Funding: None
Disclosures: None
Doi:10.1017/ice.2020.535

Presentation Type:
Oral Presentation

Transmission of Listeriosis in a Neonatal Intensive Care Unit Supported by Whole-Genome Sequencing

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Background: Listeriosis is a rare but serious infectious disease caused by *Listeria monocytogenes* (LM) and predominantly transmitted through contaminated food. Moreover, 15% of listeriosis cases in the United States are pregnancy associated; nosocomial neonatal transmission in hospitals is extremely rare. In July 2018, the California Department of Public Health (CDPH) was notified of 4 patients, a mother–neonate pair and twin neonates, with listeriosis at the same hospital. The CDPH and San Diego County Health and Human Services Agency initiated an investigation to determine transmission and prevent additional infections. **Methods:** We reviewed medical records of the neonates and their mothers, interviewed the mothers with a detailed food exposure questionnaire, interviewed healthcare personnel (HCP), and performed an infection control assessment of the neonatal intensive care unit (NICU). CDPH performed whole-genome sequencing (WGS) on LM isolates that were then analyzed by whole-genome multilocus sequence typing (wgMLST) by the Centers for Diseases Control and Prevention (CDC) to assess relatedness in PulseNet, a public health laboratory database. The CDC also performed testing for LM on formalin-fixed placentas from the mother of the twins. **Results:** During a 1-week period, 4 patients with LM were identified at the hospital. A mother was admitted at 31 weeks gestation with acute abdominal and back pain that progressed with precipitous vaginal delivery and postpartum sepsis. Her neonate was resuscitated, transported to the NICU, underwent a sepsis evaluation, received antibiotics, and was transferred to another hospital within 6 hours. Maternal blood, placenta, and neonatal blood cultures grew LM. Twin neonates, born to an asymptomatic mother and present in the NICU during the index neonate's stay, developed acute infection 4 and 6 days after the index neonate's transfer; blood cultures confirmed LM. The LM isolates from the 4 patients were indistinguishable by wgMLST and were not related to other PulseNet isolates. LM was not detected in the twin placentas. There were no common food exposures between the mothers. At least 1 common HCP cared for all 3 neonates. Infection control lapses included lack of proper hand hygiene during the index neonate's resuscitation and potentially after cleaning and disinfection of the neonate's incubator. **Conclusions:** This report provides supportive evidence that nosocomial transmission of LM can occur during a brief NICU stay due to lapses in infection control practices. Strict adherence to standard precautions in the delivery room and NICU is imperative to prevent cross transmission.

Disclosures: None
Funding: None
Doi:10.1017/ice.2020.536

Presentation Type:
Oral Presentation

Trends in Hospital Onset *Clostridioides difficile* Infection Incidence, National Healthcare Safety Network, 2010–2018

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Background: *Clostridioides difficile* infection (CDI) is one of the most common laboratory-identified (LabID) healthcare-associated events reported to the National Healthcare Safety Network (NHSN). CDI prevention remains a national priority, and efforts to reduce infection burden and improve antibiotic stewardship continue to expand across the healthcare spectrum. Beginning in 2013, the Centers for Medicare and Medicaid Services (CMS) required acute-care hospitals participating in CMS' Inpatient Quality Reporting program to report CDI LabID data to NHSN and, in 2015, extended this reporting requirement to emergency departments (ED) and 24-hour observation units. To assess national progress, we evaluated changes in hospital onset CDI (HO-CDI) incidence during 2010–2018. **Methods:** Cases of HO-CDI were reported to NHSN by hospitals using the NHSN's LabID criteria. Generalized linear mixed-effects modeling was used to assess trends of HO-CDI by treating the hospital as a random intercept to account for the correlation of the repeated responses over time. The data were summarized at the quarterly level, the main effect was time, and the covariates of interest were the following: CDI test type, inpatient community-onset (CO) infection rate, hospital type, average length of stay, medical school affiliation, number of beds, number of ICU beds, number of infection control professionals, presence of an ED or observation unit , and an indicator for 2015 to account for CDI protocol changes that required hospitals to conduct surveillance in both inpatient and ED or observation unit setting. **Results:** During 2010–2013, the number of hospitals reporting CDI increased and then stabilized after 2013 (Table 1). Crude HO-CDI rates decreased over time, except for an increase in 2015 and steeper reduction thereafter. (Table 2). During 2010–2014, the adjusted quarterly rate of change was −0.45% (95% CI, −0.57% to −0.33%; $P < .0001$). The rate of reduction was smaller in 2010–2014 compared to those of 2015–2018

Table 1.

Table 1. Annual crude healthcare facility-onset *Clostridioides difficile* infection (HO-CDI) rates, 2010-2018

Year	No. of facilities	No. HO events	No. of patient days	HO Rate / 1,000
2010	618	19,870	27,395,881	0.73
2011	777	26,103	35,301,030	0.74
2012	1,462	40,365	55,376,026	0.73
2013	3,492	98,673	144,621,429	0.68
2014	3,502	99,831	145,208,862	0.69
2015	3,512	100,464	140,196,226	0.72
2016	3,536	95,371	141,226,760	0.68
2017	3,608	81,854	142,283,723	0.58
2018	3,588	69,281	143,004,833	0.48

Table 1.

Table 2. Adjusted quarterly decrease estimates from the multivariable interrupted time series generalized linear mixed random intercept model

Variable[a]	Estimate	Standard Error	p-value	Rate Ratio	Annual percent change of rate ratio (95% CI)
Slope1[b]	-0.005	0.001	<0.0001	0.996	-0.45 (-0.01, -0.33)
Indicator[c]	0.583	0.020	<0.0001	1.791	79.14 (72.42, 86.11)
Slope2[d]	-0.029	0.001	<0.0001	0.972	-2.82 (-2.53, - 2.21)

a: the model adjusted for the following variables: CDI test method; community-associated infection rate (CO); facility type; medical school affiliation type; number of beds; number of Intensive Care Unit (ICU) beds; presence of an emergency department of observation unit; b: estimate, rate ratio and % of rate change at quarterly level for the year between 2010 to 2014; c: estimate, ratio and % of rate change 2015 vs. 2014; d: estimate, rate ratio and % of rate change at quarterly level for the year between 2015-2018.

(−2.82%; 95% CI, −3.10% to −2.54%; $P < .0001$). Compared to 2014, the adjusted rate in 2015 increased by 79.14% (95% CI, 72.42%–86.11%; $P < .0001$). **Conclusions:** The number of hospitals reporting CDI LabID data grew substantially in 2013 as a result of the CMS requirement for reporting. Adjusted HO-CDI rates decreased over time, with a rate hike in the year of 2015 and a rapid decrease thereafter. The increase in 2015 may be explained by changes in the NHSN CDI surveillance protocol and better test type classification in later years. Overall decreases in HO-CDI rates may be influenced by prevention strategies.

Funding: None
Disclosures: None
Doi:10.1017/ice.2020.537

Presentation Type:
Oral Presentation

Universal Decolonization Reduces MDRO Burden on High-Touch Objects in Nursing Home Resident Rooms and Common Areas

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Background: More than half of nursing home (NH) residents harbor a multidrug-resistant organism (MDRO), and MDRO contamination of the environment is common. Whether NH decolonization of residents reduces MDRO contamination remains unclear. The PROTECT trial was a cluster-randomized trial of decolonization versus routine care in 28 California NHs from April 2017 through December 2018. Decolonization involved chlorhexidine bathing plus nasal iodophor (Monday–Friday, every other week), and it reduced resident nares and skin MDRO colonization by 36%. **Methods:** We swabbed high-touch objects in resident rooms and common areas for MDROs before and after the 3-month decolonization phase-in (April–July 2017). Five high-touch objects (bedrail, call button and TV remote, doorknob, light switch, and bathroom handles) were swabbed in 3 resident rooms per NH based on care needs (Alzheimer's disease and related dementias (ADRD), ie, total care; ADRD, ambulatory care; and short stay). Five high-touch objects were also swabbed in the common area (nursing station, table, chair, railing, and drinking fountain). Swabs were processed for methicillin-resistant *S. aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), extended-spectrum β-lactamase (ESBL) producing *Enterobacteriaceae*, and carbapenem-resistant *Enterobacteriaceae* (CRE). We used generalized linear mixed models to assess the impact of decolonization on MDRO environmental contamination when clustering by NH and room and adjusting for room type and object because unclustered and unadjusted results are likely to be inaccurate. **Results:** A high proportion of rooms were contaminated with any MDRO in control NHs: 43 of 56 (77%) in the baseline period and 46 of 56 (82%) in the intervention period. In contrast, decolonization NHs had similar baseline contamination (45 of 56, 80%) but lower intervention MDRO contamination (29 of 48, 60%). When evaluating the intervention impact using multivariable models, decolonization was associated with significantly less room contamination for any MDRO (OR, 0.25; 95% CI, 0.06–0.96; $P = .04$) and MRSA (OR, 0.16; 95% CI, 0.05–0.55; $P = .004$) but nonsignificant reductions in VRE contamination (OR, 0.86; 95% CI, 0.23–3.13) and ESBL contamination (OR, 0.13; 95% CI, 0.01–1.62). CRE was not modeled due to rare counts (2 rooms total). In addition, room type was important, with common areas associated with 5-fold, 9-fold, and 3-fold higher contamination with any MDRO, MRSA, and VRE, respectively, compared with short-stay rooms. **Conclusions:** The high burden of MDROs in NHs calls for universal prevention strategies that can protect all residents. Although decolonization was associated with an 84% reduction in odds of MRSA contamination of inanimate room objects, significant reductions in VRE or ESBL contamination were not seen, possibly due to the lower proportion of baseline contamination due to these organisms. Multimodal strategies are needed to address high levels of MDRO contamination in NHs.

Funding: None
Disclosures: Gabrielle Gussin: Stryker (Sage Products): Conducting studies in which contributed antiseptic product is provided to participating hospitals and nursing homes. Clorox: Conducting studies in which contributed antiseptic product is provided to participating hospitals and nursing homes. Medline: Conducting studies in which contributed antiseptic product is provided to participating hospitals and nursing homes. Xttrium: