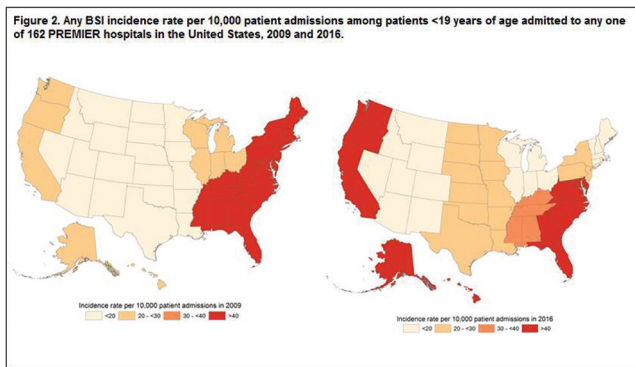
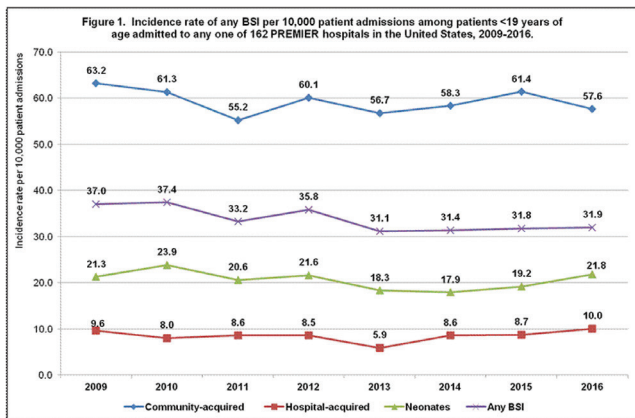


Background. Bloodstream infections (BSI) cause significant morbidity and mortality in children, leading to longer hospital stays and increased healthcare costs. Recent epidemiology on national trends and pathogens in children is lacking, which could improve prevention strategies and empiric therapy selection.

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 a 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 US hospitals reporting ≥4 years of blood cultures, 1,809,722 patient encounters met 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 2).

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.



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

Kaitlin Mitchell, PhD¹; Heather Couch, MT²; Sheryl Henderson, MD³ and Derrick Chen, MD⁴; ¹Department of Population Health Sciences, University of Wisconsin-Madison, Madison, Wisconsin, ²Clinical Microbiology Laboratory, University of Wisconsin-Madison, Madison, Wisconsin, ³Department of Pediatrics, University of Wisconsin-Madison, Madison, Wisconsin, ⁴Department of Pathology and Laboratory Medicine, University of Wisconsin-Madison, Madison, Wisconsin

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 hours, 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 *Enterococcus* 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.

Disclosures. All authors: No reported disclosures.

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

Thomas Boyle, BS¹; Rebecca Starker, BS²; Ashira Morgan, BS¹; Misha Tori Armstrong, BS Biology³; Anna Moscovitz, BS¹; Laurence Lindenmaier, BS¹; Megan McSherry, BS¹; Lukas Gaffney, BS¹; Julia Amundson, BS¹; Samantha Greissman, BA, MPH²; Chad Thorson, MD²; Eduardo Perez, MD²; Anthony Hogan, MD³; Ann-Christina Brady, MD²; Juan Sola, MD¹ and Holly Neville, MD¹; ¹University of Miami, Miami, Florida, ²University of Miami Miller School of Medicine, Miami, Florida, ³University of Miami Miller School of Medicine, Miami, Florida, ⁴University of Miami Miller School of Medicine, Miami, Florida

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 methods 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. $P < 0.05$ 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 ($P = 0.002$).

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

	BSI + (n = 11)	BSI- (n = 59)	P-Value
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	3 (27.3)	3 (5.1)	0.064
Gestational age (weeks)	28.0(2.53)	27.6(4.56)	0.771
Bell Stage 3	9 (81.8)	39 (66.1)	0.280
Surgery	5 (54.6)	10 (17.0)	0.011

Table 2: Survival Analysis

Factor	Risk Ratio	95% CI	P-Value
+ BSI	5.3	0.5–56.6	0.145
Male	1.0	1.0–5.3	0.976
African American	4.7	1.1–33.0	0.040
No enteral feeds	5.8	1.5–25.3	0.014
Surgery	17.0	2.8–150.4	0.002
Recurrence	2.9	0.2–11.4	0.172

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2328. Community-Onset Invasive Bacterial Infections in Infants Under 3 Months–10 Years of Experience in Auckland, New Zealand

Sarah Primhak, MBBS BSc(hons)¹; Lesley M. Voss, MB, ChB¹; Elizabeth Wilson, MBBS BSc¹; Diana R. Lennon, MB, ChB¹; Rachel Webb, MBChB¹ and Emma Best, BHB, MBChB, DTMH, FRACP (PAEDS), MMED (Research)³; ¹Pediatric Infectious Diseases, Starship Children's Hospital, Auckland, New Zealand, ²Population Child and Youth Health, University of Auckland, Auckland, New Zealand, ³Paediatric Infectious Diseases, University of Auckland, Auckland, New Zealand

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Background. Serious infections remain the leading cause of death in the first year of life. Sepsis in neonatal intensive care units is well described but infants with bacterial infections presenting from the community has not previously been described in New Zealand. Recent studies suggest an increasing incidence of *Staphylococcus aureus* and *Streptococcus pyogenes* in New Zealand pediatric populations. It is, therefore, important to understand the unique pattern of infections seen in the infant population in New Zealand as this may impact on empiric management.

Methods. A retrospective study (2007–2017) including infants aged 8 to 90 days presenting with clinically significant infection and positive culture from a sterile site. Cases were identified from laboratory database and ICD discharge codes, enabling data collection and analysis.

Results. 192 cases were identified from two major hospitals in Auckland. This represented an incidence of invasive bacterial infections of 129/100,000 live births. *Escherichia coli* (40%) and *Streptococcus agalactiae* (22%) were the commonest pathogens. *Streptococcus pyogenes* and *Staphylococcus aureus* caused 14% and 12% of bacteremias respectively. Pacific island infants had the highest rates of infection (255/100,000) as did those from deprived backgrounds.

Conclusion. *Escherichia coli* and *Streptococcus agalactiae* are the commonest causative organisms in community-onset infant sepsis in Auckland.

Rates of invasive bacterial infections in this age group are higher than reported in other industrialized countries (including published data from the USA), with *Staphylococcus aureus* and *Streptococcus pyogenes* being the most disproportionate. Our study demonstrates the increased risk of invasive *Staphylococcus aureus* and *Streptococcus pyogenes* in New Zealand, even at this early age, and this impacts on empiric antibiotic prescribing and management of infant sepsis in New Zealand. The risk of invasive infection is highest in Pacific and Māori infants and those from deprived backgrounds.

A small number of multi-resistant organisms were present in this age group, prior to antibiotic exposure, illustrating that rising rates of community antimicrobial resistance will need to be considered even when prescribing for infants.

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2329. Preliminary Safety and Effectiveness of Whole-Body MRI in Pediatric Patients With Persistent Bacteremia or Febrile Illness

Edwin Hayes, MD¹; Lindsay Miranda, BS²; Anna-Kathryn Burch, MD³; Matthew Marcus, MD⁴; Helmut Albrecht, MD⁵ and Kamla Sanasi-Bhola, MD⁶; ¹Infectious Diseases, University of South Carolina, Columbia, South Carolina, ²University of South Carolina, SOM, Columbia, South Carolina, ³Pediatrics ID, University of South Carolina, Columbia, South Carolina, ⁴Pitts Radiology, Columbia, South Carolina, ⁵Department of Medicine, Division of Infectious Diseases, University of South Carolina School of Medicine, Columbia, South Carolina, ⁶University of South Carolina, School of Medicine, Columbia, South Carolina

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Background. Early recognition of deep seated infections (osteomyelitis and abscesses) in the pediatric population may be difficult, given nonspecific symptoms and signs but remains crucial in the management. There is increasing emphasis on ionizing radiation dose reduction, making whole-body MRI (WBMRI) with short TI inversion recovery (STIR) the advanced imaging modality of choice over bone scintigraphy and CT-scans.

Methods. A retrospective chart review of pediatric patients, <19 years, at Palmetto Health, Columbia, SC who had WBMRI with infectious indications during 9/2011 to 12/2013 was performed. The aims of this research were to describe complications related to sedation/contrast, to determine what portion of patients had

new evidence of deep seated infections and to obtain initial evidence for effectiveness of WBMRI.

Results. 20 patients were included with male predominance (12; 60%). 9/20 patients < 12 months old and 4 between the ages of 12–70 months. The most common comorbidity was sickle cell syndrome ($n = 6$) and 16/20 patients had a recent/current central venous catheter. The reasons for imaging were fever (9, 45%), pain/swelling (5, 25%), and abnormal labs/imaging (6, 30%). 19 patients had other diagnostics studies prior to WBMRI, 17 of whom had ionizing radiation using studies (X-rays / CT scans). 10/19 also had additional trips to the radiology department for focal MRIs. Duration of sedation for WBMRI averaged 88 minutes, with propofol (10/14) being the most common agent used. No complications from the sedation or the MRI contrast were recorded. WBMRI found an average of 1–4 areas of osteomyelitis in 11 patients and up to 8 other locations of deep seated infections in 15 patients. 11/20 had post WBMRI surgical intervention of debridement/drainage. Gram-positive cocci were isolated from 10/17 patients with positive blood/tissue cultures. Of those, 6 were methicillin-resistant *Staphylococcus aureus*.

Conclusion. Utilized as an early imaging modality in pediatric patients with persistent bacteremia/fevers, WBMRI commonly facilitated timely definitive interventions while sparing the patient exposure to ionizing radiation. WBMRI with STIR was safe and is likely to be cost effective.

Disclosures. All authors: No reported disclosures.

2330. Comparison of Clinical Symptoms in Children Who Present With Sore Throat Who Are Later Determined to Be Carriers vs. Acutely Infected

Anne-Marie Rick, MD, MPH¹; Haniah Zaheer, BS² and Judith M. Martin, MD¹; ¹Department of Pediatrics, Children's Hospital of Pittsburgh, Pittsburgh, Pennsylvania, ²University of Pittsburgh, Pittsburgh, Pennsylvania

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Background. Among symptomatic children who test positive for Group A *Streptococcus* (GAS) by throat swab, approximately 20–25% are GAS carriers. Current laboratory methods cannot distinguish acute infection from the carrier state at time of diagnosis.

Methods. We examined findings from two longitudinal studies of children 5 to 15 years of age who had throat cultures performed for the detection of GAS while endorsing at least one symptom consistent with streptococcal pharyngitis. Cohort 1 was a surveillance study in which cultures were performed at regular intervals and with illnesses. Cohort 2 were children who were selectively tested by their care providers and then followed. Symptoms were assessed systematically at the time of the first positive culture. Each participant had at least two follow-up cultures performed between 7–21 days and 22–35 days after the first culture. We defined acute infection as two or more negative follow-up cultures for GAS and carriage as two or more positive follow-up cultures in the absence of symptoms. We compared symptoms at the time of the first positive culture between those with acute infection or carriage using chi-square statistics.

Results. A total of 181 children contributed 228 symptomatic episodes; 52% were female, with a mean age of 8.9 years. In cohort 1: 96/122 (79%) were acute infections vs. 26/122 (21%) were carriers. Children endorsed at least one upper respiratory symptom (other than sore throat) in 40/65 (62%) of those with acute infection and 13/21 (62%) in those who were carriers ($P = 0.976$). In cohort 2: 94/106 (89%) were acutely infected and 12/106 (11%) were carriers. Children had at least one upper respiratory symptom in 24/94 (26%) acute infection and 6/12 (50%) of carriers ($P = 0.076$). In cohort 2, symptoms of nasal congestion alone ($P = 0.009$), vomiting ($P = 0.018$), and abdominal pain ($P = 0.015$) were more common among carriers compared with acutely infected. There was no difference in severity score or duration of symptoms.

Conclusion. This study highlights that when children are selectively tested for GAS based on clinical judgement fewer GAS carriers are identified. For those who were selectively tested, clinical symptoms, including nasal congestion, were more common in children identified as GAS carriers.

Disclosures. All authors: No reported disclosures.

2331. Household Pets and Recovery of *Moraxella catarrhalis* and Other Respiratory Pathogens From Children With Asthma

Meghan Davis, PhD DVM MPH¹; Kathryn Dalton, VMD, MPH¹; Zoe Johnson, BS²; Shanna Ludwig, PhD²; Katie Sabella, DVM²; Michelle Newman, RN³; Susan Balcer Whaley, MPH³; Corinne Keet, MD, PhD⁴; Meredith C. McCormack, MD, MHS⁵; Karen C. Carroll, MD, FIDSA⁶ and Elizabeth C. Matsui, MD, MHS⁴; ¹Department of Environmental Health and Engineering, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, ²Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, ³Johns Hopkins School of Medicine, Baltimore, Maryland, ⁴Department of Pediatrics, Johns Hopkins School of Medicine, Baltimore, Maryland, ⁵Department of Medicine, Johns Hopkins School of Medicine, Baltimore, Maryland, ⁶Department of Pathology, Division of Medical Microbiology, Johns Hopkins University School of Medicine, Baltimore, Maryland

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Background. Upper respiratory tract colonization with a number of bacterial pathogens has been associated with significant respiratory disease and asthma in children. As part of a larger study to evaluate microbial contributions from animals