

Presentation Type:

Poster Presentation

Subject Category: Implementation Science**Results of a Stepped-Wedge Cluster-Randomized Implementation Science Trial to Improve Chlorhexidine Gluconate Bathing Compliance**

Staci Reynolds and Edward Keating

Background: Daily chlorhexidine gluconate (CHG) bathing in intensive care units (ICUs) is widely supported in the literature to decrease risk of central-line-associated infections (CLABSIs). However, adoption of this practice is inconsistent. The primary objective of this implementation science study was to assess the effect of a bathing intervention on compliance with the AHRQ CHG bathing protocol. Secondary objectives were to examine (1) moderating effects of unit characteristics, (2) the intervention effect on nursing staff's knowledge and perceptions of CHG bathing, and (3) the intervention effect on CLABSI rates. **Methods:** A stepped-wedge cluster-randomized design was used to implement and evaluate the effectiveness of a CHG bathing intervention. At 2 large hospitals, 14 units were clustered into 4 sequences. Units included 9 adult ICUs, 3 pediatric ICUs, 1 pediatric bone marrow transplant unit, and 1 adult hematology-oncology unit. Sequences were enrolled into the active intervention phase over the course of 4 months. The intervention included 2 evidence-based implementation strategies: (1) educational outreach visits and (2) audit and feedback on CHG bathing compliance. Compliance with the CHG bathing processes and daily CHG bathing documentation were assessed. At 12 months after the last enrolled date, booster sessions were completed, and outcomes were assessed for sustainability. **Results:** In models of CHG bathing process compliance, the implementation strategy was significant ($b = 6.97$; $P = .009$), indicating that compliance was 6.97% higher after the intervention than before. There was a statistically significant improvement in nursing knowledge of CHG bathing ($\chi^2 = 9.32$, $p = .002$) and perception of the priority of CHG bathing ($t = 2.56$; $P = .01$). Daily CHG bathing documentation compliance and CLABSI rates did not significantly improve immediately following the intervention; however, a clinically significant decrease (27.4%) in CLABSI rate was observed. At 12 months after the intervention, improvements in CHG bathing documentation and process outcomes were sustained. There was no change in bathing process compliance after 12 months ($b = -0.19$; $P = .87$; intercept=96.96, $p < .001$), and compliance remained high at 96.96%. There was no change in documentation compliance after 12 months ($b = 3.89$, $p = .37$, intercept=78.72, $p < .001$), and compliance remained high at 78.72%. After 12 months, CLABSI rates were statistically significantly reduced ($b = -0.16$; $P = .009$; intercept = 1.97, $p < .001$). **Conclusions:** Using educational outreach visits and audit-and-feedback strategies can improve the adoption of evidence-based CHG bathing practices. CHG bathing—a simple, nurse-driven practice—can make a significant improvement in patient outcomes.

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Subject Category: Implementation Science**Antibiotic Stewardship Implementation at Hospitals Without On-Site Infectious Disease Specialists: A Mixed-Methods Study**

Daniel Livorsi; Eli Perencevich; Kenda Stewart Steffensmeier; Matthew Goetz and Heather Reisinger

Background: Hospitals are required to have antibiotic stewardship programs (ASPs), but there are few models for implementing ASPs without the support of an infectious disease (ID) specialist, defined as an ID physician and/or ID pharmacist. In this study, we sought to understand ASP implementation at hospitals within the Veterans' Health Administration (VHA) that lack on-site ID support. **Methods:** Using a mandatory 2016 VHA survey, we identified acute-care hospitals that lacked an on-site ID specialist. For each hospital, antibiotic use (2018–2019) was quantified

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as days of therapy (DOT) per 1,000 days present, based on NHSN methodology for tracking all antibacterial agents. From July 2019 through April 2020, we conducted semistructured interviews with personnel involved in or affected by ASP activities at 7 qualifying hospitals. All interview transcripts were analyzed using thematic content analysis. **Results:** Of the 7 acute-care hospitals, 6 (86%) had a long-term care unit; 3 (43%) had an intensive care unit; and 2 (29%) had full-time employment equivalents dedicated to stewardship. Sites averaged 1,075 (SD, ± 654) and 148 (SD, ± 96) admissions per year in acute-care and long-term care, respectively. At the site-level, mean antibiotic use was 486 DOT (SD, ± 98) per 1,000 days-present in acute-care and 207 DOT (SD, ± 74) per 1,000 days present in long-term care. We interviewed 42 personnel across the 7 sites. Although sites reported using similar interventions to promote antibiotic stewardship, the shape of these interventions varied. The following 4 common themes were identified: (1) The primary responsibility for ASPs fell on the pharmacist champions, who were typically assigned multiple other non-ASP responsibilities. (2) The pharmacist champions were more successful at gaining buy-in for stewardship initiatives when they had established rapport with clinicians, but at some sites, the use of contract physicians and frequent staff turnover were potential barriers. (3) Some sites felt that having access to an off-site ID specialist was important for overcoming institutional barriers to stewardship and improving the acceptance of their stewardship interventions. (4) In general, stewardship champions struggled to mobilize institutional resources, which made it difficult to advance their programmatic goals. **Conclusions:** In this study of 7 hospitals without local ID support, we found that ASPs are largely a pharmacy-driven process. Remote ID support, if available, was seen as helpful for implementing stewardship interventions. These findings may inform the future implementation of ASPs in settings lacking local ID expertise.

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Subject Category: Other**Gamifying the Infection Control Curriculum: The Impact on Nursing Students' Knowledge, Exam Performance, and Course Perception**

Tomislav Mestrovic; Jasminka Talapko; Tina Cikac and Marijana Neuberger

Background: Unlike passive didactic teaching, the introduction of innovative active-learning approaches to university nursing curricula aims to address the educational content in an interactive learning environment, improving in turn the learning process and problem-solving skills indispensable for future infection control professionals. One such strategy is the use of educational games, which can motivate students and enhance the degree of their engagement. We appraised the effectiveness of introducing an interactive game based on a popular television quiz show "Who Wants to be a Millionaire?" for educational attainment, exam performance, and course perception in nursing students. **Methods:** A whole generation of second-year undergraduate nursing students (126 female and 27 male participants; age range, 19–41 years) from a public university in Croatia (University Centre Varazdin, University North) were divided into 2 groups by cluster randomization; one group had received additional hours of game play after core training curriculum in a "Hygiene and Epidemiology" course, while the other had not. Game play was accomplished by employing 'edutaining' interactive multimedia approach, and covered primarily hand hygiene, cough etiquette, the use of personal protective equipment, sterilization and disinfection, and safe injection practices. Quantitative results of multiple-choice exams were used to evaluate any differences in the knowledge level of respective groups. A satisfaction opinion survey was used to gauge attitudes of students attending the course. Statistical significance was defined as $P < .05$ (2-tailed). **Results:** The mean baseline examination score was 28.30 \pm 5.79 points for the game group and 24.65 \pm 5.94 points for the control group, demonstrating improved knowledge retention when the interactive game was introduced into the curriculum.

The statistically significant improvement in knowledge was observed in the domains of personal protective equipment and safe injection practices. There was no statistically significant difference in the overall scores between male and female students. Students who were subjected to game play expressed more agreement on a Likert scale regarding course enjoyment and innovativeness, albeit they did not differ from control group when assessing the educational merit of the course. **Conclusions:** Introducing interactive games to university courses that cover infection control may boost student enjoyment and enhance long-term retention of information, as confirmed by this study. Nonetheless, extra care should be taken when specific games that have not been assessed objectively are implemented. Further research in this field will elucidate how this increased knowledge retention in infection control principles translates to quotidian practice, for the benefit of students and (ultimately) patients.

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Subject Category: Infection Control in Low- and Middle-Income Countries

Assessment of COVID-19 Infection Prevention and Control Capabilities in 39 Haitian Hospitals

Afeke Kambui; Mentor Lucien; Catherine Emilien; Francois Staco; Ymeline Pateau St Vil; Pierre Philippe Wilson Registe; Mackenley Brice; Dassaève Brice; Nathan Zephirin; Sandra Benjamin and Martha Murdock

Background: Infection prevention and control (IPC) is key (1) to keeping health workers and patients safe from contracting infections during care, (2) to enabling continuity of essential health services, and (3) to pandemic preparedness and response. Frontline health workers are at 3-fold increased risk for COVID-19 (*Lancet* 2020) and account for 6% of COVID-19 hospitalizations (CDC 2020). With the support of the US Agency for International Development Bureau of Humanitarian Assistance (USAID/BHA) and collaboration of the Haitian Ministry of Health (MSPP), MSH’s Rapid Support to COVID-19 Response in Haiti project (RSCR Haiti) developed an instrument to assess select public hospitals and identify IPC gaps that informed COVID-19 response and system strengthening measures for increasing patient and provider safety. **Methods:** The IPC tool contains 13 IPC domains and 80 questions, for a total of 600 points. It was developed based on the World Health Organization IPC Assessment Framework for Health Facilities (2018) and US Centers for Disease Control Facility Readiness Assessment for COVID-19 (2020). In total, 39 health facilities chosen by the MSPP across all 10 departments of Haiti were evaluated in October 2020. Data were analyzed in Microsoft Excel by category, site, and IPC capabilities then classified as inadequate, basic, intermediate or advanced. **Results:** IPC capabilities scored as inadequate in 18% and basic in 67% of hospitals (Graph 1). No institution was advanced. Among health facilities, IPC programs existed in only 18%; IPC guidelines or procedures were present in 38%; staff were trained regularly in 12%; and

Table 1. IPC assessment summary, 39 hospitals, Haiti, October 2020

Assessment category	Max score	Average score	%
IPC general			
IPC program	60	10.5	17.5%
Technical guidelines	15	5.7	38.0%
IPC training	15	1.8	12.0%
HAI surveillance	20	3.8	19.0%
IPC for COVID-19			
Triage	95	53.3	56.1%
IPC commodity management	75	29.6	39.5%
Training	70	31.4	44.9%
Management of exposed/infected staff	15	4	26.7%
Monitoring of handwashing, PPE use, disinfection	55	24.2	44.0%
Availability of protocols	95	22.3	23.5%
Risk communication	20	14.4	72.0%
Preparing for a surge in cases	25	9.1	36.4%
Provision of care for suspected or confirmed cases	40	15.3	38.3%
Total	600	225.4	

healthcare-associated infection surveillance was performed in 19%. Systems for COVID-19 triage existed in 56%; 39% had IPC commodity management systems; 45% provided COVID-19 training; 26% practiced monitoring of staff and patients for COVID-19; 36% had protocols for an influx of COVID-19 cases; and 72% practiced risk communication (Table 1). **Conclusions:** No health facility was sufficiently equipped to implement adequate COVID-19 IPC measures, and all needed strengthening, even in the highest-scoring IPC areas. Through RSCR Haiti, MSH and MSPP were able to identify and address priorities in hospitals: establishing hospital IPC programs; training staff; monitoring health workers and patients; and implementing guidance, triage, and commodity-management systems. This study demonstrates that it is possible to do a quick yet thorough assessment to rapidly identify IPC needs and opportunities, using the results to rapidly build response capacity. Haiti’s experience of integrating locally contextualized global IPC tools to inform systemic COVID-19 response measures can benefit other experts globally.

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Subject Category: Infection Control in Low- and Middle-Income Countries

An Observational Study on CRE Colonization and Subsequent Risk of Infection in Adult ICU Patients

Kirtika Sharma; Vibhor Tak and Vijaya Lakshmi Nag

Background: Carbapenem-resistant Enterobacteriaceae (CRE) has emerged as a global health threat with increasing incidence. It is a particular problem in India because control over antibiotics prescription is really poor; these agents can be easily bought over the counter and the antibiotic prescription threshold is low among Indian doctors. Also, even when administered, antibiotics are given in inappropriate dosages and durations. CRE infections are a healthcare challenge due to their difficulty to treat and high morbidity and mortality. Colonization requires infection prevention measures, and it should be prioritized. **Methods:** We sought to determine the prevalence rate of CRE colonization in the gastrointestinal tract in newly admitted ICU patients along with follow-up of any subsequent infection following colonization. A prospective observational study was carried out among ICU patients from January 2019 to August 2020 by collecting perirectal swabs from patients who gave consent. Clinical variables were identified, and the relationship between CRE colonization and subsequent systemic CRE infection was assessed. Processing was carried out by culturing on MacConkey agar plate with ertapenem disk and further identified using conventional microbiological techniques. The ertapenem MIC was determined using an Epsilometer (E) test. The modified carbapenem inactivation (mCIM) test and the EDTA carbapenem inactivation method (eCIM) were used to confirm carbapenem resistance using Clinical

Graph 1. Level of IPC capabilities in the evaluated hospitals, Haiti, October 2020

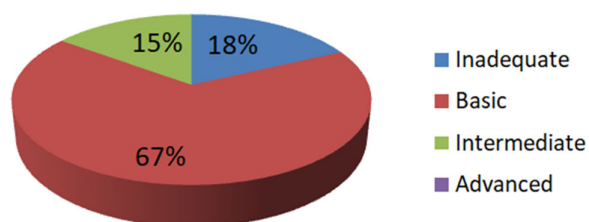


Figure 1.