Taking the Lead with Disposable ECG Leads: Preventing Chest Incision Surgical Site Infections

Charlene Head, RN, BSN, CIC, Sonya Helms, RN-BC, MSN, CLNC, Marie Mercier, RN, MSN
CMC-NorthEast, Infection Prevention and Cardiac Services Departments, Concord, NC

**Background and Significance**

In 2012 an increase in chest incision surgical site infections occurred in our cardiovascular surgery patient population. As a result, the cleaning and disinfection processes for ECG lead wires were evaluated. We were suspicious that the lead wires could be a potential source of previous carbapenem resistant enterobacteriaceae (CRE) infections and possibly a factor in the chest incision surgical site infections.

Albert, et al (2010) conducted a descriptive cross-sectional study to determine the presence and number of bacterial and fungal species on cleaned, reusable ECG lead wires. Multiple hospitals and multiple work environments in each hospital were studied. The authors found that by hospital, the percentage of lead wires with any bacterial growth varied from 49% to 80% of those sampled. Methods used to detect bacterial growth presence were similar to the methods used in our quality improvement project.

Albert, et al (2010) conducted a descriptive cross-sectional study to determine the presence and number of bacterial and fungal species on cleaned, reusable ECG lead wires. Multiple hospitals and multiple work environments in each hospital were studied. The authors found that by hospital, the percentage of lead wires with any bacterial growth varied from 49% to 80% of those sampled. Methods used to detect bacterial growth presence were similar to the methods used in our quality improvement project.

**Goal**

The goal of this quality improvement project was to evaluate the effectiveness of the cleaning and disinfection process of ECG lead wires and use this information to support the purchase and use of disposable ECG leads for cardiovascular surgery patients to prevent chest incision surgical infections.

**Methodology: Quality Improvement Process**

**Outcome measures:**

1. Demonstrate inadequate cleaning of re-usable ECG leads by collecting and measuring organic matter on cleaned leads and surfaces/objects in terminally cleaned patient rooms.
2. Demonstrate that disposable ECG wires have less potential to transmit microorganisms to patients by comparing the amount of bacterial growth on clean, re-usable ECG leads to disposable leads.
3. Prevent and/or reduce chest site surgical infections in the post-operative cardiac patient population using surgical site infection data pre and post implementation of disposable ECG leads.

**Interventions:**

1. Measure the cleanliness of reusable lead wires after terminal cleaning using the 3M Clean-Trace ATP surface test.
2. Culture the lead wires after terminal cleaning.
3. Compare the cleanliness of terminally cleaned lead wires to disposable lead wires.
4. Use 3M Clean-Trace ATP surface test to determine the cleanliness of environmental surfaces in a patient room.

**ATP Bioluminescence Test:** Detects the amount of organic matter remaining on surfaces after cleaning. Surface is swabbed and tested for ATP- protein that provides energy to cells. The amount of ATP is read as a relative light unit (RLU). The higher the RLU reading, the greater the amount of organic contamination.

**Organic matter on cleaned, reusable ECG leads**

**Organic matter on surfaces in a terminally cleaned ICU room**

**Results**

Preliminary evidence suggests that the use of disposable ECG leads in cardiovascular surgery patients may play a role in preventing chest incision surgical site infections. Other hospitals could potentially avoid future chest incision surgical site infections by adopting this practice. The cost of a single chest incision surgical site infection after cardiac surgery has been reported as high as $299,237 and mortality rates as high as 40%. The cost of one set of disposable ECG leads is $16.47.

We do acknowledge that more study is needed to determine the efficacy of disposable ECG lead use for surgical and non-surgical telemetry patients, and the long-term benefit in reducing transmission of other infections, including multi-drug resistant organisms (MDROs).

Carolina Healthcare System aspires to be a national leader in culture of safety by allocating resources for innovative practices and equipment. Innovative equipment can have significant upfront cost, but can have a positive impact on patient outcomes.

**Conclusion and Innovation**

Results provide preliminary evidence that the use of disposable ECG leads in cardiovascular surgery patients may prevent chest incision surgical site infections. Other hospitals could potentially avoid future chest incision surgical site infections by adopting this practice. The cost of a single chest incision surgical site infection after cardiac surgery has been reported as high as $299,237 and mortality rates as high as 40%. The cost of one set of disposable ECG leads is $16.47.

We do acknowledge that more study is needed to determine the efficacy of disposable ECG lead use for surgical and non-surgical telemetry patients, and the long-term benefit in reducing transmission of other infections, including multi-drug resistant organisms (MDROs).

Acknowledgements

Thank you to the Nursing Staff and Leaders for their participation in the following departments: Arrhythmia Center, ACCU, CVRU, CVIMC, PCCU.

References

NHSN (National Healthcare Safety Network)