used maximal sterile barriers
- Only 17.0% insert into subclavian vein
- >10% reported use of CHG
- *Possible reasons:*
  - *Little awareness of published guideline*
  - *Maximal sterile barriers not believed to effect outcomes*
  - *Lack of immediate availability of CHG*

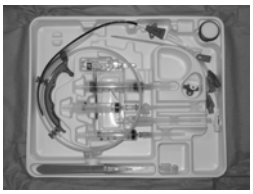
Rubinaon L, et al. Why is it that internists do not follow guidelines for preventing intravascular catheter infections? ICHE 2005;26:525-33.

10 Essential Interventions to Prevent CLAB

1. Establish Credibility

- Recruit Physician & Nurse Champions
- Key areas:
  - ER
  - ICUs
  - Anesthesiology
- All must be committed to same goals
- *Leaders must convince their own*
- Appoint "CLAB Leader" for each patient unit

Key Strategy: Have Materials Management Join the Team



- Novel technologies will have incremental costs
- Key person who will facilitate purchase of needed products

2. Educate & Train the "Frontline" Healthcare Worker

- *A. Educate health-care workers regarding the indications for intravascular catheter use, proper procedures for the insertion and maintenance of intravascular catheters, and appropriate infection-control measures…***Cat IA.**
- *B. Assess knowledge of and adherence to guidelines periodically for all persons who insert and manage intravascular catheters.* **Cat. IA**

Performance-Based Training

- Educational focus is on the continuous improvement of worker performance
- Worker skills and competencies are identified to achieve the department mission
- Curriculum is organized around learner needs and regulatory mandates. A collaborative approach is used with manager, worker, and educator input.
- The evaluation measures the workers' abilities to meet standard; it also determines if learned skills are enough to perform the job effectively.

Education as a Main Intervention

- 9 hospitals, 5,200 beds
- Multidisciplinary task force
- 10 page self-study module
- Pre-test avg score: 78.3%
- Post-test avg score: 89.9%
- Pre-education CR-BSI rate: 10.8/1000 CD
- Post-education CR-BSI rate: 3.7/1000 CD

Coopersmith CM, Rebmann TL, Zack J, Ward M, Corcoran RM, et al. Effect of an education program on decreasing catheter-related bloodstream infections in the surgical intensive care unit. Crit Care Med 2002;30:59-64.


APIC
BJC HealthCare™

Prevention of Catheter-Related Bloodstream Infections

Self-Study Post-Test
March 2003

Name: _____
Date: _____
Hospital: _____
Unit/Floor: _____


BSI Study Module Post-Test

Test your Catheter-Related Bloodstream Infection Knowledge
Circle the correct answer.

1. Approximately how many hospital-acquired bloodstream infections occur each year in the US? A. 25,000 B. 250,000 C. 2,500,000
2. Approximately what percentage of primary bacteremias in ICU patients are associated with IV devices? A. 10% B. 20% C. 30% D. 40%
3. Hands of healthcare personnel may serve as a source of contamination of intravenous catheters. T F
4. Lines inserted in the subclavian vein have a decreased risk of BSI compared to femoral or internal jugular lines. T F
5. The two most common ways CR-BSIs occur are migration of skin organisms from the insertion site to the catheter tip and contamination of the catheter hub. T F
6. In long-term catheters (in place >30 days), skin contamination at the insertion site is the most likely mechanism of infection. T F
7. Inserting or changing a CVC over a guidewire is a sterile procedure, and full sterile garb, including sterile drape, must be used during the procedure. T F
8. If a multi-lumen catheter is used to administer TPN, designate the distal or middle port for TPN infusion only. T F

Courtesy of Teresa Garrison, Barnes-Jewish Hospital, St. Louis. Mo. Available through APIC publications.

Effect of Education on CLAB

Study	Type of unit	Pre-intervention rate (per 1000 catheter days)	Post-intervention rate (per 1000 catheter days)
Coopersmith, Crit Care Med, 2002	Surg/burn/ trauma ICU	10.8	3.7
Rosenthal, AJIC 2003	ICU	17.0	9.9
Warren, Crit Care Med, 2003	ICU (Comm. Hosp.)	4.9	2.1
Warren, Chest 2004	MICU (Univ. Hosp.)	9.4	5.5

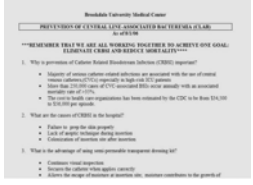
Education Failure

- Audit following study in a SICU in a referral hospital
- Within 18 months after education program, compliance with handwashing, documentation of dressing dating, stopcock use, and use of maximal sterile barrier had decreased
- *Conclusion: Compliance with best practice principles wanes over time*

Coopersmith CM, et al. The impact of bedside behavior on catheter-related bacteremia in the intensive care unit. Arch Surg 2004;139:131-6.

Basic Education on CLABs

- Handout designed for nurses and physicians
- Required education session for all Managers and "front line" workers
- Includes information on:
  - Magnitude of problem
  - Hospital rates by unit
  - Mortality
  - Cost
  - Prevention strategy
  - Policy


Brookdale University Medical Center

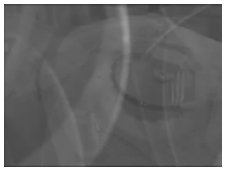
PREVENTION OF CENTRAL LINE ASSOCIATED BACTEREMIA (CLAB)

REMEMBER THAT WE ARE ALL WORKING TOGETHER TO ACHIEVE ONE GOAL: ELIMINATE CRBSI AND REDUCE MORTALITY*

1. Why is prevention of Catheter Related Bloodstream Infection (CRBSI) important?
   - Majority of serious catheter-related infections are associated with the use of central venous catheters (CVC) and generally are higher in ICU patients
   - More than 250,000 cases of CVC-associated BSIs occur annually with an associated mortality rate of >15%
   - The cost to health care organizations has been estimated by the CDC to be from $14,166 to $16,000 per episode.
2. What are the causes of CRBSI in the hospital?
   - Failure to prep the skin properly
   - Lack of aseptic technique during insertion
   - Colonization of insertion site after insertion
3. What is the advantage of using semi-permeable transparent dressing kit?
   - Continuous visual inspection
   - Secures the catheter when applies correctly
   - Allows the escape of moisture at insertion site; moisture contributes to the growth of

Training Video on Insertion

- Required viewing by all residents
- Reflects acceptable aseptic practice & policy
- Emphasizes key interventions including:
  - Kit setups
  - Handwashing
  - Maximal barriers
  - Proper skin prepping
- Corresponding handout



Training on Mannequins

- Held weekly
- All first-year residents are required to attend
- Conducted by IC and Surgical Attending
- Walk-through on insertion steps

Credentialing & Competency

- Physicians:
  - 1st-year residents required to be assisted by 2nd-year or greater physcian for first 5 subclavian/jugular insertions and 3 femoral insertions
- Nurses:
  - In addition to basic education, must attend dressing and maintenance education session
  - Observed for policy adherence 2 x year

3. Demand Strict Hand Hygiene

- *Observe proper hand washing procedures either by washing hands with conventional antiseptic-containing soap and water or with waterless alcohol-based gels or foams.* **Cat. IA**
- **JCAHO Patient safety Goal #7 requirement**

Key Components of Hand Hygiene Compliance

- Usage monitoring
  - Collect data on empty soap/sanitizer containers
  - Educate PATIENTS to increase EMPLOYEE handwashing compliance
  - Calculated as hand hygienes per patient day
- Education mandate
- Observation monitoring (ownership by department heads/directors)
- Point prevalence surveys to ensure adequate supplies on patient units

4. Ensure Adherence to Policy During Insertion


PATIENT LABEL

- All insertions assisted by nurse
- Empower nurses to stop procedure if observed break
- Use checklist to reflect step by step policy adherence

5. Optimal Site Placement

- *Weigh the risk and benefits of placing a device at a recommended site to reduce infectious complications against the risk for mechanical complications (e.g., pneumothorax, subclavian artery puncture, subclavian vein laceration, subclavian vein stenosis, hemothorax, thrombosis, air embolism, and catheter misplacement).* ***Cat. IA***
- *Use a subclavian site (rather than a jugular or a femoral site) in adult patients to minimize infection risk for nontunneled CVC placement.* ***Cat. IA***
- *No recommendation can be made for a preferred site of insertion to minimize infection risk for a nontunneled CVC.* ***Unresolved issue***

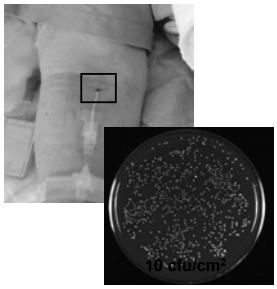
Risk of Infection by Site

- Prospective study in ICU
- Standardized insertion techniques and care
- 831 catheters, 4735 cath days, 657 pts.
- Results (per 1000 catheter days):
  - SC: 0.881 (0.45%)
  - IJ: 0.00 (0.0%)
  - Fem: 2.98 (1.44%)

Deshpande KS, et al. The incidence of infectious complications pf central venous catheters at the subclavian, internal jugular, and femoral sites in an intensive care unit population. Crit Care Med 2005

Skin Microbial Density: Antecubital Space

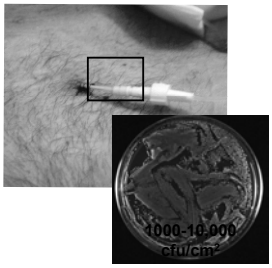
- Skin surface microbial density varies at different body sites and between genders
- Normal microbial colony counts at the antecubital space are 10 cfu per cm



Ryder, MA. Catheter-Related Infections: It's All About Biofilm. *Topics in Advanced Practice Nursing eJournal*. 2005;5(3) ©2005 Medscape. Posted 08/18/2005 http://www.medscape.com/viewarticle/508109

Skin Microbial Density: Jugular and Subclavicular Space

- Skin surface microbial density is highest on the skin at the femoral, jugular, and subclavian sites
- Normal microbial colony counts at the jugular and subclavicular space are 1000 – 10,000 cfu per cm^2



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6. Use Maximal Sterile Barriers

- *Use aseptic technique including the use of a cap, mask, sterile gown, sterile gloves, and a large sterile sheet for the insertion of CVCs (including PICCs) or guidewire exchange.* **Cat. IB**

Study on Efficacy of Barrier Precautions of CR-BSI

	# Pts.	Minimal barrier group*	Maximal barrier group**
Cath colonization	176	7.2%	2.3%
CR-BSI	167	3.6%	0.6%

* Sterile gloves, small drape

** sterile gloves, gown, mask, cap, large drape

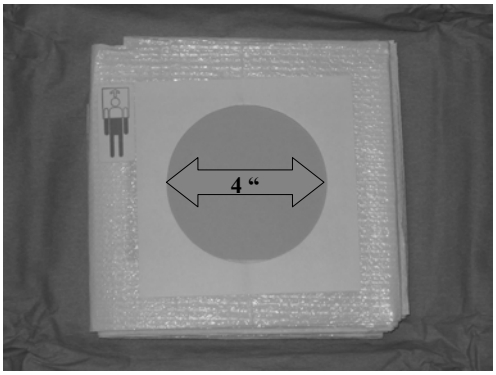
Raad II, Hohn DC, Gilbreath BJ, Suleiman N, et al. Prevention of central venous catheter-related infections by using maximal sterile barrier precautions during insertion. ICHE 1994;15:231-8.

Maximal Sterile Barriers: Accessibility & Standardization Issues

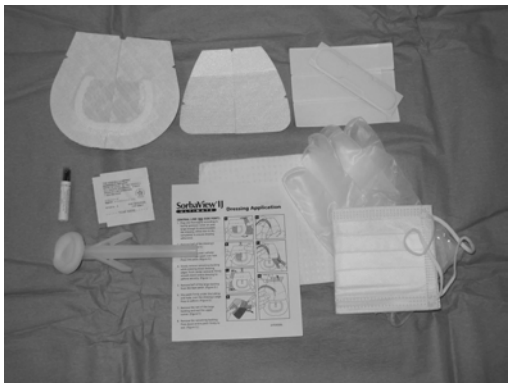
- Seek vendor to create a "one stop shopping" custom kit
- Let the user decide on type of components
- Provide in all insertion areas: eliminates searching
- Eliminate all other items used before
- Also used during placement of other lines, e.g., arterial, PICC lines

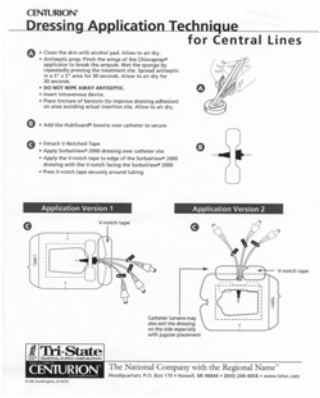
Large Sterile Drape

Drape size approx. 7.5' (90") long x 5' (60") wide



TIP: Seek advice from surgeons/sterilization manager on correct packing of items in order to avoid contamination during donning procedures





7. Provide Optimal Skin Antisepsis

- *Disinfect clean skin with an appropriate antiseptic before catheter insertion and during dressing changes. Although a 2% chlorhexidine-based preparation is preferred, tincture of iodine, an iodophor, or 70% alcohol can be used.* **Cat. IA**

Results of Trial of Three Antiseptics

Source of Septicemia	10% Povidone-iodine (n = 227)	70% Alcohol (n = 227)	2% CHG (n = 214)
Catheter-related	6	3	1
Contaminated:			
Infusate	0	3	0
Hub	1	0	0
All sources (%)	7 (3.1)	6 (2.6)	1 (0.5)*

668 patients with either central venous or arterial catheters.

***Compared with the other two groups combined: OR=0.16, 95% CI 0.30-1.17, p=.04**

Maki et al. Prospective randomized trial of povidone-iodine, alcohol, and chlorhexidene for the prevention of infection associated with central venous and arterial catheters. Lancet 1991;338:339-343.

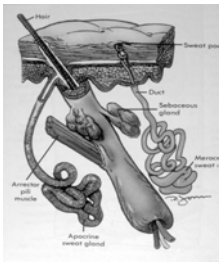
Meta-Analysis on CHG vs. PI

- Reviewed eight randomized, controlled trials involving a total of 4,143 catheters (peripheral venous, peripheral arterial, pulmonary arterial, PICC, introducer sheaths, hemodialysis).
- The summary risk ratio for CRBSI for all catheters was 0.49 indicating *"a significantly reduced risk in patients using chlorhexidine gluconate."*

Chaiyakunapruk N, et al. Chlorhexidine compared with povidone-iodine solution for vascular catheter-site care: A meta-analysis. Ann Intern Med 2002;136:792-801.

Microbiology of the Skin

- 80% of the resident bacteria exist within the first 5 layers of the stratum corneum of the epidermis
- The remaining 20% of the resident bacteria are found in biofilms within the hair follicles and sebaceous glands
- Complete recolonization of surface bacteria can occur within 18 hours of antiseptic application



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Catheter Site Care Tips

- *Alcohol/CHG product: 30/30 rule*
- *New movement: Revise policies from "cleaning from center to outer areas" to "SCRUB THE AREA THOROUGHLY"!*
- *Antiseptics only work if they are allowed to dry*
- *Iodine solutions should be allowed to dry for a minimum of 2 minutes*

8. *Consider Novel Technologies*

- Antibiotic, Antimicrobial-Coated Catheters

Antibiotic/Antiseptic Coated Catheters

CDC on Antimicrobial Catheters

- CVCs: II.B. Use an antimicrobial or antiseptic impregnated CVC in adults whose catheter is expected to remain in place >5 days if, after implementing a comprehensive strategy to reduce rates of CRBSI, the CRBSI rate remains above the goal set by the individual institution based on benchmark rates and local factors (comprehensive strategy = education, use of maximal sterile barriers, and a 2% chlorhexidine skin prep). **Cat. IB**

Review of Vantex Trials

	No. Of CRBSIs/ No. of CVCs studied			
No. of Trials	Study	Control	RR (95% CI)	*P*
3	8/275	21/295	0.41 (0.18-0.91)	.02

Crnich CJ, Maki DG. The promise of novel technology for the prevention of intravascular device-related bloodstream infection. I. Pathogenesis and short-term devices. CID 2002;34:1232-42.

Silver-Platinum vs. Rifampicin-Minocycline Catheters

- Large, prospective randomized study
- Blood cultures matched to cath tip cultures
- DNA matching
- 574 catheters evaluated
- Colonization: RM caths – 8.9%; SP caths – 14.6%
- BSI: RM – 1.4%; SP – 1.7%
- Yeast: RM – 1.8%; SP – 0.3%

Fraenkel D, et al. A prospective, randomized trial of rifampicin-minocycline-coated and silver-platinum-carbon-impregnated central venous catheters. Crit Care Med 2006;34:668-75.

9. Provide Optimal Dressing Care

- *Replace the catheter- site dressing when it becomes damp, loosened, or soiled…***Cat. IA**
- *Replace dressings used on short- term CVC sites every 2 days for gauze dressings and at least every 7 days for transparent dressings, except in pediatric patients where the risk for dislodging the catheter outweighs the benefit of changing the dressing.* **Cat. IB**

Dressing Adherence Study I

- Point prevalence study at teaching hospital
- Of 114 pts who had CVCs, 78 (68%) had sub-optimal site care (uncovered or bloody)
- Study did not correlate with site colonization or BSI occurrence

Warren D, Apisarnthanarak A, Shukla S, Zack J, Fraser V. Processes of Urinary and Central Venous Line Care Among Non-ICU Patients. Abstract, SHEA Conference, Salt Lake City Utah, 2002

Does the Dressing Matter?

	# Pts.	# LD	# Observ. Days	# Dressings Peeled	% peeled	# CRBSI
Prod. A	120	1227	345	180	52.2	6
Prod. B	117	1220	338	44	13.0	2

Study conducted at Brookdale University Medical Center; Population included adult patients with a central venous catheter; Product A & B are both transparent dressings; Similar percent by site in both groups (femoral, subclavian, jugular); Observations of site conducted on days 1,3,5 after application; dressing policy – replace as needed; unpublished data.

Key Strategy: Monitor dressing protocols

Blood under dressing

Loose Dressing

Site Monitoring

	Yes	No
Is there evidence of inflammation or purulence at site?		
Is there blood at insertion site?		
Has dressing been applied correctly?		
Are all four sides of dressing adhered correctly?		
Does dressing appear clean and dry?		
Is dressing dated as per policy?		

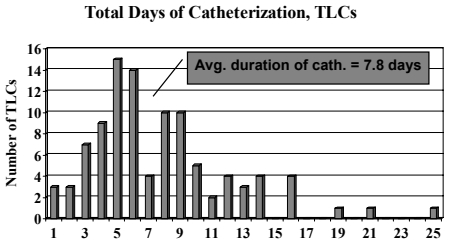
10. Conduct Daily Assessment of Line Necessity

- All physicians, especially chief residents, must be on board with this issue
- Every day, ask the following:
  - *Does the patient still need the line?*
    - *If yes, can a less risky catheter be used (e.g., triple lumen to a PICC)?*
    - *If no, can we remove the line today?*
- *Incorporate into Daily Goal Sheets*

Replacement of Intravascular Catheters

- *Do not routinely replace central venous or arterial catheters solely for the purposes of reducing the incidence of infection.* **Cat. IB**
- **What is avg. duration of catheterization of CVC in your institution?**

Calculation of Mean Duration
(98 catheters in 78 patients, Jan. 2005)



Calculation of average: 761 catheter days / 98 catheters = 7.8 days

Success Stories

Effect of Multifaceted Approaches on CLAB

Study	Type of unit	Pre-intervention rate (per 1000 catheter days)	Post-intervention rate (per 1000 catheter days)
Eggiman, 2000	MICU	11.3	3.8
Hover, 2003	2 ICUs	9.15	3.58
Wallace, 2003	SICU	25.1	6.2
Fauerbach, 2004	Housewide	10	6
Vinsel, 2004	PICU NICU	7.8 10.5	6.1 5.5
Matt, 2004	Neuro ICU	9.9	4.6
Berenholtz, 2004	SICU	11.3	0
Gilliam, 2004	PICU	9.2	5.0

Effect of Multifaceted Approaches on CLAB: more Examples

Study	Type of unit	Pre-intervention rate (per 1000 catheter days)	Post-intervention rate (per 1000 catheter days)
Greene, 2005	Housewide	6.9	3.9
Fauerbach, 2005	SICU	15.51	4.16
Ellis, 2005	ICUs in 4 hospitals	1.7	0.4
Bryant, 2006	PICU	6.96	2.1
Koll, 2006	ICU Non-ICU	8.5 13.3	0 0
Muto, 2006	8 ICU types in 20 hospitals	4.2	1.3
Bevan, 2006	MICU	6.5	2.2

The Brookdale University Medical Center

Overview of Brookdale Study

- 5+ year project including all hospital patients with central venous catheters (CVC)
- Largest U.S. trial to date on effect of interventions: >5000 pts, >60,000 catheter days
- Results presented at 2003-2005 APIC conferences
- Awarded NYS Patient Safety Award, 2004
  - *Peer reviewed by Johns Hopkins & Duke University MCs*
- Selected as best practice project, JCAHO
- Project included as part of JCAHO video broadcast on Infection Control, 4/15/04
- Methodology presented to members of the Greater New York Hospital Association and Maryland Patient Safety Center on prevention of CRBSI

As of 5/06

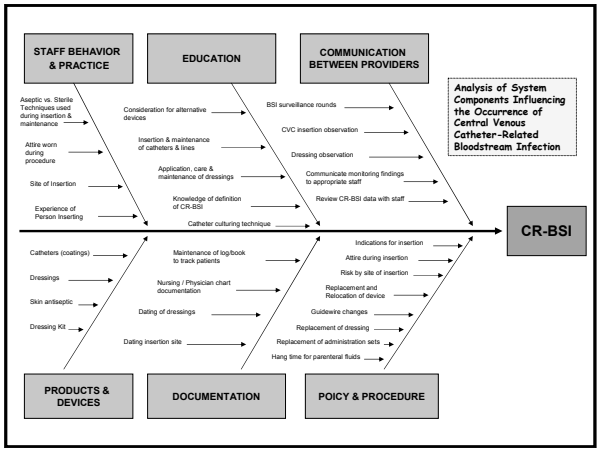
THREE YEARS EXPERIENCE IN IMPLEMENTING HICPAC RECOMMENDATIONS FOR THE REDUCTION OF CENTRAL VENOUS CATHETER-RELATED BLOODSTREAM INFECTIONS

Garcia R.*, Jendrisky L., Landesman S., Maher A., Nicolas F.
Brookdale University Medical Center (BUMC), Brooklyn, NY.

MODIFIED ABSTRACT

BACKGROUND

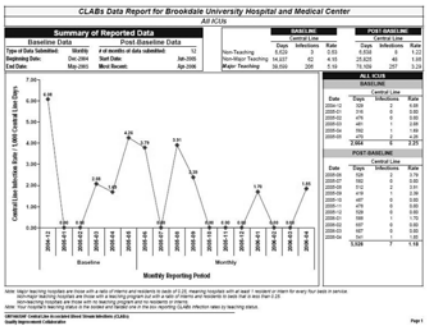
OBJECTIVES



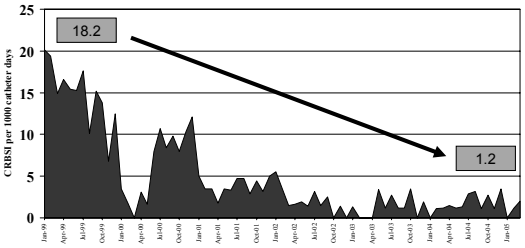
Key Strategy: Identification of Needs

- A uniform education program for nurses and physicians
- A certification process for first year residents on proper insertion
- Selection of insertion site to reduce risk
- Standards for aseptic practice during maintenance
- Standardization of sterile attire
- Standardization of skin antisepsis

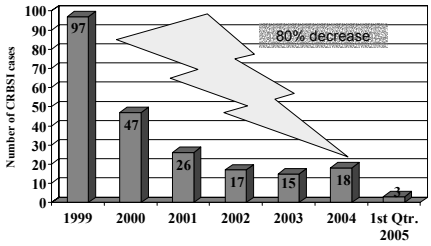
GNYHA CLAB Project



CLAB Rates, 1999-2005



CLAB by Year



Cost Avoidance

Infections & Costs Avoided

Year	# CRBSI	# CRBSI avoided	Costs avoided*
1999	97	---	---
2000	47	50	$2,262,700
2001	26	71	$3,213,034
2002	17	80	$3,620,320
2003	15	82	$3,710,828
2004	18	79	$3,575,066
2005**	12	85	$3,846,590
Total		**447**	**$20,228,538**

*Cost per CRBSI case based on CDC mean of $45,254

** projected based on 1st quarter data

Incremental Cost of New Interventions

Item	Description	Incremental cost per item	# items used in 10 days	Total Cost
Maximal sterile barrier kit	Sterile gown, gloves, mask, large drape, dressing components	$7.00	2	$14.00
Dressing kit	Transparent dressing, 2% CHG antiseptic, tincture of benzoin, tape	$2.00	1	$2.00
Skin antiseptic	70% alcohol-2% CHG in 3ml applicator	$0.70	2	$1.40
Antiseptic patch	Chlorhexidine-impregnated patch	$5.00	2	$10.00
Antimicrobial catheter	Silver-platinum catheter	$10.00	2	$20.00
Total incremental cost per patient : →				$47.40

Conclusion

- High-morbidity, high-cost infections are an ever-increasing focus of patient safety and quality improvement initiatives
- Application of several specific preventive measures targeting key routes of catheter colonization resulted in significant overall infection reduction

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2007 Teleclass Schedule

January

9 - *The UK Infection Prevalence Survey*, Chris Perry, UK
18 - *Personal Hygiene Measures to Prevent Influenza Transmission*, Dr. Elaine Larson, USA
25 - *Twenty First Century Plagues*, Prof. Robert Pratt, UK

February

8 - *Influenza – Of Poultry, Pets and People*, Dr. Corrie Brown, USA
15 - *Fresh Produce and Human Pathogenicity*, Prof. Keith Warriner, Canada
21 - *Infection Control in the Endoscopy Clinic*, Dr. Richard Everts, New Zealand
22 - *Best Practice for Hospital Construction Management*, Andrew Streifel, USA

March

6 - *Tuberculosis in the Modern Age*, Evonne Curran, UK
8 - *Voices of CHICA*, CHICA Canada Board & Guests
22 - *A Year of Cleaner, Safer Care - A Worldwide Experience*, Dr. Didier Pittet, Switzerland
29 - *Environmental Control Strategies for C. diff*, Dr. Lynne Schulster, USA

April

12 - *Who's Afraid of the CIC Exam?*, Sheila MacDonald & Sharon Krystofiak
19 - *Bacterial Resistance to Biocides in the Healthcare Environment*, Dr. Jean Yves Maillard, UK
25 - *Making IC Really Work - Managing the Human Factor*, Prof. Seto Wing Hong, China
26 - *Environmental Surveillance for Infection Control*, Andrew Streifel, USA

May

8 - *Panton-Valentine Leucocidin Producing Staph. aureus*, Brenda Dale & Adam Brown, UK
10 - *Infection Control in the Dialysis Clinic*, Dr. Charmaine Lok, Canada
17 - *Ethics of Care During a Pandemic Crisis*, Dr. Eric Wasylenko, Canada
24 - *Importance of Vaccination Among Dialysis Patients*, Dr. Matthew Arduino, USA
31 - *Evaluation and Management of Outbreaks in Nursing Homes*, Dr. Chesley Richards, USA

June

7 - *Infection Control in the Living and the Dead: The Angola Marburg Outbreak*, Dr. Adriano Duse, South Africa
20 - *Central Venous Lines and Prevention of Infection*, Dr. Steve Chambers, New Zealand

July

3 - *Implementing Innovations in Health Services*, Clare Allen, UK
26 - *CDC Guideline Review - Disinfection & Sterilization*, Dr. Bill Rutala, USA

August

9 - *Outcome Surveillance and Process Surveillance to Minimize Nosocomial Infection*, Dr. Victor Rosenthal, Argentina
22 - *ESBLs - Where Are We Now?*, Dr. Fong Chiew, New Zealand

September

20 - *Extreme Makeover: Exploring New Challenges to Our Identity in Infection Control*, Gwyneth Meyers, Canada
27 - *Ethical Issues in Infection Control*, Dr. Loreen Herwaldt, USA

October

4 - *Green Cleaning Strategies for Healthcare*, Dr. Lynne Schulster, USA
10 - *Infection Prevention Among Refugees*, Dr. Mark Birch, Australia
18 - *Hot Issues in Hand Hygiene Improvement - The First Global Challenge*, Julie Storr, Switzerland

November

6 - *Commissioning Infection Control Strategy*, Yvonne Sawbridge, UK
8 - *Hazard Vulnerability Analysis for Infection Control*, Andrew Streifel, USA
15 - *An Approach to Outbreak Management- Using Biostats to Clobber Bugs*, Dr. Dick Zoutman, Canada
29 - *Effective Infection Control Promotion in 3-to-5 Steps*, Allen Soden, USA

December

13 - *Water Quality Issues Pertaining to Medical Device Reprocessing*, Dr. Michelle Alfa, Canada