Presentation Type:
Poster Presentation - Poster Presentation
Subject Category: Surveillance
Carbapenemase-Producing Enterobacteriaceae detected in a Large Canadian Tertiary Care Hospital: Five-year retrospective study
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Background: The prevalence of carbapenemase-producing Enterobacteriaceae (CPE) is increasing worldwide. In Canada, where rates of healthcare-associated (HA) transmission of CPE remains relatively low, there is a need to share early experience of universal screening programs and risk factors for HA acquisition. **Method:** In 2018, universal screening was introduced throughout our large Canadian tertiary care hospital across, all critical care and oncology units. Additionally, risk-factor based screening was applied in all other inpatient units, with further targeted screening of roommate exposures or all inpatients on unit following identification of a single HA case. A retrospective cohort study was carried out on CPE cases detected between January 2018 and December 2023. We assessed the proportion of HA CPE cases, defined as CPE identified in patients with prior admission to our facility or after >72 hours after admission. HA cases were examined for relevant risk factors, including known roommate with CPE, the presence of other CPE on the unit, exposure to outbreak units, prior travel history, travel by a family member, and antibiotic exposure within the past 90 days. **Result:** A total of 150 CPE cases were identified, with 66 (44%) classified as HA. Among these HA cases, 14 (21%) were associated with presence of known case on the unit. The remaining 52 (79%) represented sporadic nosocomial cases without a known exposure or further transmission on the unit. Upon further retrospective review, 6 (9.2%) HA cases had documented travel history or exposure to a family member with recent travel to China, India, Sri Lanka, or the United States within the past year. Nearly all HA cases (62, 95.4%) had antibiotic exposure within 90 days of CPE detection; specifically, 47 (72.3%) received beta-lactams, 42 (64.6%) cephalosporin, 25 (38.5%) glycopeptide, 20 (30.8%) carbapenem, and 8 (12.3%) macrolide. **Conclusion:** HA CPE acquisition identified during the first 5-years of universal screening were mostly sporadic and not associated with known exposures or other risk factors. Receipt of prior antibiotics was present in nearly all cases.

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Subject Category: Surveillance
From Swiffers to Solutions: The Impact of Environmental Sampling in the Veterinary Medical Center at OSU
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Background: In 2018, the Ohio State University College of Veterinary Medicine (OSU CVM) implemented an Antimicrobial Stewardship Program, central to which was the integration of an environmental surveillance (ES) program. The ES focuses on pathogens recognized as urgent threats to public health by the Centers for Disease Control and Prevention. The pathogens currently targeted include carbapenemase-producing Enterobacterales (CPE), Salmonella spp., methicillin-resistant Staphylococcus spp. (MRSs), vancomycin resistant Enterococcus spp., and enrofloxacin resistant Pseudomonas aeruginosa. Identification of these pathogens allows the hospital to be aware of the local environmental microflora which can act as a sentinel for disease in the hospital, potentially causing healthcare associated infections. Therefore, the objective of this program is to identify resistant bacterial pathogens, characterize their resistance profiles, analyze prevalence patterns, and initiate infection control interventions where needed in the OSU VMC. **Method:** From January 2018 through December 2023, a total of 5449 samples were collected from approximately 86 locations across the OSU VMC encompassing the small animal, equine, and farm animal sections. A majority (64%, n=3561) of samples were collected from the small animal hospital, with the farm animal section contributing 1055 samples and the equine section 899. Areas sampled were frequented by both humans and animals, as well as surfaces exclusively touched by humans. Samples were collected using Swiffers® and processed through selective culture media. **Result:** Approximately half (52%, n=2890) of the samples collected represented human-touch only surfaces. A total of 3794 bacterial isolates were recovered, with an overall low prevalence for all targeted pathogens. Prevalence of CPE was 2% (n=103), with Enterobacter species being the most common. Recovery of MRSs was 8.5% (n=464) and Salmonella species was 1% (n=47). **Conclusion:** Through this initiative, the equine division of the OSU VMC collaborated with the antimicrobial stewardship team to enhance their Salmonella fecal and ES practices. In 2019, ES was critical in identifying persistent CPE and extended-spectrum cephalosporin-resistant Enterobacteriaceae in the ICU and surrounding areas of the small animal hospital. Effective measures were taken to halt the spread of ESC among patients and eliminate CPE in the environment. With the discovery of a new CPE in early 2023 in the small animal ICU and nearby areas, the program initiated targeted ES and cleaning and disinfection protocols, to identify contaminated areas and control disease transmission. These efforts have increased patient safety, health, and well-being, demonstrating how ES can be an important tool for infection control and prevention in veterinary settings.

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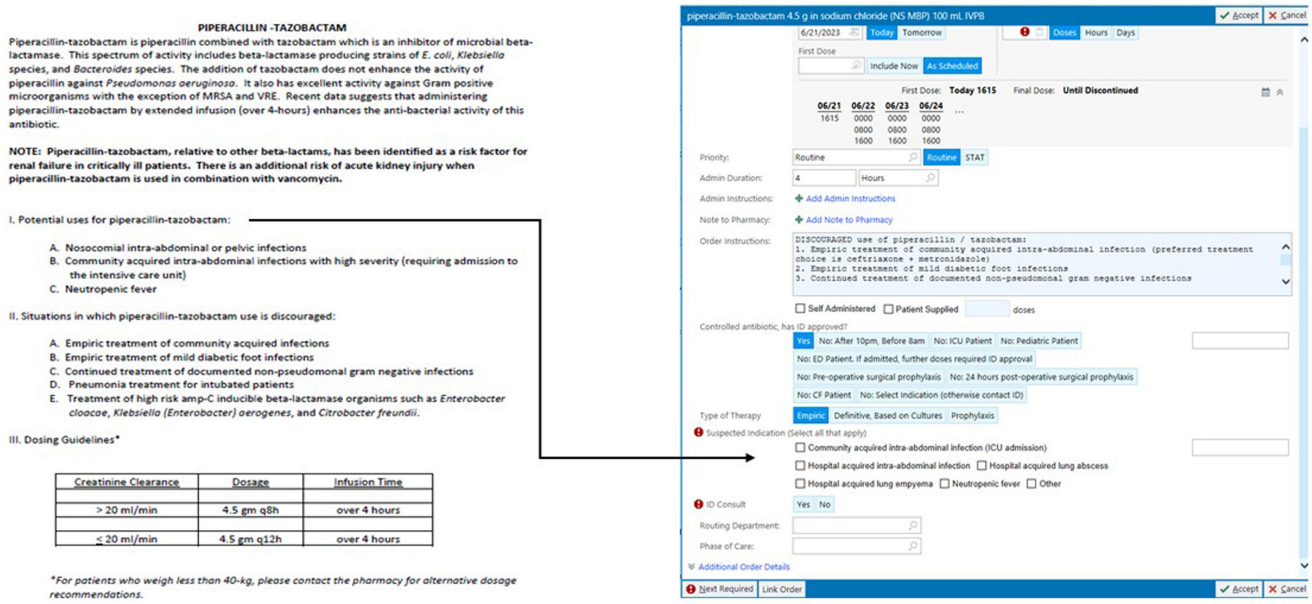
Subject Category: Technology
An "Epic" Journey to Improve Antimicrobial Stewardship
Lindsay Smith, University of Vermont; John Ahern, University of Vermont Medical Center; Lisa Lapin, The University of Vermont Health Network and Thyleen Tenney, The University of Vermont Health Network

Background: Antimicrobial stewardship programs rely heavily on the electronic medical record (EMR) to carry out daily activities, make interventions, optimize patient care, and collect data. In 2019 the University of Vermont Medical Center transitioned from using a third party platform to the Epic (Verona, WI, www.epic.com) Bugsy module for antimicrobial stewardship. **Method:** We have spent the past 4 years optimizing the Epic foundation to match our institutional antimicrobial prescribing guidelines, susceptibility patterns, and build reports to extract actionable data. **Result:** During the build process, we readily identified three areas needed for customization: (1) Empiric, definitive, and prophylactic indications of use for all antimicrobials based on our hospital's internally published books "Guide to Antimicrobial Therapy for Adults" and "Guide to Antimicrobial Therapy for Pediatrics" (figure 1); (2) An on-demand report to capture all patients with new administrations of antimicrobials in the preceding 72 hours, that includes

Figure 1: Customized antimicrobial order entry matching UVMMC's internal antimicrobial prescribing guide



PIPERACILLIN -TAZOBACTAM

Piperacillin-tazobactam is piperacillin combined with tazobactam which is an inhibitor of microbial beta-lactamase. This spectrum of activity includes beta-lactamase producing strains of *E. coli, Klebsiella* species, and *Bacteroides* species. The addition of tazobactam does not enhance the activity of piperacillin against *Pseudomonas aeruginosa*. It also has excellent activity against Gram positive microorganisms with the exception of MRSA and VRE. Recent data suggests that administering piperacillin-tazobactam by extended infusion (over 4-hours) enhances the anti-bacterial activity of this antibiotic.

NOTE: Piperacillin-tazobactam, relative to other beta-lactams, has been identified as a risk factor for renal failure in critically ill patients. There is an additional risk of acute kidney injury when piperacillin-tazobactam is used in combination with vancomycin.

I. Potential uses for piperacillin-tazobactam:

A. Nosocomial intra-abdominal or pelvic infections
B. Community acquired intra-abdominal infections with high severity (requiring admission to the intensive care unit)
C. Neutropenic fever

II. Situations in which piperacillin-tazobactam use is discouraged:

A. Empiric treatment of community acquired infections
B. Empiric treatment of mild diabetic foot infections
C. Continued treatment of documented non-pseudomonal gram negative infections
D. Pneumonia treatment for intubated patients
E. Treatment of high risk amp-C inducible beta-lactamase organisms such as *Enterobacter cloocae, Klebsiella (Enterobacter) aerogenes*, and *Citrobacter freundii*.

III. Dosing Guidelines*

Creatinine Clearance	Dosage	Infusion Time
> 20 ml/min	4.5 gm q8h	over 4 hours
≤ 20 ml/min	4.5 gm q12h	over 4 hours

**For patients who weigh less than 40-kg, please contact the pharmacy for alternative dosage recommendations.*

Figure 2: A unique on-demand report for all hospitalized patients receiving at least one dose of an antimicrobial agent in the past 72 hours

Patient	MRN	Administration Times	Dept/Room/Bed	Age	Attending	Order Name	Order Dt/Tm	Frequency	End Date	Order Question	Question Response
		06/21/2023 1602	UVMMC MCCLURE 6 GEN MED/TELE / M628 / M628-02	68 y.o		cefepime (MAXIPIME) 2,000 mg in sodium chloride (NS MBP) 50 mL IVPB	06/21/23 12:28	EVE... 12 HOURS	06/28/2023	FA RX CONTROLLED ABX [100537] HN RX AMS CEFEPIME MAIN IOU [106504] HN RX AMS CEFEPIME EMPIRIC IOU [106505] HN RX AMS ID CONSULT [106036] HN RX AMS ID CONSULT TYPE [105535] HN RX AMS ID CONSULT PROVIDER [104828]	Yes Empiric Concern for Pseudomonas pneumonia – CAP Yes Formal ID Consult
		06/21/2023 1558	UVMMC ED / GT34 / GT34	77 y.o		sulfamethoxazole-trimethoprim (BACTRIM/CO-TRIMOXAZOLE DS) 800-160 mg per tablet 1 Tablet	06/21/23 15:41	NOW X1	06/21/2023	HN RX AMS TMP/SMX PO MAIN IOU [107365] HN RX AMS TMP/SMX PO EMPIRIC IOU [107367] HN RX AMS ID CONSULT [106036]	Empiric UTI No
		06/21/2023 1557	UVMMC ED / WA04 / WA04	30 y.o		amoxicillin-clavulanate (AUGMENTIN) 875-125 mg per tablet 1 Tablet	06/21/23 15:22	NOW X1	06/21/2023	HN RX AMS AMOXICILLIN-CLAVULANATE MAIN IOU [110079] HN RX AMS AMOXICILLIN-CLAVULANATE EMPIRIC IOU [110080] HN RX AMS ID CONSULT [106036]	Empiric Bite wound No

ordering clinician, stop date of therapy, and indication (figure 2); and (3) A unique, custom-built slicer-dicer report to capture high-level data on how each antimicrobial is being prescribed by indication, dose, route of administration, ordering clinician, attending physician, and department (figure 3). **Conclusion:** We have built a system where we can readily identify patients that are receiving antimicrobials both within and outside of institutional guidelines and know the ordering clinician to contact to provide in-the-moment feedback. We can also collect retrospective data to know which antimicrobial agents were prescribed for all infectious syndromes. These three institutional customizations have provided invaluable information to improve patient care.

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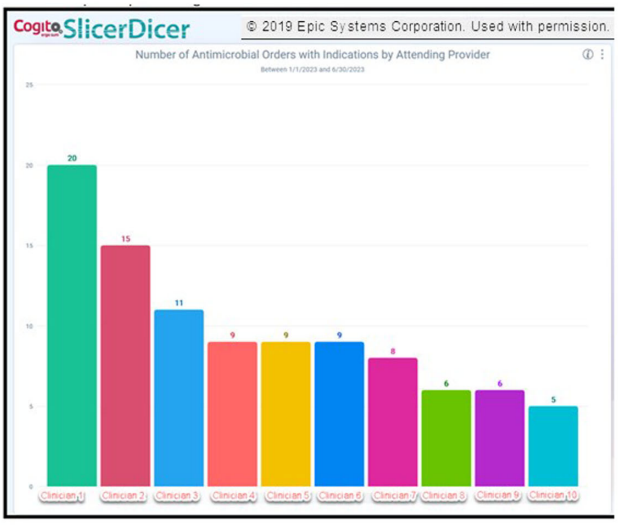
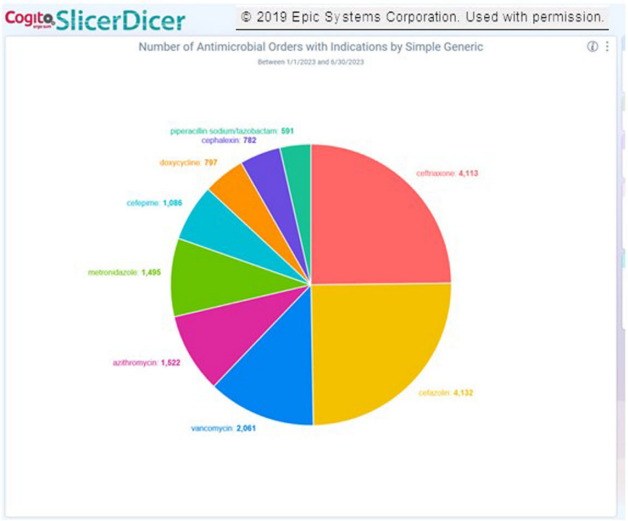
Figure 3: A custom-built SlicerDicer model to capture antibiotic usage data and prescribing practices.



Number of patients administered cefepime in the UVMMC MICU by attending physician.



Top 9 prescribed antimicrobials at UVMMC.

Presentation Type:
Poster Presentation - Poster Presentation
Subject Category: Water Management
Chlorine levels and a Legionella outbreak
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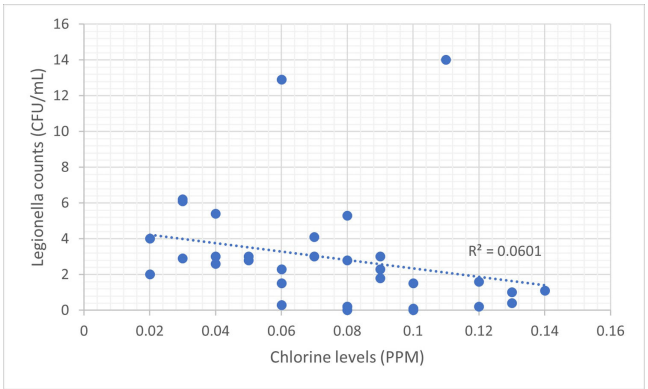
Background: Legionella, first identified in the 1970s, is increasingly recognized as an opportunistic pathogen in healthcare facilities.1 The National University Hospital (NUH) is a large quaternary level academic hospital with 1,200 beds located in equatorial Singapore. Its first building, completed in 1985, still serves patients today. In 2022, the infection prevention team (IPT) was informed of two cases of nosocomial legionella, which sparked the start of an extensive investigation consisting of water quality testing of multiple sources, case finding, and formation of a water management committee. **Methods:** 250mL water samples were collected and cultured by an external vendor using direct membrane filtration followed by plating on selective agar according to ISO 11731 standards. Bacterial colonies were then identified, quantified and speciated. At the same time, NUH's facility management measured chlorine levels using a portable colorimeter. **Results:** In total, we cultured 34 samples taken from sinks, shower heads, potable water dispensers. 91.2% of samples were positive for legionella. Of the 91.2%, 35.3% of sites grew Legionella pneumophila serogroup 1 while 79.4% of sites grew Legionella pneumophila serogroup 2-15. We attributed our high rates of legionella positivity to an aging plumbing system and Singapore's high humidity and temperatures. In addition, the maximal temperature of our hot water is only 48-50 °C. Although chlorine levels were generally low, they were still within the local recommendation of less than 2ppm (Singapore does not have guidance on minimum chlorine levels). We found no statistically significant correlation between the number of legionella colony forming units (CFUs) and chlorine levels (ranging between 0.02 to 0.14ppm). This supports the United States Environmental Protection Agency's recommendation, as well as the findings from in vitro and in vivo studies, for a minimal chlorine of 0.2 PPM at the taps for acute care hospitals.2,3However, these levels may be inadequate in the presence of acanthamoeba or a high biofilm load within water systems.4,5 **Conclusion:** Hospital water management programs should require a minimal level of chlorine at hospital taps and at levels above those recommended by public water systems, in order to control legionella growth. In addition, the formation of a hospital water management committee is essential to improve hospital water quality and put mitigation measures in place. References 1. Phin, N. et al. Epidemiology and clinical management of Legionnaires' disease. Lancet Infect. Dis. 14, 1011–1021 (2014). 2. Marchesi, I. et al. Monochloramine and chlorine dioxide for controlling Legionella pneumophila contamination: biocide levels and disinfection by-product formation in hospital water networks. J. Water Health11, 738–747 (2013). 3. Cervero-Aragó, S., Rodríguez-Martínez, S., Puertas-Bennasar, A. & Araujo, R. M. Effect of Common Drinking Water Disinfectants, Chlorine and Heat, on Free Legionella and AmoebaeAssociated Legionella. PloS One 10, e0134726 (2015). 4. Kessler, M. A., Osman, F., Marx, J., Pop-Vicas, A. & Safdar, N. Hospital-acquired Legionella pneumonia outbreak at an academic medical center: Lessons learned. Am. J. Infect. Control 49, 1014–1020 (2021).



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