members were trained, and 380 batches of quality-assured ABHR (17,820 L) were produced and distributed to 278 health facilities. Consumption of ABHR in the first distribution was used to benchmark predicted ABHR consumption per targeted facility in subsequent months. Increased demand for ABHR due to the COVID-19 pandemic and the Ebola virus disease outbreak in central Uganda (September 2022) was addressed through emergency requests on a case-by-case basis. ABHR local production costs $3 per liter for materials, less than half of commercial ABHR ($8 per liter). **Conclusions:** Early results suggest that this approach is potentially sustainable but requires national advocacy as well. Leveraging existing distribution systems while building local capacity for ABHR production and distribution may improve longevity of such innovations in similar resource-limited settings.

Disclosure: None

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Presentation Type:
Poster Presentation - Top Poster Award
Subject Category: Infection Control in Low- and Middle-Income Countries

Assessment of ventilation in low-resource healthcare settings: Montserrado County, Liberia—2022–2023

Krithika Srinivasan; Ronan Arthur; Ashley Styczynski; Ethan Bell; Thomas Baer and Jorge Salinas

Background: Mitigating the risk of nosocomial respiratory disease transmission in the healthcare facilities of low- and middle–income countries (LMICs) poses unique challenges because mechanical ventilation and mixed–mode strategies are often unavailable. Carbon dioxide (CO_2) can serve as a proxy for ventilation and, hence, airborne infectious disease transmission risk in naturally ventilated spaces. We assessed the adequacy of ventilation in Liberian hospitals. **Methods:** We sampled 3 hospitals, both urban and rural, in Montserrado County, Liberia. Moreover, 3 CO_2 meters were concurrently utilized to measure CO_2 levels at a 1-meter height in every patient-care room in each facility. We recorded temperature, humidity, room dimensions, and number of people in the rooms. From these variables, we calculated absolute ventilation using the ASHRAE equation to determine areas with the highest risk of nosocomial respiratory disease transmission. We also recorded qualitative observations about the sampled spaces. **Results:** From August 2022 to February 2023, 39 rooms in 3 healthcare facilities were sampled. Initial quantitative findings show that only 8 rooms (21%) met the WHO-recommended ventilation rate of 60 L per second per person. The average ventilation rate per person in the adequately ventilated settings was 86 L per second per patient, compared to 19 liters per second per patient in inadequately ventilated rooms. Additionally, 467 ppm mean CO_2 was noted in well-ventilated rooms compared to 895 ppm mean CO_2 in inadequately ventilated rooms.
Initial qualitative observations showed that facilities with lower CO_2 readings tended to be older constructions that likely had been constructed with airborne disease such as tuberculosis in mind. Willingness to open windows was limited by lack of window screens for malaria prevention, and there was a pervasive fallacy that air conditioning was a source of ventilation. Correspondingly, of the 31 inadequately ventilated rooms, 22 (71%) had operating air conditioning units compared with 4 (50%) of the 8 adequately ventilated rooms. Overall, of the 13 rooms without air conditioning, 7 (54%) were more frequently characterized by open windows compared to only 5 of 26 (28%) of rooms that did have air conditioners. **Conclusions:** Being prepared for the next respiratory disease outbreak and creating more resilient healthcare systems in LMICs requires a frameshift of prevention strategies. Measuring CO_2 provides a simple strategy for identifying areas at highest risk for nosocomial respiratory disease transmission, which can be prioritized for low-cost environmental interventions, such as provision of window screens, as part of routine infection prevention and control efforts.

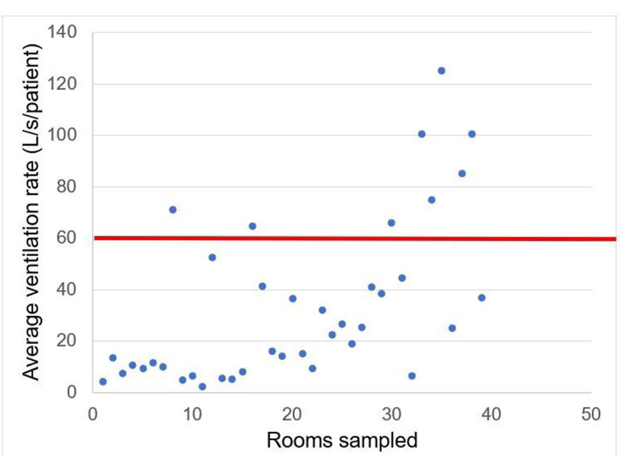

Figure 1: Average Ventilation Rate per Person in Liberian Healthcare Facilities. The red line represents the World Health Organization recommended ventilation rate of 60L/s/patient. Out of 39 rooms measured, only eight (21%), noted above the red line, met the WHO recommended ventilation rate of 60L/s/patient.

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Presentation Type:
Poster Presentation - Top Poster Award
Subject Category: MDR GNR

Carbapenemase genes and mortality in patients with carbapenem-resistant Enterobacterales, Atlanta, Georgia, 2011–2020

Lucy Witt; Ahmed Babike; Gillian Smith; Sarah Satola; Mary Elizabeth Sexton and Jesse Jacob

Background: Carbapenemase genes in carbapenem-resistant Enterobacterales (CP-CRE) may be transmitted between patients and bacteria. Reported rates of carbapenemase genes vary widely, and it is unclear whether having a carbapenemase gene portends worse outcomes given that all patients with CRE infections have limited treatment options. **Methods:** Using active population- and laboratory-based active surveillance data collected by the US CDC-funded Georgia Emerging Infections Program from 2011 to 2020, we assessed the frequency of carbapenemase genes in a convenience sample of CRE isolates using whole-genome sequencing (WGS), and we investigated risk factors for carbapenemase positivity. Only the first isolate per patient in a 30-day period was included. We compared characteristics of patients with CP-CRE and non–CP-CRE. Using multivariable log binomial regression, we assessed the association of carbapenemase gene positivity and 90-day mortality. **Results:** Of 284 CRE isolates, 171 isolates (60.2%) possessed a carbapenemase gene (Table 1), and KPC-3 was the most common carbapenemase gene (80.7%), with only 7 isolates possessing NDM (Table 2). No isolates possessed >1 carbapenemase gene, and most isolates were from urine (82.4%) (Table 1). Carbapenemase gene positivity was associated with lower age, male sex, black race, infection with *Klebsiella pneumoniae*, polymicrobial infection, having an indwelling medical device, receiving chronic dialysis, and prior stay in a long-term acute-care hospital, long-term care facility, and/or prior hospitalization in the last year. The 90-day mortality rates were similar in patients with non–CP-CRE and CP-CRE: 24.8% versus 25.7% ($P = .86$). In multivariable analysis, carbapenemase gene presence was not associated with 90-day mortality (adjusted risk ratio, 0.82; 95% CI, 0.50–1.35) when adjusting for CCI, infection with *Klebsiella pneumoniae*, and chronic dialysis use. **Conclusions:** The frequency of CP-CRE among CRE was high in this study, but unlike prior studies, the 90-day mortality rates wer similar in patients with CP-CRE compared to non–CP-CRE. Our results provide

Table 1. Basic Demographics by those with and without carbapenmase

	Total n= 284	Carbapenemase (CP) n= 171 (60.2%)	No Carbapenemase (non-CP) n= 113 (39.8%)
Age, median (IQR)	68 (56-77)	67 (52-74)	70 (60-80)
Female, n (%)	172 (60.6%)	92 (53.8%)	80 (70.8%)
Race, n (%)			
Black	145 (51.1%)	105 (61.4%)	40 (35.4%)
White	112 (39.4%)	50 (29.2%	62 (54.9%)
Asian or Pacific Islander	10 (3.5%)	4 (3.5%)	6 (3.5%)
Ethnicity, n (%)			
Hispanic	5 (1.8%)	2 (1.2%)	3 (2.7%)
Non-Hispanic	230 (81.9%)	137 (80.1%)	93 (82.3%)
Charlson Comorbidity Index Score, median (IQR)	2 (1-4)	2 (1-4)	2 (1-3)
Hospitalized n (%)	183 (64.9%)	114 (67.5%)	69 (61.1%)
Length of Stay, median (IQR)	11 (5-24)	11 (6-24)	10 (5-26)
Intensive Care Unit Admission Prior to culture, n (%)	32 (11.7%)	18 (10.4%)	14 (13.0%)
Immunocompromised, n (%)	49 (17.3%)	23 (13.5%)	26 (23.0%)
HIV or AIDS, n (%)	6 (2.1%)	6 (3.5%)	0
Transplant (solid organ), n (%)	2 (0.7%)	0	2 (1.8%)
Solid Tumor, n (%)	26 (9.2%)	12 (7.0%)	14 (12.4%)
Metastatic Cancer, n (%)	12 (4.2%)	6 (2.1%)	6 (5.3%)
Hematologic Malignancy, n (%)	6 (2.1%)	4 (2.4%)	2 (1.8%)
Cirrhosis	2 (0.7%)	0	2 (1.8%)
Specimen Source, n (%)			
Blood	40 (14.1%)	25 (14.6%)	15 (13.3%)
Urine	234 (82.4%)	143 (83.6%)	91 (80.5%)
Peritoneal fluid	5 (1.8%)	2 (1.1%)	3 (2.7%)
Other	5 (1.8%)	1 (0.6%)	4 (3.5%)
Organism, n (%)			
Escherichia coli	47 (16.6%)	17 (10.0%)	30 (26.6%)
Enterobacter cloacae	50 (17.7%)	8 (4.7%)	42 (37.2%)
Klebsiella aerogenes	13 (3.6 %)	1 (0.6%)	12 (10.6%)
Klebsiella pneumoniae	172 (60.8%)	144 (84.7%)	28 (24.8%)
Klebsiella oxytoca	1 (0.4%)	0	1 (0.9%)
Polymicrobial Infection, n (%)	84 (29.8%)	61 (35.7%)	23 (20.7%)
History, n (%)			
Previous stay in hospital (1 year)	215(75.7%)	142 (83.0%)	73 (64.6%)
Previous stay in long term care facility (1 year)	143 (50.4%)	106 (62.0%)	37 (32.7%)
Previous stay in long term acute care (1 year)	39 (13.7%)	36 (21.1%)	3 (2.7%)
Surgery	85 (29.9%)	47 (27.5%)	38 (33.6%)
Chronic Dialysis	30 (10.6%)	24 (14.0%)	6 (5.3%)
Previously Isolated same organism (1 year)	29 (10.4%)	27 (16.0%)	2 (1.8%)
Indwelling Devices, n (%)			
Any	200 (70.4%)	139 (81.3%)	61 (54.0%)
Central line	91 (72.8%)	69 (49.6%)	32 (51.6%)
Urinary Catheter	148 (84.1%)	112 (80.6%)	36 (58.1%)
Both Trach and PEG	45 (15.9%)	42 (28.1%)	6 (9.8%)
Positive for CP by CDC on WGS (out of 228 tested)	177		
Postive for CP on Bactopia (out of 96 tested)	23		
Postive by either WGS n(%)	200 (61.9%)		
90-day Mortality	72 (25.4%)	44 (25.7%)	28 (24.8%)
In-hospital Mortality	19 (6.7%)	12 (7.0%)	7 (6.2%)

Missing values: Race - 17, Ethnicity - 49, Charlson Comorbidity Index - 6, Hospitalized - 2, Polymicrobial - 2, Organism source - 9, Organism type - 1, Intensive care unit prior -10, Hospital mortality 6, Previously isolated organism- 6

Abbreviations: IQR – Interquartile Range, PEG – Percutaneous Endoscopic Gastrostomy

Species	CP-CRE (%)	Carbapenemase genes (n)
Klebsiella pneumoniae	143 (83.1%)	KPC-2 (18), KPC-3 (119), KPC-38 (1), NDM-1 (1), NDM-4 (1), NDM-5 (2), NDM-9 (1)
Escherichia coli	17 (36.2%)	KPC-2 (1), KPC-3 (13), KPC-4 (1), NDM-5 (2)
Enterobacter cloacae	8 (16.0%)	KPC-3 (4), KPC-4 (3), IMP-13 (1)
Klebsiella aerogenes	1 (7.7%)	KPC-3 (1)

novel associations (eg, lower age, male sex, infection with *Klebsiella pneumoniae*, and indwelling medical devices) that infection preventionists could use to target high-risk patients for screening or isolation prior to CP-CRE detection.

Disclosure: None

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Poster Presentation - Top Poster Award
Subject Category: MRSA/VRE

Impact of discontinuation of contact precautions on surveillance- and whole-genome sequencing-defined MRSA infections

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Background: Current guidelines recommend contact precautions to prevent transmission of methicillin-resistant *Staphylococcus aureus* (MRSA) in acute-care hospitals. Prior literature demonstrates that discontinuation of contact precautions for MRSA has not been associated with an increase in carriage rates including surveillance-defined healthcare-associated infection (HAI) while horizontal infection prevention strategies are implemented. **Objective:** To analyze the impact of discontinuation of contact precautions on the rate of MRSA infections, including surveillance-defined HAI and transmission events identified through whole-genome sequencing (WGS) surveillance. **Methods:** In this single tertiary-care center, retrospective, observational, quality improvement analysis, we measured 2 MRSA HAI outcomes before and after discontinuation of contact precautions (ie, gown and gloves no longer required for care of patients with prior or current MRSA infections or colonization, effective December 2, 2020). First, we conducted a time-series analysis using linear regression modelling of NHSN reported MRSA HAI rates (January 2019–November 2022). We also calculated the frequency of WGS-confirmed MRSA transmission events before in the discontinuation of contact precautions (January 2019–August 2019) and after the discontinuation of contact precautions (January 2022–November 2022) periods. Surveillance HAI events were determined using NHSN definitions; MRSA transmission events were defined as an isolate identified ≥3 days after hospitalization or within 30 days of a healthcare exposure, genetically related by ≤15 single-nucleotide polymorphisms compared to ≥1 previously sequenced MRSA isolate. **Results:** We identified 171 MRSA HAIs in the 23 months before discontinuation of contact precautions, corresponding to 4.24 HAI per 10,000 patient days, and 129 HAIs in the 24 months after discontinuation of contact precautions, corresponding to 3.01 HAI per 10,000 patient days (Fig.). We detected a nonsignificant change in the trend in HAI rate before and after discontinuation of contact precautions ($P = .22$) as well as a significant immediate decrease in the MRSA HAI rate ($P < 0\ .001$) at the time of discontinuation of contact precautions. In the WGS analysis 8 months before discontinuation of contact precautions, 11 MRSA transmission events were confirmed, comprising 4 clusters (0.75 per 10,000 patient days). In the WGS for the 11-month analysis period after discontinuation of contact precautions, there were 23 confirmed MRSA transmission events comprising 10 clusters (1.22 per 10,000 patient days; incidence rate ratio, 1.61; 95% CI, 0.75–3.66; $P = .19$). **Conclusions:** After discontinuation of contact precautions, there was no significant increase in MRSA HAI or transmission events. Further evaluation of the individual WGS

Figure: Methicillin-resistatant *Staphylococcus aureus* healthcare-associated infections before and after discontinuation of contact precautions