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## Infection Control Current Awareness: February 2015

### The Burden of Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection among Hematology, Oncology, and Stem Cell Transplant Patients.

Metzger KE, Rucker Y, et al
Infect Control Hosp Epidemiol. 2015 Feb, vol 36, no 2, p119-24.

OBJECTIVE:
To evaluate the impact and burden of the new National Healthcare Safety Network surveillance definition, mucosal barrier injury laboratory-confirmed bloodstream infection (MBI-LCBI), in hematology, oncology, and stem cell transplant populations.

DESIGN: Retrospective cohort study.

SETTING: Two hematology, oncology, and stem cell transplant units at a large academic medical center.

METHODS: Central line-associated bloodstream infections (CLABSIs) identified during a 14-month period were reviewed and classified as MBI-LCBI or non-MBI-LCBI (MBI-LCBI criteria not met). During this period, interventions to improve central line maintenance were implemented. Characteristics of patients with MBI-LCBI and non-MBI-LCBI were compared. Total CLABSI, MBI-LCBI, and non-MBI-LCBI rates were compared between baseline and postintervention phases of the study period.

RESULTS: Among 66 total CLABSI cases, 47 (71%) met MBI-LCBI criteria. Patients with MBI-LCBI and non-MBI-LCBI were similar in regard to most clinical and demographic characteristics. Between the baseline and postintervention study periods, the overall CLABSI rate decreased from 3.37 to 3.21 infections per 1,000 line-days (incidence rate ratio, 0.95; 4.7% reduction, P=.84), the MBI-LCBI rate increased from 2.08 to 2.61 infections per 1,000 line-days (incidence rate ratio, 1.25; 25.3% increase, P=.44), and the non-MBI-LCBI rate decreased from 1.29 to 0.60 infections per 1,000 line-days (incidence rate ratio, 0.47; 53.3% reduction, P=.12).

CONCLUSIONS: Most CLABSIs identified among hematology, oncology, and stem cell transplant patients met MBI-LCBI criteria, and CLABSI prevention efforts did not reduce these infections. Further review of the MBI-LCBI definition and impact is necessary to direct future definition changes and reporting mandates

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### Clostridium difficile in the Long-Term Care Facility: Prevention and Management.

Jump RL, Donskey CJ. Curr Geriatr Rep. 2015 Mar, vol 4, no 1, p60-69.

Abstract
Residents of long-term care facilities are at high risk for Clostridium difficile infection due to frequent antibiotic exposure in a population already rendered vulnerable to infection due to advanced age, multiple comorbid conditions and communal living conditions. Moreover, asymptomatic carriage of toxigenic C. difficile and recurrent infections are prevalent in this population.

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Here, we discuss epidemiology and management of C. difficile infection among residents of long-term care facilities. Also, recognizing that both the population and culture differs significantly from that of hospitals, we also address prevention strategies specific to LTCFs.

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## A community-engaged infection prevention and control approach to Ebola.

Marais F, Minkler M, et al. Health Promot Int 2015 Feb 12.

**Abstract**
The real missing link in Ebola control efforts to date may lie in the failure to apply core principles of health promotion: the early, active and sustained engagement of affected communities, their trusted leaders, networks and lay knowledge, to help inform what local control teams do, and how they may better do it, in partnership with communities. The predominant focus on viral transmission has inadvertently stigmatized and created fear-driven responses among affected individuals, families and communities. While rigorous adherence to standard infection prevention and control (IPC) precautions and safety standards for Ebola is critical, we may be more successful if we validate and combine local community knowledge and experiences with that of IPC medical teams. In an environment of trust, community partners can help us learn of modest adjustments that would not compromise safety but could improve community understanding of, and responses to, disease control protocol, so that it better reflects their 'community protocol' (local customs, beliefs, knowledge and practices) and concerns. Drawing on the experience of local experts in several African nations and of community-engaged health promotion leaders in the USA, Canada and WHO, we present an eight step model, from entering communities with cultural humility, though reciprocal learning and trust, multi-method communication, development of the joint protocol, to assessing progress and outcomes and building for sustainability. Using examples of changes that are culturally relevant yet maintain safety, we illustrate how often minor adjustments can help prevent and treat the most serious emerging infectious disease since HIV/AIDS.

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## Estimation of hand hygiene opportunities on an adult medical ward using 24-hour camera surveillance: validation of the HOW2 Benchmark Study.

Diller T, Kelly JW, et al Am J Infect Control. 2014 Jun, vol 42, no 6, p602-7

BACKGROUND: We previously published a formula to estimate the number of hand hygiene opportunities (HHOs) per patient-day using the World Health Organization's "Five Moments for Hand Hygiene" methodology (HOW2 Benchmark Study). HHOs can be used as a denominator for calculating hand hygiene compliance rates when product utilization data are available. This study validates the previously derived HHO estimate using 24-hour video surveillance of health care worker hand hygiene activity.

METHODS: The validation study utilized 24-hour video surveillance recordings of 26 patients' hospital stays to measure the actual number of HHOs per patient-day on a medicine ward in a large teaching hospital. Statistical methods were used to compare these results to those obtained by episodic observation of patient activity in the original derivation study.

RESULTS: Total hours of data collection were 81.3 and 1,510.8, resulting in 1,740 and 4,522 HHOs in the derivation and validation studies, respectively. Comparisons of the mean and median HHOs per 24-hour period did not differ significantly. HHOs were 71.6 (95% confidence interval: 64.9-78.3) and 73.9 (95% confidence interval: 69.1-84.1), respectively.

CONCLUSION: This study validates the HOW2 Benchmark Study and confirms that expected numbers of HHOs can be estimated from the unit's patient census and patient-to-nurse ratio. These data can be used as denominators in calculations of hand hygiene compliance rates from electronic monitoring using the "Five Moments for Hand Hygiene" methodology.

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## Group B Streptococcus: Compliance with the information in prenatal card records and knowledge of pregnant women.

de Mello DS, Tsunechiro MA, Mendelski CA, et al Am J Infect Control. 2015 Feb 18.

This study aimed to determine the rate of compliance on prenatal cards and the women's knowledge and feelings regarding Group B Streptococcus (GBS) screening in a maternity ward in São Paulo City, Brazil. Structured interviews and a review of prenatal card records of 391 women were performed. The GBS screening was not recorded in more than half of prenatal cards (51.4%, n = 201); 169 women reported no knowledge or not remembering the GBS screening.

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## Individualizing the WHO HIV and infant feeding guidelines: optimal breastfeeding duration to maximize infant HIV-free survival.

Ciaranello AL, Leroy V, Rusibamayila A, et al AIDS. 2014 Jul;28 Suppl 3:S287-99.

OBJECTIVES: To determine how infant feeding recommendations can maximize HIV-free survival (HFS) among HIV-exposed, uninfected African infants, balancing risks of breast milk-associated HIV infection with setting-specific risks of illness and death associated with replacement feeding.

DESIGN: Validated mathematical model of HIV-exposed, uninfected infants, with published data from Africa.

METHODS: We projected 24-month HFS using combinations of: maternal CD4, antiretroviral drug availability, and relative risk of mortality among replacement-fed compared to breastfed infants ('RR-RF', range 1.0-6.0). For each combination, we identified the 'optimal' breastfeeding duration (0-24 months) maximizing HFS. We compared HFS under an 'individualized' approach, based on the above parameters, to the WHO 'public health approach' (12 months breastfeeding for all HIV-infected women).

RESULTS: Projected HFS was 65-93%. When the value of RR-RF is 1.0, replacement feeding from birth maximized HFS. At a commonly reported RR-RF value (2.0), optimal breastfeeding duration was 3-12 months, depending on maternal CD4 and antiretroviral drug availability. As the value of RR-RF increased, optimal breastfeeding duration increased. Compared to the public health approach, an individualized approach improved absolute HFS by less than 1% if RR-RF value was 2.0-4.0, by 3% if RR-RF value was 1.0 or 6.0, and by greater amounts if access to antiretroviral drugs was limited.

CONCLUSION: Tailoring breastfeeding duration to maternal CD4, antiretroviral drug availability, and local replacement feeding safety can optimize HFS among HIV-exposed infants. An individualized approach leads to moderate gains in HFS, but only when mortality risks from replacement feeding are very low or very high, or antiretroviral drug availability is limited. The WHO public health approach is beneficial in most resource-limited settings.

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## A multitiered strategy of simulation training, kit consolidation, and electronic documentation is associated with a reduction in central line-associated bloodstream infections.

Allen GB, Miller V, et al. Am J Infect Control. 2014 Jun, vol 42, no 6, p643-8

BACKGROUND: Simulation-based training has been associated with reduced central line-associated bloodstream infection (CLABSI) rates. We measured the combined effect of simulation training, electronic medical records (EMR)-based documentation, and standardized kits on CLABSI rates in our medical (MICU) and surgical (SICU) intensive care units (ICU).

METHODS: CLABSI events and catheter-days were collected for 19 months prior to and 37 months following an intervention consisting of simulation training in central line insertion for all ICU residents, incorporation of standardized, all-inclusive catheter kits, and EMR-guided documentation. Supervising physicians in the MICU (but not the SICU) also completed training.

RESULTS: Following the intervention, EMR-based documentation increased from 48% to 100%, and documented compliance with hand hygiene, barrier precautions, and chlorhexidine use increased from 65%-85% to 100%. CLABSI rate in the MICU dropped from 2.72 per 1,000 catheter-days over the 19 months preceding the intervention to 0.40 per 1,000 over the 37 months following intervention (P = .01) but did not change in the SICU (1.09 and 1.14 per 1,000 catheter-days, P = .86). This equated to 24 fewer than expected CLABSIs and $1,669,000 in estimated savings.

CONCLUSION: Combined simulation training, standardized all-inclusive kits, and EMR-guided documentation were associated with greater documented compliance with sterile precautions and reduced CLABSI rate in our MICU. To achieve maximal benefit, refresher training of senior physicians supervising practice at the bedside may be needed.

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## Performance of different culture methods and of a commercial molecular assay for the detection of carbapenemase-producing Enterobacteriaceae in nursing homes and rehabilitation centers.

Saegeman V, Van den Eynde J, Niclaes L, et al Eur J Clin Microbiol Infect Dis. 2015 Jan 21.

Over the last several years, carbapenemase-producing Enterobacteriaceae (CPE) have been increasingly detected not only among patients in acute care hospitals, but also in long-term care facilities. In this point prevalence survey, residents from three nursing homes and patients in one rehabilitation center were screened for asymptomatic intestinal carriage of CPE by rectal swabs. The first objective was to evaluate the hypothesis of the establishment of a CPE reservoir in a geriatric/chronic care population. Secondly, we evaluated the comparative performances of different culture methods (chromID® CARBA, chromID® OXA-48, MacConkey with temocillin/meropenem, ertapenem enrichment broth) and a commercial molecular assay (Check-Direct CPE). From the 257 included residents, only one had evidence for CPE

carriage. From the rectal swabs of this resident, an OXA-48-producing Klebsiella pneumoniae could be isolated and was confirmed by a molecular assay both on the strain and on the rectal swab. The specificity of the different culture methods and Check-Direct CPE was at least 97 %. Neither enrichment broth nor prolonged incubation up to 48 h increased the yield of CPE. This point prevalence survey shows a low CPE prevalence of 0.39 %. Larger scaled studies are needed in order to confirm the role of chronic care settings as secondary CPE reservoirs and to adjust the infection control and prevention recommendations.

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## Self-management intervention for long-term indwelling urinary catheter users: randomized clinical trial.

Wilde MH, McMahon JM, McDonald MV, et al  Nurs Res. 2015 Jan-Feb, vol 64, no 1, p24-34

BACKGROUND: People using long-term indwelling urinary catheters experience multiple recurrent catheter problems. Self-management approaches are needed to avoid catheter-related problems.

OBJECTIVES: The aim was to determine effectiveness of a self-management intervention in prevention of adverse outcomes (catheter-related urinary tract infection, blockage, and accidental dislodgement). Healthcare treatment associated with the adverse outcomes and catheter-related quality of life was also studied.

METHODS: A randomized clinical trial was conducted. The intervention involved learning catheter-related self-monitoring and self-management skills during home visits by a study nurse (twice during the first month and at 4 months-with a phone call at 2 months). The control group received usual care. Data were collected during an initial face-to-face home interview followed by bimonthly phone interviews. A total of 202 adult long-term urinary catheter users participated. Participants were randomized to treatment or control groups following collection of baseline data. Generalized estimating equations were used for the analysis of treatment effect.

RESULTS: In the intervention group, there was a significant decrease in reported blockage in the first 6 months (p = .02), but the effect did not persist. There were no significant effects for catheter-related urinary tract infection or dislodgment. Comparison of baseline rates of adverse outcomes with subsequent periods suggested that both groups improved over 12 months.

DISCUSSION: A simple-to-use catheter problems calendar and the bimonthly interviews might have functioned as a modest self-monitoring intervention for persons in both groups. A simplified intervention using a self-monitoring calendar is suggested-with optimal and consistent fluid intake likely to add value.

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## Sequential hand hygiene promotion contributes to a reduced nosocomial bloodstream infection rate among very low-birth weight infants: an interrupted time series over a 10-year period.

Helder OK, Brug J, van Goudoever JB et al  Am J Infect Control. 2014 Jul, vol 42, no 7, p718-22

BACKGROUND:  Sustained high compliance with hand hygiene (HH) is needed to reduce nosocomial bloodstream infections (NBSIs). However, over time, a wash out effect often occurs. We studied the long-term effect of sequential HH-promoting interventions.

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METHODS: An observational study with an interrupted time series analysis of the occurrence of NBSI was performed in very low-birth weight (VLBW) infants. Interventions consisted of an education program, gain-framed screen saver messages, and an infection prevention week with an introduction on consistent glove use.

RESULTS: A total of 1,964 VLBW infants admitted between January 1, 2002, and December 31, 2011, were studied. The proportion of infants with ≥1 NBSI decreased from 47.6%-21.2% (P < .01); the number of NBSIs per 1,000 patient days decreased from 16.8-8.9 (P < .01). Preintervention, the number of NBSIs per 1,000 patient days significantly increased by 0.74 per quartile (95% confidence interval [CI], 0.27-1.22). The first intervention was followed by a significantly declining trend in NBSIs of -1.27 per quartile (95% CI, -2.04 to -0.49). The next interventions were followed by a neutral trend change. The relative contributions of coagulase-negative staphylococci and Staphylococcus aureus as causative pathogens decreased significantly over time.

CONCLUSIONS: Sequential HH promotion seems to contribute to a sustained low NBSI rate.