

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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Poster Presentation

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

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

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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

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

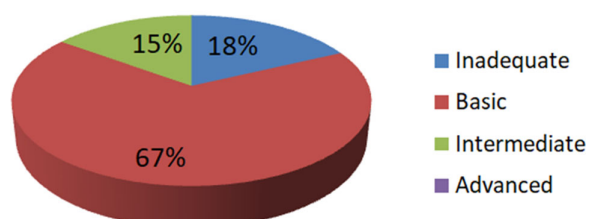


Figure 1.

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

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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

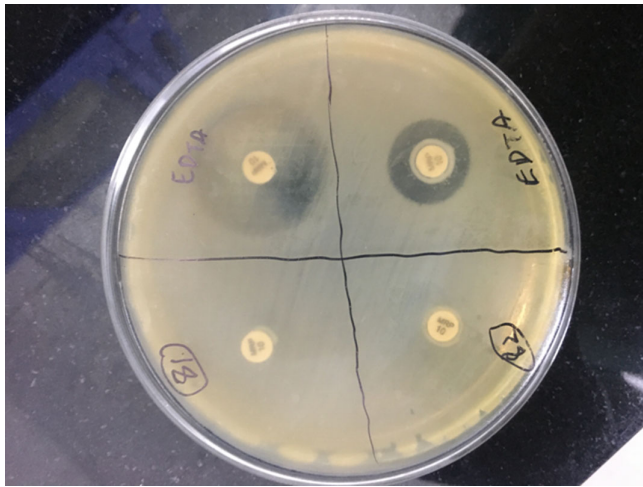


Figure 1.

Table 17: Different CRE infection developed following CRE colonization.

Type of CRE infection developed	<i>Klebsiella pneumoniae</i>	<i>Escherichia coli</i>	<i>Enterobacter spp.</i>
Pneumonia	10	1	1
Surgical site infection	3	4	0
Bloodstream infection	1	0	0
Urinary tract infection	2	2	0
Multiple site infection*	8	1	0

* Includes 6 patients who developed Pneumonia and Surgical site infection, 1 patient each developed Blood stream infection with Pneumonia, Blood stream infection with Surgical site infection and Urinary tract infection with Pneumonia.

Table 18: Characteristics of CRE colonized patients who expired during hospital stay

Feature	<i>Escherichia coli</i>	<i>Klebsiella pneumoniae</i>	<i>Enterobacter spp</i>
Males	2	4	0
Females	0	4	0
Post-surgical patients	0	5	0
No CRE infection	1	0	0
CRE infection developed			
Pneumonia	1	2	0
Surgical site infection	0	1	0
Pneumonia + surgical site infection	0	2	0
Pneumonia + Urinary tract infection	0	1	0
Pneumonia + blood stream infection	0	1	0
Blood stream infection + Surgical site infection	0	1	0

Laboratory Standards Institute 2020 guidelines (Figure 1). **Results:** Among 192 ICU patients, 37 (19.27%) were colonized with CRE (Table 1). Also, 13 (35.13%) CRE isolates showed metallo-β-lactamase resistance. Furthermore, 18 CRE isolates (48.64%) showed serine carbenemase activity; 6 CRE isolates showed no carbenemase activity. *Klebsiella pneumoniae* (n = 25 of 37, 67.56%) was the most common CRE isolated

followed by *Escherichia coli* (n = 11 of 37, 29.72%) and 1 isolate of *Enterobacter spp* (n = 1 of 37, 0.02%). Of 37 patients, 33 (89.18%) developed CRE infection during their hospital stay. Pneumonia was the most common infection developed (36.36%), followed by surgical site infection (21.21%) and urinary tract infection (12.12%). Only 1 patient developed a bloodstream infection. However, 9 patients (27.27%) developed multiple-site infections. Of 37 CRE-colonized patients, 10 (27.02%) died during their hospital stay. **Conclusions:** Our study highlights the increased risk of CRE infection and mortality in patients with CRE colonization in ICU patients. Hence, CRE perirectal screening for detection of asymptomatic carriers should be conducted, and strict infection control measures, such as isolation and cohorting with barrier nursing of such patients, should be done to prevent further spread of CREs in hospital settings.

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Medical Tape Contamination Study: Effect of Packaging on the Reduction of Cross Contamination

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Background: Medical tape is used routinely for a variety of tasks across healthcare settings. The literature contains numerous publications in which common practices around medical tapes have been suspected to lead to infection transmission. Healthcare providers can turn to individually packaged single-patient-use medical tape rolls to help reduce cross-contamination risk by limiting exposure to environmental contaminants, minimizing contact with hospital surfaces and equipment, and minimizing exposure to healthcare workers' hands and other patients. **Methods:** We evaluated the effect of individually packaged tape on cross contamination using a controlled laboratory assay. Ceramic tiles were inoculated with microorganisms evenly spread across the surface and allowed to air dry. Using gloves, packaged and unpackaged tapes were rolled over their entire outside circumference onto the contaminated tiles to simulate cross contamination. Using new gloves, the packaged tapes were then removed from their package with minimum contact. All cross-contaminated tape rolls were placed in phosphate-buffered water and mixed in a vortexer for bacterial recovery procedures. Serial dilutions were plated on appropriate media for bacterial enumeration. The average log₁₀ colony-forming unit (CFU) recovery was measured for comparison. We used 4 types of tapes in this study (3M Micropore S Surgical Tape, 3M Medipore H Soft Cloth Surgical Tape, 3M Durapore Surgical Tape, and 3M Transpore White Surgical Tape). We used 4 different microorganisms as inoculates: *Staphylococcus aureus* (methicillin-resistant), *Enterococcus faecium* (vancomycin-resistant), *Klebsiella pneumoniae*

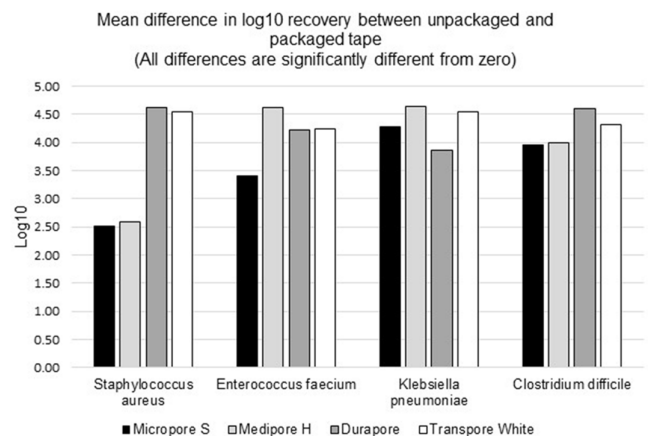


Figure 1.