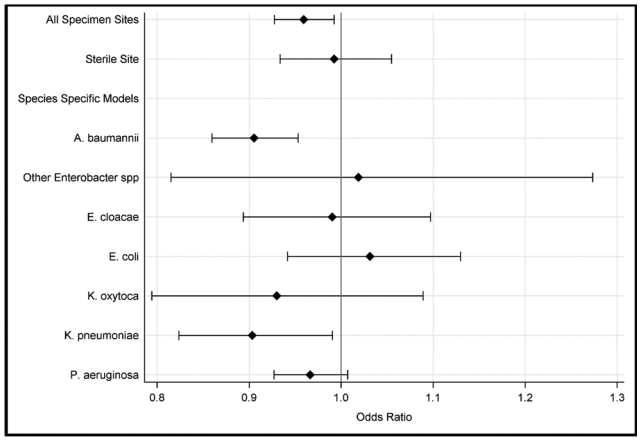
Figure 2. Annual Percent Change in Incidence of Difficult-to-Treat Resistance (DTR) among Gram-negative Isolates in Clinical Cultures among inpatients in the United States, 2012–2017



The point estimates represent annual percent change in DTR incidence and the horizontal bars represent corresponding 95% confidence intervals generated using weighted multivariate logistic regression controlling for hospital characteristics including bed size, US census division, urban/rural designation, teaching status, month of discharge, proportion of male patients, proportion of patients reported as Caucasian race, proportion of patients in specific age groups (0-18, 55-74, ≥75), and data source. The species-specific model presented was generated using all clinical cultures. The number of hospitals included in the analysis for each year ranged from 348 to 388.

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The opinions expressed in this abstract are those of the authors and do not represent any position or policy of the United States Centers for Disease Control and Prevention, the National Institutes of Health, the United States Department of Health and Human Services, or the United States government.

Disclosures. **All Authors:** No reported Disclosures.

2851. Impact of Antimicrobial-Resistant Gram-Negative Bloodstream Infections on Outcomes Among Pediatric Hospitalizations in the United States, 2009–2016

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Background. Antimicrobial-resistant (AMR) Gram-negative bloodstream infections (GNBSIs) are more challenging to treat and may be associated with higher rates of morbidity and mortality. However, no recent studies have assessed the impact of pediatric AMR GNBSIs on outcomes. This study's objective was to analyze the impact of AMR GNBSIs on mortality, length of stay (LOS), and costs among pediatric hospital admissions in the United States.

Methods. We conducted a retrospective cohort study of patients ages < 19 from the Premier Healthcare Database (2009–2016) limited to hospitals reporting ≥4 years of blood culture data and to encounters with susceptibility testing among the five most common laboratory-confirmed GNBSIs. AMR was defined per pathogen according to Centers for Disease Control and Prevention criteria. Outcomes mortality, LOS, and total patient encounter costs were compared between AMR and susceptible GNBSIs using Bayesian hierarchical regression modeling, which allowed us to analyze outcomes at the pathogen-level and to incorporate adjustment for confounding factors in order to produce risk-adjusted average differences or risk ratios (RR), and corresponding 95% credible intervals (CrI).

Results. Among 1,279 GNBSI encounters with susceptibility testing from 104 hospitals, 153 (12%) were AMR, but varied by pathogen. AMR GNBSI occurred more often among non-neonates (62% vs. 51%); non-neonates more often had hospital-acquired infections (27% vs. 13%) or were transferred from a healthcare facility (16% vs. 10%) vs. susceptible GNBSIs. The adjusted RR for mortality was 1.31 (95% CrI 0.62, 3.07) and adjusted average differences for LOS were 6.8 days (95% CrI: −0.3, 16.3) and for cost $23800 (95% CrI $400, $53900) comparing AMR to susceptible GNBSIs.

Conclusion. This study analyzed the impact of AMR GNBSIs, which were rare, on pediatric patient outcomes using laboratory-confirmed GNBSIs with susceptibility results and advanced statistical methods, finding the greatest impact of pediatric AMR on costs. Knowing the impact of AMR GNBSIs can help improve management of these serious infections, increase clinician and patient awareness of the issue, and further strengthen evidence for justifying pediatric antimicrobial stewardship.

Disclosures. **All Authors:** No reported Disclosures.

2852. Epidemiology of Emerging Carbapenemase-Producing Organisms (CPO) in Chicago, Illinois, 2013–2018

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Background. Emerging CPO in the Chicago area poses clinical and infection control challenges across the spectrum of care. Since November 2013, CPO are reportable to the Illinois' Extensively Drug-resistant Organism (XDRO) registry. We examined trends in mechanism of resistance (MOR) among CPO reported through December 2018.

Methods. MOR reported into the XDRO registry were identified by clinical laboratories performing molecular methods on routine clinical cultures, by public health laboratories during point prevalence surveys (PPS) in response to clusters and as part of a project to assess CPO prevalence in high-risk Chicago area healthcare settings. Chicago patients with known MOR other than *Klebsiella pneumoniae* carbapenemase (KPC) are investigated by Chicago Department of Public Health (CDPH) to implement containment strategies and identify risk factors within 6 months of culture date.

Results. MOR was identified in 40% (1,216/3,587) of CPO-positive specimens collected from unique Chicago patients; 87% were KPC, 7% New Delhi metallo-β-lactamase (NDM), 5% Verona integron-mediated metallo-β-lactamase (VIM), 0.6% OXA-48-type carbapenemases, and 0.01% Imipenemase metallo-β-lactamase (IMP) (figure). Since 2017, 15 patients with CPO expressed more than one MOR; 14 were identified during PPS at ventilator capable skilled nursing facilities (vSNF) or long-term acute care hospitals (LTACH), and one was hospitalized in India. Among 156 patients with non-KPC CPO, the median age was 64 years (range, 20–97), 107 (69%) were identified from rectal screening and 49 (31%) were from clinical specimens, most of which were urine 23 (47%) or blood 6 (12%). Among 134 patients with risk factor history, 64% had history of tracheostomy (Table 1). Among 113 patients without documented travel outside of the United States, all stayed overnight at an Illinois healthcare facility; 62% stayed in a vSNF and 24% in an LTACH within 6 months of identification (Table 2).

Conclusion. We have increasingly detected non-KPC CPO in Chicago; however, estimates of prevalence are limited by lack of systematic surveillance and molecular testing. The high proportion of CPO patients without travel who stayed in vSNF or LTACH underscores the need for infection control training and surveillance in these settings.

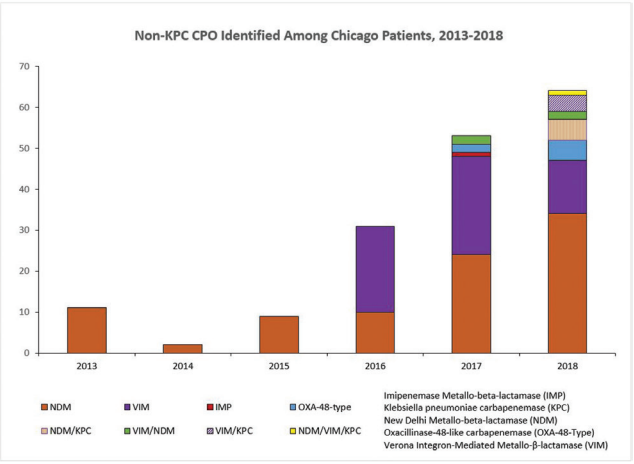

Table1. Risk Factors for non-KPC CPO identified among Chicago patients, 2013-2018. (N=134)

Risk Factor	n (%)
Tracheostomy	86 (64)
Percutaneous endoscopic gastrostomy (PEG) tube	81 (60)
Mechanical ventilation	60 (45)
Other invasive procedures*	29 (22)
Endoscopy	2 (1)

*Other invasive procedures including: Thoracoscopy, Gastric bypass surgery, Wound debridement.

Table 2. Recent travel and hospitalization* history of Non-KPC CPO patients among those with risk factor history obtained (N=134)

	2013 n (%)	2014 n (%)	2015 n (%)	2016 n (%)	2017 n (%)	2018 n (%)	Total n (%)
Recent overnight stay at an Illinois healthcare facility	6 (100)	1 (100)	5 (71)	30 (97)	46 (94)	34 (85)	122 (91)
Recent overnight stay at an Illinois vSNF	1 (17)	1 (100)	2 (29)	22(71)	34 (69)	23 (58)	83 (62)
Recent overnight stay at an Illinois LTACH	2 (33)	1 (100)	1 (14)	7 (23)	14 (29)	7 (18)	32 (24)
Recent overnight stay at an Illinois ACH	5 (83)	1 (100)	5 (71)	20 (65)	22 (45)	31 (75)	83 (62)
Foreign travel	2 (33)	0 (0)	4 (57)	4 (13)	4 (8)	7 (18)	21 (16)
Hospitalization outside of the United States	2 (33)	0 (0)	4 (57)	3 (10)	3 (6)	5 (13)	17 (13)

*Recent hospitalization is defined as within 6 months of culture collection

Disclosures. **All Authors:** No reported Disclosures.

2853. Innate Immune Response in Serum and Cerebrospinal Fluid of Neonates and Infants Infected with Parechovirus-A3 and Enteroviruses

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Session: 297. Pediatric Viral and Fungal Diseases
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Background. Parechovirus-A3 (PeV-A3) and enteroviruses (EVs) are the most common viral causes of neonatal and infantile sepsis. We previously reported that the clinical manifestations of PeV-A3 infection—e.g., high body temperature, tachycardia, and poor peripheral circulation, but not cerebrospinal fluid (CSF) pleocytosis—tend be more severe than those of EV infection. We tested the hypothesis that innate immune responses to PeV-A3 and EVs are distinct.

Methods. Using serum and CSF samples, we investigated immune responses of febrile neonates and infants <4 months in Niigata, Japan, from 2015 through 2018. PeV-A and EV infections were diagnosed with real-time PCR. PeV-A3 infection was diagnosed by sequence analysis of the VP1 region. The control was clinically well patients without serum and CSF findings suggestive of bacterial or viral etiology. The Milliplex MAP human cytokine/chemokine magnetic bead panel (Merck Millipore, Germany) was used to analyze 22 cytokines/chemokines related to innate immunity in serum and CSF.

Results. We evaluated 14 PeV-A3-infected and 15 EV-infected patients and 8 controls. Serum levels of proinflammatory cytokines/chemokines (fractalkine, interferon-α2, interleukin [IL]-1 receptor α, IL-6, IL-8, and IL-15) were significantly higher in PeV-A3-infected patients than in EV-infected patients ($P < 0.005$). Serum cytokine/chemokine profiles of EV-infected patients did not differ from those of controls. However, while most pro- and anti-inflammatory cytokines/chemokines in CSF were elevated in EV-infected patients, levels were low or undetectable in PeV-A3-infected patients and controls ($P < 0.005$).

Conclusion. PeV-A3-infected patients had high serum levels of proinflammatory cytokines/chemokines, which may explain why clinical manifestations were more severe in this patient group than in EV-infected patients. Conversely, the limited or nonexistent innate immune response in CSF from PeV-A3-infected patients might explain the absence of CSF pleocytosis. These findings improve our understanding of the differing pathophysiological characteristics of PeV-A3 and EV infection in neonates and young infants.

Disclosures. **All Authors:** No reported Disclosures.

2854. Enterovirus D68 Infections in Pediatric Patients in Central Ohio: Clinical Characteristics of a New Outbreak in 2018

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Background. Many aspects of EV-D68 pathogenesis in children are not fully understood. In 2014, we experienced an outbreak of EV-D68-associated acute respiratory illness affecting mostly asthmatic children with no cases of acute flaccid myelitis identified. Late in 2018, a new outbreak occurred. The objective of this study was to describe the differences in clinical presentation in children diagnosed with EV-D68 infection during the 2018 outbreak.

Methods. This is a single-center, observational study. Nasopharyngeal (NP) samples from patients <21 years of age that tested positive for rhinovirus/enterovirus (RV/EV) by the FilmArray respiratory panel v1.7 were prospectively collected. EV-D68 was confirmed using a laboratory-developed RT-PCR. Demographic, clinical characteristics, and semiquantitative EV-D68 loads were analyzed according to the clinical presentation.

Results. From May to October 2018, 1,987/3,633 (55%) samples were RV/EV positive. Of those 399/1,028 (39%) tested positive for EV-D68 (121 outpatients; 278 inpatients). Inpatients were older (3.1 vs. 1.8 year olds; $P < 0.01$) with no differences in sex or EV-D68 loads ($P > 0.05$). Within the inpatient cohort, 67 (1.4 year olds) children were previously healthy, 146 (4.1 year olds) had underlying asthma and 65 (2.5 year olds) had chronic medical conditions (24% vs. 53% vs. 23%, respectively). Most patients presented with respiratory symptoms (>95%), followed by fever (51%) or gastrointestinal symptoms (28%). Eleven children (4%) presented with neurologic manifestations including: acute flaccid myelitis in two children, opsoclonus myoclonus syndrome in one child, and seizures in the remaining eight. Rates of viral co-detection were low (8%) and none of the children with neurologic manifestations had another respiratory virus identified. Patients with neurologic findings had lower EV-D68 loads than those who did not (29 vs. 25 Ct values; $P = 0.03$).

Conclusion. EV-D68 infection was associated with significant morbidity, affecting children with underlying asthma at greater rates. It was associated with severe neurologic manifestations despite these children having lower EV-D68 loads. Active surveillance for EV-D68 should be routine to allow a better understanding of the epidemiology and severity of disease.

Disclosures. **All Authors:** No reported Disclosures.

2855. Respiratory Syncytial Virus Neutralizing Antibodies in Cord Blood and Serum from Infants up to 2 Years of Age in a Multinational Prospective Study

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Background. Respiratory syncytial virus (RSV) is the most common cause of lower respiratory tract infections (LRTI) during infancy worldwide. High cord blood (CB) concentrations of anti-RSV neutralizing antibody (nAb) may attenuate, delay, or prevent infant infection. We report RSV A and B nAb concentrations in CB and serum from a birth cohort at different time points through 2 years of age.

Methods. Between 2013 and 2017, newborns from 8 countries were studied prospectively from birth to 2 years of age (NCT01995175). CB was collected at birth for the entire cohort. A subcohort of children was randomly assigned to have one blood sample collected again at either 2, 4, 6, 12, 18, or 24 months of age. Sera were analyzed for RSV A and B nAb concentrations by serum neutralization assay. Active surveillance was used to identify LRTIs during the 2-year follow-up as previously reported.

Results. In total, 2,401 newborns were enrolled and followed up. >99% of infants had detectable CB RSV A and B nAb. Geometric mean antibody titers (GMTs) varied by country, but were overall higher for RSV B than for RSV A (327 vs. 251; Figure 1). The lowest GMTs were seen from CB sera collected from South African newborns (197 RSV A, 255 RSV B); Canadian newborns had the highest RSV A GMT (383), while Hondurans had the highest RSV B GMT (460). 1380 infants provided follow-up serum nAb results as part of the subcohort (Figure 2). Dramatic waning of GMTs was evident, with a ~3-fold drop in GMTs at 2 months of age, and an additional ~2-fold drop between 2 and 4 months of age. At 6 and 12 months of age, 71% and 50% of infants had RSV A nAb and GMTs were at a nadir of 14. At 6, 12, and 18 months of age, RSV B nAb was detected in 98%, 69%, and 63% of infants, respectively. The RSV B nAb nadir GMT of 20 was observed at 12 months of age, while the 6- and 18-month RSV B nAb GMTs were 30 and 31, respectively. A total of 1,017 LRTIs were identified during the 2-year study period; of which, 94 (9%) were caused by RSV A and 132 (13%) by RSV B. Associations between CB nAb levels and RSV infection will be presented.

Conclusion. Neutralizing Ab to RSV A and B was present at birth in infants from 8 countries, and waned over time. GMTs were at a nadir at 6 to 12 months of age.

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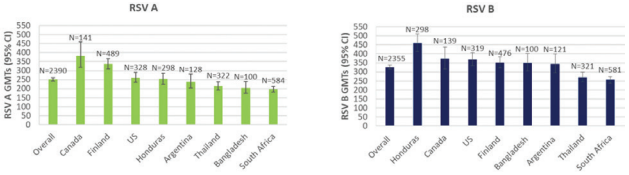
Figure 1. Geometric mean titers of RSV A and RSV B neutralizing antibodies in cord blood, overall and by country



[Per-protocol cohort] 2390 (99.5%) participants had available results for neutralizing antibodies against RSV A and 2355 (98.1%) for neutralizing antibodies against RSV B; Neutralizing antibody titers were expressed as ED60; **GMT**, geometric mean antibody titer; **95% CI**, 95% confidence interval; **N**, number of participants with available results