

#1: A Novel Antibody Assay Strongly Predicts Children With *S. aureus* Musculoskeletal Infections

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Background. *Staphylococcus aureus* is the most common cause of musculoskeletal infections (MSKI) in children. Despite blood and tissue sampling, cultures remain negative in half of all cases and staphylococcal-specific serologic assays are not available. Our group recently reported that children with invasive *S. aureus* infections generate high antibody titers to the cytotoxin LukAB. The aim of the current study was to assess the diagnostic utility of an anti-LukAB antibody assay for children with MSKI.

Methods. We conducted a prospective study of children 6 months to 18 years of age admitted to Vanderbilt Children's Hospital with MSKI. Acute and convalescent sera were obtained, and antibodies targeting LukAB were measured by ELISA.

Results. Forty-two children were enrolled (25 with culture-proven *S. aureus*, 17 with a non-*S. aureus* pathogen or culture-negative) from September 2014 to October 2016. The median concentration of LukAB antibodies for children acutely infected with *S. aureus* was 130.3 U/mL (IQR 82.1-261.3 U/mL), which rose significantly to 455 U/mL (IQR 24.9-955.8 U/mL) in convalescence ($p < 0.0001$). The median concentration for acute samples obtained from children with non-*S. aureus* MSKI was 8.6 U/mL (IQR 0.4-103.5 U/mL), and 9.7 U/mL (IQR 0.5-118.6 U/mL) in convalescence. The assay accurately discriminated those with *S. aureus* infection from those without, with an area under the ROC curve of 0.872 ($p < 0.0001$).

Conclusions. Children with *S. aureus* MSKI demonstrate elevated antibodies to LukAB during both the acute and convalescent phases of illness, in contrast to children with non-*S. aureus* or culture-negative MSKI. Culture-independent diagnostics have the potential to improve care by narrowing antimicrobial therapy based on the likelihood of *S. aureus* disease. This proof of concept study suggests that a LukAB serologic assay may be a useful diagnostic test in MSKI, and larger-scale validation is indicated.

#2: Adherence to guidelines for the care of children with cancer and high-risk febrile neutropenia

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Background. Expedited antimicrobial treatment of febrile neutropenia (FN) in children with cancer, especially in high-risk patients, improves survival. To standardize the FN care process, we developed in 2015 an institutional guideline for FN treatment. We then trained emergency pediatrician, nurses, and pediatric and oncology fellows in the use of the guidelines. Here, we evaluated the adherence to the guidelines in high-risk patients with FN events and their outcome.

Methods. We conducted a prospective study of the adherence to our FN guideline for high-risk FN patients attending the pediatric emergency and pediatric oncology departments in Mexico from November 1st, 2015 to December 31st, 2016. Time to antibiotic (TTA) delivery in minutes and outcome (length of stay, intensive care unit admission, and mortality) were recorded. Two months pre-training and 12 months post-training, we collected data including malignant disease type and characteristics of the FN events. We determined the statistical significance of our interventions, correlating TTA with the outcomes.

Results. In the study, we included 318 high-risk FN events in 186 patients. Our interventions improved the TTA pre- vs post-training (mean, 620.5; SD, 296; range, 120-1260; vs mean, 372.7; SD, 337.4; range, 30-1380; respectively) ($p=0.0001$), and the length of stays decreased (mean, 11.9; SD, 7.1; vs mean, 9.2; SD, 5.4) ($p=0.003$). The decreases in intensive care admission and mortality were not statistically significant {18.7% (9/48) to 11.6% (30/258) ($p=0.74$), and 14.6% (7/48) to 7.7% (20/258) ($p=0.125$), respectively}. Importantly, antibiotic preparation and dispensing by institutional pharmacy follow established process, and the mean turn-around time is 10 hours.

Conclusion. Adherence to FN guidelines by the multidisciplinary team standardized and decreased delays of FN care process. Also, expediting pharmacy processes may further improve FN treatment.

#3: Assessing the impact of CDC definitions on bloodstream infection rates in Mexico City

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Background: The CDC Mucosal Barrier Injury (MBI) Laboratory-Confirmed Bloodstream Infection (LCBI) definitions have been recently incorporated into the Mexican healthcare-associated infection surveillance protocol. We aimed to (1) determine the proportion of LCBI classified as MBI vs. non-MBI among pediatric cancer patients, and (2) compare central line associated bloodstream infection (CLABSI) rates before and after using the CDC definition.

Methods: We applied 2016 NHSN criteria to all LCBI reported within the active infection surveillance data at our hospital between January 2014 and December 2015. We conducted a retrospective review of medical records and re-classified LCBI cases as MBI or non-MBI. We use descriptive and inferential statistics to show our findings.

Results: From 88 LCBI identified among 75 patients, 44 cases met the CLABSI criteria. The CLABSI rate was higher when using the CDC definition vs Mexican definition (1.09 vs 0.56 infections per 1000 catheter days). 24% (21/88) of LCBI qualified as MBI events. Among them, the most commonly isolated microorganisms were *Escherichia coli* (67%), *Enterococcus faecalis* (10%) and *Candida albicans* (10%). Among non-MBI cases, *Pseudomonas aeruginosa* (28%), *Klebsiella pneumoniae* (12%) and *Staphylococcus aureus* (12%) were isolated most often. Patients who developed MBI vs. non-MBI LCBI were demographically and clinically similar. We did not find significant differences in length of stay (55 vs. 46 days, $P=0.927$), admission to intensive care (40% vs 61%, $P=0.094$) and infection-related mortality (5 vs.16 patients, $P=0.995$) between MBI vs. non-MBI events. Non-MBI events had greater frequency of profound neutropenia (59% vs. 41%, $P=0.001$), and prolonged neutropenia (60% vs. 40%, $P=0.001$).

Conclusion: We demonstrate that the CDC definition impacted CLABSI rates. Further studies should assess if our findings are similar at other pediatric cancer centers in Mexico.

#4: Association between asymptomatic maternal malaria infections and birth weight in Myanmar

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In malaria endemic countries, malaria infection during pregnancy is an important risk factor for adverse birth outcomes. Association between malaria in pregnancy and low birth weight is well established in areas of moderate to high malaria transmission. But in areas of low or unstable malaria transmission, as in Southeast Asian countries like Myanmar, reliable data are scarce. The effect of malaria parasitemia on pregnancy outcomes remains an identified research gap in Myanmar, where most infections are asymptomatic and undiagnosed. To determine whether asymptomatic maternal malaria infections are associated with adverse pregnancy outcomes in Myanmar, data were collected from 752 pregnant women in 12 villages of 2 townships where the women were followed longitudinally and tested for malaria, anemia, and other parasite infections. Demographic data, malaria and other parasite infections, hemoglobin concentrations, and pregnancy outcomes were analyzed. The primary objective was to assess whether these risk factors in pregnant women are associated with low birth weight of newborns.

Of 752 pregnant women enrolled, there were 646 live births and 7 stillbirths. Birth weights were recorded in 514 of the 646 live births. Low birth weight (<2.5kg) was noted in 20 of 514 (3.9%) live births. There were 68 asymptomatic malaria infections detected by ultra sensitive PCR in 41 of the 752 pregnant women. Infections with various other parasites were also recorded.

An association between low birth weight and maternal malaria infection was not observed. There was, however, a statistically-significant association between low birth weight and one of the two study townships. Although the analyses are limited by the small number of low birth weight infants, this preliminary data is useful for informing future study designs in order to improve ongoing investigations into adverse birth outcomes in malaria endemic settings.

#5: BACTERIA INVOLVED IN BLOODSTREAM INFECTIONS IN PEDIATRIC HEMATOLOGICAL PATIENTS IN LIMA, PERU

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Background: There is limited information on the microbiological profile of bacteria involved in bloodstream infections (BSI) in pediatric patients with hematological conditions in Latin America.

Objective: To determine the microbiological profile and antimicrobial resistance patterns of bacteria involved in BSI among pediatric patients with immunosuppressive hematological conditions in a tertiary care children's hospital in Lima – Peru.

Methods: We retrospectively reviewed the institutional electronic database of antimicrobial resistance patterns of isolated bacteria from pediatric hematologic patients at Instituto Nacional de Salud del Niño San Borja, in Lima – Peru, from January 1st 2015 to June 30th 2016. We defined BSI as one or more positive blood cultures of well recognized virulent bacteria, or at least 2 positive blood cultures taken from different sites within 48 hours for common commensal organisms. Only one isolate from each set of cultures was considered for analysis.

Results: Among 972 sets of cultures, we identified 52 episodes of BSI from 42 patients. The median age was 8.1 years (IQR 5.5-13.4), and 26 were male (49.1%). Thirty three episodes occurred in patients with lymphoblastic leukemia, 5 in patients with myelogenous leukemia, and 15 in patients with aplastic anemia. Gram negative bacteria were predominant (39 isolates, 73.6%). Most frequent isolates were *Pseudomonas* spp (18.9%), *E. coli* (17.0%), *Acinetobacter* spp (13.2%), and coagulase-negative staphylococci (13.2%). Among the 52 isolates, frequency of ESBL-producer enterobacteriaceae, carbapenem resistant *Pseudomonas*, MRSA, and VRE, were 19.2%, 3.5%, 0.0%, and 0.0%, respectively.

Conclusion: BSI due to gram negative bacteria is a serious problem in pediatric patients with hematological conditions at this institution. Further investigation is required to determine risk factors associated with antimicrobial resistance in this specific population.

#6: Burden of Central-Line Associated Bloodstream Infections at a Pediatric Cancer Center in El Salvador

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Background: Central venous catheters allow the safe infusion of chemotherapy and other fluids and improve the quality of life of children with cancer. Surveillance of infection rates associated with central venous catheters serves as a quality indicator of pediatric cancer care. We aimed to determine the incidence of central line associated bloodstream infections (CLABSI) among pediatric cancer patients in El Salvador.

Methods: We applied the 2013 CDC/NHSN CLABSI criteria to all healthcare-associated bloodstream infections previously reported within the Hospital Bloom prospective surveillance data between January and December 2016. We used denominator data prospectively collected to calculate rates of infections for temporary and permanent central lines.

Results: Overall, 50 healthcare associated bloodstream infections were evaluated over 8,596 patient days, with 37 being categorized as CLABSI. The overall CLABSI incidence density was 7 infections per 1000 catheter days. Temporary catheter associated infection rates was higher than permanent catheter associated infection rates (7 vs. 5 per 1000 catheter days). The device utilization ratio was higher for temporary than permanent catheters (0.318 vs. 0.069). Although coagulase-negative staphylococci were the pathogens most commonly isolated (10/37), Gram-negative microorganisms (54%) were most prevalent. *Escherichia coli* was (7/37) the second most frequently pathogen isolated tied with *Staphylococcus aureus* (7/37).

Conclusion: Our results show a higher incidence of CLABSI when compared to similar disease care settings in developed countries. Implementation of evidence-based bundles that target catheter insertion and maintenance might decrease CLABSI rates in pediatric cancer centers in low-to-middle income countries.

#7: Candida Infection of a Limb-sparing Prosthesis in a Teenager with Osteosarcoma

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Objectives: To report the success of the medical management of a Candida limb-sparing prosthesis infection when surgical removal of the prosthesis was not possible. **Background:** Candida infection of a limb-sparing prosthesis in a cancer patient is a challenge because no specific guidelines detail the antifungal treatment when the prosthesis is retained. By reporting this case we illustrating a possible management approach when removal of the prosthesis is not feasible. **Case description:** Localized right distal femur osteosarcoma was diagnosed in a 13-year-old Hispanic girl on 2/5/2013. Her chemotherapy (MAP-IE) completed on 10/19/2015. A limb-sparing surgery with prosthesis placement was performed on 5/6/2013 complicated by the stiff knee. On 11/9/15, a tissue release with revision of femoral components was done, complicated by deep wound infection. Multiple attempts of incision and drainage were performed with hardware retention. A culture of the surgical site indicated coagulase-negative staphylococcus on 11/28/2015 and Enterobacter amnigenus on 12/16/2015. A three-week-course of vancomycin, rifampin, and levofloxacin was completed, but infection of the limb-sparing prosthesis developed. Although the patient underwent replacement of the infected prosthesis on 01/11/16, she had right leg erythema and increased serosanguineous drainage from the surgical wound, which worsened over weeks despite antibiotic treatment. Candida albicans was grown from the wound drainage as well as from aspirated right knee fluid. Eight weeks of primary antibacterial and micafungin was completed followed by suppressive therapy with fluconazole and levofloxacin. Despite that, her prosthesis was not removed, clinical improvement occurred, restoring her ambulation, with occasional use of crutches. **Conclusion:** Maintaining a remission of fungal periprosthetic joint infection is possible when removal of the joint prosthesis is not feasible.

#8: Characteristics and Outcomes of Fungal Infections in Patients with Cancer at a Hospital in Mexico

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Background: Invasive fungal infections (IFI) are a major cause of morbidity and mortality in pediatric cancer patients. In low-and-middle income countries, there is limited published literature regarding patients presenting with IFI. We compare clinical characteristics and outcomes of IFI among pediatric cancer patients at a tertiary referral hospital in Mexico City, Mexico.

Methods: Pediatric patients with cancer admitted between January 1st, 2010 and August 31st, 2016 and who met EORTC/MSG 2008 criteria for proven or probable IFI were included in this retrospective chart review. We use descriptive and inferential statistics, Pearson χ^2 test, and independent t-test to report our findings.

Results: Of 84 events from 80 patients, there were 65 proven (77.4%) and 19 probable (22.6%) cases of IFI. *Candida* sp. infections were most common (47 events, 55.9%) followed by *Aspergillus* sp. (25 events, 44.1%). Incidence rate was 7.6 IFI events per 100 cases of cancer. Patients with mold infections experienced longer hospital stays than those with yeast infections (74 days v 56 days, respectively) although not statistically significant ($P = 0.117$). All-cause in-hospital mortality was significantly higher for patients with mold IFI (24 v 9 deaths, $P=0.016$) and remained significant when isolating for IFI-related mortality (10 v 2 deaths, $P=0.003$). Patients who died were significantly more likely to be older ($P=0.021$), to have longer episodes of neutropenia ($P=0.002$), and to have received T-cell immunosuppressants ($P=0.003$). Use of steroids in the prior 3 weeks was greater in those who died (75% vs 46%), although not statistically significant ($P=0.061$).

Conclusions: Incidence of IFI (7.6%) and infection-related mortality (14.3%) reported here are similar to that found in other publications. Identification of IFI risk factors and use of prophylaxis for at-risk patients may decrease infection-related mortality in our center.

#9: Characterization of Astrovirus-associated Gastroenteritis in Hospitalized Children <5 in Lebanon

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Diarrhea is the second leading cause of childhood mortality in children less than 5 years of age. Astrovirus (AstV) has been recently identified as one of the major etiologic agents of gastroenteritis in children. Nonetheless, the burden of AstV in the Middle East including Lebanon remains largely understudied. Stool samples were collected from children less than 5 years of age hospitalized for gastroenteritis at six medical centers across Lebanon between 2011 and 2013. Extracted viral RNA of eligible samples (n=739) was screened by two AstV-specific PCR assays followed by genotype-specific PCR. For genotypic characterization, Sanger sequencing and phylogenetic analysis were performed. Demographic and clinical data were collected and analyzed. AstV was detected in 41/739 (5.5%) of rotavirus-negative stool samples. AstV infections were mainly detected during the summer and winter seasons. AstV infections were most prevalent in Northern Lebanon and the 49-60 months age group was most susceptible to AstV infections. The Vesikari Scoring System revealed severe gastroenteritis (score >11) in 85.4% (35/41) of the cases. Genotype-specific PCR identified 22 classical and 4 MLB-like AstV specimens. Further sequencing and phylogenetic analysis of orf1b and orf2 genes revealed that AstV classical 1-3, 5, 6, and 8, MLB-1, VA-1 and -2 genotypes circulated in Lebanon. AstVs are associated with 5.5% of non-rotavirus gastroenteritis-associated hospitalizations in children under five years. High genetic diversity was detected among AstVs circulating in Lebanon.

#10: Characterization of Respiratory Viral Infections in Children with Cancer in Posadas, Argentina

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Background Viral infections in children with cancer occur frequently and complicate care delivery. We present patient characteristics, outcomes and potential risk factors for viral infections among children with cancer treated at a hospital in Argentina.

Methods We retrospectively examined the prospective infection surveillance database for patient characteristics associated with respiratory viral infections between January 2014 and November 2016 and compared healthcare-associated infections (HAI) to those present on admission (POA).

Results The study period included 1146 admissions, with 50 admissions among 37 patients related to a viral infection. The incidence rate was 4.2 infections per 1000 hospital days. Most patients (78%) had leukemia. None of the infected patients had influenza vaccinations. Most admissions received chemotherapy (98%). Profound neutropenia and lymphopenia were significantly more prevalent for HAI vs POA infections, $p = 0.036$ and $p = 0.008$, respectively. Prolonged neutropenia and lymphopenia were also significantly different for HAI v POA, $p < 0.001$ and $p < 0.001$, respectively. Influenza-type viral infections were most prevalent (36%), followed by respiratory syncytial virus (28%), and parainfluenza type virus (26%). Most events (46%) were upper respiratory tract infections. 13 admissions (26%) involved two pathogens, 3 of which (6%) involved a respiratory co-virus. 2 admissions required mechanical ventilation. Overall 32% ($n=16$) received antiviral treatment with oseltamivir for an average of 7 days. 2 deaths occurred in admissions infected with the parainfluenza III and influenza B virus. HAI viral infection experienced almost 3x longer hospital length of stay vs POA infection (19.2 v 7.4 days, $p = 0.001$). Mean time to diagnosis after admission was 14.7 days ($SD \pm 5.7$).

Conclusions Vaccination of patients and relatives and prompt diagnosis could decrease incidence and improve patient outcomes

#11: Complication and clinical outcomes of using PICC lines in pediatric oncology patients

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Background: Peripherally inserted central venous catheters (PICCs) are frequently used in infants and children and can be invaluable in the pediatric oncology setting for administration of intravenous therapy, parenteral nutrition and/or blood products. In this study, we report PICC-related complications in pediatric hematology/oncology patients at a hospital in Quito, Ecuador.

Methods: Demographic data and catheter insertion, maintenance and removal information were prospectively collected on patients receiving PICC lines between January 2010 and December 2015. All PICCs were inserted in the operating room by the vascular care team surgeon.

Results: During the study period, 54 PICC lines were placed in 53 patients, totaling 1,185 catheter days. Of the inserted PICCs, 31 (57%) were removed prematurely due to complications that included both non-infectious (18) and infectious (13) causes. Occlusion accounted for over half (10) of the catheters with non-infectious complications and PICC related bloodstream infections comprised the majority (8) of catheters removed as a result of infection. The overall complication rate was 26 complications per 1000 catheter days. Infectious complications were 4-fold greater in patients whose PICC lines were placed without ultrasound guidance (2 versus 8), but the total complications were equivalent between ultrasound guided and non-ultrasound guided placements. Superficial venous dissection was used during insertion of 11 (38%) of PICC lines that later developed complications, while the remaining PICC complications did not require venous dissection during placement.

Conclusion: Our findings indicate the need for further efforts in staff education and training in the insertion, care and maintenance of PICC lines. Best practices guidelines are also critical to reducing complications, especially blockage and infection rates, and thereby improving patient outcomes.

#12: Detection of OXA-48 in *Klebsiella oxytoca*: an unusual finding

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Objective: To identify a carbapenemase type OXA 48 in an isolation of *Klebsiella oxytoca* in a pediatric third level hospital.

Material and Methods: An isolate of *K. oxytoca* with carbapenem resistance was identified. The production of extended spectrum betalactamases (ESBL) with a double disc diffusion test and carbapenemases with the CarbaNP test was detected, following the guidelines of the Clinical and Laboratory Standards Institute. Afterwards, the blaVIM, IMP, KPC and BLAVIM genes were analyzed by blaTEM, SHV, CTX-M-1, CTX-M-2, CTX-M-9, OXA-48 and NDM. The products obtained were sequenced and analyzed using bioinformatic tools.

Results: Isolation was obtained from a peripheral blood culture of a 14-year-old patient diagnosed with acute lymphoblastic leukemia, which was managed with multiple antimicrobial schedules (meropenem, piperacillin-tazobactam, vancomycin and trimethoprim with sulfamethoxazole). The antibiogram reported that the isolation was resistant to: ampicillin, imipenem, piperacillin / tazobactam, gentamicin, ciprofloxacin; Intermediate to meropenem and sensitive to: aztreonam, cefazolin, cefepime, ceftazidime, ceftazidime, amikacin, and nitrofurantoin. The tests for BLEE and Carba NP were negative. A fragment was amplified that was identified as OXA-48.

Conclusions: The phenotypic detection of OXA-48 is complex since the hydrolysis of the carbapenems is inefficient and practically non-existent for the third and fourth generation cephalosporins, and an inhibitor is not known to make it evident through phenotypic tests. The importance of this report lies in being the first isolation of *K. oxytoca* producer of OXA-48 in our country.

#14: Effectiveness of Parent Education to Decrease HAP at a Pediatric Cardiology Unit in Mexico.

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Background: Healthcare-associated pneumonia (HAP) is one of the most common hospital-acquired infections. Parent education programs might impact HAP rates in pediatric hospitals. To date there is little information about its impact in centers in low-to middle-income countries.

Objectives: To evaluate the incidence of HAP in a multidisciplinary pediatric cardiology unit and to examine the effects of the implementation of parent education on its incidence.

Methods: A 18-month-long before/after study was conducted, divided into baseline, intervention, and post-intervention periods. The educational intervention consisted of: (1) a one-to-one, 20-minute educational session on hand hygiene techniques, item disinfection and respiratory/cough etiquette using a flipchart, (2) a reminder card, and (3) an education replication system. Parents were asked to replicate the educational session with at least one parent within the same unit. We compared HAP incidence and rate during the study periods.

Results: Of 298 patients admitted, 24 met the criteria for HAP during the study periods. A total of 49 parents were trained. The baseline HAP rate was 7.60 [IQR 3.60-8.73 per 1000 patient days. During the post-intervention period, it decreased to 0.0 [IQR 0.0-0.0] per 1000 patient days ($P = .004$). The overall healthcare associated infection rate decreased from 8.4 to 4.4 ($P = .07$) per 1000 patient days. There was also no significant change on hand hygiene compliance rates (65.6% vs., 62.9%) between baseline and post-intervention periods.

Conclusions: To the best of our knowledge, this study is the first one to demonstrate the effectiveness of parent education program to decreased HAP incidence in a pediatric cardiology unit in a middle income country. This educational intervention resulted in an improvement to the overall quality of care in our institution.

#15: Enteric fever with *S. typhi* progressing to hemophagocytic lymphohistiocytosis: A case report

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Hemophagocytic lymphohistiocytosis (HLH) is a rare, life-threatening, syndrome which is characterized by a hyperinflammatory state due to uncontrolled activation of the immune system and may be triggered by a variety of rheumatological, oncological, and infectious disorders. Viruses are a common trigger of HLH, most commonly Epstein-Barr virus, while bacterial infections are less common triggers. Here we report a 6-year-old girl with fever and abdominal pain who was diagnosed with typhoid fever based on a positive blood culture for *Salmonella typhi* and then developed HLH. She immigrated to the US from a refugee camp in Thailand three years earlier. She met diagnostic criteria for HLH with fever, splenomegaly, pancytopenia, elevated transaminases, hyperferritinemia, hypertriglyceridemia, and elevated soluble interleukin 2-receptor (5720 unit/mL; normal 45-1105). Her markers of HLH resolved with treatment of typhoid fever and steroids. No further chemotherapy was indicated. Few cases of HLH associated with typhoid fever have been reported. These often involved patients who resided in, or recently traveled to an endemic area. Our case highlights the importance of evaluating and treating possible bacterial triggers among patients with HLH, as well as considering typhoid fever in individuals presenting with fever who have previously traveled to – or reside with persons from endemic areas who might be chronic carriers of *Salmonella typhi*.

#16: Epidemiology of healthcare-associated infections in patients with cancer in San Pedro Sula, Honduras

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Background: Scant literature reports that incident rates and local burden of HAIs are higher in low- and middle-income countries compared to high-income countries, exacerbated in pediatric oncology patients who are at high risk for HAIs. Here we describe the frequency of HAIs and associated pathogens from pediatric oncology patients at the largest medical center in Honduras.

Methods: The Infection Care and Prevention team at Hospital Mario Catarino Rivas in San Pedro Sula prospectively collected patient demographic and HAI data and applied 2016 NHSN/CDC definitions to HAI diagnoses. The team reported the cumulative data in standardized monthly formats spanning January 2014–October 2016. We reviewed these reports and used descriptive statistics to summarize our findings.

Results: 151 HAIs were identified in 126 patients. Most of the HAIs (83%) were in patients with hematological malignancy. The overall incidence of HAI was 7 (range 1–22) per 100 discharges and the incidence density was 10.5 (range 2–25) per 1000 patient days. Gastrointestinal infections (primarily acute gastroenteritis) were the most frequent diagnosis (26%), followed by pneumonia (15%) and upper respiratory tract infections and oral mucositis (15%). Primary bloodstream infections accounted for 13% (19/151) of infections, with 2 qualifying as central line associated bloodstream infections. Of the infections from which microorganisms were isolated, 58% were gram negative (29/50), 36% were gram positive (18/50) and 6% were fungal.

Conclusion: Our findings confirm the urgent need to address the burden of HAIs among pediatric patients in San Pedro Sula. Using this data as a baseline, it will guide us in identifying cost effective interventions to decrease HAIs.

#17: Etiology of bacteremia and antimicrobial resistance in pediatric patients with malignancy in Ecuador

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Background: Bacteremia is common among pediatric oncologic patients. Empirical antibiotic therapy is critical to reduce infection-related morbidity and mortality in these patients. Knowledge of current epidemiology is crucial for appropriate empirical therapy in the setting of increasing antibiotic-resistance. However, literature regarding bloodstream infections in Ecuador is limited.

Objectives: To determine the etiology and antimicrobial resistance pattern of bacteremia among pediatric patients in the oncology unit of a Children's Hospital in Ecuador.

Methods: Data from blood cultures sent from the oncology service in a Children's Hospital in Ecuador, from January 2015 to December 2015, was retrospectively analyzed. Bacterial susceptibilities results were also studied.

Results: A total of 315 blood cultures from the oncology service were analyzed from which 40 (12.7%) were positive. Gram-negative bacteria were identified in 26 (65%) samples and gram-positive bacteria in 14 (35%). The most common organisms were: *K. pneumoniae* (32.5%), *Enterobacter* spp. (15%), *S. aureus* (12.5%), and *Pseudomonas* spp. (10%). Antibiotic resistant bacteria including methicillin-resistant *S. aureus* (MRSA), extended spectrum beta lactamase-producing bacteria (ESBL) and carbapenem-resistant enterobacteriaceae (CRE) were found in 9 out of 40 samples (22.5%). *K. pneumoniae* was isolated in 13 samples; from which 6 were ESBL (46.1%) and 4 were CRE (30.7%). Additionally, ESBL and carbapenem-resistant *K. pneumoniae* was identified in 3 samples (23%). MRSA accounted for 40% of the identified *S. aureus* (n=2).

Conclusion: To our knowledge this will be the first study to determine the bacteriology and resistance pattern of bloodstream infections among pediatric oncology patients in this country. Gram-negative bacteria were the most common cause of bacteremia. The prevalence of multidrug-resistant *K. pneumoniae* and MRSA is high in this population.

#18: Etiology of Primary Bloodstream Infections among Children with Cancer at a Hospital in Guatemala

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Background: Pediatric patients receiving cancer-directed therapy in low resource settings have an elevated risk for infection. The epidemiology of infections in these settings is less known than in high-income settings. Here, we describe the etiology of primary bloodstream infections (BSI) at our hospital and compare BSI present-on-admission (POA) to BSI healthcare-associated infections (HAI).

Methods: We retrospectively reviewed all episodes of BSI among pediatric patients at our hospital between January 1, 2011 and December 31, 2015 and used CDC/NHSN 2016 definitions to categorize BSI. We use descriptive statistics and Fisher's Exact test to report our results.

Results: Our review identified 215 primary BSI among 196 patients, with 232 microorganisms isolated. The majority of patients had leukemia (79.59%) and were undergoing chemotherapy at the time of infection (86.98%). 162 events (75.35%) were HAI and 53 events (24.65%) were POA, with 72 episodes of central-line associated BSI (33.49%). However, only 82 events (38.14%) were considered to be mucosal-barrier injury BSI. HAI events were more likely to require intensive care unit admission due to infection than POA events ($P=0.009$). Of the 88 patients who died during admission, the majority of deaths were attributed to BSI (54 deaths, 61%). However, mortality was not significantly different between HAI and POA groups ($P=0.34$). *Klebsiella* spp. were the most commonly isolated pathogen (55 isolations, 23.71%), followed by *Escherichia coli* (38 isolations, 16.38%), and *Pseudomonas* spp. (30 isolations, 12.93%). Two different pathogens were isolated in 7.91% of events.

Conclusion: Our findings demonstrate high morbidity and mortality in pediatric patients who experience HAI BSI. Further investigation into care for BSI is required in order to improve patient outcomes.

#19: Follow-up of Pediatric Patients Presenting for “Rule out Sexual Assault” Placed on nPEP for HIV

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Background: Current guidelines by the US Public Health Service offer no consensus about non-occupational post-exposure prophylaxis (nPEP) for children and adolescents after non-occupational exposures to HIV. At St. Christopher’s Hospital for Children (SCHC), pediatric patients are offered nPEP after sexual assault in the Emergency Department (ED) if presenting within 72 hours. Patients are asked to follow up at the SCHC Dorothy Mann Center for Pediatric and Adolescent HIV (DMC).

Objectives: Available patient records were examined to determine the rates of patients completing follow up at 1 month, 3 months and 6 months and to determine if any patients seroconverted to positive HIV status after an nPEP course after sexual assault.

Methods: SCHC ED charts from January 2012- June 2013 were queried for “rule out sexual assault” (ROSA). Patients were excluded if investigation by the ED physician showed no body fluid was exchanged. Patients were then cross-referenced in the DMC and child protection clinics EMRs to assess follow up HIV results and healthcare utilization. Results were recorded in an Excel spreadsheet and description statistics computed manually.

Results: Data mining is ongoing. Preliminary results: There were 315 ROSA patients in the SCHC ED from January 1, 2012 to June 30, 2013. 138 (43% of patients) were included in the study, all with negative ED HIV tests. 78 of the included patients (56%) have been assessed for follow up. 28 patients (35% of the 78 cross checked), had at least one follow up appointment. Of the 28 patients who had follow up, 20 patients (71%) started nPEP, 12 (60%) of which followed up with the DMC, whereas the other 8 patients were followed by the child protection clinic.

Conclusion: As of current, results from January 2012- June 2013 demonstrate poor follow up in our outpatient center. Further research is needed to determine causes of poor follow up after starting nPEP for ROSA.

#24: Healthcare-associated Bloodstream Infections in a Pediatric Cancer Unit in Honduras

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Background: Healthcare associated bloodstream infections (BSI) negatively affect outcomes and increase cost in pediatric cancer centers (PCC) in low-to-middle income countries. Prospective surveillance of BSI allows identification of strategies to reduce BSI rates. We compared incidence, risk factors, and clinical outcomes between mucosal barrier injury (MBI) and non-MBI-associated BSI among patients at a PCC in Tegucigalpa, Honduras.

Methods: We included all BSI events documented in the center's prospective infection surveillance database between January 2014 and November 2016. BSI events were classified as MBI or non-MBI-associated BSI using CDC/NHSN 2016 definition criteria. We compared demographics and clinical outcomes between groups using Pearson χ^2 test or Independent t- test.

Results: 72 patients had 92 BSIs, with an incidence density of 4 infections per 1,000 patient-days. 75% of patients had leukemia. 35% (32/92) of events met criteria for central-line associated BSI (7 infections per 1,000 catheter days) and 30% (28/92) qualified as MBI cases. Non-MBI infection incidence density was higher than MBI infections (3 vs. 1 infection per 1,000 patient-days). These cohorts had similar demographic and clinical characteristics; however, MBI events had greater frequency of profound neutropenia (64% vs. 36%, $P=0.001$), and prolonged neutropenia (58% vs. 42%, $P=0.001$). *Klebsiella pneumoniae* was the most common microorganism isolated (13%), followed by *Escherichia coli* (12%) and *Serratia marcescens* (11%). We did not find significant differences in length of stay (78 vs. 71 days, $P=0.618$), admission to intensive care (50% vs. 50%, $P=0.385$) or infection-related mortality (3 vs. 7 patients, $P=0.975$) between MBI vs. non-MBI events.

Conclusion: Our data show that most of the BSI at our PCC meet the non-MBI criteria, meaning preventable BSI, which are amenable to quality improvement initiatives.

#25: How quickly do human viral-induced inflammatory responses resolve after viral replication ceases?

Busby, Kenneth, Edward Via College of Osteopathic Medicine and DeVincenzo, John, The University of Tennessee Health Science Center.

Background: Our immune system repeatedly controls new viral infections, and after successful viral clearance it can dampen viral-induced inflammation. How complete and quickly this post-viral dampening occurs has far-reaching implications for understanding all “post-viral” diseases, and efficacy of antivirals. Recent interferon-free HCV antiviral regimens can stop viral replication quickly without artificially perturbing immune responses. We therefore re-analyzed viral load and inflammation data from these regimens to determine how quickly human inflammatory responses resolve after viral replication ceases.

Methods: We reviewed 38 studies evaluating HCV replication inhibitors for appropriate interferon-free data-content, finding 1 suitable (N Engl J Med 2014;370:211-21, sup). Group data existed from 10 treatment arms (genotypes 1,2,3, and sofosbuvir (a nucleotide analog polymerase inhibitor), daclatasvir (a NS5a replication inhibitor), and Δ VL/ Δ t) with clearance of inflammation (Δ AST/ Δ t, Δ ALT/ Δ t, and Δ IP-10/ Δ t) using linear regression. Because ribavirin may be immune modulating, we similarly analyzed the 6 non-ribavirin containing groups.

Results: By wk 4 of treatment, VL for all groups was <25 IU/mL (LLOQ), and ALT, AST were normal. Within this time, many VL data points, but only 3 relevant data points for ALT and AST were available: days 0,7 and 14 post treatment. Δ VL/ Δ t correlated with Δ ALT/ Δ t and Δ AST/ Δ t (d0-7) ($p=0.001$, $p=0.1152$ respectively). Analysis of non-ribavirin containing groups showed Δ VL/ Δ t correlating with Δ ALT/ Δ t and Δ AST/ Δ t (d0-7) ($p=0.0023$, $p=0.0729$ respectively). Δ VL/ Δ t correlated with Δ IP-10/ Δ t (d0-2) ($p=0.0484$).

Conclusions: For HCV, within evaluable time-windows (7 and 2 days), human viral-induced inflammation dampens in parallel with VL reduction. Extrapolation to new antivirals for other infections may predict disease responses.

#28: Lymphadenitis-first and facial nerve palsy in an older child: Unusual presentations of Kawasaki's

Schneider, Jack, Indiana University school of Medicine; Christenson, John, Indiana University school of Medicine; Goel, Utsav, Indiana School of Medicine; and Schneider, Kimberly, Indiana School of Medicine.

Kawasaki disease (KD) is an inflammatory condition frequently seen in preschool-age children between the ages of 2 and 4 years of age. Classic manifestations include prolonged fevers, a morbilliform exanthem, erythema of the hands and feet along with swelling, oropharyngeal erythema accompanied by red cracked lips, and unilateral lymphadenopathy >1.5 cm. Kawasaki disease in the extreme of ages in children <1 year of age and children >8-9 years of age tend to be incomplete where many of the manifestations may be absent. In addition, all features may not be present at the same time and over a period of time progression may be noted, making the diagnosis clearer. However, atypical presentations of KD, especially those in children presenting with high fevers may be difficult for early diagnosis. The diagnosis of atypical KD tends to be delayed unless there are features that support the diagnosis. It is imperative that clinicians have a high degree of suspicion when evaluating patients with persistent fever and the presence of one or more additional features that can be observed in patients. The presence of thrombocytosis, fever and skin peeling may be telling and can be supportive of the diagnosis. It may lead to detection of this condition.

The presentation of lymphadenopathy and fever as the first features of KD has been well described in the literature and it tends to be observed in patients with atypical disease and specifically it tends to be seen in older children. This is important since the presence of the lymphadenitis is associated with higher incidence of coronary artery disease. Here we present a patient who has this as an initial presentation in addition to the appearance of facial nerve palsy, a known complication of KD. However, it is a condition that is mostly observed in children <1 year of age with atypical disease. Our patient is an atypical case that merits reporting

#29: Nasopharyngeal Colonization with Non-Typable H. influenzae: Innate Immunity and Disease Severity

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Background: We showed that infants with severe RSV-LRTI had lower TNF- α and IL-8 production, which was associated with worse clinical outcomes. In addition, limited data suggest that nasopharyngeal (NP) colonization with potentially pathogenic bacteria (PPB) may play a role in RSV-disease severity. We sought to determine the association between innate immune responses, NP bacterial colonization and disease severity in RSV-LRTI hospitalized infants.

Methods: Infants with RSV-LRTI, and age/sex matched healthy controls (HC) were enrolled and blood samples obtained within 24h of hospitalization. Functional innate immune-responses were assessed by measuring TNF- α , IL-6 and IL-8 concentrations post-lipopolysaccharide stimulation. NP swabs were obtained and analyzed for PPB (culture and qrt-PCR) including: *S. aureus*, *S. pneumoniae*, *M. catarrhalis* and non-typable *H. influenzae* (NTHi). Data were compared according to the NP bacterial profile.

Results: 66 RSV-LRTI infants (PICU, n=20; ward, n=46; 2.5 mo) and 10 HC (5.1mo) were enrolled. NP colonization with ≥ 1 PPB was higher in RSV patients than HC (94% vs. 60%; p 0.04). Colonization with NTHi was higher in PICU (65%) vs. ward patients (30%); p=0.01. *S. pneumoniae* and *M. catarrhalis* colonization ranged from 40%-60% and *S. aureus* from 20%-30% irrespective of admission unit. RSV infants colonized with NTHi had lower IL-6, but not IL-8 or TNF- α , production compared to other PPB (1,103 vs. 1,601pg/mL; p=0.04) independent of RSV loads. Clinical severity scores [8(4-12) vs. 4(2-7); p=0.019], maximum temperature [38.9°C vs. 38°C; p=0.001], and oxygen duration [2(0.8-4.1) vs. 1.1(0.1-2) days; p=0.02] were also higher in infants colonized with NTHi vs. other PPB.

Conclusion: Infants hospitalized with RSV-LRTI were frequently colonized with PPB. NP colonization with NTHi was associated with impaired innate immune function and enhanced disease severity.

#30: Penicillin Resistance Identified in a case of Thoracic Actinomycosis

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Thoracic actinomycosis is a rare but emerging infection observed in children with chronic granulomatous disease (CGD). *Actinomyces* species are described as universally susceptible to beta-lactam antibiotics.

A 2 year old male with X-linked CGD was treated with three months of amoxicillin for an infection with *Actinomyces meyeri* and had resolution of his symptoms. He underwent flexible bronchoscopy to identify the etiology of new opacities on a follow-up chest CT. *Actinomyces odontolyticus* was isolated from tissue culture of an endobronchial mass. Minimum inhibitory concentrations (MIC) were obtained via E test and susceptibilities were reported in accordance with CLSI standards.

The *Actinomyces odontolyticus* isolate was susceptible to amoxicillin/clavulanate, cefotaxime, and clindamycin (MIC 4 ug/mL, 2 ug/mL, and 0.25 ug/mL respectively). The isolate was resistant to penicillin (MIC 4 ug/mL) and metronidazole (MIC 32 ug/mL).

We present a case of thoracic actinomycosis with an isolate that was resistant to penicillin, which has not been reported previously in the literature. This microbe was identified in a patient that was undergoing prolonged treatment with amoxicillin for a previous infection with *Actinomyces meyeri*. Vigilance for antimicrobial resistance must remain high in patients treated with prolonged courses of antimicrobials.

#31: Predictive Value of Birth Dose of Hepatitis B Vaccine on Vaccination Status at 18 Months

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Background: The American Academy of Pediatrics and the Advisory Committee on Immunization Practices strongly recommend that the 3-dose Hep B vaccine course be commenced at birth to prevent acquisition of Hep B. Failure to receive the birth dose of Hep B may increase the risk of under-immunization with both the Hep B series and the primary vaccine series. Objective: To determine whether failure to receive the birth dose of Hep B vaccine predicts incomplete vaccination at 18 months of age. Methods: This is a retrospective case-control series of infants born at UNC Hospital in 2011. The group of interest (I) included infants who did not receive the birth dose of Hep B by 7 days of life and the control group (C) consisted of infants who did receive the birth dose of Hep B by 7 days of life. Data were collected through the Carolina Data Warehouse for Health and sent to the North Carolina Immunization Registry to determine each infant's vaccination status. Completion of the primary vaccination series by 18 months of age was defined as follows: Hep B (3 doses), Rotavirus (2-3 doses), DTaP (4 doses), Hib (3-4 doses), Pneumococcal (4 doses), IPV (3 doses), MMR (1 dose) and Varicella (1 dose). Incomplete vaccination was defined as failure to receive one or more of the above recommended vaccinations by 18 months of age. Results: 1495 infants were included in the initial chart review. Vaccination data were not available for 59 infants. Of 696 infants in the intervention group, 163 (23%) completed the primary series by 18 months of age compared with 326 (44%) of 740 in the control group ($p < 0.001$). Infants in the control group were more likely to complete the 3-dose Hep B series (88% v 64%, $p < 0.001$). Conclusion: Infants who miss the birth Hep B vaccine are at risk for incomplete vaccination at 18 months of age, both with the Hep B series and the full primary vaccine series.

#32: Pro-inflammatory Mediators May Distinguish Infection from Trauma in a Rat Model of Shunt Infection

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Bacterial infection is a frequent and serious complication of CSF shunt. The gold standard for diagnosis is CSF culture; however, culture may not always be reliable in the setting of biofilm, slow growing or fastidious organisms and antibiotic pretreatment. CSF chemokines and cytokines may prove useful as alternative strategies for diagnosis of shunt infection. We hypothesized that *Staphylococcus epidermidis* CNS catheter infection has a distinct chemokine and cytokine profile when compared to CSF from animals without surgical intervention (control) and those with sterile CNS catheters. To evaluate this hypothesis, we adapted our previously published murine CNS catheter infection model to generate infection with *S. epidermidis* in Lewis rats. The rats tolerate the procedure well and catheter placement in the lateral ventricle was verified visually. Bacterial cultures demonstrated a greater bacterial burden adherent to the catheter in comparison to the surrounding brain tissue, consistent with our prior demonstrations of biofilm infection in this model. Chemokine and cytokine analysis was performed on CSF at 1 day post implantation. As expected, there were higher levels of the pro-inflammatory mediators IL-1 β , IL-6 and CCL3 in CSF of rats implanted with *S. epidermidis* infected CNS catheters compared with both sterile catheters and the control group. There was also an increase in the anti-inflammatory cytokine IL-10, consistent with our prior studies in human CSF with gram positive shunt infections. Importantly, these results demonstrate a potential role for pro-inflammatory IL-1 β , IL-6 and CCL3 in differentiating infection from post-operative trauma even at early time points. On-going studies at later time points will determine the evolution of these responses over time, in addition to defining the concomitant changes in serum chemokine and cytokine profiles.

#33: Propagation of astrovirus VA1, a recently identified neurotropic human astrovirus, in cell culture

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Astrovirus VA1/HMO-C (VA1; mamastrovirus 9) is an astrovirus species recently implicated as a novel etiological agent of encephalitis in humans. Astroviruses have been classically associated as a cause of gastroenteritis and diarrhea. However, VA1 has been identified in brain tissue from five patients with encephalitis, suggesting a previously unappreciated neurotropism for this astrovirus species. To date, there is no reported cell culture system or in vivo model that supports infection and propagation of VA1, significantly limiting any attempt to understand the pathogenicity of this virus. We describe successful propagation of a VA1 strain in multiple cell lines using a clinical stool sample from the initial case series of VA1-associated gastroenteritis. Serial passaging of VA1 in human colonic epithelial (Caco-2) cell line yielded a 3,000-fold increase in VA1 RNA copies. As further evidence of VA1 replication, subgenomic RNA was detected by Northern blot. In addition, crystalline lattices of viral-like particles were observed by electron microscopy in infected Caco-2 cells. Unlike cell culture system of classic human astroviruses which require trypsin cleavage of the capsid for infectivity, VA1 replicated equally well with or without the addition of exogenous trypsin. Lastly in Caco-2 cells, pretreatment with interferon- β reduced replication of VA1, demonstrating that VA1 is sensitive to interferon. The ability to propagate VA1 in cell culture will facilitate future studies of the neurotropism and neuropathogenesis of VA1.

#34: Respiratory virus infection characteristics among children with cancer in Lebanon

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Respiratory viral infections constitute a significant burden to pediatric cancer patients. Knowledge of the local and regional epidemiologic distribution and frequency aid in best care practices, however, data about these infections among pediatric cancer patients are scarce. Between October 2014 and November 2015, 89 participants (48 males and 41 females) with acute respiratory infection at a Cancer Center in Lebanon were recruited. Participants had their nasopharyngeal swabs (NP-swabs) screened with a point-of-care rapid antigen detection test (RADT) for detection of influenza A, B and respiratory syncytial virus (RSV). Then, total nucleic acid was extracted from all collected NP-swabs followed by real-time PCR analysis targeting 16 respiratory viruses to determine the viral etiology and estimate the frequency of coinfections. A structured questionnaire was used to collect demographic and clinical information as well as exposure history. The median age of participants was 4.5 years (range 0.16—18 years). RSV, influenza A, and influenza B virus were detected in 18%, 8%, and 6% of the subjects, respectively, using the RADT. Real time PCR analysis confirmed virus infection in 85% of participants. RSV was the most common (39.3%) viral etiology followed by influenza B (22.5%), and human metapneumovirus (21.3%). Viral coinfections were detected in 55% of the participants. RSV and influenza B were significantly associated with infectivity enhancing correlations. HCoV-NL63 and -HKU1 were significantly associated with the occurrence of diarrhea. Cancer type and neutropenia were not found to affect the likelihood of infection or coinfection. Our results show a high frequency of respiratory viral infections among pediatric cancer patients in Lebanon. In addition, the majority of patients presented with multiple viral infections. The effect of simple or multiple viral infections on disease outcomes will be discussed.

#35: Surveillance for influenza C infection, Minnesota, 2013-2016

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Existing literature suggests that influenza C typically causes mild respiratory tract disease. However, the epidemiology is not well described. To address this knowledge gap, we implemented testing for influenza C through a surveillance network for acute respiratory illnesses (ARI) in Minnesota. Four outpatient clinics and three hospitals, including one free-standing children's hospital, submitted clinical data and respiratory specimens from patients with respiratory illness during May 2013 through August 2016. Specimens were tested using a multi-target real-time RT-PCR for 23 bacterial and viral respiratory pathogens, including influenza C. We tested 11,631 specimens (83% hospitalized, 17% outpatients) and identified 59 influenza C-positive cases (81% hospitalized, 19% outpatients). Most detections occurred during the winter (December-March). There was year-to-year variability, with 86% occurring in the 2014-2015 winter. The median age of cases was 21 months (range 7 weeks - 84 years) among hospitalized patients, the median length of stay was 2 days (IQR 1.5-4 days), and 5 cases required intensive care. Medical co-morbidities were reported in 60% of hospitalized case-patients and all who required intensive care. At least one other respiratory pathogen was detected in 40 (68%) of cases, most commonly rhinovirus/enterovirus, respiratory syncytial virus and adenovirus. The HEF gene was sequenced to perform phylogenetic analysis in 37 specimens obtained between December 2014-April 2015, and both Kanagawa and Sao Paulo lineages were detected. In summary, we found seasonal circulation of two lineages of influenza C with marked year-to-year variability in the number of cases. Most cases were among young children. Some, particularly those with underlying medical co-morbidities, developed severe disease, suggesting a need for further study of influenza C's role in the pathogenesis of respiratory disease.

#36: Towards a collaborative, e-learning approach for disseminating infection prevention policies

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Background: Dissemination of infection control and prevention (ICP) policies improves patient safety. As part of our ICP program, we implemented an educational project in collaboration with St. Jude Children's Research Hospital. We incorporated a mandatory ICP training as part of yearly performance goals and developed an electronic system to prospectively capture ICP training completion rate. We aim to assess the role of ICP education in improving IPC knowledge gain and determine mandatory training completion rates in a pediatric cancer unit in Guatemala City.

Methods: We retrospectively reviewed our ICP training completion rates. The Guatemalan ICP team recorded 4 online Spanish modules: hand hygiene, safe vascular access, isolation precautions, and waste management. The content was based on their local ICP policies and delivered via Cure4Kids.org. Pre and post-test knowledge assessments were completed online for each module. Module completion was determined by reaching a level > 80% in each post-test assessment.

Results: A total of 252 healthcare providers completed the course during its initial release. A significant knowledge transfer was documented for each of the modules ($P < 0.001$). The overall completion rate was 91%. The course completion rate varied according to the healthcare provider category. The highest completion rate was found among laboratory personnel and respiratory therapists (100%), followed by pharmacists (96%), and nurses (92%). Physicians' course completion rate was the lowest (78%). A total of 245 participants completed the course satisfaction survey, 94% of them agreed that e-learning was an effective methodology to teach IPC policies.

Conclusions: We demonstrated successful technology integration for staff education on IPC policies in a low-to-middle income country. This was a result of international partnerships coupled with local leadership support.

#37: Treatment of Neonatal Chlamydial Conjunctivitis: A Systematic Review and Meta-analysis

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Background: In countries that lack prenatal screening and treatment of pregnant mothers with chlamydial infection, neonatal chlamydial conjunctivitis (NCC) is still a common problem. A systematic review of the effects of treatment for NCC was commissioned as part of the updated 2016 World Health Organization (WHO) Guidelines for the treatment of Chlamydia trachomatis.

Methods: The guideline panel identified oral erythromycin, azithromycin or trimethoprim for NCC as important treatments to review. We searched Medline, Embase, and CENTRAL up to July 13th, 2016 for primary studies and reviewed reference lists of relevant studies, guidelines and systematic reviews. Two investigators independently screened articles and abstracted the data. Data was pooled using a random effects generic inverse variance method, and the certainty of the evidence was assessed using the GRADE approach.

Results: Twelve studies were included evaluating 302 neonates receiving erythromycin and 12 receiving azithromycin. Nine of the studies were non-randomised studies and 3 studies were randomised trials where only a single arm evaluated the identified treatments. The pooled proportion of clinical and microbial cure for the most common dosage of erythromycin 50 mg/kg/day for 14 days was 98% (95% confidence interval [CI], 94%-100%) and 97% (95% CI, 95%-99%), respectively. One study with 12 neonates evaluated azithromycin at 20 mg/kg/day as a single dose and for 3 days providing clinical and microbial cure of 60% (95% CI, 27%-93%) and 86% (95% CI, 61%-100%), respectively.

Conclusions: This systematic review provides a comprehensive summary of the effects of treatments for NCC. Due to the high risk of bias and the small numbers of neonates across the studies, the certainty of the evidence is very low. More data is needed to test alternatives to erythromycin and to address the concerns about the risk of pyloric stenosis.

#38: Trends in the clinical course of pediatric fatalities to visceral leishmaniasis in Teresina, Brazil

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There is a paucity of information on which risk factors are associated with poor prognosis due to visceral leishmaniasis in the pediatric population. With children under 10 representing 48.9% of annual fatalities in Brazil, it is important to identify the clinical course of severe pediatric cases. This descriptive retrospective case study at IDTNP (Teresina, Brazil) looked at pediatric case fatality from a VL diagnosis between June 2013 to Nov 2015. Ten patients between the ages of 4 months and 11 years with a positive diagnostic marker for VL who died were analyzed for patient's background, symptom evolution, treatment, timeline, and cause of death. Average symptom duration prior to hospitalization was 30.5 days, with fever being the predominant symptom (20.3 days). Patients were hospitalized for an average of 5.26 days. Once admitted, 70% of patients had fever for an average of 2.3 days. The clinical presentations included: fever (100%), distended abdomen (100%), pallor (80%), hepatosplenomegaly (80%), emesis (60%), irritability (60%). Lab values included: anemia (100%), thrombocytopenia (100%), leukopenia (100%). 8 patients received amphotericin B liposomal with an average treatment length of 3 days. Antibiotics were given to 8 patients with an average treatment length of 4.25 days. 9 patients received transfusions of plasma, platelets and/or RBCs. Causes of death were infection (40%), hemorrhage (30%), sepsis and shock (30%). Lack of hospital resources, personnel or ICU beds (70%) negatively impacted timely treatment. Fever, distended abdomen, anemia, thrombocytopenia, and leukopenia had the highest predictability of fatality. This data suggests that the time delay from symptom onset to treatment initiation, often limited by resource availability, was a more important contributor to fatality than treatment choice. Further, this study emphasizes the rapid symptom progression and mortality in pediatric cases.

#40: Viral Respiratory Panel (VRP) Testing in a Tertiary Neonatal Intensive Care Unit (NICU)

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Sepsis-like symptoms and new respiratory symptoms are common in NICU infants and are a diagnostic challenge since cultures are frequently negative. The recent availability of molecular diagnostic assays for viruses provides the opportunity to determine their role in these symptoms. There are limited studies about the use of these assays for diagnosis of viruses in a large tertiary care NICU. We describe the use of VRP in a tertiary NICU. Method: NICU with 1500 admissions yearly was site of study. Infants having a VRP from 7/1/12 to 8/31/16 were identified from medical records and descriptive data for infants with positive tests were abstracted. Either a direct fluorescent assay (DFA) detecting 7 viruses or a polymerase chain reaction (PCR) assay detecting 16 viruses was used. Results: 281 patients with 428 VRP identified. 64 patients had = 2 tests. 30 / 428 tests (7%) positive (11/295 DFA tests (3.7%) + with 1 hMNv, 8 RSV, 2 parainfl and 19/134 PCR tests (14%) + with 3 hMNv, 5 RSV, 9 RV, 2 CoroV) 29/281 (10%) infants + for a virus. Respiratory symptoms most common reason for VRP. Cultures done in 16 of those with + VRP, all were negative. 11/29 infants had nosocomial infections. 26 infections occurred in winter. Babies testing + had gestational ages from 24-39 weeks (median 32.7), age at testing 12-294 days (median 47.5) and 25 babies on respiratory support at time of testing (9 intubated). Conclusion: VRP was used infrequently in this NICU. It is likely that a significant number of infants with similar symptoms were not tested. Of those tested 10% were infected with a virus. Identifying respiratory viruses in this setting is particularly important for infection prevention. Studies are needed to determine role of viruses in NICU and how molecular assays can inform care.

#42: Rothia mucilaginosa infections in immunocompromised pediatric patients

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Rothia mucilaginosa are gram-positive cocci that are part of the normal flora of the human oropharynx and upper respiratory tract and can cause infection and severe complications in immunosuppressed pediatric patients. We describe 33 cases of one or more blood or cerebral spinal fluid cultures positive for *R. mucilaginosa* at St. Jude Children's Research Hospital from 1995 to 2015. Among these, 64% (21/33) of the patients had leukemia and all patients (33/33) had central venous catheters at the time of infection. Twenty-four percent (8/33) of patients were determined to have severe complications, including ICU stay, respiratory distress, and sepsis, and had no significantly defining characteristics when compared to the analyzed patients without severe complications. All patients were treated with vancomycin (33/33) and 82% received 1 or more additional antibiotics. All of the tested isolates were susceptible to vancomycin and the majority were resistant to penicillin, oxacillin, and sulfamethoxazole/trimethoprim. There were no mortalities as a result of this infection.

#43: Characteristics of Coronavirus Infection in Immunocompromised vs. Non-immunocompromised Children

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Background: Immunocompromised (IC) children may be predisposed to serious human coronaviruses (HCoV) infections; however, the virologic and clinical features of HCoV infection in IC children have not been compared to non-IC children.

Methods: We retrospectively reviewed IC and non-IC children who presented to the ED or clinic with HCoV detected in nasal samples by multiplex respiratory PCR from 3/2012-3/2016. Lower respiratory tract disease (LRTD) was defined as possible or definite infiltrate on chest imaging, oxygen requirement or abnormal lung exams in conjunction with physicians' diagnosis of LRTD. The rates of hospitalization, LRTD and LRTD requiring oxygen use (severe LRTD) were compared.

Results: The median ages of 85 IC and 1152 non-IC children with HCoV infection were 6.3 years and 1.6 years, respectively ($p < 0.01$). The rates of LRTD were similar for all HCoV strains with and without respiratory copathogens ($p = 0.64$ and 0.35 , respectively). The rate of hospitalization due to respiratory distress and the rate of LRTD was similar in the IC versus non-IC group (15% vs. 20%, $p = 0.32$; 22% vs. 26%, $p = 0.4$). Higher rates of LRTD were found in children ≥ 5 years old (28% vs. 19%, $p < 0.01$), with underlying pulmonary disorders (48% vs. 21%, $p < 0.01$) and with respiratory copathogens (43% vs. 19%, $p < 0.01$). Respiratory copathogens were more common in the non-IC group than the IC group (31% vs. 22%, not statistical significance, $p = 0.10$). Among children without underlying pulmonary disorder and without respiratory copathogens, a higher rate of severe LRTD was seen in the IC group (6/56, 11%) than the non-IC group (28/642, 4%) ($p = 0.03$).

Conclusions: HCoV may be associated with severe LRTD as a single respiratory pathogen in IC children. Further analyses of the importance of IC state will be presented by multivariable Cox regression analysis.

#44: Golden Hour: a multilevel intervention in children with cancer and febrile neutropenia

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BACKGROUND. Febrile neutropenia (FN), an emergency, requires timely antibiotics administration. At the General Hospital of Tijuana (HGT), FN is the second cause of hospital admission. Risk factors for poor outcomes in our population are: poverty, low education, long distances to hospital and deficient FN knowledge in primary caregivers.

OBJECTIVE. To develop and implement the "Golden Hour", an intervention to decrease time to antibiotic (TTA) administration to less than 1 hour in all patients with FN at the HGT.

METHODS. We conducted a 2.8 years prospective study in patients with FN admitted to the HGT pediatric oncology unit in 3 phases. In 2013 we collected pre-intervention baseline data. In phase 1 (2014) we implemented and evaluated the effect of the intervention (FN guideline and education for hospital staff and families, and availability of a "Golden Box" containing all needed supplies). In phase 2 (2015) and phase 3 (January 1 to October 31, 2016) we sustained the intervention. For each FN episode, demographics, cancer type and clinical severity and outcomes (TTA, Intensive Care Unit (ICU) admission, length of hospital stay, and death) were collected. Statistical analyses were completed with chi-square and independent t tests.

RESULTS. We included 97 FN events in 59 patients. In phase 1, TTA was reduced from 68.9 minutes (range: 15-204 minutes) to 35.1 minutes ($p=0.0001$). In phase 2, TTA was 72 minutes (range 0-450 minutes), but after the re-intervention in phase 3, TTA decreased to 55.3 minutes (range 5-290 minutes), $p=0.026$. ICU admission decreased from 5 in 2013, to a mean of 2.5 in 2014, 2015 and 2016 ($p=0.022$). Other patient's characteristics were not significantly associated with any of the outcomes.

CONCLUSIONS. In a resource limited setting, we demonstrated the possibility of decreasing the TTA and the rate of ICU admission when supplies to treat FN are readily available and used adequate