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SHEA Spring 2025 Abstracts

Presentation Type:
Oral Presentation - Top Oral Abstract
Subject Category: C. difficile
The Impact of a Healthcare Facility-Onset Antibiotic-Treated CDI Surveillance Definition on reportable cases in VA Medical Centers
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Background: Most laboratories diagnose Clostridioides difficile infection (CDI), using a nucleic acid amplification test (NAAT) or an enzyme immunoassay (EIA) for detecting the toxins in the stool. Adoption of a two-step testing method where a positive NAAT is folowed by a negative toxin EIA may lead to underreporting of patients with CDI healthcare-associated infections (HAIs). The possibility that patients with an active infection may be underreported has been suggested by data, that NAAT positive/Toxin negative patients are sometimes treated. Therefore a new surveillance definition has been adopted by NHSN, healthcare facility-onset antibiotic-treated C. difficile infection (HT-CDI). To date, the impact of adopting this new metric on the number of CDI cases that would qualify for HAI surveillance reporting remains unknown. We chose to explore this by retrospectively evaluating CDI cases using the current and proposed HT-CDI surveillance definition over a two year period in a sample of VA Medical Centers. **Method:** The above HT-CDI definition was applied to all acute care inpatients tested for CDI from July 1, 2022 through June 20, 2024 in 25 volunteer acute care VA medical centers. Centers were chosen based on the use of NAAT alone, NAAT followed by toxin EIA, GDH followed by toxin EIA with discordant results arbitrated by NAAT, GDH plus toxin EIA, toxin EIA alone, or GDH plus NAAT. A HT-CDI was defined according to NHSN as any qualifying C. difficile-positive asssay collected in an inpatient location on day 4 or greater after admission, along with administration of new qualifying antimicrobial therapy in a time frame window. Qualifying therapeutic agents for CDI were defined as enteral vancomycin, metronidazole, or fidaxomycin or intravenous metronidazole. **Results:** Analysis of the 789 CDI cases in 25 VA facilities collected over two years showed that adoption of the HT-CDI definition could potentially increase the number of reportable cases by 23.3%. The impact was most pronounced for patients diagnosed with two-step testing where presumably the patient would not be reported to a national database on the last test done. **Conclusion:** Application of the HT-CDI definition to Veterans Affairs patients could lead to an estimated 23% increase in the number of cases identified and eligible for reporting to a national database such as NHSN. These cases may be a better indicator of the true burden of CDI in an acute healthcare system.

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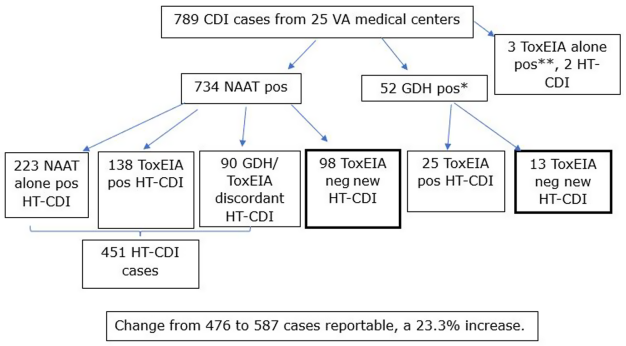

Figure 1. Effect of applying HT-CDI definition on reportable healthcare-associated *C. difficile* infections. (*no NAAT done, **no NAAT or GDH done)

Table 2. Relationship between diagnostic testing algorithm healthcare facility-onset antibiotic-treated *Clostridioides difficile* infection (HT-CDI) in VA acute care medical facilities (July 2022 – June 2024)

Algorithm*	Total Number cases using algorithm	Number HT CDI cases	Percent of cases identified as HT-CDI
NAAT alone pos	259	223	86
NAAT pos/ToxEIA pos	146	138	95
GDH & ToxEIA discrepant/NAAT pos	112	90	80
NAAT pos/ToxEIA neg	216	98	45
GDH pos/ToxEIA pos	25	25	100
GDH pos/ToxEIA neg	27	13	48

*NAAT = nucleic acid amplification test, EIA = enzyme immunoassay, GDH = glutamate dehydrogenase.

Presentation Type:
Oral Presentation - Top Oral Abstract
Subject Category: Diagnostic Stewardship
Environmental Impact of a Single Combined Urine Antigen Test for Streptococcus pneumoniae and Legionella pneumophila
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Background: Healthcare produces 10% of US carbon emissions. Diagnostic stewardship can improve patient care while reducing emissions from unnecessary testing. In the Bronx, community outbreaks of Legionella pneumophila result in frequent testing, yet, most testing for Legionella and Pneumococcus are negative. The institution is transitioning from separate tests for Streptococcus pneumoniae and L. pneumophila to a single combined test. We evaluated the environmental impact of this change. **Methods:** To approximate emissions from separate versus combined testing kits, each kit component was weighed and converted to CO2 emission equivalents using the US Environmental Protection Agency (EPA) greenhouse gas equivalencies calculators. Using data from the previous 12 months and projecting similar future testing patterns, we estimated an emissions reduction based on combined testing. By multiplying waste emissions before and after combined testing, we were able to estimate the emissions diverted by this institutional change. **Results:** From January 2023 to November 2024, 13906 urine Legionella tests were performed and 62 (0.45%) were positive, while 12796 urine Pneumococcal tests were performed and 479 (3.74%) were positive. Separate testing kits generated 218.2 kg of plastic waste and 749.1 kg of paper waste. Projected plastic waste from January 2025 to November of 2026 using the combined test is 48.5 kg of paper waste and 64.2 kg of plastic waste. The total

estimated emissions reduction is 4.34 Kg of CO2. **Conclusions:** Diagnostic stewardship via a combined urinary antigen test can reduce waste from unnecessary testing without altering workflow. This institutional change is projected to reduce the plastic waste equivalent to 8480 water bottles and reduce emissions equivalent to using 11 gallons of gasoline or charging 340 smartphones. Our calculations are likely an underestimate of total emissions diverted since we only estimated emissions produced by waste in the landfill and did not account for other associated emissions such as those produced by transporting the waste. While the impact is modest, diagnostic stewardship applied broadly is a step towards a goal of net zero.

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Oral Presentation - Top Oral Abstract
Subject Category: Infection Prevention in Low and Middle-Income Countries

CRE colonization on admission and acquisition among surgical intensive care unit patients in an Indian tertiary care hospital

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Introduction: Studies examining carbapenemase producing carbapenem resistant Enterobacterales (CP-CRE) transmission incorporating clinical and genomic data in Indian hospitals are lacking. We investigated the prevalence, risk factors for CP-CRE peri-rectal colonization on admission and acquisition during hospital stay and genomic epidemiology of CP-CRE isolates in an adult surgical intensive care unit (SICU) in a tertiary-care hospital in India. **Methods:** SICU patients admitted from July 31 to November 30, 2023 were prospectively enrolled. Peri-rectal swabs (PRS) were collected at SICU admission and discharge, and hospital discharge. Environmental sampling of sinks was performed. Swabs were plated on selective agar (CHROMagarTMmSuperCARBATM) for CP-CRE isolation. Whole genome sequencing of CP-CRE isolates was performed to investigate antimicrobial resistance gene (ARG) abundance, strain typing (ST), and relatedness classified by community-associated (CA), healthcare-associated (HCA), hospital-acquired (HA), and environmental isolates. **Results:** 56 (28%) of 203 enrolled patients were colonized with CP-CRE on SICU admission. Among 147 admission-negative patients,

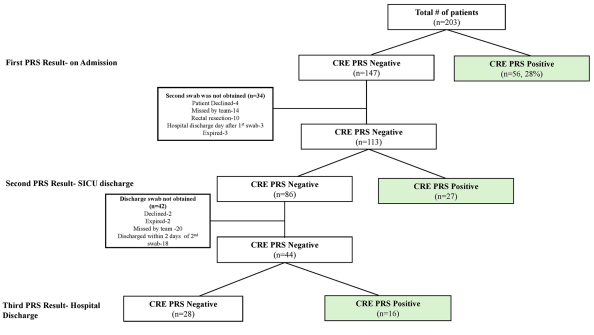

Figure 1: Carbapenemase producing carbapenem resistant *Enterobacterales* (CP-CRE) peri-rectal swab (PRS) status among surgical intensive care unit (SICU) patients in a tertiary care hospital, Kerala, India, July 31 – November 30, 2023

CP- CRE species	SICU Admission (N=56 patients)	SICU Discharge (N=27 patients)	Hospital Discharge (N=16 patients)	Hospital Acquisition (N=43 patients)
Escherichia coli (EC)	29 (52%)	8 (30%)	5 (33%)	13 (30%)
Klebsiella pneumoniae (KP)	9 (16%)	10 (37%)	6 (40%)	16 (37%)
Enterobacter cloacae (EBCLO)	2 (4%)	2 (7%)	0	2 (5%)
EC+KP	13 (23%)	7 (26%)	5 (20%)	12 (28%)
EC+EC	2 (4%)	0	0	0
EC+EBCLO	1 (2%)	0	0	0

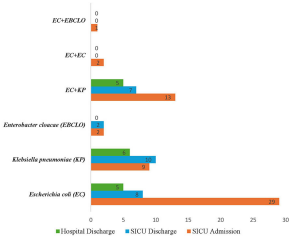

Figure 2: Organism distribution among carbapenemase producing carbapenem resistant *Enterobacterales* (CP-CRE) peri-rectal colonization patients on surgical intensive care unit (SICU) admission, SICU discharge and hospital discharge in a tertiary care hospital, Kerala, India, July 31 – November 30, 2023

	CP- CRE positive (N=56)	CP-CRE negative (N=147)	Univariate analysis* P-value	Multivariable analysis** (aOR; 95% CI)
Age (Median, IQR)	58(47-68)	58(46-68)	0.927	-
Gender (Males,%)	32 (57)	85 (58)	0.930	-
Hospital LOS in days prior to ICU admission (Median, IQR)	2 (1-3)	2 (1-2)	0.162	-
Transfer from outside hospital	17 (30)	41 (28)	0.728	-
Hospital stay < 1 year	30 (54)	64 (44)	0.201	-
Outside hospital stay <1 year	10 (18)	36 (25)	0.315	-
Study hospital stay <1 year	20 (34)	28 (19)	**0.010**	2.48 [1.23- 4.98]
Hospitalization without ICU stay <1 year	22 (39)	42 (27)	0.114	-
Hospitalization with ICU stay <1 year	8 (14)	21 (14)	1.000	-
Study hospital ICU stay <1year	8 (14)	9 (6)	0.068	-
Long term hemodialysis	0	4 (3)	0.577	-
Antibiotic exposure prior to SICU admission	23 (41)	35 (24)	**0.012**	0.75 [0.13-4.24]
Exposure to 2 or more antibiotics prior to SICU admission	11 (20)	12 (8)	**0.024**	2.77 [1.12-6.82]
Anaerobic agent exposure prior to SICU admission	21 (38)	29 (20)	**0.010**	1.58 [0.66-3.77]
Duration of antibiotics>3days prior to SICU admission	8 (14)	11 (8)	0.143	-
Presence of invasive devices <30 days of ICU admission	0 (0)	5 (3)	0.325	-
Invasive procedures or surgeries < 30 days of ICU admission	17 (30)	43 (29)	0.877	-
Surgeries within 30 days of ICU admission	0	6 (4)	0.190	-
Procedures within 30 days of ICU admission	17 (30)	37 (25)	0.455	
Upper GI Endoscopy	3 (6)	14 (10)	0.345	-
Colonoscopy	6 (11)	12 (8)	0.569	-
Others	8 (14)	11 (8)	0.143	-
Prior CRE clinical culture <14 days of ICU admission	2 (4)	1 (1)	0.141	-

*Univariate analysis was performed using Chi-square test and Fisher-exact test; Kruskal-Wallis non-parametric test was used to compare median values
**Multivariable logistic regression analysis was performed on variables with P<0.05 in univariate analysis using backward selection with likelihood ratios.
aOR- adjusted Odds Ratio; CI- confidence interval; ICU- intensive care unit; IQR: Interquartile range; SICU-surgical ICU

Figure 3: Univariate and multivariable analysis of the risk factors associated with carbapenemase producing carbapenem resistant *Enterobacterales* (CP-CRE) peri-rectal colonization on admission to surgical intensive care unit in a tertiary care hospital, Kerala, India, July 31 – November 30, 2023

	CP-CRE acquisition N=43 (%)	CP-CRE non-acquisition N= 94 (%)	Univariable analysis* P-value	Cox regression** HR (95% CI)
Age, median (IQR)	58 (46-68)	57 (45-67)	0.588	
Female	20 (46)	37 (39)	0.431	
Outside transfer before SICU admission	12 (28)	27 (29)	0.922	
Outside hospital stay <1 year	12 (28)	24 (26)	0.770	
Study hospital stay <1 year	11 (26)	15 (16)	0.186	
Hospitalization with ICU stay in last one year	11 (26)	10 (11)	**0.028**	1.67 [0.84-3.44]
Hospitalization without ICU stay in last one year	11 (26)	30 (32)	0.453	
Study hospital ICU stay <1 year	6 (14)	4 (4)	**0.055**	1.60 [0.76-3.34]
Type of surgery				
Hepatobiliary surgery	12 (28)	29 (31)	0.727	
Colorectal surgery	12 (28)	32 (34)	0.476	
Upper Gastrointestinal & Small intestine surgery	10 (23)	21 (22)	0.905	
Other surgery	8 (19)	10 (11)	0.205	
Device exposure				
Urinary catheter	40 (93)	82 (87)	0.321	
Central venous catheter	30 (70)	63 (67)	0.749	
Arterial line	26 (61)	59 (63)	0.797	
Mechanical ventilator	12 (28)	35 (37)	0.288	
3 or more devices	21 (49)	39 (42)	0.422	
New procedures/surgeries after initial surgery	9 (21)	12 (13)	0.223	
Antibiotic exposure from SICU admission to hospital discharge				
Any antibiotic exposure+	24 (56)	39 (42)	0.120	0.66 [0.36-1.28]
Two or more antibiotics exposure	10 (23)	16 (17)	0.390	
Meropenem exposure	2 (5)	7 (7)	0.544	
Anaerobic agent exposure	21 (49)	35 (37)	0.201	

*Univariate analysis was performed using Chi-square test and Fisher-exact test; Kruskal-Wallis non-parametric test was used to compare median values
** Cox regression analysis was performed on variables with P<0.1 in univariate analysis using backward selection with likelihood ratios. +We forced the antibiotic exposure variable into the model.
CP-CRE: carbapenemase producing carbapenem resistant *Enterobacterales* (CP-CRE); CI- confidence interval; HR- Hazard Ratio: ICU-intensive care unit; IQR: Interquartile range; SICU- surgical ICU

Figure 4: Survival analysis examining risk factors associated with carbapenemase producing carbapenem resistant *Enterobacterales* (CP-CRE) acquisition among surgical intensive care unit patients (SICU) during hospital stay in a tertiary care hospital, Kerala, India, July 31 – November 30, 2023

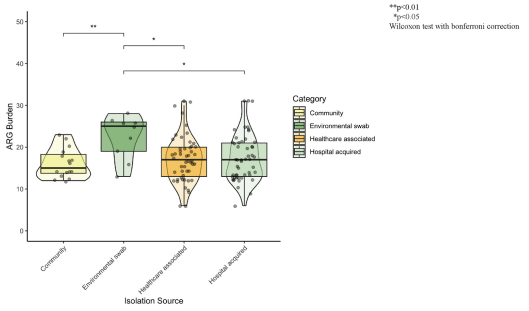

Figure 5: Antimicrobial resistance gene (ARG) burden among carbapenemase producing carbapenem resistant *Enterobacterales* isolates obtained from peri-rectal swab samples (classified as community associated, healthcare associated, hospital acquired) and environmental swabs in a surgical intensive care unit in a tertiary care hospital, Kerala, India, July 31 – November 30, 2023