admissions ($p < 0.001$) (figure). MRSA infections declined 52% ($14.4$ in 2009 to $6.9$ infections per 1,000 admissions in 2016, $P < 0.001$) while MSSA infections declined 17% ($11.9$ to $9.9$ infections per 1,000 admissions, $P < 0.001$). DOT for anti-MRSA antibiotics declined from $38.0$ to $24.5$ per 1,000 patient-days.

**Conclusion.** Rates of pediatric hospitalization with *S. aureus* infection declined substantially over time. This was largely driven by decreased rates of MRSA hospitalizations, and we observed a corresponding decline in anti-MRSA antibiotic use. Further research is needed to better understand factors driving epidemiologic changes.

**Figure.**  *S. aureus* hospitalization rate per 1,000 hospital admissions in 39 PHIS hospitals with continuous reporting, 2009–2016. All *S. aureus* infections

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**Background.** Reduced vancomycin susceptibility (RVS) is considered to be present when the minimum inhibitory concentration (MIC) is equal to 2 µg/mL. RVS *Staphylococcus aureus* (SA) bloodstream infections (BSI) have been associated with worse outcomes than non-RVS BSI in adults but not been well studied in children.

**Methods.** We reviewed the electronic medical records of infants and children admitted to Penn State Children’s Hospital with ≥1 blood culture positive for SA from 2005 to 2015. We abstracted demographic information, potential risk factors, laboratory results and clinical outcomes. We defined RVS as a vancomycin MIC = 2 µg/mL as determined by the clinical microbiology laboratory at the time of the infection. We used Chi square and Wilcoxon rank-sum test to compare patient factors for RVS and non-RVS BSI. Using a logistic regression adjusted for year and the presence of an infection-related complication, we calculated the odds of treatment failure for children with RVS and non-RVS BSI. For children with a central line in place at the time of the first positive culture, we also calculated the odds of treatment failure adjusted for year, presence of a complication and line removal. We defined treatment failure as death within 30 days of the first positive culture, recurrence of SA BSI within 30 days or a duration of bacteremia > 3 days.

**Results.** Of the 216 identified pediatric SA BSI, 139 (64%) had RVS. RVS was present in 63% of MSSA BSI and 65% of MRSA BSI, $P = 0.835$. There was no difference in age, sex, and racial distributions among children with RVS vs. non-RVS BSI. Similarly, hospitalization in the prior year, surgery within the prior 30 days, the presence of an underlying comorbidity or use of immunosuppressing medications were not more common for RVS vs. non-RVS BSI. RVS was not associated with an increased risk of treatment failure overall, odds ratio (OR)=1.34 (95% confidence interval: 0.71, 2.55), but did increase the odds of treatment failure if an indwelling central venous catheter was present and not removed, OR=3.14 (1.16, 8.54).

**Conclusion.** RVS is common among pediatric SA BSI. For central line associated SA BSI, RVS was associated with increased odds of treatment failure compared with non-RVS infections if the line was retained.

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**233. Unexpected Pediatric Presentation Patterns of Toxic Shock Syndrome**

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**Session:** 247. Pediatric Bacterial Infections

**Saturday, October 6, 2018: 12:30 PM

**Background.** A subcategory of severe septic shock, toxic shock syndrome (TSS) represents up to 20% of pediatric septic shock in the United States. Diagnostic criteria for streptococcal TSS (STSS) and non-streptococcal TSS (NSTSS) were first published by the CDC in the early 1990s, with updates, respectively, in 2010 and 2011.

**Methods.** The Nationwide Children's Hospital electronic medical record was queried for inpatient hospitalizations with ICD-9/10 codes of interest between 1/1/2010 and 8/31/2017. The query returned 579 hospitalizations which were assessed for adherence to STSS and NSTSS criteria published by the CDC. 61 cases of TSS were identified and categorized into STSS or NSTSS. The prevalence of organ system involvement was quantified, and organ system involvement unanticipated by CDC criteria was examined for prevalence, quality and chronology.

**Results.** TSS patients were predominately female (62%) with an average age of 12. The most common presentation of TSS was with hypotension (93%), fever (82%) and rash (72%). Findings unanticipated by CDC criteria include: pyuria in STSS (41%), pulmonary involvement in NSTSS (66%) and coagulation abnormalities in NSTSS (92%). Pyuria in STSS was commonly accompanied by protein (73%) and leukocyte esterase (55%) on urinalysis. Pyuria also commonly presented with hematuria (45%). Radiographic evidence of pulmonary involvement in STSS was typically described as bilateral/diffuse airspace disease, presenting simultaneously with pulmonary edema and pleural effusions. Abnormalities in PT/PTT associated with NSTSS were commonly found within the first few hours of admission and began normalizing by the next day; d-dimer assays were abnormal in the six instances in which they were assessed.

**Conclusion.** This study suggests that early signs and symptoms of pediatric TSS may exist beyond those described by existing guidelines. The organ systems found to be involved in this review are often found early in the clinical course and can be assessed by noninvasive methods. Contextualization of these findings within the narrative of TSS might help clinicians better detect and diagnose a disease associated with significant patient morbidity and mortality. They may also aid in understanding the results of toxic shock surveillance efforts.

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

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**233.4. Long-Term Health Outcomes of Children Evaluated for Unexplained Fevers in a Pediatric Infectious Diseases Clinic**

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**Session:** 247. Pediatric Bacterial Infections

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**Background.** Unexplained fever is a common reason for outpatient referral to pediatric infectious diseases (PID) subspecialists. A previous study at our center concluded that most children referred to PID for prolonged or recurrent unexplained fever have self-limited illnesses and receive no specific diagnosis. Studies looking at long-term outcomes of such patients have not been published.

**Methods.** The study cohort consisted of 156 patients seen in the PID clinic for unexplained fever from 2008 through 2012 who were not given a definitive diagnosis or were thought to have sequential self-limited illnesses plus 20 patients seen during that time who were diagnosed with periodic fever, aphyous stomatitis, pharyngitis, and adenitis (PFAPA) syndrome. A scripted telephone interview with consenting parents or guardians who could be reached was conducted to collect information about patients or guardians who could be reached was conducted to collect information about patients' medical history, personal history of recurrent fever, and patient and family sociodemographic and economic characteristics.

**Results.** Attempts were made to contact all 176 families; to date, 100 interviews have been completed. Thirteen of the children initially had prolonged, 45 recurrent, and 25 periodic fever; 17 had PFAPA. The mean follow-up period was 8 years. Only 2 patients developed new diagnoses in the interval since their initial PID visit. One who was thought to have PFAPA developed genital ulcers and was diagnosed with Behcet’s disease 4 years after the PID visit. Another who was thought to have self-limited, prolonged fever was eventually diagnosed with juvenile idiopathic arthritis. None of the remaining 98 children developed serious diagnoses. However, 14 of these children reportedly have continued fevers; 9 of the children suffer from anxiety, and 4 of the remaining 5 report good general health.

**Conclusion.** Most children seen in PID clinic for unexplained fever who were not given a specific diagnosis remained well after their initial visit. Two were diagnosed with autoinflammatory diseases after the appearance of telltale signs and symptoms, and none were diagnosed with immunodeficiency or cancer. The children who reportedly continue having fevers but are otherwise healthy warrant further study, with particular attention to their families’ health and illness beliefs.

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**2335. Bloodstream Infections in Hospitalized Children in the United States: Incidence, Pathogens, and Regional Differences**

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**Background.** Bloodstream infections (BSI) are common complications of hospitalization for children. A national, population-based study of BSI in hospitalized children was performed to determine the incidence and pathogens of BSI, including differences between urban and rural regions in the United States.

**Methods.** We conducted a prospective, population-based study of BSI in hospitalized children in urban and rural regions of the United States. BSI incidence and pathogen distributions were analyzed using age, gender, and region.

**Results.** BSI incidence was highest in children under 1 year of age. The most common pathogens were *Staphylococcus aureus* and *Escherichia coli*. There were significant differences between urban and rural regions in terms of pathogen distribution and incidence.

**Conclusion.** This study provides valuable insights into the incidence and pathogens of BSI in hospitalized children, highlighting regional differences and informing future research and interventions.

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Background. Bloodstream infections (BSI) cause significant morbidity and mortality in children, leading to longer hospital stays and increased healthcare costs. Recent epidemiology on national trends and pathogens in children is lacking, which could improve prevention strategies and empiric therapy selection.

Methods. We conducted a retrospective cohort study utilizing demographic and microbiology data from the Premier Healthcare Database, including all inpatient encounters from 2009-2016 among patients <19 years. BSI were identified via documented positive blood culture; known contaminants were excluded. Incidence rate was the number of BSI positive patient encounters per 10,000 admissions. Demographics were analyzed comparing BSI-positive to patients without a documented positive BSI (non-BSI). Hospital-acquired infections were defined as those occurring at least 2 days after admission and analyzed only for non-neonates. Differences were assessed using chi-square tests and t-tests; time trends were analyzed using Cochran-Armitage tests.

Results. Among 162,972 patient encounters meeting inclusion criteria; 6,152 (0.34%) had a positive BSI. BSI patients were significantly more often 1-5 years old (16% vs. 6%), and had a complex chronic condition (26% vs. 5%), central line (34% vs. 2%), or catheter (12% vs. 3%) compared with non-BSI patients. Overall BSI incidence rate declined over time (37.0 in 2009 vs. 31.9 in 2016 per 10,000 admissions, P < 0.001). Among non-neonates, pathogens with the highest incidence rates (per 10,000 admissions) were methicillin-susceptible Staphylococcus aureus (MSSA) (10.5), E. coli (10.4), and Streptococcus pneumoniae (6.4); among neonates incidence was highest for E. coli (4.3), Group B Streptococcus (4.0) and MSSA (2.6). Incidence increased significantly over time in two US regions while decreasing in three (Figure 1).

Conclusion. Hospitalized children remain at risk of community and hospital-acquired BSI. Due to substantial efforts, pediatric BSI incidence has declined nationally in recent years. However, more effective methods to prevent and assess patients at risk for BSI are warranted.

Disclosures. J. Dreyfus, Premier, Inc.: Employee and Shareholder, Salary.

2326. Necessity of Anaerobic Blood Cultures for Identification of Pediatric Bloodstream Infections

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Background. Recent epidemiology on national trends and pathogens in children is lacking, which could improve prevention strategies and empiric therapy selection.

Methods. We conducted a retrospective cohort study utilizing demographic and microbiology data from the Premier Healthcare Database including all inpatient encounters from 2009-2016 among patients <19 years. BSI were identified via documented positive blood culture; known contaminants were excluded. Incidence rate was the number of BSI positive patient encounters per 10,000 admissions. Demographics were analyzed comparing BSI-positive to patients without a documented positive BSI (non-BSI). Hospital-acquired infections were defined as those occurring at least 2 days after admission and analyzed only for non-neonates. Differences were assessed using chi-square tests and t-tests; time trends were analyzed using Cochran-Armitage tests.

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Conclusion. Hospitalized children remain at risk of community and hospital-acquired BSI. Due to substantial efforts, pediatric BSI incidence has declined nationally in recent years. However, more effective methods to prevent and assess patients at risk for BSI are warranted.

Disclosures. J. Dreyfus, Premier, Inc.: Employee and Shareholder, Salary.

2327. Microbiology and Prognostic Significance of Blood Stream Infections in Necrotizing Enterocolitis

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Background. Necrotizing enterocolitis (NEC) is the most severe and frequent gastrointestinal disease seen in neonatal intensive care units. The purpose of this study was to characterize and correlate disease severity and survival in NEC patients with bloodstream infections (BSI).

Methods. An institutional database was retrospectively reviewed for all infants with NEC (Bell’s stage II or III) between April 1, 2016 and November 2, 2017. Standard statistical analytic tools were utilized to analyze demographics, need for surgery, survival, and blood culture results. Chi-squared was used to compare categorical variables, t-test for continuous variables, and Cox proportional hazards model for survival analysis. A P < 0.05 was considered significant.

Results. The cohort consisted of 70 infants with NEC with 11 (16%) having concurrent BSI. Demographics and disease severity were similar between +BSI and -BSI patients (Table 1). Blood cultures from +BSI patients identified Klebsiella (36%), S. Epidermidis (36%), E. coli (18%), and S. Aureus (9%). Positive BSI patients were more likely to require surgery (54.6% vs. 17.0%, P = 0.011).

There was a trend toward higher mortality in +BSI patients (P = 0.145), which is reflected in a Kaplan-Meier curve. Significant risk factors for mortality were African American race (P = 0.040), lack of enteral feeds prior to onset (P = 0.014) and need for surgery (P = 0.092).

Conclusion. This retrospective cohort study elucidated the microbiology related to NEC at a single-center and revealed an association between concurrent bloodstream infections and increased disease severity and need for surgery.

Table 1: Demographics

| Trait                          | BSI + (n = 11) | BSI− (n = 59) | PValue |
|-------------------------------|----------------|---------------|--------|
| Gender (M)                    | 3 (27.3)       | 29 (49.2)     | 0.173  |
| African American              | 6 (54.6)       | 31 (52.5)     | 0.064  |
| Hispanic                      | 2 (18.2)       | 25 (42.4)     | 0.064  |
| Non-Hispanic White            | 5 (45.5)       | 32 (54.3)     | 0.964  |
| Gestational age (weeks)       | 28 (012.53)    | 27(64.56)     | 0.771  |
| Bell Stage 3                  | 9 (81.8)       | 39 (66.1)     | 0.280  |
| Surgery                       | 5 (45.6)       | 10 (17.0)     | 0.011  |

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Background. There is conflicting evidence in the literature on the necessity of anaerobic blood cultures for the diagnosis of pediatric bloodstream infections. Here we investigated the utility of anaerobic blood culture bottles in addition to aerobic blood culture bottles for the recovery of microorganisms in pediatric blood specimens.

Methods. A retrospective review of positive blood culture records was performed for culture results reported from January 2016 to December 2017. Blood cultures from pediatric patients (<18 years of age) performed at the University of Wisconsin Hospital and Clinics were included in the analysis. Variables collected included patient demographics, volume of blood cultures, microorganism identification, and time-to-positivity (TTP).

Results. Of 4280 pediatric blood cultures collected during the study period, a total of 266 were positive (6.2%). Of these, 224 had been inoculated into both aerobic and anaerobic bottles, while 42 had only been inoculated into aerobic bottles. For the cases where both aerobic and anaerobic bottles were both inoculated, 100 (44.6% of 224) were positive in both bottles, 76 (33.9%) were positive only in the aerobic bottle, and 48 (21.4%) were positive only in the anaerobic bottle. The mean TTP for aerobic and anaerobic bottles was 22.6 and 21.5 days, respectively. In the 100 cases where both bottles were positive, the same organism was identified in all but 4 cases. Among the 48 cases with only positive anaerobic bottles, the most commonly isolated genera were Staphylococcus (N = 24, 50%; n = 11 S. aureus), Bacteroides (n = 5, 10%), and Enteroabces and Escherichia (each n = 3, 6%).

Conclusion. Our findings demonstrate that anaerobic blood cultures are necessary to gain a complete understanding of infection status in pediatric patients. This supports the current consensus for adult blood cultures, stating that both aerobic and anaerobic bottles should be inoculated. While it is often more difficult to obtain sufficient blood volumes from pediatric patients, performance of anaerobic culture should be encouraged when possible.

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