Clinic Characteristics Are not Associated with the Risk of Healthcare-associated Influenza-like Illness (HA-ILI) Among Young Children in Pediatric Primary Care Settings

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Background. Kawasaki disease (KD) is a medium-sized vessel vasculitis with a predilection for coronary arteries and is of unknown etiology. KD is responsible for the majority of acquired pediatric cardiovascular disease in the industrialized world, and is associated with development of coronary artery aneurysms in approximately 25% of untreated patients. Epidemiologic, pathologic, and clinical characteristics of KD display notable overlap with common pediatric viral illnesses, leading some to hypothesize that a viral infection is the inciting agent for KD.

Methods. We investigated viral exposure history in KD patients by utilizing a recently developed technique to profile sera against the known human virome in an uncontrolled manner. The sera of affected sera during the acute (presentation) and non-carrier phases of illness from 35 patients meeting clinical diagnostic criteria for KD, preferably selecting patients with coronary involvement and/or late presentation. Control samples included healthy children and patients with known viral infections. Using phage immunoprecipitation sequencing (PhIP-seq), the sera were screened against phage display library expressing epitopes that cover the complete reference protein sequences of the known 206 viruses with human tropism.

Results. The mean patient age was 4.6 years (range 0.4–16.9) and mean day of illness at acute sample collection was 14.5 days (range 5 to 32). A majority of patients demonstrated coronary artery changes during the course of their illness (22/35, 62%). Sera from patients with KD demonstrated patterns of viral infection to common pediatric viruses with similar signal intensity and distribution to healthy control children. In a subset of patients with known MRSA nasal colonization and a control group of infants with negative MRSA screening swabs, and their parents, were enrolled in a prospective cohort study. Weekly swabs were obtained to identify AROs from 4 infant body sites, 3 parental body sites, and 5 high-touch environmental surfaces in the NICU to be compared with AROs used to identify MRSA.

Results. Samples were collected 1–14 times (median 7) from 11 MRSA-colonized infants, 7 control infants, 17 mothers, and 9 fathers. Of MRSA-colonized infants, 9 (82%) were colonized with MRSA in the nares, 6 (55%) in the umbilicus, 8 (73%) in the inguinal folds, and 6 (55%) in the rectum over the study period. Six (55%) MRSA-colonized infants had persistent colonization (i.e., consecutive positive sampling) despite receiving decolonization measures. One (14%) control infant was colonized with MRSA during longitudinal sampling. Sixteen (89%) infants were colonized with methicillin-resistant *S. aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), and multi-drug-resistant Gram-negative rods (MDR-GNR) among infants hospitalized in the Neonatal Intensive Care Unit (NICU) are associated with mortality and serious morbidities. Implementing appropriate infection control policies may help prevent transmission of AROs. However, the most effective strategies for surveillance of AROs in the NICU are unclear. Prior data collected from infants transferred from outside hospitals to 2 NICUs affiliated with New York-Presbyterian (NYP) Hospital detected low rates of ARO colonization in the first week of life. Thus, in 2013 the strategy of performing targeted surveillance on infants transferred to NICUs over 7 days of life (DOL) was changed to performing targeted surveillance on infants transferred to NICUs over 7 days of life (DOL). The purpose of this study was to assess this change in surveillance strategy and monitor ARO colonization trends in the NICU.

Results. Data from all infants transported to the NICU were collected from NYP from 2007 to 2016 were used. Risk factors for colonization with AROs including demographics and admitting diagnoses were explored using a multivariable binomial mixed model clustered by transferring hospital and controlled for NYP NICU. Trends in ARO colonization in infants at 7 days of life were assessed. Risk factors at time of transfer were analyzed by performing targeted surveillance on infants transferred to NICU over 7 days of life at Site 1. This study was not designed to use the limited sample size of infants who remained in the NICU over 7 days of life at Site 1.

Conclusion. These data continue to support the rationale for our change in surveillance policy. Further studies should evaluate the effect of this strategy on ARO transmission in the general NICU population.

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Methods. We conducted a prospective cohort study of a sample of 1308 children presenting to any of the 31 primary care clinics in a large pediatric healthcare network for a non-ILI clinic visit during three consecutive respiratory seasons (2012/13–2014/15). HA-ILI cases were defined as any ILI encounter within 8 days after a non-ILI visit. Clinic factors (waiting room patient density or number of ILI encounters at clinic, time in waiting room, clinic location), sociodemographic and clinical data were obtained electronically and from parent interviews. School attendance (daycare, school or parent) and age (≤2 years and >2 years) were combined to create 5 category composite variable. Logistic regression models after applying sampling weights evaluated associations between HA-ILI risk and patient age, daycare, school attendance, gender, influenza vaccine receipt and waiting room patient density.

Results. Our cohort included 367 HA-ILI cases and 941 non-cases. The majority (48.6%) were ≤2 years and did not attend school, 52.8% were male, and 18.9% received flu vaccine. Median clinic patient density was 44.2 patients/1,000 square feet. In multi-variable models, only the young age/daycare attendance composite variable was significantly associated with increased HA-ILI risk (OR 2.06, 95% CI 1.48–2.88). No clinical characteristics were associated with HA-ILI risk and risk did not vary by site.

Conclusion. In our cohort of young children, HA-ILI was not associated with the measured clinic characteristics that we hypothesized may increase respiratory virus transmission risk. Instead HA-ILI risk was highest in young daycare attendees who may be more likely to engage in behaviors that increase respiratory virus exposure risk or seek out healthcare services when sick. This suggests that HA-ILI may be more strongly influenced using risk factors than site-specific factors.