(RR, 0.79; 95% CI, 0.67–0.95 per 10%) were protective of lower ESBL-Ec incidence. After accounting for multiple demographic factors, the residual, structured, random-effects model indicated that hot spots were still detected in more remote communities but also in several city regions. **Conclusions:** The change in distribution of ESBL-Ec across Queensland suggests the presence of area-level specific risk factors that enhance spread in the community. Risk factors for spread appear different between remote and city settings, and future research should be tailored to understand the respective area-level risk factors. Factors such as local temperature, antibiotic consumption, and access to services should be validated. Future public health measures to reduce transmission should be focused on the identified hot spots.

The impact of COVID-19 on the incidence of carbapenem-resistant Enterobacterales (CRE) in Singapore: An interrupted time-series analysis

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Objectives: Over the past 2 years, many infection prevention and control (IPC) resources have been diverted to manage the COVID-19 pandemic. Its impact on the incidence of antimicrobial-resistant organisms has not been adequately studied. We investigated the impact of the pandemic on the incidence of carbapenem-resistant Enterobacterales (CRE) in Singapore. **Methods:** We extracted data on unique CRE isolates (clinical and/or surveillance cultures) and patient days for 6 public hospitals in Singapore from the carbapenemase-producing Enterobacteriaceae (CaPES) study group database, and we calculated the monthly incidence of CRE (per 10,000 patient days). Interrupted time-series (ITS) analysis was conducted with the pre–COVID-19 period defined as before February 2020, and the COVID-19 period defined as after February 2020. Statistical analyses were performed using Stata version 15 software. **Results:** From January 2017 to March 2021, 6,770 CRE isolates and 9,126,704 patient days were documented. The trend in CRE monthly incidence increased significantly during the pre–COVID-19 period (0.060; 95% CI, 0.033–0.094; $P < .001$) but decreased during the COVID-19 period (−0.183; 95% CI, −0.390 to 0.023; $P = .080$) without stepwise change in the incidence (−1.496; 95% CI, −3.477 to 0.485; $P = .135$). The trend in monthly incidence rate of CRE clinical cultures increased significantly during the pre–COVID-19 period (0.046; 95% CI, 0.028–0.064; $P < .001$) and decreased significantly during COVID-19 period (−0.148; 95% CI, −0.249 to −0.048; $P = .048$) with no stepwise change in the incidence (−0.063; 95% CI, −0.803 to 0.677; $P = .864$). The trend in monthly incidence rate of CRE surveillance cultures decreased during the pre–COVID-19 period (−0.020; 95% CI, −0.062 to 0.022; $P = .341$) and the COVID-19 period (−0.067; 95% CI, −0.291 to 0.158; $P = .552$) without stepwise change in the incidence (−1.327; 95% CI, −3.535 to 0.881; $P = .233$). **Conclusions:** The rate of CRE in clinical cultures decreased during COVID-19 but not the rate in surveillance cultures. Further studies are warranted to study the impact of COVID-19 on CREs.
(DUPLICATE DELETED)

The attributable mortality and excess length of stay associated with third-generation cephalosporin-resistant Enterobacterales bloodstream infections—A prospective cohort study in Suva, Fiji

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Objectives: Although antimicrobial resistance (AMR) disproportionately affects low- and middle-income countries (LMICs), primary clinical data on AMR burden from LMICs are lacking, particularly from the Pacific Islands. We adapted recent World Health Organization methodology to measure the impact of third-generation cephalosporin (3GC) resistance on mortality and excess length of hospital stay among inpatients with Enterobacterales bloodstream infection (BSI) in Fiji. **Methods:** We conducted a prospective cohort study of inpatients with Enterobacterales BSIs at Colonial War Memorial Hospital in Suva. We collected demographic, clinical, and microbiological data, and we stored bacterial isolates for confirmatory testing and molecular genomics in Melbourne, Australia. We employed cause-specific Cox proportional hazards models to estimate the effect of 3GC-resistance on hazard of in-hospital mortality and discharge alive (competing outcomes), and we used multistate modelling to estimate the excess length of hospital stay associated with 3GCR. **Results:** From July 2020 to February 2021, we identified 162 consecutive Enterobacterales BSIs, and 66 (40.7%) were 3GC resistant. The crude mortality rates for patients with 3GC-susecptible and 3GC-resistant BSIs were 16.7% (16 of 96) and 30.3% (20 of 66), respectively. Also, 3GC resistance was not associated with either in-hospital mortality (aHR, 1.67; 95% CI, 0.80–3.49) or discharge alive (aHR, 0.75; 95% CI, 0.50–1.12). However, patient comorbidities and acuity of illness were associated with in-hospital mortality. Furthermore, 3GC-resistance was associated with an increased length of stay of 2.6 days (95% CI, 2.5–2.8). Overall, 3GC-resistance was more common among patients with hospital-associated than community-acquired infection, but genomics did not identify clonal transmission. **Conclusions:** Among patients with Enterobacterales BSIs, mortality was relatively high, and 3GC resistance was common. Also, 3GC resistance was associated with increased hospital length of stay but not with in-hospital mortality after adjusting for potential confounders. Accurate estimates of the burden of AMR are important, especially from LMICs. Such knowledge can inform policy decisions, guide allocation of limited resources, and assist the evaluation of future interventions to address AMR.

Implementing infection prevention bundle significantly reduced multi-drug-resistant organisms infection and healthcare-associated infections in intensive care unit at a national hospital in Vietnam

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Objectives: In Vietnam, the burden of healthcare-associated infections (HAIs), especially by multidrug-resistant organisms (MDROs), can be greater at national hospitals where a high number of severe patients from lower-tier hospitals are received for treatment. To reduce MDRO and HAI incidences at the tropical diseases intensive care unit (ICU) of Cho Ray Hospital, the final line of treatment for 20 southern provinces of Vietnam, a comprehensive infection prevention bundle was developed and implemented in 2019. In this retrospective study, we evaluated the effectiveness of this intervention in preventing MDRO infections and HAIs among patients at risk. **Methods:** The infection prevention bundle included elements to improve administration controls, environmental controls, and personal protective equipment usage. The bundle was implemented via training and active monitoring. Medical data, such as microbiology results, length of hospital stay, treatment cost of all patients admitted to the targeted ICU, and data on adherence to the bundle elements, were collected via routine monitoring from July to December 2019. These data were reviewed and analyzed. An independent 2-sample *t* test was used to calculate the significance of the differences in MDRO and HAI rates before and after the intervention. **Results:** The mean number of MDRO infections decreased significantly after implementation of the infection prevention bundle (7.0 vs 3.3; *P* = .011). HAI and ventilator-associated pneumonia (VAP) rates also decreased significantly (5.9 vs 3.7; *P*= .013 and 20.4 vs 13.7; *P*=0.047, respectively). The mean total treatment cost per patient was reduced by 1.8 million VND (US $76.76). Bundle-element adherence was high throughout the intervention period, ranging from 72.7% (putting MDRO sign on beds) to 100% (hand hygiene, cohort patients, environment cleaning). **Conclusions:** Implementation of an appropriate infection prevention bundle with a high adherence rate by healthcare workers helped to effectively reduce MDRO infection and HAI rates in the tropical diseases ICU.

Subject Category: Multidrug-Resistant (MDR) Organisms
Abstract Number: SG-APSIC1209
Risk factors associated with mortality among carbapenem-resistant Enterobacteriaceae inpatient in a tertiary-care teaching hospital in Malaysia
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Objectives: Carbapenem-resistant Enterobacteriaceae (CRE) is a multidrug-resistant gram-negative bacteria (MDR-GNB) that is rapidly emerging as a life-threatening nosocomial disease in many countries. We sought to identify the risk factors associated with mortality for carriage of CRE in patients at a tertiary-care teaching hospital. **Methods:** A retrospective observational study was conducted between January 2020 to December 2021 in a tertiary-care teaching healthcare facility, University Malaya Medical Centre in Malaysia. The study included all inpatients aged ≥18 years who

had a CRE infection or were colonized during the study period. The genotype was identified by polymerase chain reaction (PCR). Statistical analysis of data including a multivariate logistic regression analysis was conducted using SPSS version 23.0 software. **Results:** In total, 176 cases of CRE (130 infection and 46 colonized) were identified, and the mortality rate was 31.8%. The main sources of CRE were rectal swab (61.9%), blood (11.9%), and respiratory sources (11.9%). *Klebsiella pneumoniae* (55.7%) was the predominant species, followed by *Escherichia coli* (21.6%). Among the isolates, 17.7% were non–CPE-CRE and 82.3% were CPE-CRE: NDM (69.3%) and OXA (10.8%). In multivariate analysis, the factors associated with mortality were older age (OR, 1.040; 95% CI, 1.012–1.069), longer length of stay (OR, 0.974; 95% CI, 0.955–0.994), use of central venous catheter (OR, 0.287; 95% CI, 0.094–0.878), and arterial lines (OR, 0.292; 95% CI, 0.095–0.891). **Conclusion:** Patients with CRE had a high mortality rate. Older age, longer duration of stay, indwelling CVC and arterial line were independent risk factors for death. Infection prevention and control measures to reduce CRE, such as active surveillance, contact precautions, compliance to intravenous catheter care bundles, healthcare worker education, and hand hygiene adherence, should be implemented.

Subject Category: Multidrug-Resistant (MDR) Organisms
Abstract Number: SG-APSIC1203
Detection of carbapenemase genes in donor lungs at the point of care before transplantation reduces the risk of carbapenem-resistant Enterobacteriaceae–associated donor-derived infection in lung-transplant recipients
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Objectives: The number of lung transplants is increasing year by year in China and globally. With the widespread use of donation after brainstem death (DBD) donor lungs and donation after circulatory death (DCD) donor lungs, donor-derived infection (DDI) poses a major challenge in lung transplantation. Using donor lungs infected or colonized with carbapenem-resistant Enterobacteriaceae (CRE) may have serious implications in lung-transplant recipients. Currently, traditional microbial culture along with antimicrobial susceptibility testing cannot fully meet the need for rapid and accurate diagnosis of CRE infection in a donor before organ harvest. **Methods:** The Xpert Carba-R device (Cepheid, Sunnyvale, CA) was used to detect and differentiate *Klebsiella pneumoniae* carbapenemase (KPC), New Delhi metallo-β-lactamase (NDM), Verona integron-encoded metallo-β-lactamase (VIM), active-on-imipenem (IMP), and OXA-48 carbapenemase genotypes in bronchial lavage fluid from donor lungs before organ harvest. Positive detection of 1 or more of these genotypes indicated a potentially CRE-infected donor lung, and these organs were removed from the lung transplantation cohort. Donor lungs negative for all KPC, NDM, VIM, IMP, and OXA-48 genotypes determined by the Xpert Carba-R device were used for lung transplantation. The incidence of CRE-associated DDI and infection-related complications were compared in the Xpert Carba-R screening group and an historic control group. **Results:** In this study, 21 donor lungs were tested with the Xpert Carba-R device to detect and differentiate carbapenemase genotypes. Among them, 4 were positive for 1 or more carbapenemase genotypes and were discarded, and the remaining 17 donor lungs showing no carbapenemase gene presence were used for lung transplantation. No CRE-associated DDI occurred in these 17 lung-transplant recipients. **Conclusions:** Rapid and accurate detection of the carbapenemase gene in donor lungs at the point of care before transplantation using the Xpert Carba-R device reduced the risk of CRE-associated DDI in lung-transplant recipients.