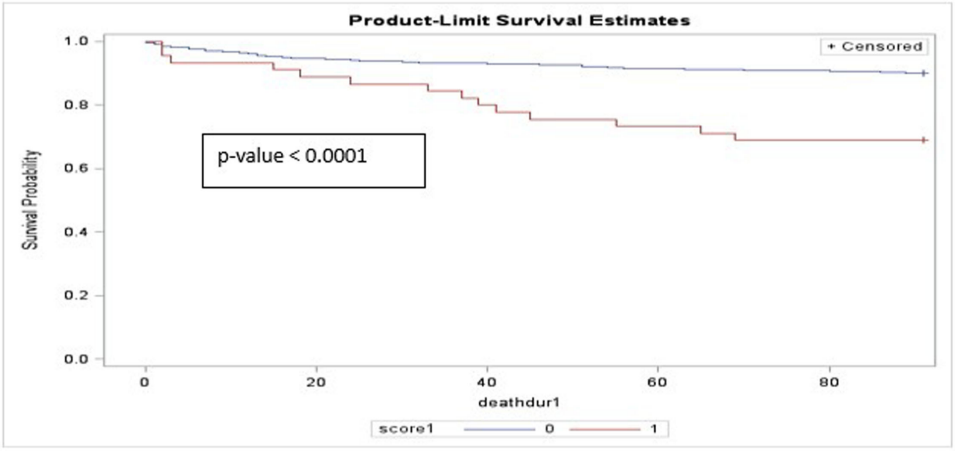
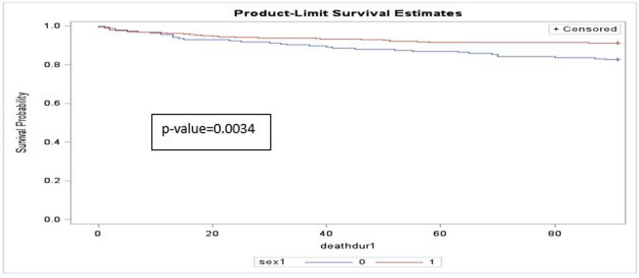
Figure1: 90-days Survival Estimates of CRE Patients by the Charlson Score Status



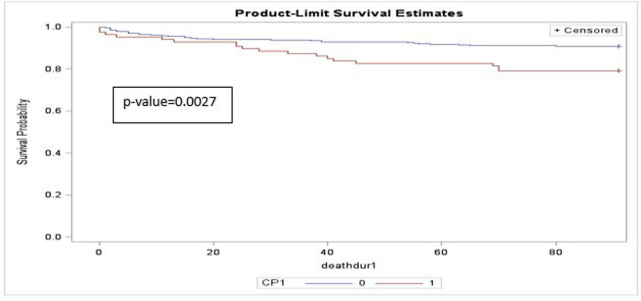
Score1: 1 = Charleson score >=5; 0 = Charlson score <5

Figure2: 90-days Survival Estimates of CRE Patients by Sex



Sex1: Female=1; Male=0

Figure3: 90-days Survival Estimates of CRE patients by Carbapenemase Production (CP) status



Deathdur1: Number of days from the date of specimen collection

CP1: 0= Cases infected with non Carbapenemase producing CRE pathogens tested; 1= Cases infected with Carbapenemase producing CRE pathogens

part of the Emerging Infections Program (EIP), the state has participated in population-based surveillance in Davidson and seven surrounding counties, collaborating with the Centers for Disease Control and Prevention (CDC) since 2014. **Methods:** The data collected through the Muti-site Gram-negative Surveillance Initiative (MuGSI) project, a collaboration between Tennessee and CDC as part of EIP, was used for this study. The analysis was performed on a subset of CRE isolates tested for carbapenemase production (CP) among all incident CRE cases collected from 2016 to 2022. Incident CRE cases are defined as the identification of carbapenem-resistant E. coli, Enterobacter cloacae complex, and Klebsiella species (K. aerogenes, K. oxytoca, K. pneumoniae, and K. variicola) from urine or normally sterile specimens (e.g., blood) from the residents of the surveillance area in a 30-day period. The mortality data was obtained from the Tennessee Vital Registry and merged with the surveillance data. Cox regression analysis was performed to evaluate if there is a difference in the 90-day survival rate based on the CP status of the pathogen, gender, age group, and the Charlson comorbidity index (CCI) score. Data analysis was done using SAS version 9.4. **Results:** There were 570 CRE cases reported during the study period (2016-2022). Of these, 406 were tested for carbapenemase production and 87 (21.4%) were positive for CP. There were 269 (66.3%) females and 137 (33.7%) males. Patients with higher Charlson comorbidity index score (> = 5) have significantly higher hazard ratios compared to those with low scores (HR 4.17; p-value) **Conclusion:** This study indicates that patients infected with CP-CRE, females, and those with high Charlson comorbidity index score have a significantly higher probability of dying within 90 days. These factors are worth considering when conducting a risk assessment of patients infected with drug-resistant gram-negative bacilli. The significantly increased risk of death among patients infected with CP-CRE highlights the need for timely carbapenemase testing and use of the test result for appropriate antimicrobial therapy and infection prevention.

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Presentation Type:
Poster Presentation
Subject Category: Surveillance

A Decade of Change: Shifting Trends in Carbapenemase-Producing Enterobacterales Among Hospitalized Patients

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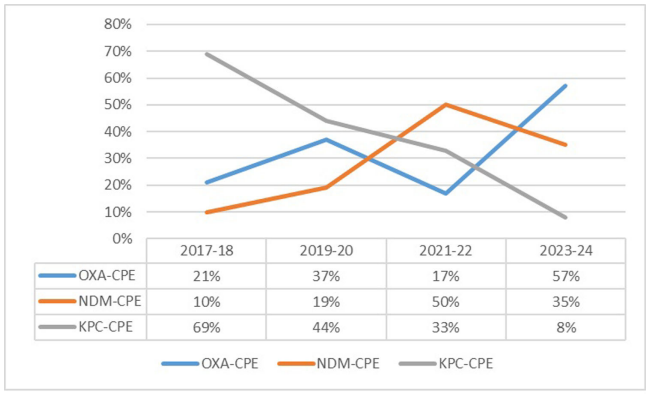
Background: Carbapenemase-producing Enterobacterales (CPE) poses a major infection control challenge in healthcare settings. Over the past decade, Klebsiella pneumonia carbapenemase (KPC)-CPE colonization at our hospital declined to under 10% of all CPE rectal screens, while New Delhi metallo-beta lactamase (NDM)-CPE and oxacillinase (OXA)-CPE colonization rates have tripled, Figure 1. **Methods:** A comparative historical study was conducted on adult patients colonized with OXA-CPE (2017-



Variable, no (%)	OXA-CPE (N=115)	NDM-CPE (N=136)	*P* Value OR[95% CI]	KPC-CPE (N=92)	NDM-CPE (N = 136)	*P* Value OR[95% CI]	OXA-CPE (N=115)	KPC-CPE (N=92)	*P* Value OR[95% CI]
Hospitalization department									
- Internal Medicine	66(57.4)	83(61)	0.347	75(81.5)	83(61)	0.001 2.81[1.5-5.28]	66(57.4)	75(81.5)	<0.01 0.3[0.16-0.6]
- Surgery	43(37.4)	38(27.9)	0.116	12(13)	38(27.9)	0.007 0.38[0.19-0.79]	43(37.4)	12(13)	<0.001 4[1.9-8]
Urinary catheter	26(22.6)	35(25.7)	0.565	44(47.8)	35(25.7)	0.001 0.38[0.22-0.66]	26(22.6)	44(47.8)	<0.001 0.3[0.2-0.6]
Decubitus ulcer	24(20.9)	22(16.2)	0.339	50(54.9)	22(16.2)	<0.001 0.16[0.09-0.29]	24(20.9)	50(54.9)	<0.001 0.22[0.1-0.4]
Bacteria									
- *Escherichia coli*	70(60.9)	92(67.6)	0.264	6(6.5)	92(67.6)	<0.001 0.03[0.001-0.8]	70(60.9)	6(6.5)	<0.001 22[9-55]
- *Klebsiella sp.*	40(34.8)	17(12.5)	<0.001 3.7[1.9-7]	63(68.5)	17(12.5)	<0.001 15.2[7.76-29.8]	40(34.8)	63(68.5)	<0.001 0.24[0.1-0.4]
End of hospitalization									
- Mortality	15(13)	15(11)	0.624	11(12)	15(11)	0.913	15(13)	11(12)	0.815
- Home discharge	78(67.8)	103(75.7)	0.164	15(27.2)	103(75.7)	<0.001 0.11[0.07-0.55]	78(67.8)	15(27.2)	<0.001 11[5.5-21]
- Nursing-care facility discharge	19(16.5)	13(9.6)	0.100	56(60.9)	13(9.6)	<0.001 14.7[7.24-29.9]	19(16.5)	56(60.9)	<0.001 0.13[0.06-0.2]

2023), NDM-CPE (2017-2023), or KPC-CPE (2017-2018). Patients were retrospectively identified through the microbiology laboratory, their files reviewed for demographics, clinical characteristics, and outcomes. **Results:** The study included all 341 patients who underwent a screening rectal swab for CPE on admission or during contact tracing: 115 tested positive for OXA-CPE, 136 for NDM-CPE, and 92 for KPC-CPE. Patients colonized with OXA-CPE or NDM-CPE were younger (61.7±20 and 60.7±19.56, respectively) compared to those colonized with KPC-CPE (67.2±18.78; P=0.043 and P=0.013). Clinical characteristics and outcomes for the three cohorts are summarized in Table 1. Patients colonized with OXA-CPE or NDM-CPE were more likely to be admitted to surgical wards, have fewer urinary catheters and decubitus ulcers, and were more often discharged home compared to KPC-CPE colonized patients. OXA-CPE and NDM-CPE genes were predominately associated with Escherichia coli, while KPC-CPE gene was mainly found with Klebsiella sp. **Conclusions:** OXA-CPE and NDM-CPE colonized patients are younger, less debilitated and primarily reside at home. These findings prompted a revised CPE admission strategy, resulting in higher detection of OXA-CPE and NDM-CPE colonization upon admission.

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Epidemiologic and economic evaluation of automated surgical site infection indicators in a commercial surveillance software product

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Background: The gold standard for surgical site infection (SSI) surveillance is 100% chart review, a practice neither efficient nor pragmatic for most large hospital systems.
Modern infection surveillance software uses indicators – specific data elements within the patient medical record - to report possible SSI for confirmation by infection preventionists (IPs). Using all available indicators has been shown to increase identification of SSIs and may approximate the gold standard but has been called "noisy" for including many patients with no SSI and costing precious surveillance time. Here, we describe our experience with evaluating the performance of our surveillance system. **Methods:** The setting for this study was the 21-hospital Cleveland Clinic health system with a uniform SSI surveillance plan and shared medical record. Our software, Bugsy (Epic Systems Corporation), employs six indicators for possible SSI: hospital readmission, return to surgery, positive microbiology tests, and chief complaint, physician diagnoses (billing codes), or administration of post-prophylaxis antibiotics suggestive of SSI. We extracted all possible SSIs, indicators, and confirmed infections for seven NHSN procedure code categories. We calculated the sensitivity and specificity of each indicator individually using OpenEpi v3.01 and estimated the cost associated with IP time spent on indicators that do not result in confirmed SSI. **Results:** From January to December 2023, 12,739 possible SSIs were reported with any indicator out of 26,276 inpatient procedures (48%). The frequency of procedures flagged for review ranged from 25% for CSEC to 78% for HYST. The number of procedures, possible SSI, and confirmed SSI with rates are shown in Table 1. The sensitivity and specificity of each indicator are shown in Table 2. Infection preventionists spent an average of 2 minutes reviewing each of 12,027 patient charts (401 hours) and determined there was no SSI, costing an estimated $18,602 annually. **Conclusion:** Nearly 50% of surgical patients were flagged for review for possible SSI with any indicator. Post-prophylaxis

Table 1 – Number of procedures, possible surgical site infections, and infection rates per 100 procedures

	n procedures	Possible SSIs (% of procedures)	Total confirmed SSI (rate per 100 procedures)	Complex SSI confirmed (rate per 100 procedures)
COLO	4016	2242 (56%)	340 (8.47)	186 (4.63)
CSEC	4148	1029 (25%)	69 (1.67)	18 (0.43)
FUSN	3213	1399 (44%)	89 (2.77)	62 (1.93)
HPRO	4863	2801 (58%)	73 (1.50)	57 (1.17)
HYST	1075	749 (70%)	32 (2.98)	19 (1.77)
KPRO	5562	3290 (59%)	62 (1.11)	43 (0.77)
LAM	3399	1232 (36%)	50 (1.47)	29 (0.85)
TOTAL	26276	12739 (48%)	712 (2.71)	411 (1.56)

Table 2 - Sensitivity and Specificity of each indicator to all levels of confirmed surgical site infection by NHSN procedure code category

		Antibiotics	Readmit	Labs	Return to surgery	Diagnoses	Chief complaint
COLO	*sens%*	97	49	65	57	64	7
	(95% CI)	(94- 98)	(44-55)	(59-96)	(52-62)	(59-69)	(5-11)
	spec%	63	79	96	84	84	99
	(95% CI)	(61-64)	(77-80)	(95-97)	(82-85)	(82-85)	(99-100)
CSEC	*sens%*	97	55	55	17	36	3
	(95% CI)	(90-99)	(43-66)	(43-66)	(10-28)	(26-48)	(1-10)
	spec%	89	85	99	98	99	100
	(95% CI)	(88-90)	(84-87)	(99-99)	(98-99)	(99-99)	(100-100)
FUSN	*sens%*	98	88	77	80	64	17
	(95% CI)	(92-99)	(79-93)	(68-85)	(70-87)	(54-73)	(10-26)
	spec%	70	72	97	89	97	99
	(95% CI)	(69-72)	(71-74)	(97-98)	(88-90)	(96-98)	(99-99)
HPRO	*sens%*	100	89	75	85	73	25
	(95% CI)	(95-100)	(80-94)	(64-84)	(75-91)	(63-83)	(16-36)
	spec%	52	72	98	90	96	99
	(95% CI)	(51-54)	(71-73)	(97-98)	(89-91)	(95-96)	(99-99)
HYST	*sens%*	94	66	50	34	59	9
	(95% CI)	(80-98)	(48-80)	(34-66)	(20-52)	(42-74)	(3-24)
	spec%	49	66	98	89	95	99
	(95% CI)	(45-52)	(63-69)	(96-98)	(87-91)	(93-96)	(98-99)
KPRO	*sens%*	95	95	81	84	71	18
	(95% CI)	(87-98)	(87-98)	(69-89)	(72-91	(58-81)	(10-29)
	spec%	54	70	98	88	94	99
	(95% CI)	(53-56)	(69-72)	(98-99)	(87-89)	(93-95)	(99-99)
LAM	*sens%*	92	78	68	58	46	22
	(95% CI)	(51-97)	(65-87)	(54-79)	(44-71)	(33-60)	(13-35)
	spec%	77	80	98	92	97	99
	(95% CI)	(75-78)	(78-81)	(97-98)	(91-93)	(97-98)	(98-99)
TOTAL	***sens%***	**97**	**66**	**68**	**61**	**62**	**12**
	(95% CI)	**(96-98)**	**(62-69)**	**(64-71)**	**(57-64)**	**(58-65)**	**(10-15)**
	spec%	**65**	**76**	**98**	**90**	**95**	**99**
	(95% CI)	**(65-66)**	**(75-76)**	**(98-98)**	**(90-90)**	**(94-95)**	**(99-99)**