Background. Enterovirus D68 (EV-D68) causes sporadic worldwide outbreaks of human respiratory illness, especially in children with asthma. Spacio-temporally related outbreaks of acute flaccid myelitis (AFM), a polio-like illness, have implicated EV-D68 in infants.

Method. The key to identifying mAbs is developing an appropriate screen for antibodies producing B cells. We have focused on developing an ELISA of high titers that will have virus particles in order to preserve tertiary and quaternary epitopes that are not present on recombinant proteins. We hypothesize that this approach will help identify mAbs that are most likely to have a protective effect during natural infection.

Results. It is difficult to achieve high titers of EV-D68 in virus suspensions in sufficient quantity to screen hundreds of 384-well plates of human B cell supernatants by ELISA. We overcame this obstacle by optimizing production of virus stocks using sonication to disrupt cellular membranes followed by ultracentrifugation of this lysate through a sucrose cushion. Furthermore, we optimized ELISA conditions for screening based on signal from a fluorescent reporter molecule. Additionally, collaborators at the Universities of Wisconsin and Colorado have provided PBMCs from children known to have had either respiratory illness or AFM associated with EV-D68 during the 2014 US outbreak.

Conclusions. We now have the tools to create a large panel of human mAbs against EV-D68, which will be the first human mAbs against this virus. We plan to characterize the binding and neutralization characteristics of the resulting mAbs in order to provide preclinical support for their future development as therapeutics.

Increase in Distal Airway Mucus-Producing Clara-Cells During Primary Pneumocystis Infection

Andrea Méndez,1 Diego A. Rojas,1 Carolina A. Ponce,1 Rebeca Bustamante,2 Jorge Toledo,1 and Sergio L. Vargas1

Background. Pneumocystis jirovecii causes sporadic worldwide outbreaks of primary pneumocystis infection in infants with high mortality if left untreated. Respiratory morbidity increases during this infancy age window. Clara (CC10) and goblet cell (MUC5AC and MUC5B) secretion markers were investigated in lungs of immunocompetent rats during Pneumocystis primary infection at 40, 60, and 80 days of age.

Methods. Total mucus was determined using simple microscopy and Alcian-Blue-PAS stain, and frequency of Clara and goblet cells by IFI using antibodies against CC10, Muc5ac, and Muc5b. Colocalization of Clara and goblet cell markers in distal airways <250 mic was evaluated by confocal microscopy using Fiji ImageJ software. Gene expression of Cc10, Muc5ac, and Muc5b in lung tissue was determined by qRT-PCR at same age intervals.

Results. Mucus and proportion of goblet cells/distal epithelium area increased in Pneumocystis-infected rats as respects controls at 60 days of age (P = 0.0004). These cells expressed Muc5b but not Muc5ac. mRNA levels of Muc5b and Muc5ac increased 2.7 and 3.9 times at 60 days of infection (P = 0.0025 and P = 0.0001, respectively). Clara cell frequency remained same, while mRNA levels of Cc10 increased (2.3-fold change) in Pneumocystis-infected rats at 80 days of age (P = 0.0006). Cc10- and Muc5b colocalized in distal airway epithelium of Pneumocystis-infected rats at 60 days. Primary infection by Pneumocystis associates to increased frequency of goblet cells in lungs of immunocompetent rats during Pneumocystis infecion and suggest Clara to mucus-secreting goblet cell transdifferentiation.

Predective Value of Noninvasive Diagnosis of Primary Pneumocystis Infection in Infants at Autopsy

Sergio L. Vargas1, Carolina A. Ponce,1 Fabien Magne,1 Rebecca Bustamante,1 Pamela Börquez,1 Karime Hananias,1 Viviana San Martín,1 Fabien Magne,1 Carolina A. Ponce,1 Pamela Börquez,1 Karime Hananias,1 Viviana San Martín,1 Mireya Gutiérrez-Mejías,1 and Miriam Gallo1

Background. Pneumocystis is a fungus with lung tropism that cannot be cultured microbiologically. Most immunocompetent infants develop undetected lung primary infection before 6 months. Diagnosis relies on Pneumocystis-DNA-amplification of a nasopharyngeal aspirate sample (NPA) and yields vary with age reaching a peak of ~45% at 2–5 months. However, examination of autopsy lung samples from infants dying in the community give lung yields over 90% at this same age window. The numerical correlation of Pneumocystis organisms in NPA and lung samples is high in immunosuppressed rats but whether NPA predict lung infection in immunocompetent infants has not been studied because lung biopsies cannot be obtained from healthy infants. A high positive predictive value (PPV) will validate NPA as a predictor of lung infection in infants.

Methods. Pneumocystis diagnosis was sought in simultaneously obtained paired double-NPA (two nostrils) and lung biopsy samples from 27 infants (age 1.0–8.9 months) dying in the community using P. jirovecii-DNA amplification of the mtsL/S1RNA by nested PCR.

Results. Paired samples were concordant in 22 (81.5%) infants and were Pneumocystis-positive in 16 (59.3%) and negative in 6 (22.2%). Five infants (18.5%) had discordant NPA/lung positive results (4/0 and 0/1). Sensitivity, specificity, and PPV for NPA were 94.1%, 60.0%, and 80.0%, respectively. The mitochondrial gene was successfully sequenced in paired samples from 3 of the 13 Pneumocystis-positive concordant infants and suggests that isolates in both samples were not different.

The Human Antibody Response to Enterovirus-D68 Infection

Matthew R. Vogt1 and James E. Crowe1,2,3

Background. Enterovirus-D68 (EV-D68) causes sporadic worldwide outbreaks of human respiratory illness, especially in children with asthma. Spacio-temporally related outbreaks of acute flaccid myelitis (AFM), a polio-like illness, have implicated EV-D68 as a cause of AFM. We aim to use our laboratory’s expertise in producing human monoclonal antibodies (mAbs) from the B cells in peripheral blood mononuclear cells (PBMCs) to investigate the poorly understood human humoral immune response to EV-D68.

Methods. mAbs were isolated by affinity chromatography of mouse serum using a recombinant EV-D68 protein captured on a Protein G column.
Conclusions. Results validate double-NPA for noninvasive diagnosis of *Pneumocystis* primary infection with 80% PPV and 81% accuracy. They provide a first reference for comparing reported NPA or lung sample incidences of *Pneumocystis* in infants with different diagnoses. As a validated test may be used in clinical studies to evaluate the impact of this subclinical infection in infants in the general population.

Identification of Practices for the Management and Treatment of Febrile Neutropenic Patients in the Hemato-oncology Units of Latin America

**A. Caniza**1, Mirna L. Gonzalez,2 Mayras R. Homs,2 and Miguela A. Caniza1,2, Universidad Nacional de Oncologia Pediátrica, 1Department of Global Pediatric Medicine and 2Department of Infectious Diseases of St. Jude Children's Research Hospital

**Background.** The empiric antibiotic treatment of a patient with fever and neutropenia (FN) decreases mortality. But, not all patients with FN might require similar management. Therefore, a management based on risk for serious infections has been proposed. Evidence-based guidelines for management of FN based on risk are used in Latin America. Our objective in this study was to identify current practices for the management of patients with FN in oncologic pediatric centers of Latin America.

**Methods.** Using an on-line survey we conducted an observational, transversal, and descriptive study. Eligible participants were those caring for children with cancer. Using contacts of the St. Jude Global Pediatric Medicine, its network of Preventionists and Infectologists for Pediatric Cancer in Latin America (PRINCIPAL), the Latin American Pediatric Infectology Society (SLIPE), and by word-of-mouth we recruited the participants. The survey addressed several aspects during the care of FN, including risk assessment, site of care, clinical evaluation, antibiotic administration, admission, and discharge criteria.

**Results.** A total of 220 surveys were sent and 109 responses were received (108 suitable for analysis) from 19 countries. Thirty-six percent of responders used the same definition for fever, and 35% used the same definition for neutropenia; most common definitions used were consistent with IDSA guidelines. Sixty-seven percent reported double-NPA for noninvasive diagnosis of FN. Twenty percent did not have guidelines for FN available; 73% use a risk stratification scale for management of FN. Only 15% of responders having guidelines for FN available; 73% use a risk stratification scale for management of FN, which can lead to high variable disease phenotypes and end-organ dysfunction, particularly in the heart and abdominal viscera. As a result, there is substantial variability in both the clinical courses and the management of children with *S. aureus* BSI. The objectives of this study were to describe the clinical characteristics of *S. aureus* BSI in pediatric patients admitted to Vanderbilt Children's Hospital (VCH) and to identify variation in their clinical evaluation and treatment.

**Methods.** A retrospective descriptive study was conducted in pediatric patients ages 0–18 years admitted to VCH between January 1, 2013 and July 1, 2017 with either a blood culture positive for *S. aureus* (from the VUMC Microbiology Laboratory) or who were assigned an ICD9/C10 code for *S. aureus* bacteremia (via the Research Derivative). Data were extracted from the electronic medical record and included demographics, medical history, clinical presentation and hospital course, radiographic studies, microbiologic data, and antimicrobial utilization. Descriptive and comparative statistics were calculated using StataSE, using demographic characteristics and antimicrobial resistance as the primary exposures of interest. Where multiple comparisons were made, a Bonferroni correction was applied.

**Results.** One-hundred eighty-nine (189) patients with *S. aureus* BSI were identified; 50 patients distributed across the study period were selected for initial review. Methicillin-susceptible *S. aureus* (MSSA) bacteremia was more frequent than MSSA bacteremia (32% [64%] vs. 18% [36%]). MRSA BSI frequency did not differ from MSSA BSI frequency based on sex, ethnicity, or age; however, African-American children were more likely to experience MRSA BSI than Caucasian children (7/10 [70%] vs. 9/37 [24%], *P = 0.04*, corrected for multiple comparisons). Patients with MRSA BSI experienced longer median duration of hospitalization than those with MSSA BSI (17 days vs. 8.5 days, respectively, *P = 0.002*, Wilcoxon rank-sum); however, there was no difference in median length of ICU stay. BSI-related radiologic evaluations were abnormal: echocardiograms were performed in 28 (56%), abdominopelvic ultrasonography in 10 (20%); renal ultrasounds in 5 (10%); computed tomography of the chest, abdomen, and pelvis in 16 (32%); magnetic resonance imaging of long bones in 27 (54%); and venous Doppler ultrasound in 9 (18%). The majority of radiologic evaluations were abnormal. Forty-six patients (92%) with *S. aureus* BSI received prolonged parenteral therapy (greater than 72 hours). Of the 32 patients diagnosed with MSSA BSI, 28 (88%) received parenteral therapy. Seventeen of these patients (61%) received nafcillin, 10 (36%) received cefazolin, and 1 (4%) received ampicillin/subactam as definitive treatment.

**Conclusions.** Among all children admitted to VCH with *S. aureus* BSI, MSSA has now become more frequently identified than MRSA, a substantial epidemiologic shift from the last two decades. African American children with *S. aureus* BSI are more likely to have MRSA than Caucasian children and patients with MRSA BSI experience significantly longer duration of hospitalization than those with MSSA BSI. Parenteral therapy remains the most frequent treatment strategy, despite recent treatment recommendations for some indications (e.g., acute hematogenous osteomyelitis), suggesting that oral therapy is appropriate. Future studies are needed to determine the clinical and microbiologic characteristics that are most predictive of adverse clinical outcomes.

**Intestinal Parasites in Pediatric Cancer Patients in South of Mexico**

**E. Alejandra Nava, Maricruz Narváez, J. Manuel Feliciano, Miguela A. Caniza,** Hospital de Especialidades Pediatrías Tuxtla Gutiérrez, Chiapas, Mexico

**Background.** Current estimates indicate that at least a quarter of the world's population, mostly in developing countries, is chronically infected with intestinal parasites. In immunocompromised individuals, such agents are recognized as important pathogens. Different groups of immunocompromised individuals have been studied regarding intestinal parasites; however, cancer patients are still poorly investigated. Our objectives were to identify burden of intestinal parasites infections in oncologic pediatric population, describe most frequent intestinal parasites, identify the role of intestinal parasites during neutropenic colitis/enteritis, and recommend prevention strategies for intestinal parasites in oncologic patients population.

**Methods.** This was prevalence epidemiological study with pediatric oncologic patients in a third -level referral center for pediatric patients in Tuxtla Gutiérrez Chiapas from 2013 to 2017. A total of 200 stools samples were more frequent than aspirated bronchial washings, and to identify variation in their clinical evaluation and treatment.

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**Results.** Prevalence of intestinal parasites: *E. histolytica* 33.3%, *Ascaris lumbricoides* 26.6%, *Giardia lamblia* 13.2%, *Blastocystis hominis* 6.6%, *Trichuris trichiura* 4.4%. Some of those parasites were directly related with neutropenic tiiitis (40%). Commensal parasites as Entamoeba coli, Endolimax nana, and Pentatrichomonas were identified in low frequency.

**Conclusion.** Fecal parasite examination for intestinal infection should be performed before and during treatment of cancer patients, as well as specific treatments of positive patient for some parasites infections so as to prevent more severe complications.
Clinical Features of a Cases Series of Acute Chagas Disease in Children at a Hospital From Colombia
José Antonio Vargas Soler, Ana Celina Rueda López, and Javier Mauricio Castro, Fundación Cardiovascular de Colombia, Bucaramanga, Santander, Colombia

Background. Chagas’ disease (CD) is endemic in Latin America. Its acute form (ACD) has been associated with oral transmission and occurs as outbreaks where children are frequently affected with high mortality. In Colombia, outbreaks ACD have been reported in the last two decades. A case series of ACD is reported in a fourth-level institution from Colombia.

Methods. Sociodemographic, clinical, electrocardiographic, echocardiographic, and laboratory variables were analyzed by reviewing clinical records of children under 18 years of age with ACD seen at Fundación Cardiovascular de Colombia.

Results. We found 13 cases of ACD in children in the last decade. The oral transmission was documented in 9 (69%). In 9 cases (69%) other relatives affected at home. All cases presented prolonged fever (15 days). Other symptoms and signs were: headache (77%), abdominal pain (77%), cough (70%), myalgia (62%), hepatomegaly (62%), chest pain (54%), bipalpebral edema (38%), and palpitations and rash (31%). There was some degree of heart failure in 9 (69%), dilation and left ventricular dysfunction in 4 (31%), pericardial effusion 6 (46%), arrhythmias 4 (31%), myocarditis confirmed by histology in 1 (7.5%), and meningoencephalitis in 1 (7.7%) cases. The diagnosis was made late (20 days of evolution). Parasitological tests (Strout and thick drop) were positive in one case (80%). The mortality was 7.7% (1 case). One case evolved to dilated cardiomyopathy (7.7%).

Conclusion. In endemic regions of CD, ACD should be suspected in children with prolonged fever, acute heart failure, pericardial effusion with or without ventricular dysfunction, arrhythmias, or myocarditis.

Acute Viral Gastroenteritis Illness Severity by Pathogen and Rotavirus Vaccination Status
Lubna Hamdan,!* Bhinnata Piya,* Laura S. Stewart,† Einais Batarseh,* Christopher J. Fonnesbeck,* John R. Dunn,* Aron J. Hall,** Daniel C. Payne,* and Natasha Halasa,** Vanderbilt University Medical Center and +Centers for Disease Control and Prevention

Background. Viral pathogens are the most common cause of acute gastroenteritis (AGE) and can be associated with severe illness.

Methods. Using Modified Vesikari Score (MVS) parameters, we compared AGE illness severity by viral pathogen and by rotavirus vaccination status in rotavirus-positive children. AGE surveillance for children aged >14 days and <18 years was performed at Vanderbilt Children's Hospital in the inpatient, emergency department (ED), and outpatient (OP) settings. Stool specimens were tested by RT-qPCR for norovirus, astrovirus, and sapovirus, and by ELISA for rotavirus (RoV) VP6 antigen (Rotarix®, Rotaclone®).

We used the MVS parameters and stratified by single virus detection and vaccination status in rotavirus-positive children.

Results. From December 2012 to November 2015, 3,705 AGE cases were enrolled and 2,889 (78%) children were provided stool specimens. Testing revealed 565 (20%), 231 (8%), 224 (8%), and 89 (3%) stools tested positive for only norovirus, sapovirus, rotavirus, and astrovirus, respectively. The median MVS parameters of patients with norovirus (6.8), sapovirus (6.9), or astrovirus (6.9) were all significantly lower (P < 0.05) than that among rotavirus patients (8.3). Table 1 compares rotavirus-positive children by vaccination status.

Conclusion. Despite the decline in rotavirus incidence in a post-rotavirus vaccine era, the severity of AGE illness in rotavirus-positive children remains greater than that among other viral pathogens. Although the AGE severity for rotavirus-positive children was not statistically different by vaccination status, unvaccinated children were older, and more likely to be hospitalized and to require IV hydration. These data highlight the benefits of rotavirus vaccination and support efforts to maximize vaccination coverage.

Table 1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rotavirus positive with any rotavirus vaccine dose, n = 154</th>
<th>Unvaccinated rotavirus-positive, n = 70</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Vesikari Score</td>
<td>8 (7–10)†</td>
<td>9 (7–10)†</td>
<td>0.68</td>
</tr>
<tr>
<td>Age (months)</td>
<td>1.8 (1.2–3.4)†</td>
<td>4.4 (1.5–8.2)†</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Diarrhea (duration), days</td>
<td>2 (1–3)†</td>
<td>3 (1–3)†</td>
<td>0.27</td>
</tr>
<tr>
<td>Max no. of diarrheal stools/24 hour period (in the course of the disease)</td>
<td>6 (4–8)†</td>
<td>5 (4–8)†</td>
<td>0.73</td>
</tr>
<tr>
<td>Vomiting duration (days)</td>
<td>2 (1–3)†</td>
<td>2 (1–3)†</td>
<td>0.89</td>
</tr>
<tr>
<td>Max no. of vomiting episodes/24 hour period (in the course of the disease)</td>
<td>5 (3–8)†</td>
<td>5 (3–9)†</td>
<td>0.58</td>
</tr>
<tr>
<td>Max recorded fever</td>
<td>102 (101–104)†</td>
<td>102 (101–104)†</td>
<td>0.98</td>
</tr>
<tr>
<td>IV Rehydration</td>
<td>18 (11.7%)</td>
<td>23 (32.2%)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>13 (8.4%)</td>
<td>16 (22.9%)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Emergency department/hospitalized follow-up</td>
<td>5 (6.3%)</td>
<td>2 (3.6%)</td>
<td>0.66</td>
</tr>
</tbody>
</table>

*All continuous variables in median (IQR). †Pearson’s χ² test for categorical and Wilcoxon rank-sum (Mann–Whitney) test for continuous variables.

Genotypic and Phenotypic Diversity Within the Neonatal HSV-2 Population
Lisa N. Akhtar,1* Christopher D. Bowen,2* Daniel W. Renner,2* Utsav Pandey,2* Ashley N. Dela Fera,3 David W. Kimberlin,1* Mark N. Prichard,1* Richard J. Whiteley,1* Matthew D. Weitzman,3* and Moriah L. Spara1* Division of Infectious Diseases, Children’s Hospital of Philadelphia and University of Pennsylvania Perelman School of Medicine,1 Pennsylvania State University,2 Department of Pediatrics, Division of Infectious Diseases, University of Alabama at Birmingham,3 Department of Pathology and Laboratory Medicine, Children’s Hospital of Philadelphia and University of Pennsylvania Perelman School of Medicine, and 1Department of Biochemistry and Molecular Biology, Pennsylvania State University

Background. Neonates infected with herpes simplex virus (HSV) at the time of birth can have different clinical courses. Approximately half display manifestations limited to the skin, eyes, or mouth (SEM disease, 45%). However, others develop invasive infections that spread systemically (disseminated, 25%) or to the central nervous system (CNS, 30%); both of which are associated with significant morbidity and mortality. The viral and/or host factors that predispose a neonate to invasive forms of HSV infection are not known.

Methods. To define viral diversity within the neonatal population, we evaluated 10 HSV-2 isolates cultured from neonates with a range of clinical presentations. To assess viral fitness independent of host immune factors, we measured the viral growth characteristics of each isolate in cultured cells. We then sequenced the complete viral genomes of all 10 neonatal HSV-2 isolates.

Genotyping. HSV-2 is divided into two major genotypes, A and B, based on the presence of the 17-kb repeat region. The genotypes differ at 31 loci, making it possible to assign a precise viral genotype (A or B) to every isolate.

Phenotyping. HSV-2 infects and cytopathically kills human fibroblasts in culture. The cytopathic effect (CPE) is assessed by light microscopy.

Viral Fitness. To assess viral fitness independent of host immune factors, we measured the viral growth of each isolate in cultured cells.

Conclusion. The use of genotypic and phenotypic diversity within the neonatal HSV-2 population will aid in the identification of viral and/or host factors that predispose a neonate to invasive forms of HSV infection.
Results. We found that these neonatal HSV-2 isolates displayed diverse in vitro phenotypes. Isolates from neonates with CNS disease were associated with larger average plaque size and enhanced spread through culture, with isolates derived directly from the cerebrospinal fluid (CSF) exhibiting the most robust growth characteristics. We also found extensive genetic variation between isolates distributed throughout the HSV-2 genome. Several HSV-2 proteins including glycoprotein 1 (g1), gK (UL53), and viral proteins UL20, UL24, and US2 contained variants that were found only in neonatal isolates associated with CNS disease. These genes encode viral proteins known to contribute to cell-to-cell spread and neurovirulence in mouse models of HSV encephalitis.

Conclusions. This study represents the first-ever application of comparative pathogen genomics to neonatal HSV disease. Our findings suggest that HSV-2 isolates from neonates with CNS disease may contain unique genetic variations that enhance cell-to-cell spread. Further studies are required to elucidate the relevance of these findings to neonatal HSV encephalitis.

Utility of Anaerobic and Fungal Blood Cultures in the Pediatric Oncologic Population
Madan Kaur and Benjamin Hanisch, Children’s National Medical Center, Washington, DC

Background. In our institution, a febrile or ill appearing oncology patient will often be evaluated with aerobic, anaerobic, and fungal cultures. This is especially true in patients with persistent fevers without a clear etiology on empiric antimicrobial therapy. It is common for all three cultures to be repeated multiple times per admission. Although this practice may seem sensible, there is to our knowledge little evidence to confirm its necessity in this population.

Methods. A record of all positive blood cultures originating from our institution oncology ward was obtained from January 2010 to April 2017. Duplicate cultures (obtained on consecutive days with repeat organisms) were excluded. Each anaerobic and fungal culture was then evaluated for corollary positive aerobic cultures from the same time frame.

Results. A total of 10,950 blood cultures were evaluated for this study. Forty-two unique anaerobic cultures were identified. The viridans group of Streptococcus was a large contributor with 9 unique cultures. Only 7 cultures of obligate anaerobes were observed: 4 cultures of Clostridial species, 2 Propionibacterium acnes, and 1 Peptostreptococcus species. Twenty-three unique fungal cultures were identified. Notably the majority of these isolates (14) were identified as having one colony present and regarded as probable contaminants. Penicillium, Cladosporium, and unidentified dermatophytes were present in greatest frequency.

Conclusions. Over a 7-year period of routinely obtaining anaerobic and fungal cultures for febrile oncology patients only 42 unique anaerobic and 23 unique fungal cultures were identified among 2,391 obtained anaerobic cultures and 1,980 obtained fungal cultures. Given the predominance of facultative anaerobes, this may simply reflect the findings of increased blood sampling rather than added utility of the growth medium. Similarly, even among the limited unique fungal cultures, the majority was of suspect validity given the presence of a single colony. These findings suggest that judicious use of selective growth media in cases with higher clinical suspicion may be more useful than empirical evaluation.

Ceftazidime for Neutropenic Fevers in Children: Is It Time for a Change?
Muayad Ali, University of Chicago, Chicago, Illinois

Background. The optimal choice of initial antibiotic therapy for high-risk febrile neutropenia (FN) patients varies by institution. Recent guidelines suggest that ceftazidime therapy for the empiric treatment of FN in pediatric cancer patients in our institution based on changes in the epidemiology of organisms isolated from blood cultures of FN patients.

Methods. We conducted a retrospective chart review of pediatric patients who received any oncology care at UCM Comer Children’s Hospitals (July 2009 to December 2016) with a diagnosis of FN who had at least one blood culture obtained. We reviewed pathogens isolated from blood cultures (BCx) and determined whether they were pathogens or contaminants using IDSA guidelines and team’s decision to treat.

Results. A total of 680 FN episodes were identified in 268 patients. Blood cultures were negative in (N = 529, 78%) and were determined to be contaminants in (N = 24, 16%). One hundred twenty-seven episodes (18.6%) in FN patients were pathogens, while Gram negative were 61/162 (38%), 5 were fungal and 4 were mycobacterium.

Conclusion. Our next step is to evaluate risks and benefits of several alternative empiric antibiotic regimens such as piperacillin/tazobactam or cefepime monotherapy. We are working also to develop predicting risk model of bacteremia in FN among pediatric cancer patients.
Results. A total of 3,168 children were enrolled, 1,397 (44%) were positive for RSV, and 90 of 1,397 (6.4%) had an UMC. Table 1 compares RSV-positive children with and without UMC, and Figure 1 categorizes RSV-positive children with and without UMC by age groups.

Conclusions. RSV hospitalized children with UMC were older, more likely to present with fever, have an abnormal chest radiograph, be admitted with the diagnosis of bronchopneumonia and be given an antibiotic, have higher Vitamin-D levels, and more likely to die compared with those without UMC. Although bronchopneumonia was the leading admission diagnosis in both groups, patients without UMC had higher frequency of bronchiolitis and suspected sepsis diagnoses and nearly 70% were <6 months of age. The future direction of this research will involve multivariable analysis for the characteristics, which will be important to target RSV preventative measures.

Background. Congenital Zika syndrome is a constellation of birth defects that occurs following in utero infection with Zika virus (ZIKV). We hypothesized that higher viral loads and broader viral tissue distribution in the fetus was associated with more severe histopathology and the development of ZIKV-associated birth defects.

Methods. We developed a nonhuman primate (NHP) model that accurately models human disease with prolonged maternal viremia, vertical transmission, fetal tissue dissemination and birth defects. We infected rhesus macaques with 10^6 PFU of a Puerto Rican ZIKV isolate (PRVABC59) in the first trimester and assessed viral tissue distribution and birth defects. We assessed liveborn infants with a postnatal evaluation that included an ophthalmologic examination, hearing evaluation, electroretinography, visually-evoked cortical potentials, brain magnetic resonance imaging, and neurodevelopmental assessment. Viral RNA was quantified in fetal and infant tissues by qRT-PCR, and for infectious virus by positive- and negative-strand RNA in situ hybridization.

Results. Two dams experienced advanced pregnancy outcomes, with a second trimester stillbirth and a miscarriage near term. Three of five infants delivered near-term underwent comprehensive postnatal evaluations; one of these experienced respiratory distress requiring noninvasive positive pressure ventilation. One stillborn infant had severe ocular defects consisting of a choroidal coloboma, anterior segment dysgenesis, and retinal dysplasia, along with widely disseminated ZIKV infection.

Conclusions. Thus, from a total of nine pregnancies evaluated in the study, two had clinical outcomes. Fetal infection and tissue dissemination are underway to positively correlate tissue viral distribution and ZIKV-associated birth defects.

Microbiological Spectrum and Antibiotic Susceptibility Pattern of Bacterial Skin Isolates From Patients With Epidermolysis Bullosa

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Background. Epidermolysis bullosa (EB) is a rare skin fragility disorders. Blistering of the skin predisposes to bacterial colonization with varying clinical significance and continuous risk of invasive infections. Limited data are available on microbiological and antibiotic susceptibility. A better understanding of these patterns may direct management when invasive bacterial infection is suspected.

Methods. We retrospectively analyzed clinical skin cultures, including antibiotic susceptibility in all EB patients aged 0–22 years managed at the University of Minnesota between 2007 and 2017.

Results. We reviewed 342 skin cultures collected from 68 EB patients. Thirty-three different bacterial species were isolated. Staphylococcus aureus was the most common. A majority (90%) were sensitive to trimethoprim/sulfamethoxazole (TMP/SMX). 82% were sensitive to ciprofloxacin. Close to 30% of S. aureus were methicillin-resistant. Other common isolates were Pseudomonas aeruginosa and coagulase-negative staphylococci (CONS) found in 14% and 13% of patients, respectively. Susceptibility pattern is shown in Table 1.

Conclusions. S. aureus was the most common isolate and Pseudomonas aeruginosa was the most common opportunistic bacteria colonizing the skin in EB patients. S. aureus was often resistant to clindamycin, while P. aeruginosa showed relatively low resistance to common empiric antibiotics (Table 1). Our findings may provide guidance for physicians suggesting that vancomycin and cefepime seem to provide the best empiric coverage when invasive infection is suspected.

Table 1. Antibiogram of bacteria isolated from the skin of EB patients compared with our institution’s antibiogram in 2017

<table>
<thead>
<tr>
<th>Methicillin-resistant S. aureus</th>
<th>Methicillin-sensitive S. aureus</th>
<th>Staphylococcus lugdunensis</th>
<th>Pseudomonas aeruginosa</th>
<th>Coagulase-negative staphylococci</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clindamycin</td>
<td>73 (75)</td>
<td>38 (46)</td>
<td>37 (52)</td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>66 (68)</td>
<td>19 (15)</td>
<td>19 (24)</td>
<td></td>
</tr>
<tr>
<td>TMP/SMX</td>
<td>95 (96)</td>
<td>77 (96)</td>
<td>11 (1)</td>
<td>100 (55)</td>
</tr>
<tr>
<td>Oxacillin</td>
<td>100 (100)</td>
<td>0 (0)</td>
<td>19 (41)</td>
<td>100 (100)</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>100 (100)</td>
<td>100 (100)</td>
<td>100 (100)</td>
<td>100 (100)</td>
</tr>
<tr>
<td>Lincomycin</td>
<td>100 (100)</td>
<td>100 (100)</td>
<td>100 (100)</td>
<td>100 (100)</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>73 (87)</td>
<td>38 (27)</td>
<td>75 (78)</td>
<td>25 (54)</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>90 (98)</td>
<td>88 (96)</td>
<td>82 (87)</td>
<td>50 (63)</td>
</tr>
<tr>
<td>Piperacillin/ tazobactam</td>
<td>57 (63)</td>
<td>77 (78)</td>
<td>77 (78)</td>
<td>77 (78)</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>91 (98)</td>
<td>81 (82)</td>
<td>81 (82)</td>
<td>81 (82)</td>
</tr>
<tr>
<td>Cefepime</td>
<td>94 (98)</td>
<td>84 (85)</td>
<td>84 (85)</td>
<td>84 (85)</td>
</tr>
<tr>
<td>Meropenem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall institutional susceptibility are in brackets.

Impact of Time-Lapse Between Onset of Fever and Administration of First Dose of Intravenous Antibiotics in Paediatric Cancer Patients With Fever and Neutropenia: A Cost-Effective Model for Improving Outcomes

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Background. Infections in patients undergoing cancer treatment are considered a medical emergency. The empirical administration of broad-spectrum antibiotic therapy within 1 hour of the onset of signs and symptoms of infection increases the patient's chance of survival, minimizes delays in chemotherapy, and reduces inpatient days and ICU admissions. Therefore, the time elapsed before the administration of appropriate antibiotic therapy becomes a decisive factor in patient outcome.

Methods. The main objective of the study was to evaluate the length of time between onset of signs and symptoms of infection and administration of first dose of intravenous (I/V) antibiotic in pediatric cancer patients with febrile neutropenia (FN), factors contributing for its delay and its impact on outcome. We present a prospective descriptive study, looking at factors for delay in first dose of antibiotic and its impact on outcome in pediatric cancer patients with FN, conducted in the hematology and oncology department of the children's hospital Lahore between September 1, 2015 and January 31, 2016. Data regarding demographics, mode of admission, time of arrival, first evaluation, intravenous access, and administration of first dose of antibiotic were recorded. All patients were followed up through their hospitalization for outcome data. All the results were analysed using SPSS version 16.

Results. A total of 55 patients were included. Seventy percent (39) were males. Majority were between 1–5 years and 5–10 years of age, i.e., 26 (47.3%) and 24 (43.6%), respectively. Most of the patients, 42 (76.4%), were admitted through out patient department while 13 (23.6%) were admitted through emergency department. Majority, 24 (43.6%), had fever of 24-hour duration, 11 (20.3%) of 48 hours and 8 (14.5%) of 96 hours. First evaluation was done (by pediatric doctor) within 30 minutes of arrival in hospital in 28 (50.9%) patients, within 30–40 minutes in 4 (7.3%), 41–60 minutes in 8 (14.5%), 60–120 minutes in 5 (9.1%) and >120 minutes in 8 (14.5%) patients. Intravenous access was achieved within 30 minutes of evaluation in 26 (47.3%) patients, 30–40 minutes interval in 7 (12.7%), 40–60 minutes in 11 (20%), 60–120 minutes in 6 (11%) and >120 minutes in 3 (5.5%) patients. Majority of patients, 47 (85.5%), received first dose of intravenous antibiotic was given at the time of I/V access. Time span from admission in the hospital to administration of I/V antibiotic varies from 60 minutes minimum to as long as 5–6 hours. Duration of stay was 3–10 days in 21 (38.2%) and 10–25 days in 18 (32.8%). Forty-two (76.4%) patients were discharged, 15 (27.2%) need ICU admission, and 13(23.6%) died.

Conclusion. Our study showed that wait times of longer than 60 minutes before receiving first dose of antibiotic in paediatric cancer patients with fever and neutropenia were associated with longer duration of hospital stay, increased chance of requiring intensive care, and possibly a higher mortality in this patient population.

Assessing Health-Related Quality of Life of Pediatric HIV Patients in Tabarre, Haiti

Aileen M. Aldrich, Elizabeth R. Lyden, Jenny Edouard, Claudanie V. Romulus, Jessie D. Guerrier, Jacqueline Gautier, and Shirley F. Delair

Background. Haiti has the largest pediatric HIV population in the Americas. Though more patients are having access to care, there are no data on the health-related quality of life (HRQoL) of these patients.

Methods. This is a cross-sectional pilot study of HRQoL using the Pediatric Quality of Life Inventory4, 4.0, a multi-dimensional survey that spans four categories: physical, emotional, social, and school function. In April 2017, 30 family/patient pairs of HIV-infected children, aged 5–15 years, at Saint Damien Pediatric Hospital in Tabarre, Haiti were surveyed during routine clinic visits using a Haitian Creole interpreter. Child and caregiver total and subscale scores were analyzed and correlated to sociodemographic traits. Intra-class correlation coefficients (ICCs) were calculated to assess agreement between patient and family reports.

Results. The mother was the primary caregiver in about half of cases (16, 54%). Few caregivers were employed (7, 23%), married (7, 23%), or had finished high school (6, 20%). Over half of patients (18, 60%) had mothers who were still alive. Most children (29, 97%) were in school and born in Port-au-Prince or the surrounding areas (25, 83%). Though the correlation of parent and child total scores was good (ICC 0.60), emotional and social functioning subscores correlated poorly (ICC 0.13 and 0.22). Parents of children with living mothers showed better school function subscores (P = 0.0388). In the setting of an unemployed caregiver, children had worse overall scores (P = 0.0122), particularly in physical and social function subscores (P = 0.0053 and P = 0.04876).

Conclusion. The survey was well received. Overall, caregivers underestimated emotional and social concerns of the children. Expanding this survey to all HIV patients in this clinic would help provide more multi-dimensional insight that could lead to further targeted psychosocial interventions to enhance quality of life.

Healthcare-Associated Infections Among Pediatric Patients With Neutropenia and Cancer in Honduras


Background. Neutropenia is a common complication of chemotherapy and is a risk factor for life-threatening infections. Understand the characteristics of these infections is essential for best care to these patients. Here we describe the clinical characteristics and outcomes of healthcare-associated infections (HAIs) in neutropenic pediatric cancer patients of the Hospital Escuela Universitario, Honduras.

Methods. We studied and included all microbiology-documented HAI events between January 2014 and July 2017. We obtained data from our prospective surveillance of infection and Risk Factor Registry. We defined Neutropenia as Absolute Neutrophil Count (ANC) less than 500 cells/mm3. We describe the clinical characteristics and outcomes of neutropenic patients, and compared these findings between groups, with and without neutropenia, using descriptive and analytic statistics tests.

Results. Of 160 HAI events, 81 occurred in neutropenic patients, of whom 45 (55%) experienced ANC <100/mm3 within the infection window. Acute leukemia was the underlying diagnosis for 91.5% of neutropenic patients. Bloodstream infection was identified as the major site of infection in 74% of cases. Gram-negative bacteria were isolated in 57 cases (53%), followed by Gram-positive bacteria (n = 12, 14.8%), and Candida sp. (n = 8, 10%). Escherichia coli (53.5%) and Klebsiella pneumoniae (18.6%) were the most frequently identified Gram-negative pathogens. HAI outcomes: 8.6% of
all neutropic patients required ICU admission, of them 85% with ANC <100/mm³. The mean (range) length of hospitalization was 63 ± 43.3 days, and mean antibiotic therapy length was 12 ± 6.2 days. By the end of the event, patients and received on average 2.8 ± 4 antibiotics. Mortality rate was 22% for neutropic patients (n = 18) and 10% for non-neutropic patients (n = 8) (OR = 2.5 (1.03–6.2); χ² = 4.27, P = 0.03).

Conclusion. We found that Enterobacteriaceae (E. coli and K. pneumoniae) were a common etiology of HAI in neonates with neutropenia and the mortality risk is 1.5 times higher in this group compared with non-neutropic patients. Strategies to lower poor outcomes is necessary.

Hospital-Acquired Viral Respiratory Infections (HA-VRI) in a Tertiary Neonatal Intensive Care Unit (NICU)
Claudette Poole, Cecelia Hutto, Bernard Camins, and Mark Prichard, University of Alabama, Birmingham, Alabama

Background. Viral respiratory infections are increasingly recognized as important hospital-acquired infections (HAI) in neonatal intensive care units (NICU). Guidelines to direct testing in this setting are lacking and infections are likely underdiagnosed. We conducted a prospective surveillance study of HA-VRI in a tertiary NICU.

Method. Single-center tertiary NICU was site of study. Enrollment from April 4, 2016 to March 21, 2017. A weekly nasal swab was collected during hospitalization and stored at −80°C. Swabs collected on infants hospitalized for ≤ 4 weeks were tested for 16 viruses using a polymerase chain reaction assay. Clinical data were collected from the medical records. P-values calculated using Fisher exact and Exact Wilcoxon two-sample test.

Results. Seventy-five patients were enrolled of which, 41 were hospitalized for ≥ 4 weeks. Five (12%) of infants tested positive for a VRI. There was no difference in gender, race, gestational age (mean 28 weeks), birth weight (mean 1,200 g), and number of siblings in VRI (+) and VRI (−) infants. VRI (+) infants had a longer length of stay (median 39 vs. 16.5 days, P = 0.04) and were more likely to develop bronchopulmonary dysplasia (P = 0.02). Excluding infants with necrotizing enterocolitis, VRI (+) infants approached significantly longer respiratory support (median 18 days vs. 2 days, P = 0.07), and days of antibiotics (median 8 days vs. 4 days, P = 0.06). No VRI (+) infants had bacterial coinfections at the time of VRI. All 5 VRI (+) infants had respiratory symptoms, only 3 were identified as virus infected by treating physician, and the other 2 remained unrecognized. Study samples obtained on these infants were negative for a virus before the clinically positive sample. One infant was reintubated at the time of rhinovirus infection and died at the time of coronavirus OC43 coinfection.

Conclusion. This study confirms prior findings that respiratory viruses are a cause of HAI, they occur in excess of clinical suspicion and are associated with negative outcomes.

Induction of Muc5b and Muc5ac via STAT6/FoxA2 Pathway During Pneumocystis Primary Infection
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Background. Muc hypersecretion features many respiratory diseases and is associated with non-neutropic Pneumocystis (P. jirovecii) or GFR models. Muc5ac was tested as marker of mucin because it is believed to be the most abundant mucin in pediatric airways. PPI is likely the most frequent and consistent infection of early infancy. This fungal infection goes undetected and is more prevalent between 2 and 5 months of age, which is the time window when more severe respiratory morbidity occurs. The pathways of induction and expression of mucin proteins in addition to Muc5ac, like Muc5b, which has an essential role in airway defense, have not been characterized during Pneumocystis infection.

Methods. We studied Muc5b and their dependence on Pneumocystis stimulation of the STAT6/FoxA2 pathway in infant lung tissue specimens and in immunocompetent infants using PPI.

Results. Muc5b levels were elevated in Pneumocystis-infected compared with Pneumocystis noninfected infants (P < 0.001). The expression of Muc5ac and Muc5b was increased (P = 0.05 and P < 0.001, respectively) in infected compared with noninfected animals. However, Muc5b mRNA and protein levels in infected animals were 20 and 3 times higher, respectively, than those of Muc5ac, suggesting that Muc5b has a role in defense against Pneumocystis as shown for bacteria. The Muc5b increment was dependent on induction of STAT6/FoxA2. Analysis of Muc5b promoter showed that transcriptional repressor FoxA2 occupancy decreased during infection and was dependent on STAT6/FoxA2 pathway.

Conclusions. Results document that Muc5b is more abundant than Muc5ac during Pneumocystis primary infection and that hypersecretion occurs through activation of the STAT6/FoxA2 pathway. Further studies regarding their role in airway disease are warranted.

Comparison of bioMérieux and Roche Procalcitonin Tests in Children with Concern for Bacterial Infection
Sophie Katz, Laura Sartori, Rendi McHenry, J. Eric Stanford, Jennifer Colby, Natasha Halasa, Derek J. Williams, and Rita Banerjee, Vanderbilt University Medical Center, Nashville, Tennessee

Background. Procalcitonin (PCT) is a biomarker used to distinguish bacterial vs. non-bacterial causes of inflammation and may aid appropriate antibiotic prescribing.
Real-Time PCR Assay for Detection of Kingella kingae in Children With Osteoarticular Infections

Theresa Madigan,1 Scott A. Cunningham,2 Poornima Ramana,3 Meenal M. Bhati,2 and Robin Patch1
1Division of Pediatric Infectious Diseases, Department of Pediatric and Adolescent Medicine, Mayo Clinic, Rochester, Minnesota; 2Division of Clinical Microbiology, Department of Laboratory Medicine and Pathology, Mayo Clinic, Rochester, Minnesota; 3Division of Clinical Microbiology, Department of Laboratory Medicine, The University of Texas, MD Anderson Cancer Center, Houston, Texas, and 4Division of Infectious Diseases, Department of Medicine, Mayo Clinic, Rochester, Minnesota

Background. Kingella kingae is a common cause of osteoarticular infections in children younger than 4 years of age, but it is not always recoverable in culture. Molecular methods are increasingly used for diagnosis.

Methods. We developed a novel real-time polymerase chain reaction (PCR) assay for the detection of K. kingae directly in clinical specimens that targets the repeat-in-toxin gene (rtxB). The assay facilitated diagnosis of K. kingae septic arthritis in three pediatric patients and the details of their presentation, diagnosis, and treatment are reviewed.

Results. The patients in our case series were 12–13 months of age and presented with septic arthritis of a major joint of the lower extremity. All underwent arthrotomy with irrigation and debridement, and were symptom-free after 3 weeks of therapy with β-lactam antibiotics. Cultures of synovial fluid or tissue grew K. kingae in two of three, whereas K. kingae rapid real-time PCR was positive in all three patients. In addition, 11 cases of K. kingae osteoarticular infection were diagnosed through Mayo Medical Laboratories using this assay. The limit of detection of the PCR assay was 73.7 CFU/µL for synovial fluid.

Conclusions. PCR-based detection methods are faster and more sensitive than conventional culture-based methods for the diagnosis of K. kingae osteoarticular infections in children. A limitation of this assay is its cross-reactivity with the newly discovered species K. negevensis sp. nov.; the clinical significance of this organism requires further study.

Ocular Toxocariasis Among Patients Referred for Suspicion of Retinoblastoma

Ivan Gutierrez, Lorena Duarte, and Diana Romero, Clinical Infantil Colsubsidio, Bogotá, Colombia

Background. Epidemiology and microbiological characteristics of S. aureus have been changing in last years. The aim of this study was to characterize the microbiological profile of S. aureus and clinically relevant isolates in a pediatric hospital in Bogotá.

Methods. We retrospectively reviewed S. aureus isolates in the WHONET database at Clinica Infantil Colsubsidio from January 1, 2008 through December 31, 2017. Isolates were classified according to source (skin and soft tissues, blood, lungs, and osteoarticular). Only one isolate per patient and origin was included in a period of 30 days.

Results. A total of 727 isolates from 614 patients were included. 71 (11.5%) patients had more than one isolate of different source. In 2008, 3 (8.3%) isolates were SAMR while, in 2017, 44 (48.8%) isolates were SAMR in the WHONET data. The isolates in 401 (55.1%) cases were from skin and soft tissues, 214 (29.4%) blood, 81 (11.1%) osteoarticular and 31 (4.2%) from lungs. Four hundred fifty-seven (62.8%) isolates were from 6- to 17-year-old group. In children under 1 year, blood and skin and soft tissue isolates were equally frequent with 47 (42.3%) isolates. In 1–5 and 6–17 years old group, skin and soft tissue isolations were more frequent. SAMR was found in 18 (58%) pulmonary, in 42 (51.8%) osteoarticular, and in 173 (43.1%) isolates of skin and soft tissues isolates. Patients with S. aureus in one site had SAMR in 263 (36.4%) cases, while those with two and three different origins had MRSA identified in 28 (52.8%) and 17 (94.4%), respectively. SAMR was susceptible in 301 (97.3%) cases to TMP-SMZ and in 296 (97.4%) cases to clindamycin.

Conclusion. In contrast to many reports, we still have high levels of SAMR. Skin and soft-tissue infection are the most frequent infections. We found MRSA more often in patients with more than one isolate presumably because of more severe infection. Clindamycin and TMP-SMZ are good alternatives for treatment of nonsevere MRSA infections.

Ocular Toxocariasis Among Patients Referred for Suspicion of Retinoblastoma

Joshua Wolf,1 Maysam R. Homsi,2,3 and Robin Patel1
1Department of Ophthalmology, St. Jude Children’s Research Hospital; 2Department of Infectious Diseases, St. Jude Children’s Research Hospital; 3Department of Radiation, St. Jude Children’s Research Hospital

Background. Toxocariasis is a zoonotic infection caused by Toxocara sp., transmitted by dogs and cats. Humans become infected by ingesting the eggs of the parasite. There are two well-established syndromes: visceral and ocular toxocariasis. The ocular syndrome can cause vision loss and blindness, and can mimic other diseases such as retinoblastoma. We aim to review all ocular toxocariasis cases diagnosed at St. Jude Children’s Research Hospital (St. Jude) and describe the epidemiology, clinical features, and outcomes.

Methods. We reviewed patient records with Toxocara serology examinations ordered as part of clinical care for all admissions to St. Jude between January 1, 1989 and December 31, 2016. Here, we report the results of all patients with final diagnosis of ocular toxocariasis. Descriptive and comparative statistics were used for this study.

Results. We found 5 cases of ocular toxocariasis. Cases consisted of previously healthy individuals referred to St. Jude on suspicion of retinoblastoma. Patients were mostly male (n = 4, 80.0%) with a mean age of 4 years. Two patients had pets at home (dogs and cats); one of whom also lived on a farm with exposure to other animals. In the remaining 3 cases, no risk factors were identified or mentioned in the records. All patients had eosinophilia and a positive serology for Toxocara. Of the 5 patients, leukocoria was present in 4 cases (80.0%), blurry vision and/or vision loss occurred in 3 cases (60.0%), strabismus in 2 cases (40.0%), and 1 patient reported eye pain. Imaging found fibrotic masses in 4 cases (80.0%), retinal detachment in 3 cases (60.0%), and posterior pole granuloma in 2 cases (40.0%). Only 2 patients received treatment for the infection.
1 patient received local steroids and 1 patient received albendazole, standard treatment for toxocariasis, but required eye enucleation after vision loss and continuous pain. The remaining 3 patients did not receive any surgical or medical treatment.

Conclusions. Ocular toxocariasis should be included in the differential for leuko-coria and intraocular mass. Despite appropriate diagnosis and treatment, these may not ameliorate the damage. Treating affected animals and encouraging good hand hygiene is critical to prevent this disease.

Predisposing Characteristics of Pediatric Patients for Extended-Spectrum β-Lactamase-Producing Bacteria-Related Urinary Tract Infections

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Background. UTIs are common pediatric infections and extended spectrum β-lactamase-producing bacteria (ESBL-PB) cause 14% of cases. These are associated with increased length of stay (LOS), higher costs, antibiotic failure, and mortality. We aim to describe patient characteristics, treatments, and outcomes in UTIs caused by ESBL-PB.

Methods. A case–control study was performed using data from Children’s Healthcare of Atlanta, Georgia, for 2012–2016. We identified eligible patients using laboratory records. ESBL-PB UTI patients were compared with random non-ESBL-PB UTI patients, matched at a 1:2 ratio. Analyzed risk factors include prior antimicrobials, comorbidities, and demographics. Outcomes evaluated were LOS, ICU admission, and mortality.

Results. A total of 260 cases and 520 control subjects were included. Median age was 1 year, and 59% were male. Cases were more likely to be male (OR 1.5; 95% CI 1.1–2.1) and had hypothermia (OR 1.6; 95% CI 1.2–2.2), a prior ICU admission (P < 0.01), undergoing comorbidity (OR 7.1; 95% CI 4.9–9.5), or recent hospitalization (P < 0.01). Cases were less likely to have dysuria (OR 0.6; 95% CI 0.4–0.9) or frequency (OR 0.5; 95% CI 0.3–0.8). No differences were seen in neutrophil count, CRP, ESR, or creatinine. Cases of ESBL-PB UTI had longer LOS [9.9 days (95% CI 4.5–15.3) vs. 3.7 days (95% CI 2.4–5.2)]. ESBL-PB isolates included 209 (80.7%) Escherichia coli and 51 (19.3%) Klebsiella pneumoniae, all showed meropenem susceptibility; only 45% were susceptible to ciprofloxacin and 51% to TMP/SMX.

Conclusions. Prior hospitalization, ICU stay, and genitourinary conditions are associated with ESBL-PB UTIs in children. Some clinical symptoms may be predictive, but inflammatory markers were not different. ESBL-PB demonstrate susceptibility to meropenem, but decreased susceptibility to ciprofloxacin and TMP/SMX. Further research is needed to elucidate the correlates most associated with ESBL-PB UTIs.

Infections in Children With Acute Myeloid Leukemia Receiving Antimicrobial Prophylaxis in a Tertiary Hospital in Ecuador

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Background. The use of antimicrobial prophylaxis during acute myeloid leukemia (AML) treatment is highly recommended and different prophylactic regimens have been suggested. Since 2009, antimicrobial prophylaxis that included ciprofloxacin and voriconazole has been given with each chemotherapy course to our AML patients. We aim to describe mortality due to infectious complications before and after implementing antimicrobial prophylaxis in our pediatric population.

Methods. This was a retrospective review of all patients with AML, who were treated per the BFM protocol 87–96 and the AHOPCA 2007 protocols between 2004 and 2014. The St. Jude Children’s Research Hospital POND database was reviewed for any infectious complication from the initiation of the protocol until death or protocol discontinuation.

Results. A total of 51 patients were evaluated, whose ages were between 8 months and 18 years. Thirty (58.8%) were male patients. A total of 32 (62.7%) patients died; 10 due to infectious complications. Mortality due to infections decreased from 23% vs. 12% (8 vs. 2 patients) after implementing antimicrobial prophylaxis. Septicemia due to Gram-negative bacteria was the most frequent cause of death. E. coli was the most common isolated microorganism. The overall survival was 14 (26.9%), including patients with secondary AML, when abandonment patients are removed (18 patients), the survival rate increased to 34.6%.

Conclusion. Fungal infections have not been reported since voriconazole prophylaxis was implemented. Gram-negative infections have decreased but still a problem for AML patients in our center.

Humoral Immune Correlates of Protection Against Postnatal Cytomegalovirus Infections in Children With Acute Myeloid Leukemia Receiving Antimicrobial Prophylaxis

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Abstracts • JPIDS 2018:7 (Suppl 2) • 591
Background. Congenital cytomegalovirus (CMV) is the leading infectious cause of birth defects in the United States. However, CMV vaccine development is limited by a paucity of knowledge of the immune correlates of protective immunity. Pre-existing CMV immunity is partially protective against congenital CMV as CMV-seropositive women transmit CMV to the fetus at a lower rate than CMV transmission during primary infection. The undefined role of CMV-specific IgG in protection against CMV acquisition is a major gap in knowledge needed to guide CMV vaccine development. Therefore, identification of passively acquired maternal antibodies that contribute to protection against postnatal CMV acquisition is predicted to elucidate immunologic targets for CMV vaccine design. We hypothesize that placental transfer of high-avidity CMV-specific IgG provides protection against postnatal CMV acquisition.

Methods. We analyzed 29 CMV-seropositive Ugandan mothers whose infants were followed weekly for postnatal CMV acquisition using saliva PCR. Twelve infants acquired CMV and 17 infants did not acquire CMV in the first 6 months of life. We compared CMV-specific IgG responses at delivery of mothers whose infants acquired CMV to mothers whose infants did not acquire CMV.

Results. We found no difference in CMV-specific IgG binding or avidity to gB or whole virions. CMV-specific total IgG and IgG3 measured by binding antibody multiplex assay to multiple antigens (gB, gH, gL, gM, gN, gP) were highest in infants whose cord blood cell-entrapped and IgG neutralization of CMV entry into epithelial cells were also the same between groups.

Conclusions. These data suggest that binding and neutralization activity of maternal CMV-specific IgG at delivery do not predict protection against postnatal CMV acquisition. However, the role of non-neutralizing antibodies is yet to be determined.

Incidence and Outcomes of Human Adenovirus Infection in Pediatric Solid-Organ Transplant Recipients


Children's Hospital of Philadelphia, Philadelphia, Pennsylvania and Lovelace Respiratory Research Institute, Albuquerque, New Mexico

Background. Information about human adenovirus (HAdV) infection in solid-organ transplant (SOT) recipients is limited. We aimed to describe the epidemiology and outcomes of HAdV infection in a single-center retrospective cohort during an era of PCR availability.

Methods. SOT recipients transplanted during 2004–2013 at Children's Hospital of Philadelphia were followed for 180 days after transplant. HAdV infection was defined as a positive HAdV PCR. No HAdV surveillance protocols were in place during the study period; testing was done solely per clinician discretion. Progression was defined as HAdV disease, based on organ-specific radiologic and/or laboratory abnormalities, or 1 log viral load increase from the first positive specimen from a given site.

Results. Of the 425 (52.6%) of SOT recipients, 227 had 21 HAdV PCR test. Twenty-four (10.6%) had 21 HAdV-positive PCR. Positive subjects were younger than negative subjects (2.0 years vs. 6.5 years, P = 0.001). Incidence rates were highest in heart–lung transplants (2 positives, 66.7%), followed by the liver (13, 15.5%), kidney (4, 6.1%), and lung (1, 4.3%). Four (16.7%) subjects had HAdV disease at initial detection, and five (20.8%) exhibited progression of infection, including 1/3 receiving cidofovir ≤8 days after transplant. No positive subjects died during follow-up; negative subjects had an all-cause mortality rate of 3.9%.

Conclusions. HAdV infection was infrequently detected in SOT recipients. More than one-third of HAdV-positive patients developed HAdV disease, but none died of HAdV. The low mortality among positives questions the potential benefit of cidofovir.

Toward a Harmonized Fever and Neutropenia Management Protocol for Central America and the Caribbean

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Background. Fever and neutropenia (FN) is a frequent complication in pediatric cancer care. Even though evidence-based guidelines for FN management have been developed, implementation varies greatly between centers, making it difficult to compare outcomes. As an initial step toward a harmonized FN protocol for Central America and the Caribbean, we assessed current practices for FN management in selected pediatric oncology centers.

Methods. A convenience sample of pediatric oncology centers was surveyed through the St. Jude Global Infectious Diseases Program and its network of Preventivists and Infectologists for Pediatric Cancer in Latin America (PRINCIPAL) and the Latin American Pediatric Infectology Society (SLIPE).

Results. Eight pediatric hemato-oncology centers from 8 countries were included (Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Dominican Republic, and Haiti). All belong to teaching hospitals. The average yearly new cancer diagnoses range from 68 to 300. All have a local FN management protocol. Three centers use the definitions proposed by the SLIPE consensus and two centers use the Infectious Diseases Society of America definition of fever and of neutropenia. For FN treatment, use a risk-stratification schema. In low risk patients, ciprofloxacin and ceftriaxone are the preferred antibiotics. For high-risk groups, piperacillin–tazobactam, cefzidime, and cefepime are used. Half of surveyed centers have a management algorithm in use.
Conclusion. Several differences in definitions and management of FN exist between the selected centers. Even though harmonization is a challenge, it would facilitate joint research and quality improvement strategies.

Visceral Toxocariasis Among Patients in a Pediatric Cancer Hospital in Memphis

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Introduction. Toxocariasis is a zoonotic infection transmitted by dogs and cats that can affect humans if the parasite’s eggs are ingested. There are two main syndromes: visceral and ocular toxocariasis. Visceral toxocariasis is characterized by abdominal and/or pulmonary lesions and eosinophilia, and can also present as a milder form without lesions, known as covert toxocariasis. Our aim is to review all toxocariasis cases diagnosed at St. Jude and describe the epidemiology, clinical features, and outcomes.

Methods. We reviewed patient records with Toxocara serology examinations ordered as part of clinical care for all admissions to St. Jude between January 1, 1989 and December 31, 2016. Here, we report the results of all patients with final diagnosis of visceral and covert toxocariasis. Descriptive and comparative statistics were used for this study.

Results. Our review identified a total of 15 patients with positive serology for Toxocara infection and that met criteria for visceral (9 cases) or covert (6 cases) toxocariasis. The majority of cases were male (n = 9, 60.0%), Caucasian/white (n = 13, 86.7%), and non-Hispanic/non-Latino (n = 11, 78.6%). Mean age of patients was 4.8 years. Eleven patients (73.3%) had a diagnosed malignancy, while 4 (26.7%) were evaluated for eosinophilia and lymphadenopathy. Nine patients (60%) had direct contact with animals, with either a dog or a cat in the home. Only 2 patients (13.3%) reported a history of pica. Most frequently reported symptoms were as follows: fever (n = 8, 53.3%); cough (n = 7, 46.7%); diarrhea (n = 6, 40%); anorexia (n = 5, 33.3%); rash (n = 5, 33.3%); abdominal pain (n = 4, 26.7%); vomiting (n = 3, 20.0%); and seizures (n = 2, 13.3%). Fourteen cases (93.3%) presented with eosinophilia. Of the 9 visceral cases, 7 (77.8%) had lung lesions, 5 of which (71.4%) had multiple pulmonary nodules. Three cases (33.3%) had central nervous system (CNS) lesions. Eleven patients (73.3%) received antihelminthic treatment. Two patients (13.3%) died: 1 from cancer progression and 1, with suspected neurotoxocariasis, from suffocation after a seizure.

Conclusions. New pulmonary lesions in a child with cancer requires a careful evaluation, toxocariasis must be part of the working diagnosis. This entity can show multiple bilateral pulmonary nodules, common findings in imaging. Prevention, through hand hygiene and proper care of pets at home, are essential.