

Intravascular Device-Related Infections

108. Antimicrobial Lock Therapy and Prophylaxis Practice Patterns: An Emerging Infections Network Survey

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Background: Instillation of an antimicrobial solution into a catheter lumen is used both to prevent and treat catheter-related bloodstream infections (CRBSI). Recent studies have shown that antimicrobial lock prophylaxis (ALP) reduces the risk of CRBSI in some high-risk patient populations. Also, some evidence suggests that antimicrobial lock therapy (ALT) may be used to help clear CRBSI caused by certain organisms. However, limited data from randomized studies are available, and little is known about how frequently antimicrobial locks are used.

Objective: To gather data on clinical practices involving ALP/ALT use.

Methods: In September 2007, the IDSA EIN surveyed its 1084 members to determine whether infectious diseases clinicians (IDCs) are using ALP, and, if so, what agents are used. Members were also asked if they attempted catheter salvage with tunneled or implanted CRBSI, and if so, whether they used ALT. Non responding members were sent two reminders in October.

Results: Of the 1094 members surveyed, 606 (56%) responded. 81% of respondents had never used ALP. ALP was most commonly used for long-term catheters, e.g., cuffed/tunneled, hemodialysis or ports (10% use ALP routinely and 69% under special circumstances). ALP was infrequently used for short-term central venous and PICC lines (1% use routinely and 22% under special circumstances). Among IDCs who use ALP, the most frequently used agents included vancomycin + heparin (46%), vancomycin alone (22%) and ethanol (9%). 61% routinely used anticoagulant agents along with ALP.

A majority of respondents have attempted salvage of catheters infected with coagulase-negative staphylococci (87%), and ALT was used along with systemic therapy by 45% of those members. Catheter salvage and ALT was less frequently attempted for the following organisms: *S. aureus* (50% have attempted salvage, 47% of those used ALT), Enterococcus spp. (50%, 39%), Enterobacteriaceae (48%, 35%), Pseudomonas spp. (32%, 32%) and Acinetobacter spp. (28%, 23%). Both catheter salvage and ALT were rarely attempted for Candida infections (11%, 36%). Barriers to ALT use mentioned by IDCs included: lack of formal guidance/protocols with specific agents, dosing and duration; concern about compatibility of agents; and conflicts with other uses of catheters.

Conclusions: ALP is practiced by a minority of respondents who reported use of a wide variety of agents and concentrations. ALT is more common, particularly for treatment of infections caused by coagulase-negative staphylococci, but little uniformity exists in the mechanics of therapy. Given the wide variation in clinical practice, the dearth of applicable data, and the urgency of the need to prevent and

treat CRBSI, data from randomized controlled trials in a variety of patient populations are needed.

109. Seeing the Whole Iceberg: The Under-recognized Threat of Central Catheter-Related Bloodstream Infections (CR-BSI) Occurring Outside the Hospital

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Background: Major efforts in healthcare-associated infection (HAI) prevention have focused on device-associated infections, including CR-BSI, in critical care units (CCU). Through the implementation of various prevention measures, many hospitals have achieved substantial reduction in CR-BSI rates. The burden of CR-BSI outside CCU, and including the outpatient (OP) setting, has been less well-measured, and preventive strategies less well-defined. As hospitals mobilize resources to achieve (and report) the lowest possible rates of HAI, it is important to have clarity about where the problems are.

Objective: To determine the proportion and features of CR-BSI that occur outside of CCU.

Methods: Our academic medical center has 382 licensed beds, of which 75 are in CCU. There are 21,000 inpatient (IP) admissions and 510,000 OP visits each year. Infection Control Practitioners review every positive blood culture report, using data in medical records to exclude contaminants and to categorize BSI as either healthcare-associated (HA) or community-acquired (CA) and as CR-BSI, other primary BSI, or secondary BSI, according to CDC definitions. HA-BSI include cases associated with IP or OP care, and cases are further classified by the location or service to which they are attributable, and whether they are related to a device or a procedure. We reviewed BSI surveillance data from 2006 and 2007 to determine the impact of CR-BSI outside of CCU.

Results: During the 2-year period, we identified 663 HA-BSI, 331 (50%) of which were CR-BSI. Of the 331 CR-BSI, 104 (31%) were associated with critical care, 116 (35%) with non-critical IP care and 111 (34%) were associated with OP care. Of the 111 OP CR-BSI cases, 42 (38%) were in dialysis patients. Pediatric patients accounted for 30% of CCU, 4% of non-CCU inpatients, and 23% of OP CR-BSI cases. The most common causal organism for IP cases was coagulase negative staphylococcus (CNS), accounting for 44% of CCU and 34% of other IP cases. Among OP, gram negative bacilli accounted for 31% of cases and CNS 23%. Excluding OP HA CR-BSI cases from the numerator results in a decrease in the CR-BSI rate from 1.6 to 1.1 per 1000 IP days - a 45% decrease solely attributable to how "healthcare-associated" is defined.

Conclusions: In our medical center, more CR-BSI occur in the OP setting than in CCU. CR-BSI prevention efforts targeting only CCU would fail to reach 2 of the 3 patients who develop these infections while receiving healthcare in other settings. Moreover, reporting only CR-BSI associated with CCU or even with IP care would yield falsely low infection rates. As invasive healthcare moves out of the hospital, surveillance and measurement need to follow, so that appropriate prevention efforts can be developed and implemented. It is time to develop an expanded set of

definitions to fit the scope of modern healthcare, modern HAI prevention, and modern reporting.

110. Successful Central Line Management and Reduction in Line-associated Bacteremia (CLAB) in a Community Hospital ICU: A Nine Year Evolution

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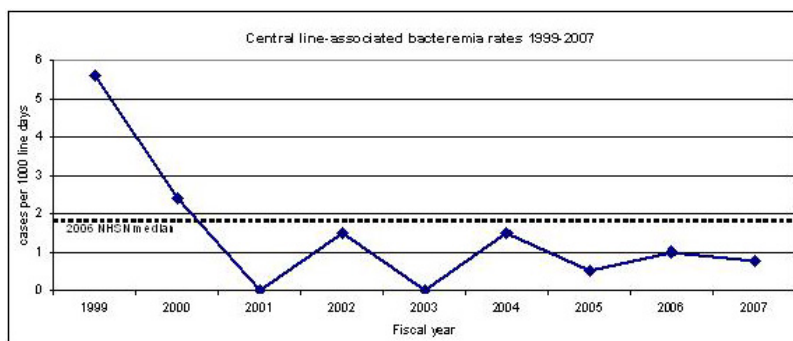
Background: Central venous catheters are used for vascular access in all critical care areas, yet are prone to life-threatening infectious complications, including exit site infections, thrombophlebitis, and septicemia. Organized attempts to reduce CLABs have resulted in the recent creation of central line “bundles” and the demand for public accountability and reporting. Many institutions have been working for years to incrementally reduce the risk of central line complications resulting in saved lives and saved healthcare costs.

Objective: We report our nine-year experience in creating a higher quality of central line care in a 14-bed med-surg ICU in a 300 bed community teaching hospital.

Methods: Incrementally, since 1999, line insertion and maintenance policies have been refined; a 3-day limit on femoral lines initiated (1999); no routine line change policy adopted (1999); barrier precautions mandated for all ICU patients (2000); PICC lines (2001) and antimicrobial catheters (2002) introduced into ICU; Biopatch® added to all central lines (2003); chlorhexidine skin antisepsis made routine (2004); and line bundle with insertion kits and checklists (2006) formalized.

Results: Over the 9 year period, there were 16,643 line-days and 30,348 ICU pt-days for a line utilization rate of 0.55 (2006 NHSN median 0.58). 25 CLABs occurred for an overall rate of 1.50 bacteremias per 1000 line-days. Improvements in line management resulted in a fall in CLABs over the 9 year period from 5.60 per 1000 line-days to 0.75 per 1000 line-days (2006 NHSN median 1.9 per 1000 line-days). Two of the 9 years were associated with zero ICU line bacteremias.

Conclusions: Incremental improvements in central line management over the past decade have resulted in decreased bacteremias, lives saved, and costs reduced in the community hospital.



111. Preliminary Microbiology Results from a Phase 3 Omiganan Pentahydrochloride Clinical Trail: In Vitro Activity against Bacterial and Fungal Pathogens

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Background: Omiganan (OMI) is a rapidly cidal cationic antimicrobial peptide with broad-spectrum activity against bacteria and yeast. A multicenter, randomized, blinded phase 3 clinical trial to study the safety and efficacy of topical OMI 1% gel compared to “standard of care” in preventing catheter-associated infections (CAI) is currently ongoing.

Objective: To present a preliminary microbiology assessment of pathogens recovered from the phase 3 clinical trial to date and their associated antibiogram profiles.

Methods: Forty-one active clinical trial sites in the United States and Europe submitted 2,709 isolates from 1,494 patients to a central laboratory for organism identification confirmation and susceptibility (S) testing by CLSI broth microdilution methods. Isolates originated from bloodstream (peripheral [471] and catheter line [826]), catheter insertion sites (190), and catheter tip and subcutaneous segments using roll plate (488 and 360, respectively) and sonication (203 and 171, respectively) methods. All patient isolates were included in the analysis. Treatment assignments have not been unblinded for this preliminary assessment.

OMI MIC in µg/ml:

Organism (no.)	OMI MIC in µg/ml:		
	MIC ₅₀	MIC ₉₀	Range
Coagulase-negative staphylococci (CoNS; 1,604)	4	8	0.5-64
Oxacillin (OXA)-S (456)	4	8	0.5-16
OXA-resistant (-R) (1148)	4	8	0.5-64
<i>Staphylococcus aureus</i> (SA; 231)	16	32	8-32
OXA-S (149)	16	16	8-32
OXA-R (82)	16	32	8-32
<i>Enterococcus</i> spp. (211)	128	128	4-128
<i>Candida</i> spp. (95)	64	128	8-512
<i>Enterobacter</i> spp. (92)	128	256	32-512
<i>Corynebacterium</i> spp. (70)	2	4	0.5-8
<i>Pseudomonas aeruginosa</i> (65)	128	256	64-512
<i>Acinetobacter</i> spp. (52)	64	64	≤4-128
<i>Escherichia coli</i> (47)	32	64	16-64
<i>Serratia marcescens</i> (45)	256	512	64->512

Results: Ranking pathogens by frequency (see Table) and key R profiles: CoNS (71.6% OXA-R); SA (35.5% OXA-R); Enterococcus spp. (0.9% vancomycin-R); *Candida* spp. (14.7% fluconazole non-S); Enterobacter spp. (42.4% ceftazidime-R); *Corynebacterium* spp.; *P. aeruginosa* (10.8 % meropenem-R); and Acinetobacter spp. (69.2% meropenem-resistant). ESBL-phenotypes for *E. coli* and *Klebsiella* spp. were 19.1 and 29.4%, respectively. OMI potency was unaffected by OXA-R in CoNS and increased only 2-fold in OXA-R SA. Mupirocin MIC_{50/90} (% high-level R) results for CoNS and SA were ≤4/>256 (18.4%) and ≤4/≤4 µg/ml (2.6%), respectively. OMI MIC₅₀ results among yeast were: *C. glabrata* (256 µg/ml), *C. parapsilosis* (128), *C. albicans* (64) and *C. tropicalis* (8).

Conclusions: OMI inhibited 99.4% of the top 10 suspect pathogens implicated in CAI at MIC values ≤512 µg/ml, a concentration approximately 20-fold below the 1% gel (10,000 µg/ml) formulation under study. As a novel topical antimicrobial agent, OMI displays critical attributes required for prevention of CAI, especially a broad-spectrum cidal action, including activity against fungal pathogens. Correlation of microbiological results with clinical outcomes is warranted.

112. Delayed Opportunity For Improvement or Imperfect Measurement? Analysis of Central-Line Associated BSI (CLAB) Rates both in and Outside of the ICU

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Background: The University of Pittsburgh Medical Center (UPMC) HS is the leading HS in western PA and a leader in patient safety. UPMC Presbyterian (P) is a complex 766 bed university hospital with 158 (21%) ICU beds. With the necessary resources, support and leverage provided by our health-care leaders (HCL), a CLAB reduction initiative (I) began in FY03 and focused on insertion practices. Our CLAB reduction bundle consisted of:

- 1) A standard procedure note requiring documentation of barriers and antiseptic used.
- 2) Mandatory CLAB education.
- 3) Chlorhexidine gluconate for skin antisepsis; CHG/Silver sulfadiazine coated central venous catheter (CVC) packaged together in a kit (PICCs uncoated).
- 4) Use of 5 maximal barrier precautions (large drape, sterile gown and gloves, mask with face shield, hat) bundled with a CVC kit conveniently located in all areas where CVCs are placed.
- 5) Monthly ICU CLAB and process measure compliance rates reported to HCL.

After 1 year, the ICU CLAB rate decreased by 71.4% to 1.2/1000 (central line) CL days and has been further reduced to 0.6; an overall 86% reduction. All ICU types demonstrated rate reduction. Non-ICU areas should also demonstrate lower CLAB rates using the standardized "bundle" but historically were not measured.

Objective: To evaluate the house wide (HW) effect of an ongoing CLAB reduction I.

Methods: CLAB rate is defined as the number of CLABs/1000 CL days. CLABs have always been captured HW. ICU CL days were only electronically captured so HW

rates could not be calculated. Since, FY06, non ICU CL days were manually counted and rates calculated. Annual ICU CLAB rates were compared to baseline. Annual HW CLAB rates were compared to FY06-FY08 ICU CLAB rates.

Results: Despite the standardized CLAB bundle, the ICU CLAB rate was significantly lower than the HW rate in FY07. See table. By FY08, the HW CLAB rate was reduced and paralleled the ICU rate. Possible reasons for variance included:

- 1) Large number of inserters
- 2) Variation in inserter experience
- 3) Extended duration of the CL
- 4) Variation in CL care
- 5) Inaccurate CL days

Education was emphasized for the non-ICU inserter and CL care providers. Review of non ICU CL days found omissions as compared to the complete electronic ICU capture, likely contributing to falsely elevated rates. The floors were re-educated on manual counting. Future plans include electronic CL capture, daily CL assessment, and electronic documentation of CL necessity in all areas of the hospital.

Conclusions:

1. Accurate reporting of CL days is critical when evaluating CLAB rates.
2. Health-care facilities should periodically measure HW CLAB rates to better assess overall incidence and the effect of their CLAB reduction I.

	Baseline 1/02- 6/02	FY03	FY04	FY05	FY06	FY07	FY08 (7/07- 11/07)
ICU CLABs	99	170	55	51	46	44	14
ICU CL days	23,413	45,528	47,058	53,564	61,516	67,718	16,605
ICU CLAB Rate	4.2	3.7	1.2	1.0	0.7	0.6	0.8
P value (vs baseline)	-	0.35	1×10^{-7}	1×10^{-7}	1×10^{-7}	1×10^{-7}	1×10^{-7}
HW CLABs	131	180	82	69	72	79	26
HW CL days	NA	NA	NA	NA	69,958	67,659	33,548
HW Rate	NA	NA	NA	NA	1.0	1.2	0.8
P value (ICU vs HW)	NA	NA	NS	NA	0.11	0.002	0.93

113. Risk Factors for Catheter Associated Blood Stream Infections (CABSI) in a Pediatric Cardiac Intensive Care Unit (CICU)

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Background: CABSI are among the most common and serious complications experienced by critically and chronically ill children, and are associated with significant morbidity and mortality. Little is known about risk factors for CABSI among children with serious congenital cardiac disease who receive care in a CICU.

Several observations suggest that the risk of CABSIs might differ from children without cardiac disease.

Objectives: To identify risk factors for CABSIs among children with cardiac disease hospitalized in the CICU of a large urban tertiary care children's hospital.

Methods: Using detailed infection control records, all CABSIs occurring in the CICU between January 1, 2004 and June 30, 2005, were identified. We conducted a retrospective matched case-control study in order to evaluate risk factors for CABSIs. Each case was matched to a single control based on incidence density sampling, adjusting for the duration of time between CICU admission and CABSIs diagnosis. We hypothesized that interventions and/or exposures occurring in the 3 days prior to CABSIs would be most strongly associated with infection (exposure window).

Results: There were 65 primary CABSIs identified during the study period. Females and males experienced CABSIs at equal frequencies. The median age of patients with CABSIs was 1.4 months. Gram-positive organisms were isolated in the majority of the infections (58%). There were 28 (43%) coagulase negative staphylococcal infections, 8 (12%) *Staphylococcus aureus* infections, 21 (33%) infections due to gram negative bacilli, and 8 (12%) infections due to other organisms. Children who experienced a CABSIs were more likely to have received at least one dose of anticoagulant ($p=0.037$) during the exposure window. Upon conditional multivariate analysis, those who had indwelling radial arterial lines (OR=3.67, CI=1.27, 10.58) or received anticoagulants (OR=3.25, CI=1.38, 7.64) during the study window were more likely to experience a CABSIs. CICU patients who had a percutaneous drain placed during the study window were less likely to experience a CABSIs (OR=0.12, CI=0.03, 0.52). Finally, cases were more likely to die during the hospitalization that included the CABSIs ($p=0.007$).

Conclusions: After controlling for length of stay until acquisition of infection, risk factors for CABSIs in the CICU include the presence of a radial arterial line and receipt of anticoagulants. Placement of a percutaneous drain, often a chest tube, was associated with a reduced risk of CABSIs in this population. Further investigation is needed to determine the mechanisms by which these risk factors may be operating and to assess whether modifications to these risk factors improve outcomes.

114. Getting to Zero: Root Cause Analysis of Central Venous Catheter-Associated (CA) Bloodstream Infections (BSIs) in the Intensive Care Unit after Implementation of Central Line Bundles

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Background: CA-BSIs have decreased, but have not been eliminated in all of our intensive care units (ICUs), with use of central line bundles. Bundles include staff education, line insertion carts, checklists to ensure adherence to guidelines, stopping procedures when guidelines are violated, and daily assessment of ongoing need for lines. Bundles are not used for hemodialysis (HD) catheters and peripherally inserted central catheters (PICCs).

Objective: We performed a root cause analysis of remaining CA-BSIs to determine source of BSI and to propose possible interventions.

Methods: Central line bundles were implemented in March 2004 in the Critical Care Medicine Unit (CCMU) and June 2005 in the Surgical Intensive Care Unit (SICU). BSIs from November 2005 through September 2007 in the two ICUs were examined. BSIs were designated by infection control professionals as catheter-related (CR) or CA according to the CDC definitions. Medical records of patients with CA-BSIs were reviewed by two infectious diseases (ID) physicians to determine source of infection. Review by a third ID physician was performed for discordant results.

Results: During the study period, there were 2,239 CCMU admissions (11,758 catheter-days) and 2,576 SICU admissions (10,857 catheter-days). There were 30 BSIs in the CCMU and 8 in the SICU, with rates 2.5 BSIs/1,000 catheter-days and 1.1 BSIs/1,000 catheter-days, respectively. Ten (33%) BSIs in the CCMU were CR, and 20 (67%) were CA. All eight (100%) BSIs in the SICU were CA. Twelve (40%) patients in the CCMU and two (25%) patients in the SICU had HD catheters, while 22 (73%) in the CCMU and 4 (50%) in the SICU had PICCs. Organisms isolated in the CCMU were *Enterococcus sp* (15), coagulase-negative staphylococcus (CNS) (7), gram-negative rods (6), *Candida sp* (5), *S. aureus* (4), and *Bacteroides sp* (1). Organisms isolated in the SICU included *Candida sp* (3), *Bacteroides sp* (2), CNS (1), *Fusobacterium sp* (1), and *Morganella sp* (1). Of the 20 CA-BSIs in the CCMU, 9 (45%) were judged to be contaminated blood cultures drawn from catheters, 10 (50%) had a probable catheter source, and one (5%) was a transient post-operative BSI. Of the 8 CA-BSIs in the SICU, 5 (62.5%) were felt to have an intra-abdominal source, 2 (25%) had a probable catheter source, and one (12.5%) was from an unknown non-catheter source.

Conclusions: The CDC definition for CA-BSI is not specific for catheter infections in all ICUs. In two of our ICUs, many BSIs which met the definition of a CA-BSI likely had a source of infection other than a central venous catheter, or were contaminated blood cultures. A high proportion of patients had HD catheters or PICCs, suggesting that placement and handling of these catheters may be a target for intervention. In addition, interventions directed at improving aseptic blood culture collection are needed to reduce BSI rates.

115. Prospective, Randomized, Controlled Trial Assessing the Clinical Performance of a Transparent Chlorhexidine Gel Pad Intravascular Catheter Dressing

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Background: Intravascular catheter-associated bloodstream infections (CA-BSI) are a significant medical problem. Novel means to prevent CA-BSI are needed.

Objective: To assess the clinical performance of an innovative catheter dressing that has the potential to inhibit the growth of microbes at the catheter insertion site.

Methods: Prospective, controlled, randomized, clinical trial comparing the 3MTM Tegaderm TM CHG (chlorhexidine gluconate) IV Securement Dressing (3M Healthcare, St. Paul, MN) to a standard transparent dressing (IV3000TM, Smith & Nephew).

Results: 60 of 69 adult subjects granting informed completed the study (3-7 days of dressing wear). Subjects were randomized to dressing type stratified by catheter insertion site (internal jugular, subclavian, antecubital PICC), and were evenly matched with regard to demographics and means of catheter securement. The mean time to first dressing change was 4.3d + 2.2d vs 4.8d + 2.0d (p=0.36) for the comparator and Tegaderm CHG dressing, respectively. The mean total study dressing wear time was 5.4d + 1.5d vs 5.5d + 1.4d (p= 0.87) for the comparator and Tegaderm CHG dressing groups, respectively. The Tegaderm CHG dressing was regarded as superior to the comparator dressing with regard to catheter securement (p = 0.0019) and overall satisfaction (p = 0.0033). There were no significant differences between the groups with regard to ease of dressing application, dressing edge lift, ability to visualize the catheter insertion site, skin condition at insertion site (erythema, edema, maceration, skin stripping, moisture), blood under the dressing, ease of removal, or patient assessment of discomfort. 18 subjects completed 7 days of dressing wear without a dressing change and, at the time of dressing removal, 10 comparator and 8 Tegaderm CHG subjects, underwent aerobic microbiologic swab cultures of the skin at the insertion site. This method recovered no microbes from 7 comparator and 5 Tegaderm CHG insertion sites. The mean colony count was 44 + 122 and 17 + 35 for the comparator and Tegaderm CHG dressing, respectively (p = 0.84). Of the 6 skin cultures in which microbes were recovered, 5 yielded coagulase-negative staphylococci (range: 10 cfu to 390 cfu) and 1 yielded *Candida parapsilosis* (100 cfu). Adverse events were reported in 6 subjects (3 comparator, 3 Tegaderm CHG): none were regarded as due to the study dressing.

Conclusions: The Tegaderm CHG dressing containing a chlorhexidine gel pad is an innovative means to potentially minimize CA-BSI. The Tegaderm CHG dressing is well-tolerated and judged to be superior to the comparator dressing with regard to catheter securement and overall satisfaction. These results justify adequately powered trials to examine the clinically relevant endpoint of CA-BSI and the surrogate endpoints of catheter colonization and insertion site skin colonization.

116. Catheter-Related Blood Stream Infections (CRBSI) Related To Short Term Central Venous Catheters (CVCs) And Peripherally Inserted Central Catheters (PICCs): Which One To Choose?

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Background: CVCs are used for inpatients requiring central venous access. PICCs are also used in an attempt to supplement high risk CVCs (femoral) or for prolonged in hospital intravenous access. It is controversial on which device has a lower risk of CR-BSI.

Objective: compare rates for CR-BSI in patients with CVCs and PICCs.

Methods: we prospectively followed CVCs on the medical-surgical units and PICCs house-wide at our hospital. A team evaluated the CVCs for need and recommended discontinuation of those catheters not needed and change to a different site if the catheters were placed emergently or in the femoral area. The team recommended PICC insertion for patients that required prolonged access. Data were obtained on site of catheter placement, duration of use, and the development of CR-BSI. No

intervention was done for patients with PICCs. The CR-BSI rate was defined as the number of CR-BSI divided by the total catheter utilization days multiplied by 1000.

Results: 639 CVCs were placed between May 2006 and September 2007 with 4924 days. Subclavian CVCs were placed in 243 (38%), internal jugular in 187 (29.3%), and femoral in 209 (32.7%) of patients. 10 patients had CRBSI (CNS=3, MRSA=2, VRE=1, G-ves=4). CR-BSI for CVCs was 2.0 per 1000 catheter days (Table 1). 622 patients had PICCs placed between November 2006 and June 2007, with 5705 catheter days. 379 (60.9%) were placed by IV team and 243 (39.1%) by interventional radiology. 108 (17.4%) were single lumen and 514 (82.6%) were double lumen. 13 patients had CRBSI (*Candida* sp=5, CNS=5, MRSA=2, *Serratia* sp=1). CR-BSI for PICCs was 2.3 per 1000 catheter days (Table 1). The mean to developing infection was significantly longer (27.9 vs. 13.2 days, $p=0.04$) for patients who had a PICC compared to CVCs (Table 2).

Conclusions: in the presence of active surveillance and intervention to remove unnecessary or high risk CVCs, CVCs had a similar rate of CR-BSI compared to PICCs. With the longer time to infection, PICCs would be more suitable for prolonged inpatient intravenous access.

Table 1: Rates of CRBSI for the Different Devices Used

Catheter	% Catheters Infected	CR-BSI rate (cases/catheter days)	2 sided p value (compared to Subclavian)
Subclavian CVC	0.82	0.95 (2/2116)	
Internal Jugular CVC	2.7	3.4 (5/1454)	0.10
Femoral CVC	1.4	2.2 (3/1354)	0.34
PICC	2.1	2.3 (13/5705)	0.23

	CR-BSI	No CR-BSI	p value
Mean Catheter Use (Days \pm SD)			
CVC	13.2 \pm 4.8	7.6 \pm 4.9	<0.001
PICC	27.9 \pm 22.7	8.8 \pm 9.1	<0.001
Median catheter use (days)			
CVC	13	7.0	
PICC	23.0	6.0	

117. Catheter Specific Bloodstream Infection Risks in a Medical Intensive Care Unit - Four Year Analysis; Opportunity for Further Improvement

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Background: Process improvement methods have proven beneficial in decreasing the risk of central venous catheter associated bloodstream infections (CA-BSI). This medical intensive care unit (MICU) at a 900 bed tertiary care hospital has conducted a vigorous campaign to follow CDC guidelines and recommendations available through recent literature with a 66% decrease ($p = .00001$) in the rate of infections in 2006 - 2007 compared with earlier in the decade. In an effort to further understand and reduce risks, catheter specific rates in this setting are examined.

Objective: To determine the catheter specific rate of CA-BSI in a medical intensive care unit.

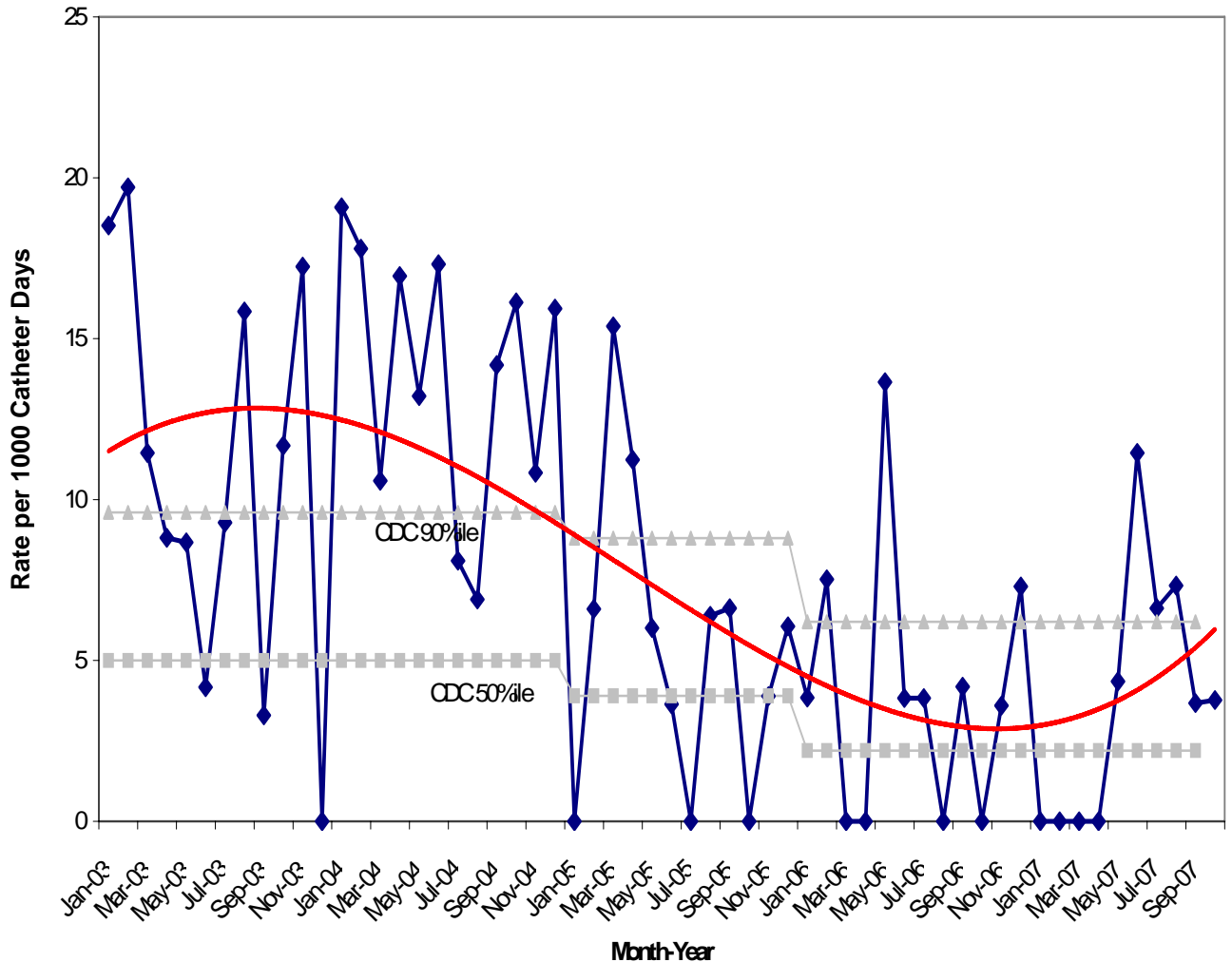
Methods: Catheter specific line days are collected daily by MICU personnel. Prospective microbiology based surveillance for CA-BSI is conducted by trained and certified infection control personnel. Calculation of relative risks, and confidence intervals was performed using CDC Epi Info; calculation of univariate regression was performed using Microsoft Excel®.

Results: The CA-BSI rate and relative risk for peripherally inserted central venous catheters (PICC) surpassed those for subclavian, internal jugular and femoral catheters (not statistically significant). Similarly, univariate regression analysis demonstrated that the highest correlation between PICC infection rates and total MICU rate when compared with other central catheters.

Conclusions: In this MICU, following a record of steady improvement in CA-BSI rate, the probable best opportunity for further risk reduction is to focus on PICC insertion and routine care. These rates of PICC infections surpass expected rates compared with other central lines and with rates published in the literature. The PICC insertion team, the interventional radiology team (where complicated cases are performed) and the MICU nursing team will aim on prevention activities for this site for focused preventive activities.

Catheter specific CA-BSI rate, rel risk, regression to total CA-BSI rate						
Catheter type	CA-BSI Rate	Rel Risk	Confidence Interval	p (RR)	R ²	p (regression)
Subclavian	3.6	0.56	.28 - 1.14	NS	0.17	0.01
Internal Jugular	4.8	0.80	.40 - 1.58	NS	0.16	0.015
Femoral	6.7	1.25	.71 - 2.18	NS	0.30	0.0005
PICC	7.6	1.49	.86 - 2.58	NS	0.55	0.0000002

**Nosocomial Primary Bloodstream Infection Rate
MCU Rate per 1000 Catheter Days**



118. Sustained Hospital-Wide Reduction in Central Line-Associated Bacteremias by a Multidisciplinary Team

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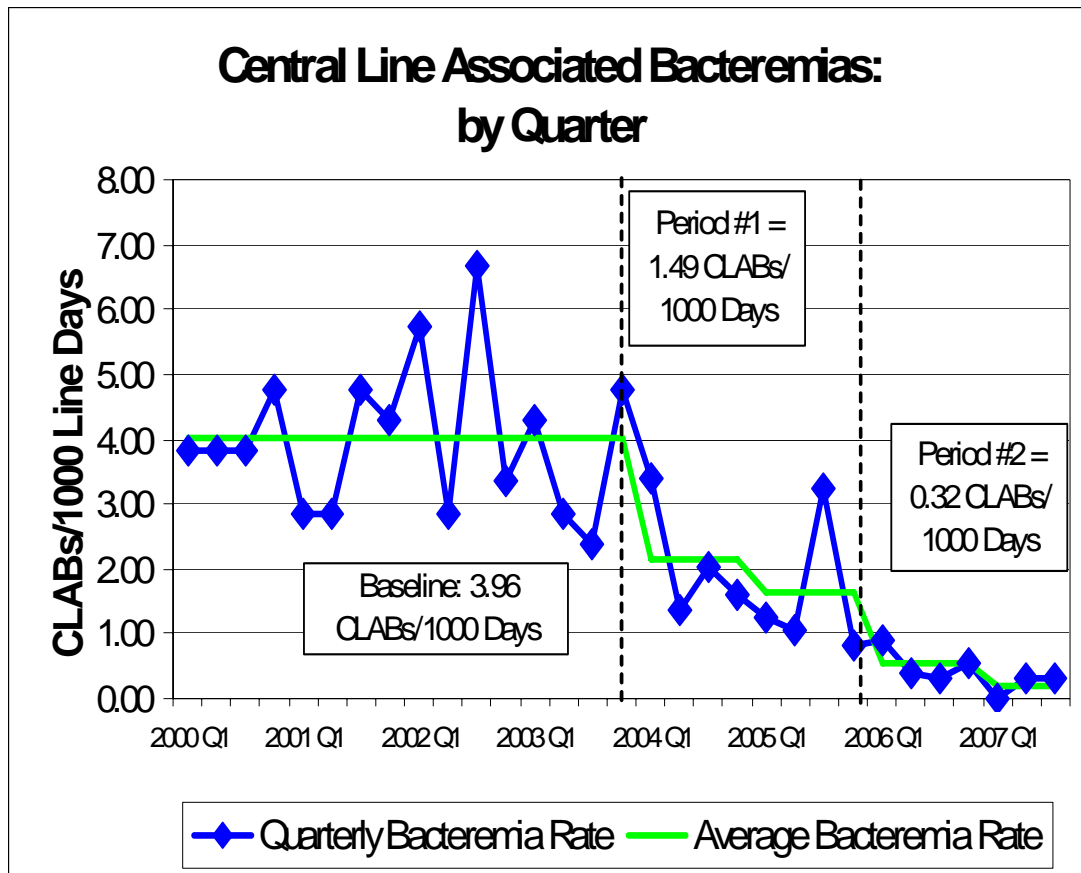
Background: Central Line-Associated Bacteremias are a high-cost, high-morbidity complication of hospital care. Most efforts to reduce occurrences have focused on intensive care units using the IHI bundle. Since most of our hospital’s CLABSIs developed in patients outside the intensive care units, we sought to lower our infection rates hospital-wide.

Objective: To decrease central-line associated bacteremias to near zero throughout the hospital.

Methods: In 2003, we implemented CDC guidelines for prevention of central line-associated bacteremias; later, the IHI bundle for all central line insertions. We discouraged use of high-risk lines (femoral and multi-access catheters) and encouraged use of PICC lines and lines with lower intrinsic risk of infection. In 2006, we centralized line care to the IV team and required IV team nurse assistance for all central line placements outside of the OR. Biopatch was implemented for selected higher-risk patients.

Results: Prior to implementation of the IHI bundle, we averaged 8.35 CLABSIs per quarter (3.96 / 1000 line-days) hospital-wide. In the first 2 years after implementation of the IHI bundle, infection rates fell to 4.45 CLABSIs per quarter (1.49/1000 line-days). Following implementation of the expanded IV team roles, our hospital-wide CLABSI rate has fallen to 1.00 CLABSIs per quarter (0.32/1000 line-days), even with a steady increase in central line days over the past 3 years to approximately 13,000 per year. \$\$

Conclusion: A multidisciplinary team approach to prevention of central line infections has reduced our entire hospital's rate to 1 central line associated bacteremia per quarter. "Getting to [near] zero" is possible hospital-wide.



149. A Novel Integrated Chlorhexidine Transparent Dressing for Prevention of Vascular Catheter-Related Bloodstream Infection (CRBSI); Three Comparative Studies

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Background: Most CRBSIs caused by short-term noncuffed central venous and arterial catheters derive from skin microorganisms colonizing the insertion site. Technologic innovations to continuously suppress the skin flora about the catheter can materially reduce the risk of CRBSI.

Objective: To better understand potential efficacy for prevention of CRBSI with noncuffed vascular catheters and subjects' tolerance of two chlorhexidine gluconate (CHG)-impregnated catheter site dressings, a CHG-impregnated sponge dressing (BIOPATCH™, Johnson and Johnson) covered with a film dressing and a novel integrated CHG transparent dressing (Tegaderm™ CHG, 3M).

Method: One study measured in vitro antimicrobial activity (quantitative kill over 15 minutes) of the CHG dressing and a transparent dressing control against 15 clinical isolates representing 9 species. Two in vivo trials of long term cutaneous antimicrobial activity in healthy volunteers were conducted. One analyzed prevention of skin flora regrowth on alcohol-prepped subclavian sites and the other, cumulative kill of skin flora on unprepped sites over 10 days of exposure.

Results: The CHG transparent dressing provided in vitro kill of 3.2-6.3 log reduction in 15 minutes when microorganisms were applied to the CHG surface of the dressing. Forty-eight healthy adults participated in the regrowth study on prepped subclavian sites. There was a significant difference among the dressings ($P < 0.0001$) at 7 days with the integrated CHG transparent dressing showing superior suppression of regrowth compared to the control transparent dressing. Both CHG dressings were vastly superior to the control transparent dressing at 10 days ($P < 0.0003$). All three dressings were well tolerated, with none showing hypersensitivity. Twenty-nine subjects participated in the kill of normal flora on unprepped skin. The integrated CHG transparent dressing was superior to the CHG-impregnated sponge dressing in prevention of cutaneous flora regrowth on prepped sites at 7 days ($\Delta \log_{10} \text{CFU/cm}^2$ 0.80, $P < 0.02$) and provided progressive kill of the microflora on unprepped sites superior to the CHG sponge dressing (day 1 $\Delta \log_{10} \text{CFU/cm}^2$ 0.60 and day 4 $\Delta \log_{10} \text{CFU/cm}^2$ 0.80) ($P < 0.03$; $P < 0.0008$). The dressings were well tolerated.

Conclusions: Both CHG dressings provide excellent long term surface antimicrobial activity against diverse microbial species and cutaneous flora suppression, and were well tolerated. The integrated CHG transparent dressing provided superior prevention of flora regrowth on prepped sites and progressive kill of cutaneous microflora on unprepped sites. The integrated CHG transparent dressing is easier to apply, reliably secures the catheter, permits continuous inspection of the insertion site and warrants evaluation in a prospective randomized clinical trial.