REFERENCES


12 www.jointcommission.org.website accessed 8/13/09

13 http://www.phc4.org/reports/hai/07 website accessed 8/13/09

PROBLEM

Healthcare-Associated Infection (HAI)
- Approximately 2 million patients, 5%-10% of hospitalized patients, develop a healthcare-associated infection¹
- 1 of every 10-20 patients hospitalized in the US develops a HAI¹
- HAIs are associated with nearly 100,000 deaths annually in US Hospitals¹
- HAIs result in $4.5 - $6.5 billion in extra costs annually¹

CLINICAL EVIDENCE

Cross Contamination Potential of ECG-CLW
- Multiple studies have demonstrated that portable healthcare equipment can become contaminated and serve as a potential vector for antibiotic-resistant pathogens to patients. This can occur either via direct contact or by clinicians’ hands becoming contaminated.²
- Cleaning noncritical patient equipment is performed inconsistently among departments and staff
- Cleaning reusable ECG-LWs and cables has specific challenges:
  - ECG-LWs and cables have numerous “nooks and crannies” that patient’s blood and body fluids seep into thereby providing an optimum environment for bacterial growth
  - ECG-LWs and cables cannot be submersed for cleaning and cleaning agents degrade the product efficacy and functionality over time
  - Multiple surfaces on ECG-LWs cables make it difficult for cleaning agents to reach for effective cleaning in between patients
  - ECG cables are positioned in the patient’s bed exposed to body fluids such as blood, urine, feces and emesis
  - ECG-LWs lie directly on the patient’s skin in close proximity to open wounds on the chest and abdomen, surgical dressings and IV catheters:
    - 2/3 of surgical site infections involve the incision³
    - Central Line Blood Stream Associated Infections (CLABSI) have an average attributable cost ranging between $5,734 - $22,939⁴ and add 4.5 - 19.6 days Excess Length of Stay (LOS)⁴
    - Coronary Artery Bypass Graft (CABG) associated infections have an average attributable cost ranging between $7,878 - $26,668⁴ and add 20-35 days excess LOS⁵

“Multicenter Study of Bacteria on Reused Clean Electrocardiography Lead Wires: Are Monitoring Patients at Risk for Nosocomial Infections?”⁶
- 320 randomly chosen reusable, cleaned ECG-LW were swabbed at 4 sites. Each site swabbed 80 ECG-LW for bacteria and fungus in 4 departments; operating room, intensive care unit (ICU), telemetry, and emergency department. 20 ECG-LW were swabbed per department.
- Results:
  - 226 bacterial species were identified on 63% or 201 of ECG-LW sampled and varied by site 49%-80%
  - At risk or potential risk bacterial growths were found on 37.8% or 121 of ECG-LW sampled with a range of 28.8%-43.8%
“Antibiotic-Resistant Pathogens Found on 77% of ECG Lead Wires”

- Dr. Paul Brookmeyer, University of Wisconsin Hospital and Clinics, cultured 100 randomly selected ECG telemetry leads after they had been cleaned and immediately before they were being placed on new ICU patients
- 77% of ECG leads were contaminated with one or more antibiotic-resistant nosocomial pathogens
  - 67% contaminated with *methicillin-resistant Staphylococcus aureus* (MRSA)
  - 17% contaminated with *Vancomycin-resistant Enterococci* (VRE)
  - 2% contaminated with gram-negative bacilli, resistant to extended-spectrum ß-lactams (*Klebsiella pneumoniae, Escherichia coli*)

“The Not-So-Hidden Costs of Surgical Infections”

- Bon Secours St. Francis Hospital, in Virginia, converted to disposable ECG lead wires with “wireless” transceivers in the ICU, Telemetry Unit and Surgery Department
  - ICU and Telemetry: in the first 18 months after using disposable ECG lead wires, there were no reported incidences of Ventilator Associated Pneumonia (VAP) or Catheter Related Blood Stream Infection (CR-BSI)
  - Surgery Department (operating suites and Post Anesthesia Care Unit (PACU)): after 4 months of using disposable ECG lead wires, the surgical site infection rate decreased 40% without any other changes made to infection prevention practices

“Outbreak of Vancomycin-Resistant Enterococci in a Burn Unit”

- 8 bed BICU, 800 bed medical center in Galveston, TX experienced a VRE outbreak
- Epidemiological investigation conducted (multiple source cultures: patients, health care workers, patient care environment and devices, typing of isolates from patient and patient care environment, case-control study of patient population, institution and monitoring of control measures)
- Initially, after the first VRE outbreak, 26% (18 out of 68) of ECG leads tested cultured positive for VRE.
- Terminal cleaning of the burn unit, including all equipment and supplies occurred after the first VRE outbreak
  - Second VRE outbreak occurred after terminal cleaning from a contaminated ECG lead that was not identified during the prior weekly culture surveys. VRE remained on the contaminated ECG lead wire for 38 days and was verified through DNA of contaminated leadwire

“Electrocardiography Wires: A Potential Source of Infection”

- 2 hospitals in South Florida and 1 hospital in Southern California converted to disposable ECG lead wires in Cardiac ICU
  - All 3 hospitals reduced sternal wound infections by 90% after moving to disposable ECG leads
RECOMMENDATIONS

National Standards
Center for Disease Control and Prevention (CDC) Report "Guideline for the Prevention of Surgical Site Infections", 1999

- Recommends the use of disposable patient care items whenever possible to minimize cross contamination of medication-resistant microorganisms


- General Recommendations for all healthcare settings independent of the prevalence of Multi-Drug Resistant Organisms (MDRO) infections or the populations served: Implement patient-dedicated or single-use disposable noncritical equipment (i.e., blood pressure cuff, stethoscope) and instruments and devices.

Society for Healthcare Epidemiology of America (SHEA) "Guidelines for Preventing Nosocomial Transmission of Multidrug - Resistant Strains of Staphylococcus aureus and Enterococcus", 2003

- Dedicate the use of noncritical patient-care equipment to a single patient (or cohort of patients infected or colonized with the pathogen requiring precautions) to avoid sharing between patients. If use of common equipment is unavoidable, then adequately clean and disinfect them before use for another patient.

The Joint Commission 2009 Patient Safety Goal 7: Reduce the risk of healthcare-associated infections

- Implement evidence-based practices to prevent health care-associated infections due to multidrug-resistant organisms in acute care hospitals. Hand hygiene, contact precautions, as well as cleaning and disinfecting [patient] care equipment and the [patient’s] environment are essential strategies for preventing the spread of health care-associated infections.

FINANCIAL IMPACT

Impact of ONE Healthcare - Associated Infection
- Attributable per patient cost of $25,903
- Occurrence of 4.5% for every 100 patient admissions
- 5.3 additional hospital days
- Unnecessary death in 5% of cases

Potential Effect on a 300 Bed Hospital (23,760 inpatient admissions annually)*
- 1069 total cases of HAIs
- Excess costs totaling $27,690,037
- 5666 additional hospital days
- 53 unnecessary deaths

*ADMISSION ASSUMPTIONS
- 80% occupancy
- Average LOS 3.7 days