Presentation Type:
Oral Presentation - Top Poster Abstract
Subject Category: Quality Improvement
Determinants of Adherence with Antimicrobial Resistant Organism (ARO) Admission Screening in a Provincial Health Care System
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Background: Effective integration of antimicrobial resistant organism (ARO) admission screening into clinical information systems (CIS) can facilitate prompt identification of patients at risk of an ARO and interrupt transmission. However, ARO admission screening remains suboptimal in Alberta, Canada following implementation of the ARO admission screening tool in the provincial CIS. We sought to understand the determinants of adherence with the use of the ARO admission screening tool in the CIS. **Methods:** A mixed-methods study was conducted using a survey, human factors observations, and qualitative focus groups. Eligible participants included nursing staff and physicians from emergency departments and in-patient units in acute care and acute rehabilitation facilities where the ARO admission screening tool was utilized in the CIS in Alberta, Canada from September 6, 2023 to June 18, 2024 (n=100). A survey (REDCap) explored staff perceptions and experiences using the tool in the CIS. Observations and interviews of nursing staff completing the tool were guided by the Systems Engineering Initiative for Patient Safety model. Virtual (Zoom) semi-structured focus groups explored barriers and enablers of using the tool guided by the Theoretical Domains Framework. Descriptive analysis of survey responses was conducted using Microsoft Excel (Version 2409). Field notes and focus group transcripts were used for a rapid qualitative, thematic analysis. A weaving narrative by theme was used to integrate survey results with findings from the observations and focus groups. **Results:** There were 527 survey respondents representing all 5 health zones, 5 nurses observed and 20 interviews conducted by the human factors team, and 24 participants in 6 focus groups. Focus group participants represented different sized hospitals (12-1,099 beds) with varying ARO admission adherence rates (29-83%). Three emergent themes arose: context, the ARO admission screening tool, and the individual. Contextual factors included time constraints, increasing nursing workload, competing priorities, lack of patient co-operation, and a need to increase interactions with infection prevention and control programs. Attributes of the tool impacting completion included location of the tool within the CIS, lack of prompts, and multiple sources of information required to complete the tool. At an individual level, themes arose related to experience, perceptions of ARO screening, and lack of training that influenced completion of the tool. **Conclusions:** Among the emergent themes, multiple determinants were identified influencing the use of the ARO admission screening tool in the provincial CIS. These findings will help inform future strategies to improve ARO admission screening and reduce ARO transmission.

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Defining Thresholds to Identify Hospitals in a Healthcare System with Opportunities to Significantly Improve C. difficile Infections
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Background: Clostridioides difficile infections (CDI) are associated with patient morbidity and mortality and also may impact reputational and financial metrics. CDI was identified as a healthcare-associated infection of concern at several of the hospitals in our healthcare system and set as a target for improvement. We sought to create an easily interpretable tool to help select hospitals with the greatest opportunity to benefit from this work. **Methods:** The National Healthcare Safety Network's (NHSN) data (infection counts and number of predicted infections) for LabID CDI from Oct 2023-Sept 2024 were exported for 3 academic and 8 community hospitals in our healthcare system in eastern Massachusetts and New Hampshire. Using published source code from the Centers for Disease Control and Prevention recreated in R software (v.4.3.3), we calculated the statistical significance of the Standardized Infection Ratio (SIR) relative to 1.0 using the p-value. We then performed the statistical test iteratively by adjusting the number of infections by one in each direction from the true observed number of infections, to establish thresholds for significantly improved or worsened performance. Data were displayed as gauge charts with indication of current SIR statistical significance defined by color (red, yellow and green) and distance to threshold that would alter that significance (See Figure). Viable opportunities for improvement were defined as being within 5 or fewer infections of calculated thresholds. **Results:** Review of CDI data across all 11 sites demonstrated more improvement opportunities at some sites than others. Four sites were in green ranges, seven in yellow and none in red. All opportunities for viable improvement were identified in the yellow range; 5 of 11 sites had potential for improvement in SIR (Hospitals C, D, E, I, K) and 2 for worsening of SIR (Hospitals G, J); see Figure. **Conclusion:** In our healthcare system, this model provided insight into site-specific opportunities for improvement in CDI by highlighting sites closest to achieving a statistically significant change in SIR. Although factors such as morbidity and cost may influence selection of targets for improvement, visual depiction of viable thresholds for change in SIR may provide an indicator of facilities likely to yield the most benefit relative to investment required for reduction efforts.

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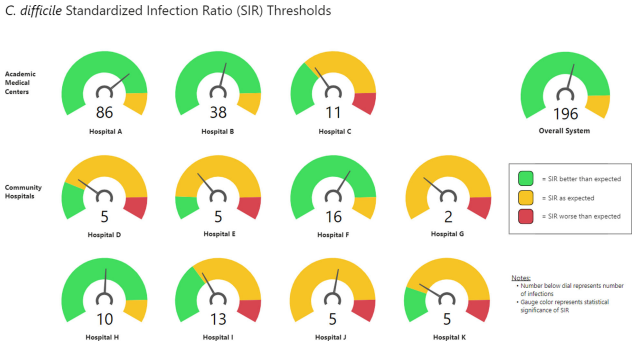

Presentation Type:
Oral Presentation - Top Poster Abstract
Subject Category: Regulatory issues
Tackling NHSN Location Mapping in a Large Healthcare System Utilizing a Robust Decision Support Tool
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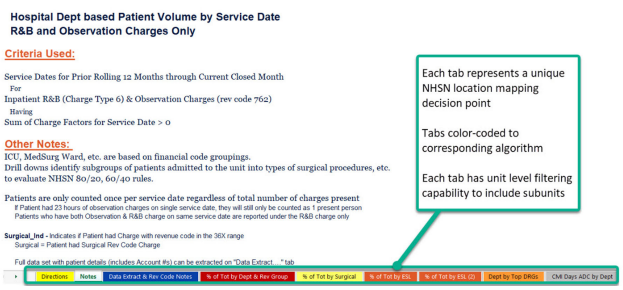
Background: Hospitals experienced increased demand for acute care and specialty services during recovery following COVID-19 epidemics. Internal analysis identified potential inaccuracies in NHSN location unit designations across a large healthcare system with 2,249 mapped NHSN locations. Findings revealed inconsistencies in how location change decisions were determined mainly from the type of data applied. Facilities

Figure 1 Decision Support Tool (DST) for Standardization of NHSN Location Mapping Based on Unique Location Data



utilized finance data to determine NHSN location mapping creating limitations. NHSN locations defined by patient populations, associated with baseline risk adjustments to provide comparison performance and impacts CMS metrics. **Methods:** Decision Support Tool (DST) based on NHSN to evaluate patient populations for acuity, service line data indicating specialty services, financial billing codes, DRG and surgical or non-surgical populations. The DST outlines data elements for review when validating mapped locations. Each tab represents a unique data element to analyze as part of the NHSN decision algorithm (Figure 1). Unit level data aggregates in DST tabs (Figure 2). Implementation consisted of a pilot followed by a regionally phased implementation via coaching calls and follow-up touchpoints. Although all units were reviewed, specific activities focused on non-CMS reportable units such as telemetry, step-down, mixed acuity. As a part of the defined change control process facilities followed an internal standardized workflow to document changes, dates and reasons for change for historical reference (Figure 3). NHSN facility population changes were applied to vendor surveillance software utilized for CDA direct reporting to NHSN. System and facility internal record keeping promotes a standardized process for data validity, associated software maintenance and CMS reporting compliance. **Results:** The majority of changes were made to units mapped as telemetry with a 62% reduction overall. Figure 4 illustrates the non-CMS reporting locations with notable location

Figure 2 Decision Support Tool (DST) Unit Level Data: Tab detail from Figure 1

Acuity Level: Red Tab "% of Tot by Dept & Rev Group"

Sum of Patient_Days	Column Labels			
Nursing Station / Dept / Rev Code	ICU	Intermediate/Step Down	Ward	Grand Total
4NEN	97.22%	2.19%	0.58%	100.00%
650 - ICU/CRITICAL CARE-4N	97.22%	2.19%	0.58%	100.00%
4NWN	66.67%	23.81%	9.52%	100.00%
650 - ICU/CRITICAL CARE-4N	66.67%	23.81%	9.52%	100.00%
4SEN	96.02%	3.21%	0.78%	100.00%
650 - ICU/CRITICAL CARE-4N	96.02%	3.21%	0.78%	100.00%
4SWN	96.42%	2.66%	0.92%	100.00%
650 - ICU/CRITICAL CARE-4N	96.42%	2.66%	0.92%	100.00%
Grand Total	96.49%	2.75%	0.76%	100.00%

Non-Surgical or Surgical: Yellow Tab "% of Tot by Surgical"

Sum of Patient_Days	Column Labels		
Nursing Station / Dept / Rev Code	Non-Surgical	Surgical	Grand Total
4NEN	20.44%	79.56%	100.00%
650 - ICU/CRITICAL CARE-4N	20.44%	79.56%	100.00%
4NWN	57.14%	42.86%	100.00%
650 - ICU/CRITICAL CARE-4N	57.14%	42.86%	100.00%
4SEN	22.44%	77.56%	100.00%
650 - ICU/CRITICAL CARE-4N	22.44%	77.56%	100.00%
4SWN	28.45%	71.55%	100.00%
650 - ICU/CRITICAL CARE-4N	28.45%	71.55%	100.00%
Grand Total	23.29%	76.71%	100.00%

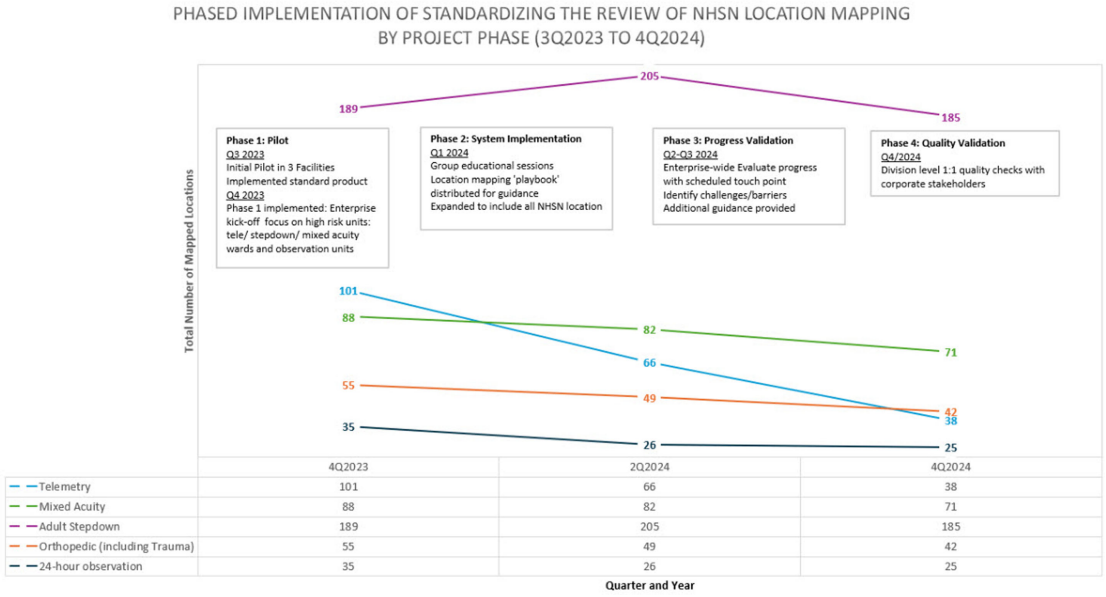
Specialty Population: Light Orange Tab "Dept by Top DRG"

Nursing_Station_Code	DRG_HCFA	DRG_Desc	Distinct Pats	Patient Days	CMI	ADC
4NEN	003	003- ECMO TRACH MV >96 W OR	19	313	21.32	1
	004	004- TRACH/ MV >96 W/O MAJ OR	20	255	14.70	2
	023	023- CRANIOTOMY W DEVICE W MCC	18	70	5.68	1
	064	064- IC HEM OR CEREB INF W MCC	23	68	2.00	1
	208	208- RESP SYS DX W VENT <=96	34	89	2.70	1
	481	481- HIP/FEMUR PX X MJ W CC	30	66	2.08	1
	522	522- HIP REPL W PDX FX WO MCC	17	26	2.12	1
	853	853- INF & PAR DIS OR PX W MCC	26	124	5.00	1
	871	871- SEPTI/SEPS W/O MV>96HR W/MCC	86	259	1.98	1
	917	917- POIS/TOX EFF OF DRUG W MCC	18	32	1.60	1
4NEN Total			291	1,302	9.66	4
4NWN	064	064- IC HEM OR CEREB INF W MCC	1	3	2.00	1
	068	068- NS CVA/PRE OCCL-INF WO MCC	1	1	0.87	1
	208	208- RESP SYS DX W VENT <=96	1	3	2.70	1
	252	252- OTH VASC PX W MCC	1	1	3.35	1
	322	322- P CV PX INT DEV WO MCC	1	2	1.82	1
	324	324- C INT LITH W INT DEV O MCC	1	2	2.97	1
	377	377- GI HEM W MCC	1	2	1.79	1
	459	459- SPINAL FUSN X CERVICAL MCC	1	1	6.63	1
	467	467- REV HIP/KNEE REPL W CC	1	1	3.49	1
	481	481- HIP/FEMUR PX X MJ W CC	1	1	2.07	1
4NWN Total			10	17	2.67	2

Figure 3 Standardized Facility Workbook: Internal documentation of the defined change control process

NHSN						Facility				DST						
orgid	Your_Code	Your_Label	CDC_Code	HL7_Code	Status A = active I = inactive	EHR Location	Dept / Nursing Station	Open Date	Closed Date	Acuity per DST (ICU / Step / Ward)	Surgical	Specialty Population (ESL%)	Dept by Top DRG (only review if ESL isn't clear)	Confirmed CDC Location Code: Based on DST	Change NHSN?	Comments (reason for change, details of eval, outstanding items, where population moved from, etc.)
xxxxx	CVT STEP	CVT (NEW 4.1.24)	IN:ACUTE:STEP	1099-1	A	CVT	630	4.1.24								Former telemetry ward redesignated to adult stepdown based on DST
xxxxx	OBS MS	OBS MED/SURG (NEW 4.1.24)	IN:ACUTE:WARD:MS	1061-1	A	OBS	612	4.1.24								Former adult mixed acuity ward redesignated to med/surg ward based on DST
xxxxx	TELE MED	TELE 2ND MEDICAL (NEW 4.1.24)	IN:ACUTE:WARD:M	1060-3	A	TELE	635	4.1.24								Former telemetry ward redesignated to medical ward based on DST
xxxxx	CVT ICU	CVT CCU CARDIOVASCULAR ICU	IN:ACUTE:CC:CT	1032-2	A	CVTCCU	655			ICU 97%	YES (84% surg)	YES	60% cardiac; 30% thoracic	IN:ACUTE:CC:CT	No	No change needed. Validated based on DST
xxxxx	OBS MIX	OBS MIXED ACUITY (RETIRED 3.31.24)	IN:ACUTE:MIXED:ALL_ADULT	1210-4	I	OBS	612		3.31.24	Ward 90% (Step 10%)	YES (60% surg)	NO	general	IN:ACUTE:WARD:MS	Yes	Utilizing the division decision support tool this location no longer meets mixed acuity criteria, redesignated as med/surg ward. Retired 3/31/24
xxxxx	CVT	(TELE2 TO CVT 4/1/21)RTRD 3.31.24	IN:ACUTE:WARD:TEL	1208-8	I	CVT	630		3.31.24	Step (99%)	NO (40% surg)	NO	40% cardiac	IN:ACUTE:STEP	Yes	Utilizing the division decision support tool this location no longer meets TELE criteria, redesignated as adult stepdown. Retired 3/31/24
xxxxx	TELE	TELE 2ND FLOOR (RTD 3.31.24)	IN:ACUTE:WARD:TEL	1208-8	I	TELE	635		3.31.24	Ward (93%)	NO (15% surg)	NO	18% cardiac	IN:ACUTE:WARD:M	Yes	Utilizing the division decision support tool this location no longer meets TELE criteria, redesignated as medical ward. Retired 3/31/24

Figure 4 Evaluation of Non-CMS Reporting Location



mapping changes. Patients in an 'observation' status were found to be housed within any inpatient unit and required another data tool for analysis. Overall, the number of mapped 24-hour observation units is low (1.7%) across the healthcare system. **Conclusions:** The initiative standardized objective data and competency which elevated the trained infection preventionists on this topic. Admission orders offer telemetry for evaluation and treatment requiring continuous cardiac monitoring. NHSN definition is specific requiring 80% of unit patients to have a cardiac centered DRG/ care and cardiac specialty treatment to meet telemetry definition. NHSN recommends at minimum annual mapping evaluation. As a large healthcare system, the DST analysis is managed continuously due to growing service lines, acquisitions and construction projects.

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Investigating Microbial Mitigation for Surgical Incision Sites Using UV-C

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Background: Surgical site infections (SSIs) are a serious complication following surgery. The emergence of multidrug-resistant pathogens has diminished the effectiveness of traditional antimicrobials necessitating a new approach to prevention and treatment. We are developing an innovative device (xIP) that uses UV-C to inactivate pathogens in surgical incision sites, mitigating the risk of developing an SSI.
Irradiation in the UV-C range (200-280 nm) is known to inactivate surface and airborne pathogens by damaging nucleic acids. However, there is a limited research on its effectiveness for surgical sites. **Methods:** A Krypton-Chloride Excimer (KrCl*) lamp (λpeak = 222 nm), a pulsed Xenon (PX) emitter (broad spectrum), and a UVC LED (λpeak = 282 nm) were evaluated. Inactivation of E. coli ATCC 29425 and MRSA USA300 was determined by in vitro exposure to UV-C at doses of 0 (control), 2, 5, 10, 15, and 20 mJ/cm2. Dosing was controlled by measuring irradiance (mW/cm2) from each lamp and calculating the time to reach desired exposure levels.
Microbial suspensions of log-phase cultures were pelletized and resuspended in phosphate buffered saline three times and diluted to 107 CFU/mL. After UV exposure, suspensions were plated on an agar substrate using a grid-based method. After incubating for 48 hours at 37°C, remaining viability was determined. **Results:** PX and KrCl* emitters exhibited 5+ log reduction for both microorganisms, while LED showed 4 and 4.5 log reduction against E. coli and MRSA, respectively. PX demonstrated the highest inactivation efficiency (log-reduction per unit dose), followed by KrCl* and LED. **Conclusions:** In-vitro data suggest that surgical sites could be effectively treated in less than a minute with a small hand-held device and in less than 10 seconds with a larger device. Inactivation of MRSA using a superficial wound model in hairless SHKI1-elite mice (Charles River strain code 477) is in progress. In-silico modelling using optical raytracing is in progress to understand the impact of wound and skin micro-environment on the performance of the device. These data will inform ex-vivo testing using porcine or cultured human skin (EpiDerm FT) models to evaluate the performance in different wound types including incisions, abrasions, and burns, as well as the impact of fluids like saline and blood. Development of the xIP device is underway in collaboration with healthcare professionals to produce a product that is effective, fits into current practice, and user friendly. Upon successful completion of a prototype device, clinical efficacy will be explored.

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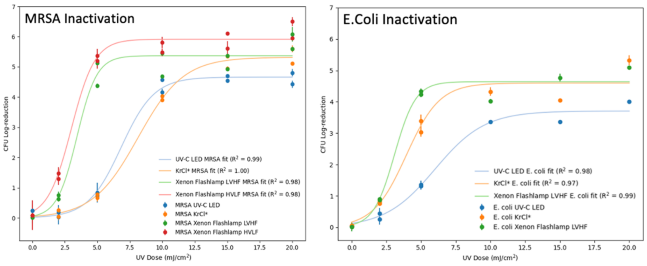

- **5-log (99.999%) inactivation** observed in **MRSA** at human-safe doses for multiple emitters.
- **4+ log (99.99%) inactivation** observed in ***E. coli***, qualifying it as non-infectious conservative surrogate for use in high throughput testing.