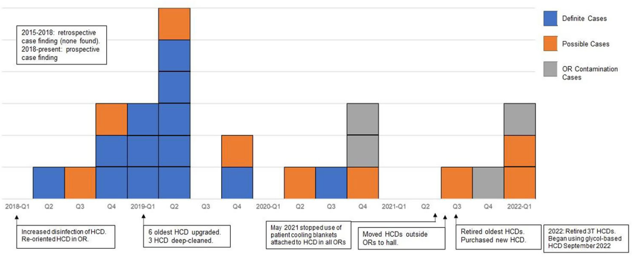

Figure: Timeline of HCD MAIC Infections and Implementation of Infection Control Measures
Abbreviations: HCD (Heater-Cooler Device); MAIC (*Mycobacterium avium-intracellulare* complex); OR (Operating Room)

undergone or are undergoing treatment for MAIC infection, and 4 (15%) have died due to NTM infection or complications. Compared to 47 controls, definite cases were associated with chronic kidney disease, implants, procedure type, use of cardiopulmonary bypass, and HCD age. Cases were not associated with time on bypass, time in the operating room, or other comorbid conditions (Table). All cases occurred despite enhanced disinfection and reorienting the HCD within the operating room, according to manufacturer recommendations. Moreover, 18 cases, including 7 definite cases, occurred after most HCDs were either deep cleaned or upgraded by the manufacturer. Also, 5 cases, including 3 possible cases and 2 contamination cases, occurred after physical separation of the HCD from the operating room. In August 2022, we purchased a fleet of glycol-cooled HCDs, and we have not identified additional MAIC cases since their deployment (Fig.). **Conclusions:** MAIC infections after cardiothoracic surgery were associated with procedure type, especially implants, use of cardiopulmonary bypass, and HCD age. Contrary to prior reports, neither operative nor CPB time was associated with MAIC infection after cardiothoracic surgery. The outbreak persisted despite disinfection and/or deep cleaning and reorienting HCDs within the operating room; some possible and contamination cases occurred even after moving HCDs outside the operating room. Thus, HCD water contamination events in the operating room (eg, spills from HCD tubing) may be a route of exposure, and different infection prevention measures are needed.

Disclosure: None

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Presentation Type:
Poster Presentation - Top Poster Award
Subject Category: Pediatrics

Epidemiology of carbapenem-resistant and extended-spectrum beta-lactamase-producing Enterobacterales in US children, 2016–2020

Heather Grome; Julian Grass; Nadezhda Duffy; Sandra Bulens; Jesse Jacob; Gillian Smith; Lucy Wilson; Elisabeth Vaeth; Bailey Evenson; Ghinwa Dumyati; Rebecca Tsay; Erin C. Phipps; Kristina Flores; Christopher Wilson; Christopher Czaja; Helen Johnston; Ruth Lynfield; Sean O'Malley; Meghan Maloney; Nicole Stabach; Joelle Nadle and Alice Guh

Background: The Centers for Disease Control and Prevention's Emerging Infections Program conducts active laboratory- and population-based surveillance for carbapenem-resistant Enterobacterales (CRE) and extended spectrum beta-lactamase-producing Enterobacterales (ESBL-E). To better understand the U.S. epidemiology of these organisms among children, we determined the incidence of pediatric CRE and ESBL-E cases and described their clinical characteristics. **Methods:** Surveillance was conducted among children <18 years of age for CRE from 2016–2020 in 10 sites, and for ESBL-E from 2019–2020 in 6 sites. Among catchment-area residents, an incident CRE case was defined as the first isolation of *Escherichia coli*, *Enterobacter cloacae* complex, *Klebsiella aerogenes*, *K. oxytoca*, or *K. pneumoniae* in a 30-day period resistant to ≥1 carbapenem from a normally sterile site or urine. An incident ESBL-E case was defined as the first isolation of *E. coli, K. pneumoniae*, or *K. oxytoca* in a 30-day period resistant to any third-generation cephalosporin and non-resistant to all carbapenems from a normally sterile site or urine. Case records were reviewed. **Results:** Among 159 CRE cases, 131 (82.9%) were isolated from urine and 19 (12.0%) from blood; median age was 5 years (IQR 1–10) and 94 (59.1%) were female. Combined CRE incidence rate per 100,000 population by year ranged from 0.47 to 0.87. Among 207 ESBL-E cases, 160 (94.7%) were isolated from urine and 6 (3.6%) from blood; median age was 6 years (IQR 2–15) and 165 (79.7%) were female. Annual ESBL incidence rate per 100,000 population was 26.5 in 2019 and 19.63 in 2020. Incidence rates of CRE and ESBL-E were >2-fold higher in infants (children <1 year) than other age groups. Among those with data available, CRE cases were more likely than ESBL-E cases to have underlying conditions (99/158 [62.7%] versus 59/169 [34.9%], P<0.0001), prior healthcare exposures (74/158 [46.8%] versus 38/169 [22.5%], P<0.0001), and be hospitalized for any reason around time of their culture collection (75/158 [47.5%] versus 38/169 [22.5%], P<0.0001); median duration of admission was 18 days [IQR 3–103] for CRE versus 10 days [IQR 4–43] for ESBL-E. Urinary tract infection was the most frequent infection for CRE (89/158 [56.3%]) and ESBL-E (125/169 [74.0%]) cases. **Conclusion:** CRE infections occurred less frequently than ESBL-infections in U.S. children but were more often associated with healthcare risk factors and hospitalization. Infants had highest incidence of CRE and ESBL-E. Continued surveillance, infection prevention and control efforts, and antibiotic stewardship outside and within pediatric care are needed

Disclosure: None

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Presentation Type:
Poster Presentation - Top Poster Award
Subject Category: Product Evaluation

Evaluation of four environmental sampling methods for the recovery of multidrug-resistant organisms

Ahmed Babiker; Alex Page; Julia Van Riel; Eli Wilber; Amanda Strudwick; Chris Bower; Michael Woodworth and Sarah Satola

Background: Environmental contamination is a major risk factor for multidrug-resistant organism (MDRO) exposure and transmission in the healthcare setting. Sponge-stick sampling methods have been developed and validated for MDRO epidemiological investigations, leading to their recommendation by public health agencies. However, similar bacteriological yields with more readily available methods that require less processing time or specialized equipment have also been reported. We compared the ability of 4 sampling methods to recover a variety of MDRO taxa from a simulated contaminated surface. **Methods:** We assessed the ability of (1) cotton swabs moistened with phosphate buffer solution (PBS), (2) e-swabs moistened with e-swab solution, (3) cellulose-containing sponge sticks (CSS), and (4) non–cellulose-containing sponge sticks (NCS) to recover extended-spectrum β-lactamase (ESBL)–producing *Escherichia coli*, carbapenem-resistant *Pseudomonas aeruginosa* (CRPA), carbapenem-resistant *Acinetobacter baumannii* (CRAB), methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus faecium* (VRE), and a mixture that contained VRE, MRSA, and ESBL organisms. A solution of known bacterial inoculum (~10^5 CFU/mL) was made for each MDRO. Then, 1 mL solution was pipetted on a stainless-steel surface (8 × 12 inch) in 5 μL dots and allowed to dry for 1 hour. All samples were collected by 1 individual to minimize variation in technique. Sponge sticks were expressed in PBS containing 0.02% Tween 80 using a stomacher, were centrifuged, and were then resuspended in PBS. Cotton and e-swabs were spun in a vortexer. Then, 1 mL of fluid from each method was plated to selective and nonselective media in duplicate and incubated at 35°C for 24 hours (MRSA plates, 48 hours) (Fig. 1). CFU per square inch and percentage recovery were calculated. **Results:** Table 1 shows the CFU per square inch and percentage recovery for each sampling method–MDRO taxa combination. The percentage recovery varied across MDRO taxa. Across all methods, the lowest rate of recovery was for CRPA and the highest was for VRE. Regardless of MDRO taxa, the percentage recovery was

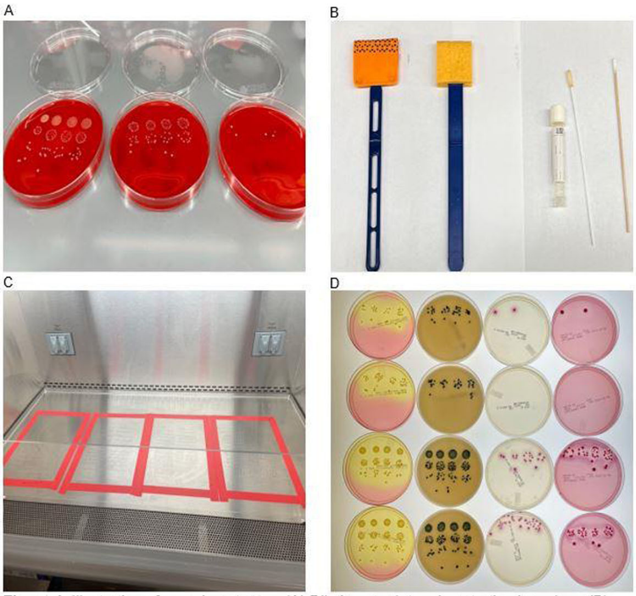
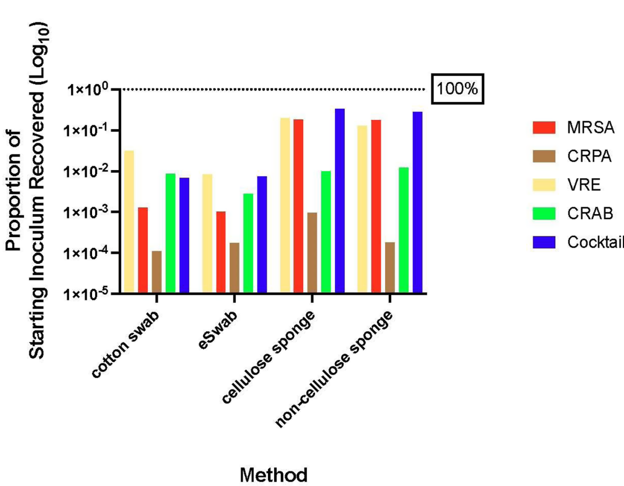


Figure 1. Illustration of experiment steps (A) Dilutions to determine starting inoculum; (B) Sampling methods assessed: non-cellulose containing sponge-stick, cellulose containing sponge-stick, e-swab, cotton swab (C) Stainless steel surfaces to which bacterial suspension was applied (D) Colonies from four different swab methods (from top to bottom cotton swab, e-swab, cellulose containing sponge-stick and non-cellulose containing sponge-stick) on different selective agars (from left to right): ESBL selective agar, MacConkey agar, VRE selective agar, MRSA selective agar.

MDRO species	Collection Method							
	Cotton swab		E-swab		Cellulose containing sponge-stick		Non-cellulose containing sponge-stick	
	CFU/inch^2	Percent recovery	CFU/inch^2	Percent recovery	CFU/inch^2	Percent recovery	CFU/inch^2	Percent recovery
VRE	2.42 x 10^1	3.20%	6.31	0.83%	9.86 x 10^1	19.94%	9.83 x 10^1	12.90%
MRSA	2.67 x 10^{-1}	0.13%	2.08 x 10^{-1}	0.10%	2.22 x 10^2	18.36%	2.15 x 10^2	17.80%
CRPA	3.19 x10^1	0.01%	5.21 x 10^{-1}	0.02%	1.02	0.10%	1.88 x 10^{-1}	0.02%
CRAB	1.04	0.85%	3.39 x 10^{-1}	0.28%	1.39 x 10^1	1.00%	1.70 x 10^1	1.23%
MRSA/VRE/ESBL cocktail	3.73 x 10^1	0.68%	4.14 x 10^1	0.75%	1.84 x 10^3	33.26%	1.52 x10^3	37.80%

Table 1. Recovery by inch^2 and percent recovery for different collection methods across MDRO taxa
Abbreviations: CRAB: carbapenem resistant *Acinetobacter baumannii*, CRPA: carbapenem resistant *Pseudomonas aeruginosa*, ESBL: extended spectrum B-lactamase producing Enterobacterales, MRSA: Methicillin resistant *Staphylococcus aureus*, VRE: vancomycin resistant *Enterococcus*.



highest for the sponge stick (CSS and NCS) compared to swab (cotton and E-swab) methods across all taxa (Table 1 and Fig. 2).

Conclusions: These findings support the preferential use of sponge sticks for the recovery of MDROs from the healthcare environment, despite the additional processing and equipment time needed for sponge sticks. Further studies are needed to assess the robustness of these findings in non-contrived specimens as well as the comparative effectiveness of different sampling methods for non–culture-based MDRO detection.

Disclosure: None

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Presentation Type:
Poster Presentation - Top Poster Award
Subject Category: SSI

The effectiveness of the appropriate prophylactic antibiotic use program for surgery

Eunjung Lee; Tae Hyong Kim; Se Yoon Park; Jongtak Jung and Yae Jee Baek

Background: Evaluation of the adequacy of prophylactic antibiotics in surgery has been implemented as a national policy in Korea since August 2007, and the appropriate use of prophylactic antibiotics has improved. However, antibiotic prescriptions that are not recommended or discontinuation of prophylactic antibiotic administration within 24 hours after surgery are still not well done. This study introduced a program to improve the adequacy of prophylactic antibiotics for surgery and analyzed its effects. **Methods:** We retrospectively analyzed the effectiveness of the appropriate prophylactic antibiotic use program for surgery conducted at a university hospital in Seoul. The participants were patients aged ≥18 years who underwent any of 18 types of surgery. The program started was implemented in June 2020. First, a computer system was used to confirm the antibiotic prescription recommended for each surgery. It also assessed whether the number of days of administration was exceeded,

Table 1. Analysis of the effectiveness of the appropriate prophylactic antibiotic use program for surgery

Variables	Total (N=1339)	Before program (N=695)	After program (N=644)	*P* value
Sex, female	730 (54.5)	378 (54.4)	352 (54.7)	0.96
Age, mean±SD	59.0±16.2	58.5±15.6	59.5±16.8	0.23
Surgery				<0.001
Vascular surgery	370 (27.6)	236 (34.0)	134 (20.8)	
Laminectomy	217 (16.2)	93 (13.4)	124 (19.3)	
Breast surgery	114 (8.5)	54 (7.8)	60 (9.3)	
Cesarean section	78 (5.8)	42 (6.0)	36 (5.6)	
Gallbladder surgery	77 (5.8)	34 (4.9)	43 (6.7)	
Hip prosthesis	62 (4.6)	24 (3.5)	38 (5.9)	
Shoulder surgery	57 (4.3)	23 (4.9)	23 (3.6)	
Open reduction of fracture	55 (4.1)	17 (2.4)	38 (5.9)	
Appendix surgery	48 (3.6)	26 (3.7)	22 (3.4)	
Herniorrhaphy	46 (3.4)	25 (3.6)	21 (3.3)	
Knee prothesis	45 (3.4)	15 (2.2)	30 (4.7)	
Lobectomy	44 (3.3)	23 (3.3)	21 (3.3)	
Colon surgery	31 (2.3)	18 (2.6)	13 (2.0)	
Prostate surgery	27 (2.0)	13 (1.9)	14 (2.2)	
Hysterectomy	25 (1.9)	18 (2.6)	7 (1.1)	
Thyroid and/or parathyroid surgery	19 (1.4)	11 (1.6)	8 (1.2)	
Craniotomy	14 (1.0)	7 (1.0)	7 (1.1)	
Pacemaker surgery	10 (0.7)	5 (0.7)	5 (0.8)	
Inappropriate antibiotic prophylaxis				
Third generation cephalosporins	29 (2.2)	22 (4.2)	0	<0.001
Fluoroquinolone	13 (1.0)	12 (1.7)	1 (0.2)	0.004
Beta-lactam/Beta-lactamase inhibitor	3 (0.2)	3 (0.4)	0	0.25
Combination of prophylactic antibiotics	64 (4.8)	57 (8.2)	7 (1.1)	<0.001
Hospital day, mean±SD	6.8±4.9	7.0±5.1	6.9±4.7	0.15
Duration of operation(hour), mean±SD	1.63±1.27	1.70±1.32	1.54±1.20	0.02
Duration of antibiotics(day), mean±SD	1.5±2.2	2.4±2.8	0.6±0.6	<0.001
Administration within 1 hour prior to incision	1288 (96.2)	647 (93.1)	641 (99.5)	<0.001
Appropriate antibiotic choice	1230 (91.9)	591 (85.0)	639 (99.2)	<0.001
Appropriate discontinuation of antibiotics	992 (74.1)	360 (51.8)	632 (98.3)	<0.001
Prescription of antibiotics at discharge	149 (11.1)	144 (20.7)	5 (0.8)	<0.001