Results. Of 958 patients with NPA specimens, 591 (61.7%) were positive for ≥1 pathogens; human rhinovirus (HRV) was the most prevalent (29.4%). Non-HRV infection (RD -12.9%; 95% CI -19.5% to -6.3%) was less common, and human metapneumovirus (HRV) was less common than HRV-C (RD -13.6%; 95% CI -23.0% to -4.3%); and parainfluenza virus (PIV) (RD -31.7%; 95% CI -44.5% to -18.9%) was negatively associated with severity; no association was found between severity and the presence of respiratory syncytial virus (RSV), co-infection, or the specific viruses HRV-A, HRV-B, HRV-C, respiratory syncytial virus, influenza (INF), enterovirus serotype D68, adenovirus or coronavirus. The risk of treatment failure in the absence of a pathogen was 12.5% (95% CI 9.0% to 16.0%). The presence of any pathogen (RD 8.2%; 95% CI 3.3% to 13.1%) and non-HRV infection as a group (RD 13.1%; 95% CI 6.4% to 19.8%) increased the risk of treatment failure. Of INF and PIV specifically (RD 24.9%; 95% CI 4.7% to 45.1% and RD 34.1%; 95% CI 7.5% to 60.7%) were positively associated with treatment failure.

Conclusion. In this large cohort of children with moderate or severe exacerbation, the presence of any respiratory pathogen was associated with higher severity on presentation. However, in addition to any pathogen and non-HRV infection, INF and PIV were specifically associated with higher treatment failure in the ED, supporting the need for influenza prevention, pathogen identification at presentation and exploration of pathogen-therapy interaction.

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2339. Human Rhinovirus Detection by PCR in Febrile Infants and Risk of Concomitant Bacterial Infection

Anne J. Blaschke, MD, PhD, FIDSA, FPIDP, E. Kent Korgenski, MS,1 Jacob Wilkes, BS, Angela Preston, PhD,2 Emily Thorell, MSC,1 Chris Stockmann, PhD, MSc,1 Elizabeth Knackstedt, MD, FAAFP,1 Carolyn Reynolds, MS, APRN,2 Jeff Schunk, MD,1 Judy Daly, PhD3 and Carrie L. Byington, MD, FIDSA,1,2 1Department of Pediatrics, Division of Pediatric Infectious Diseases, University of Utah School of Medicine, Salt Lake City, Utah, 2Department of Pediatrics, Pediatric Clinical Program, University of Utah School of Medicine and Intermountain Healthcare, Salt Lake City, Utah, Internal Medicine, University of Utah School of Medicine, Salt Lake City, Utah, 3Department of Pediatrics, Pediatric Emergency Medicine, University of Utah School of Medicine, Salt Lake City, Utah, 4Primary Children’s Hospital, Salt Lake City, Utah, 5Health Sciences Center, Texas A & M University, Bryan, Texas

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Background. Studies have shown that well-appearing febrile infants (FI) with viral respiratory infections have a reduced risk of bacterial infection (BI; urinary tract infection, bloodstream infection, meningitis). Respiratory testing by PCR allows detection of human rhinovirus (HRV), but few data exist on the risk of concomitant BI in HRV-positive FI.

Methods. We identified well-appearing FI 1–90 days old within Intermountain Healthcare evaluated in the ED or inpatient setting (IP) with viral respiratory testing by PCR (RVPCR) from August 2007 to August 2016. Respiratory viruses detected by RVPCR included: adenovirus, coronavirus, human metapneumovirus, influenza A/B, parainfluenza 1–4, RSV and HRV. We used relative risk (RR) to compare the risk of BI for infants with HRV vs. non-HRV viruses detected. Similarly, we used RR to compare risk of UTI and invasive bacterial infection (IBI; bacteremia and meningitis) for infants with HRV detected compared with those who were virus negative.

Results. Of 10,964 FI were evaluated in the ED/IP during the study period. 4037 (37%) had RVPCR and were included. 2212 (55%) were positive for a respiratory virus and 73% were 29–90 days old. HRV was detected alone in 1392 (34%) and non-HRV viruses were detected in 802 (20%). The overall frequency of BI in the cohort was 9.5%. HRV was more likely to have a co-infection with those with non-HRV viruses [7.8% vs. 3.7% P = 0.0001; RR 2.12 (95% CI 1.43–3.15)]. When compared with virus-negative infants, HRV detection in infants 1–28 days did not decrease the risk for UTI [RR 0.87 (95% CI 0.58–1.29)]; risk of IBI was statistically decreased [RD -24.9% (95% CI 4.7% to 45.1%)]. However, HRV detection was common in young febrile infants. Infants with HRV were at higher risk of BI than infants without non-HRV infection. Detection of HRV did not meaningfully change risk for UTI at any age or meaningfully impact risk of IBI in infants 1–90 days. The HRV detection may be associated with a decreased risk for IBI in infants 29–90 days.

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2340. A Varicella Outbreak Among Preschool Children Despite One-dose Vaccination

Zafer Karagul, Sr, Professor and Sure Gokce, pediatrician; Pediatrics, Ege University, Izmir, Turkey

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Background. In Turkey, a single-dose varicella vaccine was introduced into the National Immunization Program in 2013. Before this implementation, varicella vaccine had been available in the private sector since 2000. However, varicella outbreaks continued to occur in preschools and elementary schools. We investigated a varicella outbreak to estimate the effectiveness of 1-dose varicella vaccine and to evaluate potential risk factors for breakthrough disease.

Methods. This study was carried out during a varicella outbreak in 3 preschools in Izmir, Turkey, in April 2016. Using questionnaires, data including children’s medical and vaccination history were collected from their parents. Vaccination status of children was also verified with immunization records. Attack rates in vaccinated and unvaccinated children were calculated and the analysis of vaccine effectiveness and of risk factors for breakthrough disease were conducted. Vaccine effectiveness was calculated using the equation: (attack rates in vaccinated children-attack rates in unvaccinated children) x 100.

Results. A total of 124 children were enrolled in the study. Of the 124 children, 77 (62%) had received 1-dose varicella vaccine before the outbreak. Varicella developed in 34 of 124 children during the outbreak, and 18 of them (53%) had breakthrough varicella. The attack rate was 23.4% among vaccinated children and 34% among unvaccinated children. The effectiveness of single-dose varicella vaccine was 33.6% against varicella disease of any severity and 82.3% against moderate or severe varicella. Children vaccinated 5 or more years before the outbreak had 3.5 times the risk of disease than those who had been vaccinated more recently (OR 3.5 (95% CI 1.08–11.5); P = 0.046). Age at vaccination (<15 months vs.≥15 months) and the brands of varicella vaccine were not associated with the increased risk of breakthrough varicella.

Conclusion. One-dose varicella vaccine is not sufficient to prevent school outbreaks. For this reason, varicella outbreaks continued to occur in schools and kindergarten among healthy vaccinated children in Turkey. A 2-dose varicella vaccination program may help to prevent varicella outbreaks and achieve effective control of the disease.

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2341. Congenital Zika Syndrome (CZS) Phenotype Seen in Older Children

Victoria Chu, MD1; Lyle Petersen, MD, MPH1; Cynthia Moore, MD, PhD2; Dana Meaney-Delman, MD3; Greg Nelson, MD4; D. Christian Sonne, MD5; Carol Glaser, DVM, MPVM, MD67 and Sonja Rasmussen, MDS, MD2; Kaiser Permanente, Oakland, California, 2Centers for Disease Control and Prevention, Fort Collins, Colorado, 3Centers for Disease Control and Prevention, Atlanta, Georgia, 4Kaiser Permanente, Roseville, California, 5Pediatrics, Kaiser Permanente, Oakland, California, 6Division of Public Health Information Dissemination, Centers for Disease Control and Prevention, Atlanta, Georgia

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Background. Zika virus (ZIKV) has been documented in Africa since 1947 and Asia since 1969. However, the association of congenital ZIKV infection with microcephaly and serious brain defects was not recognized until a large ZIKV outbreak began in Brazil in 2015. A similar association was retrospectively identified in a 2013–2014 French Polynesian outbreak. In this report, we describe two children, ages 6 (Case 1) and 7 years (Case 2), who display a phenotype consistent with CZS. In both cases, the mothers were residing in Cambodia during their pregnancies (2011 and 2010, respectively); Cambodia has reported ZIKV infections since 2007.

Methods. We review epidemiologic, clinical and laboratory data, and the neurodevelopmental status of these two children.

Results. Both mothers reported low-grade fever and erythematous rash during their early second trimesters. The infants were born with severe microcephaly (>3 SD below the mean) with central hypotonia and peripheral spasticity (Figure 1). Both had normal karyotypes, negative TORCH results, and neuroimaging suggestive of CZS with microcephaly, calcifications, polymicrogyria, abnormal corpus callosum, ex vacuo ventriculomegaly, and reduced white matter (Figure 2). Case 1 had overlapping cranial sutures and redundant scalp (Figure 3). In 2016, serology immunofluorescence assay, immunoglobulin G, and plaque reduction neutralization test for the mother of Case 1 was positive. The vaccine status and timing among healthy vaccinated children in Turkey. A 2-dose varicella vaccination program may help to prevent varicella outbreaks and achieve effective control of the disease.

Conclusion. Given the maternal febrile rash illness, residence in a ZIKV region during pregnancy, infant features consistent with CZS, and the lack of other identified etiology, CZS should be considered as a possible diagnosis in these cases. It suggests that CZS may have occurred prior to the Brazil and French Polynesian outbreaks. Investigations into neurodevelopmental status of older children with possible CZS can provide insights into the possible long-term effects of CZS.

Figure 1.
2342. Evaluation of Pregnant Women, Fetuses and Infants with Zika Virus Exposure and Infection: Lessons Learned from the Congenital Zika Program at Children's National

Robert DiBiase, MD; MS; Sarah Mulkey, MD, PhD; Caitlin Cristante, BS; Lindsay Pescereta, RN; Gilbert Vezina, MD; Dorothy Bulas, MD and Adre duplessis, MB, ChB; Pediatrics (Infectious Diseases and Microbiology, Immunology and Tropical Medicine); Children's National Health System, Washington, DC; Fetal Medicine, Children's National Health System, Washington, DC; Children's National Health System, Washington, DC

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Background. Zika Virus (ZIKV) infection during pregnancy has severe potential consequence to the fetus. Despite limited endemic transmission in the continental US, travel/sexual exposure in the periconception/pregnancy period requires experienced multidisciplinary care to assess potential infection and effects in the fetus.

Methods. The Congenital Zika Program at Children's National (CZPCN) was developed to meet need for pre- and post-natal consultation in the setting of Zika exposure/infection during pregnancy. CZPCN includes multidisciplinary expertise in fetal imaging, pediatric infectious diseases, fetal and pediatric neurology. Services include a hotline, facilitation of ZIKV testing and interpretation, dedicated fetal MRI, US, delivery instructions to facilitate postnatal evaluation of ZIKV exposed/fetuses and educational outreach to providers regarding ZIKV.

Results. Between Jan 2016 and May 2017, 36 women/fetuses were evaluated at CZPCN for possible ZIKV infection during pregnancy (32 US residents who traveled, 2 with partner who traveled, 2 emigrees). An additional 14 women/infant pairs were evaluated following postnatal referral to our program. Exposure route included direct contact with partner who traveled, 2 emigrees). An additional 14 women/infant pairs were evaluated following postnatal referral to our program. Exposure route included direct contact with partner who traveled, 2 emigrees). An additional 14 women/infant pairs were evaluated following postnatal referral to our program. Exposure route included direct contact with partner who traveled, 2 emigrees). An additional 14 women/infant pairs were evaluated following postnatal referral to our program. Exposure route included direct contact with partner who traveled, 2 emigrees). An additional 14 women/infant pairs were evaluated following postnatal referral to our program. Exposure route included direct contact with partner who traveled, 2 emigrees). An additional 14 women/infant pairs were evaluated following postnatal referral to our program. Exposure route included direct contact with partner who traveled, 2 emigrees). An additional 14 women/infant pairs were evaluated following postnatal referral to our program.

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2343. Congenital Neurological Disorders in Children with Microcephaly Related to Exanthematous Diseases During Pregnancy: A Cohort Study

Tabata De Alcantara, MD, MS; Kalyana E. Fernandes, MD; Jessica Thais Da Silva Maia, MS; Gleyson Rosa, RN, MD; Marcelo Rodrigues Zacarkim, MD, MS; Raquel Duarte Rolim, MD; Igor Thiago Queiroz, MD, PhD; David Aronoff, MD, FIDSA; A. Desiree Labeaud, MD, MS and Nilson N. Mendes Neto, MS

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Background. Zika Virus (ZIKV) outbreak in the last 2 years. The highest rate of MCP was in November 2015 with 20.1 cases per 1,000 live births, compared with 1.8 cases/year in the previous years. Our study aimed to evaluate the neurological disorders in children with microcephaly whose mothers had exanthematous disease (ED) during the pregnancy.

Methods. We evaluated children up to 17 months old followed at a children rehabilitation center in RN. Cohort enrollment occurred with children born between January 2015 and May 2016. We interviewed their mothers about the occurrence of ED during their pregnancy.

Results. Of the 37 cases of MCP (25 male, 12 girls), 10 mothers did not know how to describe the presence of ED during pregnancy. Of the 24 cases of MCP with maternal ED, 9 patients were classified as having severe spasticity (Ashworth score 3 and 4), 4 patients were classified as mild (Ashworth score 1-2) and 11 had no spasticity. Eleven patients had seizure disorders and 5 reported irritability.

Conclusions. In our data, there is an high prevalence of neurological complications in children with MCP related to ED. These patients need close follow-up care and intensive medical interventions. Longer follow-up will provide data regarding these chronic neurological complications and how best to intervene.

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2344. Clinical and Epidemiological Profile of the Chikungunya and Zika Outbreak in Neonates in Cartagena–Colombia

Cindy Arlette Acosta, Master of Epidemiology and Wilfrido Coronell-Rodriguez, MPH (International Medicine, Infectious Disease Pediatrician); Universidad de Cartagena, Cartagena, Colombia; Medicine, Universidad del Norte, Barranquilla, Colombia

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Background. African researchers noted that aedes-transmitted Zika epizootics tended to follow aedes-transmitted Chikungunya virus (CHIKV) epidemics. In 2013 CHIKV spread pandemically from Africa-Asia, and Zika followed (1). Cartagena has been affected since 2014 by arboviruses with the most severe clinical forms in fetus, neonates and pregnant (1–4). Aim: To describe clinical, epidemiological profile of CHIKV and Zika neonatal (CHIK-neonatal, ZIKA-neonatal) in Cartagena-Colombia, between September 2014 and June 2016.

Methods. Case Series. We included neonates from 3-NICUs classified as suspected/confirmed cases of CHIK-neonatal and ZIKA-neonatal by RT-PCR.

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2345. Infants Born in New York City to Women with Zika Virus Exposure During Pregnancy, January 2016 – May 2017

Ellen H. Lee, MD; General Surveillance, Bureau of Communicable Disease, New York City Department of Health and Mental Hygiene, Long Island City, New York

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Background. An increase in the prevalence of microcephaly (MCP) was seen in Rio Grande do Norte State (RN) since September 2015. This Brazilian northeast state was highly impacted by a Zika (ZIKV) outbreak in the last 2 years. The highest rate of MCP was in November 2015 with 20.1 cases per 1,000 live births, compared with 1.8 cases/year in the previous years. Our study aimed to evaluate the neurological disorders in children with microcephaly whose mothers had exanthematous disease (ED) during the pregnancy.

Methods. We evaluated children up to 17 months old followed at a children rehabilitation center in RN. Cohort enrollment occurred with children born between January 2015 and May 2016. We interviewed their mothers about the occurrence of ED during their pregnancy.

Results. Of the 37 cases of MCP (25 male, 12 girls), 10 mothers did not know how to describe the presence of ED during pregnancy. Of the 24 cases of MCP with maternal ED, 9 patients were classified as having severe spasticity (Ashworth score 3 and 4), 4 patients were classified as mild (Ashworth score 1-2) and 11 had no spasticity. Eleven patients had seizure disorders and 5 reported irritability.

Conclusions. In our data, there is an high prevalence of neurological complications in children with MCP related to ED. These patients need close follow-up care and intensive medical interventions. Longer follow-up will provide data regarding these chronic neurological complications and how best to intervene.

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