810. Resistance to the Minocycline-Rifampin-Chlorhexidine (MRCH) combination does not emerge in biofilms of Tetracycline and Rifampin resistant bacteria grown on MRCH catheters depleted below antimicrobially effective concentrations

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Session: P-33. HAI: Device-Associated (CLABSI, CAUTI, VAP)

Background. Central Line Associated Bloodstream Infections (CLABSIs) remain a significant medical problem for critically ill cancer patients who required catheters for extended durations. Minocycline (M) -Rifampin (R) loaded catheters have shown the greatest impact on reducing CLABSIs; however, there is a risk for developing antibiotic resistant organisms when exposed to catheters whose concentration becomes depleted below antimicrobially effective levels due to extended indwells. Chlorhexidine (CH) and M-R combination catheters (MRCH) have been proposed as a next generation catheter with improved performance. Here we studied whether bacteria that were Tetracycline and Rifampin resistant became resistant to MRCH when allowed to form biofilms on MRCH catheters depleted below antimicrobially effective MRCH concentrations.

Methods. Minimum inhibitory concentrations (MICs) of Tetracycline and/or Rifampin resistant stock isolates were measured by standard microbroth dilution methods. MRCH catheters were depleted to below antimicrobially effective concentrations by soaking in serum for 6 weeks. The resistant bacteria were then allowed to form biofilm for 24 hrs on the depleted catheters in broth. Following 24 hour incubation the adherent (breakthrough) bacteria were removed by sonication and MICs were remeasured. The same organisms grown on non-antimicrobial catheters were used as controls.

Results. MICs (ug/mL) of the organisms against each agent and the combination are tabulated below:

MICs (ug/mL) of the organisms against each agent and the combination

Bacteria	History	Rifampin	Minocycline	CH	MRCH
Klebsiella penumoniae (AR542)	Stock organism	16	2	2	2
	MRCH biofilm	16	2	2	2
Enterobacter cloacae (AR544)	Stock organism	8	4	1	2
	MRCH biofilm	8	4	2	2
Staphylococcus aureus (AR 219)	Stock organism	>32	16	1	1
	MRCH biofilm	>32	16	1	1
Staphylococcus aureus (VISA) (AR 722)	Stock organism	4	0.5	1	0.5
	MRCH biofilm	4	0.5	1	0.5
Enterococcus faecium (VRE) (AR 579)	Stock organism	8	16	2	2
	MRCH biofilm	8	16	2	2

Conclusion. The M and R resistant bacteria did not develop in vitro resistance to the MRCH combination after forming biofilms on MRCH catheters depleted below antimicrobially effective concentrations.

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811. Utilizing IV team in Reducing the Central Line Associated Infections

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Session: P-33. HAI: Device-Associated (CLABSI, CAUTI, VAP)

Background. Central Line-Associated Blood Stream Infections (CLABSI) are defined as the laboratory confirmed blood stream infections after 48 hours of the line placement and excluding other sources of infection. CLABSI can lead to prolonged hospital stay, increased risk of mortality and financial burden on the health care system. In our study, we aimed at evaluating the incidence of CLABSI after involving the IV team in both critically ill and non-critically ill patients.

Methods. A retrospective chart review was performed from July 2011 to August 2019 at a 971 bedded community hospital. IV team has been involved in the central line care since 2013 and started changing the scheduled central line dressings. The interventions that were introduced since then include usage of Curos, wearing masks and gloves for any contact with central lines, flushing the central lines using pulsatile method, and not drawing the routine labs. Allpoints program was introduced in July 2018 which is a retraining program to the nurses emphasizing on central line dressing changes using a sterile technique, pulsatile flushing method and medication administration. CLABSI rate was calculated per 1,000 central line days yearly and quarterly and was compared before and after the involvement of IV team.

Results. Total number of events from July 2011 to August 2019 were 275. Average central line days were 22,350. Most common organisms that were isolated are Staphylococcus aureus (13.45%) followed by Staphylococcus Epidermidis (9.8%), Candida Albicans (8.7%), E. Coli (8.72%) and Klebsiella Pneumonia (6.9%). The average CLABSI rates quarterly and yearly were 1.00 and 1.32 respectively, per 1000 central line days. Average CLABSI rates before and after the involvement of IV team were 1.32 and 1.18 respectively. CLABSI rate has decreased significantly after the involvement of the IV team in 2013. The largest impact on the CLABSI infection rate was between July 2018 to August 2019 which can be attributed to the Allpoints program. CLABSI rate in 2018 and 2019 were 0.86 and 0.6 respectively.

Conclusion. Our analysis showed that involving the IV team in the central line care and implementing the preventive strategies like usage of curos, pulsatile flush technique, wearing mask and gloves for any contact with central line helped in reducing CLABSI.

Disclosures. **All Authors**: No reported disclosures

813. The Reduction of the acquisition rate of carbapenem resistant *Acinetobacter baumannii* after room privatization in the intensive care unit

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Session: P-34. HAI: Disinfection/Sterilization & Environmental Infection Prevention

Background. *Acinetobacter baumannii* is one of the major pathogens of hospital-acquired infection recently and hospital outbreaks have been reported worldwide. On September 2017, New intensive care unit(ICU) with only single rooms, remodeling from old ICU with multibed bay rooms, was opened in an acute-care tertiary hospital in Seoul, Korea. We investigated the effect of room privatization in the ICU on the acquisition of carbapenem-resistant *Acinetobacter baumannii*(CRAB).

Methods. We retrospectively reviewed medical records of patients who admitted to the medical ICU in a tertiary care university-affiliated 1,800-bed hospital from 1 January 2015 to 1 January 2019. Patients admitted to the medical ICU before the remodeling of the ICU were designated as the control group, and those who admitted to the medical ICU after the remodeling were designated as the intervention group. Then we compared the acquisition rate of CRAB between the control and intervention groups. Patients colonized with CRAB or patients with CRAB identified in screening tests were excluded from the study population. The multivariable Cox regression model was performed using variables with p-values of less than 0.1 in the univariate analysis.

Results. A total of 1,105 cases admitted to the ICU during the study period were analyzed. CRAB was isolated from 110 cases in the control group(n=687), and 16 cases in the intervention group(n=418). In univariate analysis, room privatization, prior exposure to antibiotics (carbapenem, vancomycin, fluoroquinolone), mechanical ventilation, central venous catheter, tracheostomy, the presence of feeding tube(Levin tube or percutaneous gastrostomy) and the length of ICU stay were significant risk factors for the acquisition of CRAB ($p< 0.05$). In the multivariable Cox regression model, the presence of feeding tube(Hazard ratio(HR) 4.815, 95% Confidence interval(CI) 1.94-11.96, p=0.001) and room privatization(HR 0.024, 95% CI 0.127-0.396, p=0.000) were independent risk factors.

Table 1. Univariate analysis of Carbapenem-resistant Acinetobacter baumannii

Table 1. Univariate analysis of Carbapenem-resistant *Acinetobacter baumannii*

	CRAB acquisition (n = 126)	No CRAB (n = 979)	p-value
Age, years (± SD)	62.51(± 17.82)	64.18(± 15.55)	0.263
Sex (M)	80 (63.5%)	587 (60.0%)	0.498
Body weight (kg)	54.21 (± 17.32)	52.62 (± 19.60)	0.386
Charlson's comorbidity index	8.99 (± 4.19)	9.18 (± 4.50)	0.724
Prior exposure to antibiotics			
Beta-lactam and Beta-lactam inhibitor	87 (69.0%)	641 (65.5%)	0.485
1st generation cephalosporine	0 (0.0%)	6 (0.6%)	1.000
2nd generation cephalosporine	0 (0.0%)	4 (0.4%)	1.000
3rd generation cephalosporine	23 (18.3%)	208 (21.2%)	0.486
4th generation cephalosporine	16 (12.7%)	74 (7.6%)	0.056
Aminoglycoside	1 (0.8%)	28 (2.9%)	0.240
Fluoroquinolone	79 (62.7%)	516 (52.7%)	0.037*
Carbapenem	18 (14.3%)	256 (26.1%)	0.004*
Vancomycin	72 (57.1%)	419 (42.8%)	0.002*
Therapeutic variables			
Mechanical ventilation	69 (92.0%)	497 (78.6%)	0.009*
Tracheostomy	43 (34.1%)	174 (18.8%)	0.000*
Central venous catheter	91 (73.4%)	529 (56.8%)	0.000*
Feeding tube	115 (91.3%)	664 (67.8%)	0.000*
Continuous renal replacement therapy	44 (35.5%)	286 (32.1%)	0.474
Duration of hospital stay			
The length of total hospital stay	68.15 (± 95.54)	56.53 (± 103.145)	0.230
The length of ICU stay	19.90 (± 34.04)	8.96 (± 8.16)	0.000*
In-hospital mortality	43 (34.1%)	284 (29.0%)	0.254

*$p < 0.05$; SD, standard deviation; M, male; ICU, Intensive care unit

Table 2. Multivariable Cox regression model of the acquisition of Carbapenem-resistant Acinetobacter baumannii

Table 2. Multivariable Cox regression model of the acquisition of Carbapenem-resistant *Acinetobacter baumannii*

	Beta-coefficient	Hazard ratio (95% CI)	p-value
Room privatization	-1.540	0.214 (0.121-0.382)	0.000*
Length of stay in ICU	-0.016	0.984 (0.965-1.004)	0.114
Feeding tube	1.555	4.737 (1.907-11.762)	0.001*

*p < 0.05; CI, confidence interval

Conclusion. In the present study, room privatization of the ICU was correlated with the reduction of CRAB acquisition independently. Remodeling of the ICU to the single room would be an efficient strategy for preventing the spreading of multidrug-resistant organisms and hospital-acquired infection.

Disclosures. **All Authors**: No reported disclosures

814. A Quasi-Experimental Study on Stethoscopes Contamination with Multidrug-Resistant Bacteria: Its Role as a Vehicle of Transmission

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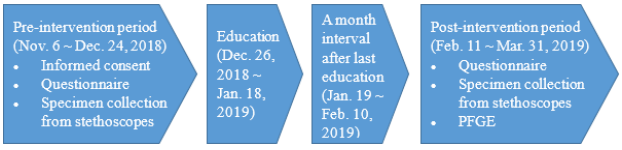
Session: P-34. HAI: Disinfection/Sterilization & Environmental Infection Prevention

Background. Stethoscopes have been suggested to be a possible vector of contact transmission. However, only a few studies have focused on the prevalence of contamination by multidrug-resistant (MDR) bacteria and the effectiveness of disinfection training to reduce. The aim of this study is to investigate the burden of stethoscope contamination with nosocomial pathogens and multidrug-resistant (MDR) bacteria and to analyze habit changes in the disinfection of stethoscopes before and after education and training.

Methods. We performed a prospective pre and post quasi-experimental study. All participants were surveyed on their disinfection behavior and stethoscopes were cultured by pressing the diaphragm directly onto a blood agar plate before and after education on disinfection. Pulsed-field gel electrophoresis (PFGE) was performed to determine the relatedness of MDR bacteria.

Fig. 1. Study flow for pre and post quasi-experimental study. Abbreviations. PFGE, Pulsed-field gel electrophoresis



Results. Most of the stethoscopes were contaminated with microorganisms, 97.9% before and 91.5% even after intervention. The contamination rate of nosocomial pathogens before and after education was 20.8 % and 19.2%, respectively. Stethoscope disinfection habits were improved (55.1% *vs* 31%; $p< 0.001$), and the overall bacterial loads of contamination were reduced (median CFUs 15 vs 10; $p=0.019$) after the intervention. However, the contamination rate by nosocomial pathogens and MDR bacteria did not decrease significantly. A carbapenemase-producing *Klebsiella pneumoniae* from the stethoscope was closely related to isolates from the patients admitted at the same ward where the stethoscope was used.

Fig. 2. Changes in colony forming units of bacteria isolated from stethoscopes between pre and post intervention period. Abbreviations. CFUs, colony forming units; ns, non-specific

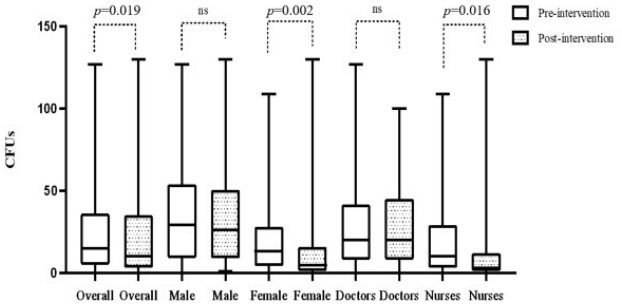


Fig. 3. Result of PFGE and dendrogram of carbapenemase-producing K. pneumoniae from the stethoscope and the patients where the stethoscope was used. Percentage similarities are shown above the dendrogram. Note. ST_7W, K. pneumoniae from the stethoscope; SM 01 to 03, K. pneumoniae isolates form the patients; PFGE, Pulsed-field gel electrophoresis

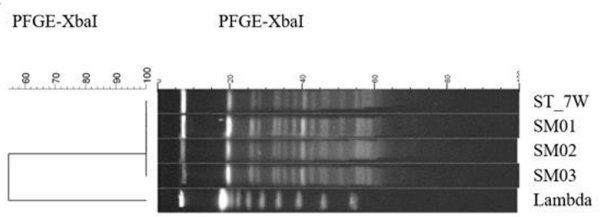


Table 1. Contamination rates caused by nosocomial pathogens and proportion of MDR bacteria

Table 1. Contamination rates caused by nosocomial pathogens and proportion of MDR bacteria

	Pre-intervention samplings (n=96)		Post-intervention samplings (n=94)	
Nosocomial pathogens	Contamination, number (%)	MDR, number (%)	Contamination, number (%)	MDR, number (%)
Overall	20 (20.8%)	3 (3.1%)	18 (19.2%)	6 (6.4%)
S. aureus	13 (13.5%)	2 (2.1%)[a]	15 (15.7%)	4 (4.3%)
Enterococcus	6 (6.3%)	0 (0.0%)	4 (4.3%)	0 (0.0%)
A. baumannii	0 (0.0%)	0 (0.0%)	1 (1.1%)	1 (1.1%)
P. aeruginosa	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Enterobacteriaceae	3 (3.1%)	1 (1.2%)	2 (2.1%)	2 (2.1%)
K. pneumoniae	1 (1.2%)	1 (1.2%)[b]	1 (1.1%)	1 (1.1%)[c]
E. coli	0 (0.0%)	0 (0.0%)	1 (1.1%)	1 (1.1%)[b]
Enterobacter	2 (2.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Abbreviations: MDR, multidrug-resistance
[a]Methicillin-resistant *Staphylococcus aureus*
[b]Extended-spectrum beta-lactamase
[c]Carbapenemase-producing *Enterobacteriaceae*

Conclusion. Stethoscopes were contaminated with various nosocomial pathogens including MDR bacteria and were very likely to be a vehicle of MDR bacteria. Healthcare workers feel the need for education and think it helps, but continuous, consistent education and training should be done in multifaceted approach to reduce the nosocomial transmission via stethoscopes.

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815. Biofilm Accumulation in New Flexible Gastroscope Channels within 30 Days in Clinical Use

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Session: P-34. HAI: Disinfection/Sterilization & Environmental Infection Prevention

Background. Flexible endoscopes are complex-design reusable devices, with long and narrow channels, making reprocessing difficult. Biofilm formation is a key factor for persistent contamination, as it protects microorganism against cleaning and disinfection agents. The aim of this study was to assess the accumulation of biofilm on the inner surfaces of new flexible gastroscope channels after 30 days of patient-use and full reprocessing.

Methods. Three flexible gastroscopes (FG) (GIF–Q150, Olympus™) with new internal channels (Teflon™) were subjected to 30 days of clinical use and reprocessing by trained nursing personnel, using a revised reprocessing protocol, at the endoscopy service of a Brazilian teaching hospital (235 beds). The reprocessing protocol included: pre-cleaning; manual cleaning; automated cleaning and disinfection - 2% Glutaraldehyde; manual drying (forced-air drying) and alcohol rinsing, and storage in vertical position in exclusive cabinets. Then, internal channels were removed from the three patient-ready FG (three biopsy, three air, three water and three air/water junction channels), and the inner surface subjected to bacteriological culture (~30 cm) (n=9) and Scanning Electron Microscopy (SEM) (~1 cm) (n=12). Air/water junctions (~1 cm) were subjected to SEM only.

Results. The average of use/reprocessing of the FG was 60 times. Bacterial growth was detected in 6/9 channels (three from FG#1 showed residual moisture) and seven bacterial isolates were recovered, most from air or water channels (Fig 1). Inner surface structural damage was identified in 11/12 channels by SEM. Extensive biofilm was detected in air, water and air/water junction channels (7/12) (Fig 2). Residuals matter were detected in all channels (12/12).