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Reduction of Risk from Bacterial Transmission in the Emergency Department through Implementation of Standardized EKG machine cleaning protocols: An Evidence-Based Approach

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- I declare that there are no relationships, conditions, or circumstances that present a conflict of interest relevant to the content of this presentation

Introduction — Problem

•Nosocomial infections are associated with increased length of hospital stay, costing an estimated $6.7 billion per year.

• Numerous studies have shown that non-critical devices, such as EKG machines can be contaminated with pathogens

•The Emergency Department (ED) is a complex and dynamic environment.

•There is no policy in place for the cleaning of this piece of equipment.

Available Knowledge

- Despite an increased focus on infection prevention, little research exists on decreasing bacterial transmission from medical equipment to patients in an emergency department setting.

Rationale

- Many ED patients come in to contact with EKG machines. Assumptions used to develop the intervention
- Essential that machines are clean and free from bacteria in order to avoid the spread of infection
- Current lack of policy for cleaning of high use medical equipment in the Emergency Department.

Purpose & Aims

- The aims of this project are:
  - Establish baseline data on type and amount of bacterial presence on EKG machines, and compliance with cleaning of machines between use
  - Determine if feedback to staff on their compliance of cleaning EKGs after each use alters practice
  - Establish an Emergency Medicine policy for the cleaning of medical equipment
  - Implement a sustainable change to the daily practice in the Emergency Department that will improve the quality of care patients receive

Methods — Context

- The Emergency Department at The University of Vermont Medical Center is a 45-bed unit
- Level One Trauma Center serving Vermont and upstate New York.
- Sees an average of 60,000 patients a year
- Performs an average of 1,230 EKGs per month using five Mortara EKG machines.
- The clinical staff who perform EKGs are limited to nurses and emergency medical technicians.
- Currently no formal policy in place for cleaning EKG machines
- Clinical expectation is they are cleaned after each use using Oxivir wipes.

Intervention(s)

One	• Machines swabbed by Infection Prevention
Two	• EMRAP audit of cleaning
Three	• Clinical Staff recieve compliance results
Four	• Repeat audit
Five	• 2nd swabbing of machines
Six	• A routine cleaning schedule will be implemented
Seven	• 3rd swabbing of machinesE
Eight	• Random audits for sustainability

Study of the Intervention(s)

- The interventions proposed will be measured by:
- comparing bacterial levels and type from
  - baseline results
  - post staff feedback
  - following the establishment of a cleaning schedule
  - At one and two-month post interventions,
- Compliance with the cleaning of EKG machines between each patient use.

Measures

- Adherence to current cleaning expectations and cleaning practices throughout study interventions will be measured EMRAP personnel
- The bacterial load and type will be obtained by infection prevention staff at the University of Vermont Medical Center. In order to provide 95% power in detecting a change in cleaning compliance, a sample size of 300 EKGs will be required.

Analysis

- Statistical analysis for changes in compliance will be compared using a chi square test. Bacterial load will be measured using a two-sample t-test.

Ethical Considerations

- Minimal risk
- Hawthorne effect
- Patient Privacy
- Anonymity of clinical staff

Results

- Initial swabbing (2/12)
- Swab results obtained and diseminated (2/20)
- Cleaning campaign initiated
- Re-swabbing of machines (3/25)
- Swab results obtained and disseminated (3/27)
- Cleaning campaign continued

Results

EKG Cart	Swab Location	Colony Forming Units (CFUs)
Cart 10	Plug	2 CFUs
	Patient	13 CFUs
	Staff	31 CFUs
Cart 20	Plug	0 CFUs
	Patient	11 CFUs
	Staff	57 CFUs
Cart 16	Plug and Staff	112 CFUs
	Patient	TNTC*
	Staff	Data Not Available
Cart 19	Plug	Data Not Available
	Patient	2 CFUs
	Staff	45 CFUs

Results

EKG Cart	Swab Location	Colony Forming Units (CFUs)	Net difference (CFUs)
Cart 10	Staff	14 CFUs	-19 CFUs
	Patient	1 CFU	-12 CFUs
Cart 20	Staff	43 CFUs	-14 CFUs
	Patient	23 CFUs	+12 CFUs
Cart 13	Staff	14 CFUs	Data not available
	Patient	13 CFUs	Data not available
Cart 19	Staff	24 CFUs	-21 CFUs
	Patient	0 CFUs	-2 CFUs

Discussion

- Number of unanticipated events.
- Baseline swabs of the EKG machines were able to be obtained, however bacterial type was not determined, nor was a baseline level of cleaning compliance.
- Because a baseline level of cleaning compliance was not obtained, it is not possible to make a quantitative determination on whether feedback to clinical staff had a direct effect on cleaning practices.
- Table 2 indicates that all but one of the one of the swabs saw a decrease in number of colony forming units (CFUs) in the second round of swabs.
- Working in tandem with Cardiology and Infection Prevention, a revision to the hospitals current policy titled; Infection Prevention Practices-Cleanliness of the Environment and Equipment is pending to include EKG machines
- It has been determined that a daily cleaning of the EKG machines will be incorporated in to the everyday operations of the ED.

Interpretation

- Initial EKG swabs show high amount of bacterial presence at baseline, with only three of the ten swabs showing two or less CFUs.
- Second round of swabs show a marked decrease in the number of bacteria present on the EKG machines.
- All but one of the six available comparisons showed a decrease in bacteria of at least two CFUs or more.

Limitations

- Importance of bacterial typing:
  - When using bacterial swabs, it is difficult to rule out environmental bacteria that is expected to be present or considered acceptable
  - Bacterial typing can be determine if the bacteria present is multi-resistant pathogens or regular skin flora.
- Consistency
  - Ideally, the same member of the infection prevention team would have performed both sets of swabs
  - Avoided a difference in swabbing technique.
  - Swabbing the same four machines
- Missing cleaning compliance data

Conclusions

- Although this project had many limitations, it still provided useful evidence for a need for a Standardized EKG machine cleaning protocols.
- In the near future, a hospital-wide protocol for the cleaning of EKG machines will be published, as well as an Emergency Department Initiative for the routine cleaning of EKG machines in addition to their expected cleaning after each patient use.
- The Emergency Department is already looking at applying a similar model to other high-use pieces of equipment, such as the ultrasound machines.
- This project, and its limitations, will serve as a useful guide when implementing similar projects.
- As part of a rural health network, finding at UVMMC can be distribute throughout the network in an effort to enhance health outcomes on a larger level.

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