

Table 1. PICU HAI Incidence, January 2019–November 2023.

Time period	Overall HAI Incidence Per 1,000 patient days	CAUTI (n=21) Per 1,000 catheter days	CLABSI (n=11) Per 1,000 line days	HAVRI (n=18) Per 1,000 inpatient days	ARO (n=6)	CDI (n=3)
Pre-Pandemic	3.66	5.52	1.24	0.92	0.31	0.31
Pandemic	5.3	5.24	2.82	1.49	0.42	0.21
Post-Pandemic	4.56	5.59	0.99	1.74	0.65	0.22

Background: Adult rates of non-COVID-19-related healthcare-associated infection (HAI) initially decreased and subsequently increased during the COVID-19 pandemic. Little is known about pediatric HAI rates during this period. **Methods:** A retrospective review of HAIs was conducted for patients admitted to the intensive care unit (PICU) at a pediatric tertiary care hospital between January 1, 2019 and November 30, 2023. Patients who spent ≥ 48 hours in the PICU were included. Surgical site infections were excluded. Data were obtained from infection surveillance reports; each HAI was reviewed for validity and attribution based on National Healthcare Safety Network definitions. HAIs were grouped into 3 time periods: pre-pandemic (January 2019–February 2020), pandemic (March 2020–February 2022), and post-pandemic (March 2022–November 2023). Infection rate ratios were calculated for pre-pandemic and post-pandemic periods. **Results:** Among 2,959 PICU patients admitted during the study period, there were 60 HAI events (4.78 per 1,000 patient days). Rates generally remained steady throughout with slight increases and decreases between time periods (Table 1). There was no significant difference in CAUTI, CLABSI, or HAVRI rates noted in the PICU between pre-pandemic and post-pandemic periods despite a significantly higher device utilization ratio in the post-pandemic period for both urinary catheters and central lines (IRR, 0.89; $p < 0.05$; 95% CI, 0.82–0.97). The most frequent HAI in all time periods was CAUTI. **Conclusion:** Unlike reports from adult centers, no significant variation between time periods was noted for HAIs in our pediatric center. Despite numerous COVID-19-related changes in infection prevention and control measures and contexts throughout the study period, HAI rates remained stable. This may be due in part to the lower burden of critically ill COVID-19 pediatric patients compared to adult populations. Additionally, this could indicate resiliency and consistency in practice among pediatric providers throughout the pandemic. Further evaluation of pediatric HAIs in the context of the COVID-19 pandemic may reveal practices that could be replicated elsewhere to control HAI rates.

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Poster Presentation - Top Poster Abstract

Subject Category: Public Health

Public Health Applications of Patient Transfer Networks—Colorado, 2022–2023

Kristen Marshall, CDC, Colorado Department of Public Health and Environment; Karlie Hoetzer, Colorado Department of Public Health and Environment; Jennifer Driscoll, Colorado Department of Public Health and Environment; Braden Bardach, Ascension All Saints Hospital; Janell Nichols, Colorado Department of Public Health; Samuel Baird, Colorado Department of Public Health and Environment; Vishnu Panicker, Colorado Department of Public Health and Environment; Devon Williford, Colorado Department of Public Health and Environment and Christopher Czaja, Colorado Department of Public Health and Environment

Background: During 2021–2023, an increase in *Klebsiella pneumoniae* carbapenemase producing Enterobacterales species (KPC-CRE) cases occurred among patients admitted to several overlapping healthcare facilities, prompting an investigation by the Colorado Department of Public Health and Environment (CDPHE). We applied social network analysis (SNA) to identify KPC-CRE networks and other multidrug-resistant organism (MDRO) transmission, created a tool for public health

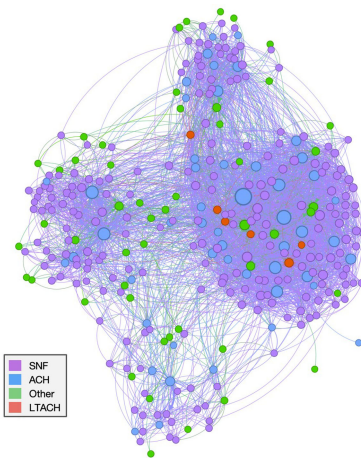


Figure 1. Social Network of 2022 CMS Patient Transfers in Colorado. This network shows Medicare beneficiary inpatient transfers (edges) between healthcare facilities (nodes), stratified by facility type (node color). SNF, skilled nursing facility. ACH, acute care hospital. Other, facilities not otherwise classified. LTACH, long term acute care hospital.

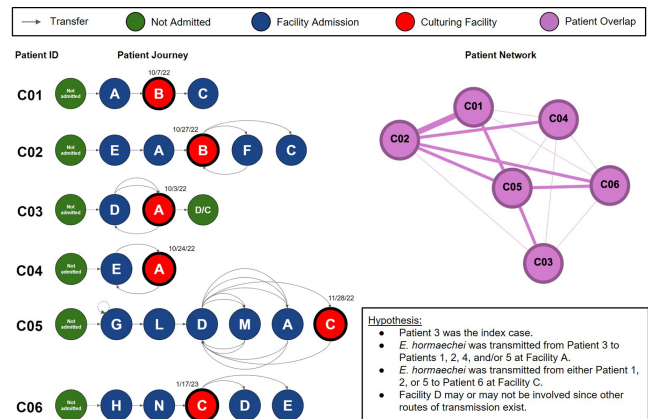


Figure 2. Example of patient journey diagrams coupled with a patient overlap network. These visualization tools enable public health to identify inpatient overlap and hypothesize where clustered *E. hormaechei* transmission may have occurred based on culture date.

prevention planning and for facilities to examine their own patient transfer connectivity, and explored additional public health and emergency preparedness applications. **Methods:** A statewide patient transfer network was created using 2021–2022 Medicare beneficiary data. Sub-networks were isolated from the larger network to examine a cluster of facilities involved in a KPC-CRE outbreak, defined as ≥ 2 KPC-CRE cases related by whole genome sequencing (WGS). WGS was conducted at the CDPHE State Lab. Highly connected facilities were determined by patient transfers between at least two KPC-CRE testing facilities. Individual patient journeys were constructed using admissions and culture date. SNA was conducted in RStudio; visualizations, network metric calculations, and clustering analysis were conducted using Gephi and ArcGIS software. **Results:** SNA yielded 4,864 direct patient transfers between 326 healthcare facilities (220 skilled nursing facilities, 50 acute care hospitals, 32 critical access hospitals, six long term acute care hospitals, and 18 facilities not previously classified; Figure 1). WGS identified five separate KPC-CRE outbreaks among 14 patients during February 2022–January 2023; 14 patient specimens were collected at four testing facilities. We identified five highly connected facilities in addition to the four testing facilities. Patient journeys allowed us to identify possible locations of KPC-CRE transmission in four of the five outbreaks (Figure 2). CDPHE provided guidance to all involved facilities on admission

screening, routine point prevalence surveys, and interfacility communication as part of an MDRO prevention plan. CDPHE then developed the transfer network into an interactive ArcGIS dashboard enabling facilities to examine their own patient transfer patterns. **Conclusions:** SNA enabled CDPHE to identify at-risk facilities for KPC-CRE transmission and create an interactive tool for facility and public health use. Future applications of patient transfer networks can include geographical grouping of facilities based on transfers to zone healthcare coalitions and conduct preparedness activities, and creating medical operations preparedness plans for emergencies or disasters.

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Health Equity Factors and Healthcare-Associated Infections in Louisiana Facilities, 2022

Tamia Dixon, Louisiana Department of Health - Office of Public Health; Grace Lee, Louisiana Department of Health - Office of Public Health and Alexa Ramirez, Louisiana Department of Health

Background: Health equity is a critical consideration in public health research, emphasizing the importance of fair and just access to healthcare resources. This study explores the impact of health equity factors on the incidence rates of Central Line-Associated Bloodstream Infections (CLABSI) and Methicillin-Resistant Staphylococcus aureus (MRSA) across diverse healthcare facilities in Louisiana. **Methods:** We conducted a comprehensive analysis utilizing 2022 data from the National Healthcare Safety Network (NHSN). Fourteen healthcare facilities were randomly selected from nine regions in Louisiana, with guidance from the 2022 NHSN external validation toolkit. Key health equity factors from Health Resources and Service Administration (HRSA) were assessed, including urbanicity, MUA/P, and HPSA_Primary Care. Risk ratios were calculated to quantify the association between these health equity factors and the incidence rates of CLABSI and MRSA. **Results:** The findings reveal intriguing insights into the relationship between health equity factors and infection rates. In urban settings, the risk of CLABSI was lower (Risk Ratio: 0.634, 95% CI: 0.2442–1.646), contrasting with a significantly higher risk of MRSA (Risk Ratio: 1.7, 95% CI: 1.119–2.582). This suggests a complex interplay between urbanicity and the specific infection types. For MUA/P, no significant impact on CLABSI rates was observed (Risk Ratio: 0.963, 95% CI: 0.4225–2.195), but an increased risk of MRSA emerged (Risk Ratio: 1.652, 95% CI: 1.029–2.652). In healthcare professional shortage areas for primary care (HPSA_Primary Care), both CLABSI (Risk Ratio: 1.37, 95% CI: 0.5854–3.204) and MRSA (Risk Ratio: 2.098, 95% CI: 1.305–3.372) exhibited elevated risks, though only MRSA risk was statistically significant. **Conclusions:** This research underscores the nuanced relationship between health equity factors and infection rates in healthcare facilities. Urban settings may contribute to a lower risk of CLABSI but a higher risk of MRSA, emphasizing the need for tailored preventive strategies. Living in medically underserved areas appears to heighten the risk of MRSA, warranting targeted interventions. Additionally, healthcare professional shortage areas for primary care demonstrate potential associations with increased risks for both CLABSI and MRSA. These findings provide valuable insights for public health practitioners, policymakers, and healthcare administrators aiming to address health disparities and enhance infection control measures in diverse healthcare settings. Further research is encouraged to unravel the multifaceted dynamics influencing infection rates and to inform targeted interventions for improved health outcomes.

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OPTIMIS PRO – A Novel Algorithm to Improve Perioperative Antibiotic Administration

Mark McIntyre, University Health Network - Toronto Western Hospital; Tariq Esmail, University Health Network - Toronto Western Hospital; Kyle Kirkham, University Health Network - Toronto Western Hospital; Timothy Jackson, University of Toronto; Qasim Mohiuddin, University Health Network and Alon Vaisman, Infection Prevention and Control, University Health Network

Objectives The selection and dosing of surgical antimicrobial prophylaxis (SAP) to prevent surgical site infections (SSIs) is often improvisational and inappropriate in clinical settings resulting in increased risk of SSI. We therefore developed and implemented a novel computer decision support tool, OPTIMIS PRO (OPTIMIZing PROphylaxis), to improve appropriate SAP selection specific to each patient’s procedure and clinical context. **Methods:** This quality improvement study was conducted at a tertiary hospital network over 2 years, divided into pre-intervention (June 2021-June 2022) and post-intervention (June 2022-June 2023) periods. The intervention was a computer decision support tool programmed within the hospital’s health information system to provide patient-specific SAP recommendations based on four variables: procedure name, patient’s beta-lactam allergy status, MRSA status, and weight. Approximately 3046 unique surgical procedures were identified and a specific best practice SAP recommendation for each surgery was identified based on international practice guidelines, up-to-date literature, and panel expertise input from 14 surgical divisions at our institution. Safety of ceftazolin prophylaxis among patients with self-reported beta-lactam allergy was established in the pre-operative clinic using a validated simple two-item questionnaire (Figure 1). During each standard preoperative preparation, a best practice SAP recommendation alert was then provided to the responsible anesthesiologist based on the inputs from the four aforementioned variables (Figure 2). To assess the impact of the OPTIMIS PRO tool on antibiotic prescribing, we retrospectively audited SAP selection before and after implementation, also assessing appropriateness for each of the specific inputs using evidence-based criteria. **Results:** Over 30 000 OPTIMIS PRO recommendation alerts were logged in the 12-month post-intervention period. A random sample audit of 408 surgical encounters were selected from the pre- and post-intervention period for analysis. Overall, appropriate antibiotic administration rose from 77% (161/208) to 92.5% (185/200) (x2=18.0, p < 0 .001) post-intervention. Usage of

