2628. Nasopharyngeal Microbiome in the First Weeks of Life Distinguishes Infants Who Subsequently Develop Lower Respiratory Tract Infections

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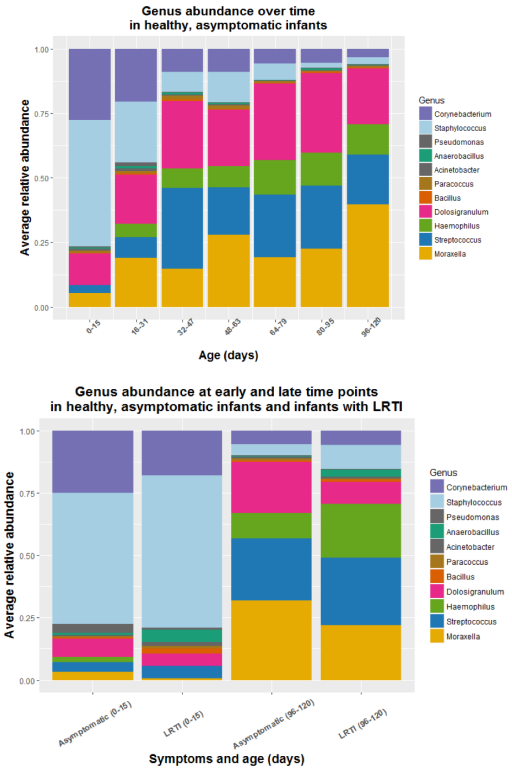
Background: Colonization of the nasopharynx (NP) is the initial event in the pathogenesis of lower respiratory tract infections (LRTI). Evidence is accumulating that the NP microbiome influences host immune responses and whether colonization progresses to disease or not. We hypothesized that infants who experience LRTI early in life display distinct NP microbiome characteristics prior to infection, and potentially as early as the newborn period.

Methods: As part of the "Southern Africa Mother Infant Pertussis Study" in Zambia, NP samples were prospectively collected approximately every 2 weeks beginning at birth, through 3 months of age, in conjunction with clinical data. Samples were also collected when an infant experienced respiratory symptoms. We identified infants from the cohort with LRTI and matched with asymptomatic controls. We performed 16S ribosomal DNA amplicon sequencing on DNA extracted from the NP samples using Illumina MiSeq, and analyzed the data using Qiime2 and PathoScope2. We described the NP microbiome characteristics of asymptomatic infants and infants with LRTI and their changes over time and compared between the two populations at each 2-week interval using the R package DESeq2.

Results: Ten infants who had LRTI during the study period were matched with 17 healthy asymptomatic controls, together contributing 183 samples with high-quality reads. In asymptomatic infants, *Dolosigranulum*, *Haemophilus* and *Moraxella*'s relative abundance increased over the first 3 months of life, while *Corynebacterium* and *Staphylococcus* relative abundance decreased in the NP microbiome (Figure 1). In contrast, infants who developed LRTI had increased abundance of *Staphylococcus*, *Anaerobacillus,* and *Bacillus*, and decreased relative abundance of *Dolosigranulum* and *Moraxella* compared with asymptomatic controls (Figure 2). These differences were already present at the time of first sample collection (age 1 week).

Conclusion: Infants who develop LRTI early in life demonstrate altered NP microbial composition as early as the first week of life. These differences could potentially lead to early identification of at-risk infants. If confirmed, interventions to prevent LRTI in infancy could be evaluated to reduce respiratory mortality and morbidity.



Disclosures. **All authors:** No reported disclosures.

2629. Respiratory Syncytial Virus Epidemiology and Factors Associated with Severity among Hospitalized Infants in Four Middle-Income Countries, 2015–2017

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Background: Respiratory syncytial virus (RSV) is the most commonly identified viral pathogen among young children with acute lower respiratory tract infection. Understanding global RSV epidemiology and risk factors for severe illness in low- and middle-income settings is critical as new vaccine candidates become available.

Methods: We prospectively enrolled infants aged < 1 year hospitalized with any acute illness from sites in Albania, Jordan, Nicaragua and Philippines during 2015–2017. Standardized parental interviews and medical record review were conducted. Respiratory specimens collected during enrollment were tested for RSV using rRT–PCR. RSV A or B subgroup was determined using a CDC-developed rRT–PCR assay. Very severe RSV illness was defined as requiring ICU admission or supplemental oxygen. Factors potentially associated with severity were assessed using individual logistic regression models to adjust for age and study site.

Results: Overall, 1,129 (31%) of 3634 enrolled infants had RSV infection. The median age of RSV-positive infants was 2.7 (range: < 1 to 11.9) months, 665 (59%) were male, and 63 (6%) had ≥1 underlying medical condition. RSV subgroup was determined for 1,028 (91%); RSV A and B co-circulated at all sites with alternating predominance by study year (figure). 583 (52%) infants had very severe RSV illness, which was significantly associated with younger age (median: 2.0 vs. 4.3 months; $P < 0.01$), study site (aOR: Jordan 5.0, Albania 2.9, Philippines 1.2, Nicaragua reference; $P < 0.01$), birth by cesarean section (aOR: 1.4; 95% CI [CI] 1.0–1.8; $P = 0.03$), having received ICU care after birth (aOR: 1.6; CI 1.0–2.4; $P = 0.03$), chronic heart or respiratory tract disease (aOR: 1.9; CI 1.0–3.4; $P = 0.04$), and a low weight-for-age Z score (aOR: 1.8; CI 1.3–2.7; $P < 0.01$). RSV subgroup was not associated with severity (aOR: 1.0; CI: 0.7–1.3; $P = 0.72$).

Conclusion: RSV was associated with a substantial proportion of acute illness among hospitalized infants in middle-income countries. Subgroups co-circulated across sites and study years with varying predominance and resulted in similar illness severity. Significant comorbidities were uncommon, but factors including younger age, low weight-for-age and chronic heart or respiratory tract disease were associated with more severe illness.

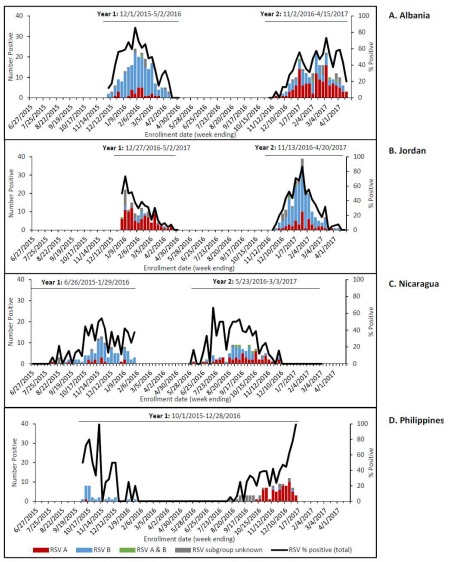

Figure. Respiratory syncytial virus (RSV) subgroups among hospitalized infants, weekly number and overall RSV percent positive by study site and year, Albania (A), Jordan (B), Nicaragua (C), Philippines (D)

Enrollment dates by site: Albania, Year 1: 12/1/2015–5/2/2016, Year 2: 11/2/2016–4/15/2017; Jordan, Year 1: 12/27/2015–5/2/2016, Year 2: 11/13/2016–4/20/2017; Nicaragua, Year 1: 6/26/2015–1/29/2016, Year 2: 5/23/2016–3/3/2017); Philippines, 10/1/2015–12/28/2016.

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