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872. PROPHETIC: Predicting Pneumonia in Hospitalized Patients in the ICU—A Model and Scoring System

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Session: 87. Respiratory Infections: An Update
Thursday, October 4, 2018: 2:00 PM

Background. Prospectively identifying patients at highest risk for hospital-acquired and ventilator-associated bacterial pneumonia (HABP/VABP) by implementing a risk assessment scoring tool may help focus prevention efforts, optimize the screening process to improve clinical trial feasibility, and enhance development of new antibacterial agents.

Methods. Within the intensive care units (ICU) of 28 US hospitals, between February 6, 2016 and October 7, 2016, patients hospitalized >48 hours and receiving high levels of respiratory support were prospectively followed for meeting the definition of HABP/VABP recommended in US FDA draft guidance. Patient demographics, medical comorbidities, and treatment exposures were recorded. The association between candidate risk factors and odds of developing HABP/VABP was evaluated with a multivariable logistic regression model. Risk factors were selected using backward selection with $\alpha = 0.1$ for model inclusion. A web-based scoring system was developed to estimate the risk of HABP/VABP from the risk factors identified.

Results. A total of 5,101 patients were enrolled, of whom 1,005 (20%) developed HABP/VABp. 4,613 patients were included in the model, excluding 488 (10%) with HABP/VABP at or before enrollment. There are 15 variables included in the model. APACHE II admission score >20 ($P < 0.001$, OR 2.14, 95% CI 2.00–2.29), admission diagnosis of trauma ($P < 0.001$, OR 3.31, 95% CI 1.90–5.74), frequent oral or lower respiratory tract suctioning ($P < 0.001$, OR 2.33, 95% CI 1.81–2.99), and receipt of enteral nutrition ($P < 0.001$, OR 2.31, 95% CI 1.69–3.16) were the key drivers of increased pneumonia risk. The model demonstrated excellent discrimination (bias-corrected C-statistic 0.861, 95% CI 0.843–0.880). The web-based scoring system can be accessed via this link: https://ctti-habpvabp.shinyapps.io/web_based_tool/.

Conclusion. Using a web-based scoring system, ICU patients at highest risk for developing HABP/VABP can be accurately identified. Prospective implementation of this tool may assist in focusing additional prevention efforts on the highest risk patients and enhance new drug development for HABP/VABP.

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873. Using the Host Immune Response to Identify Viral-Bacterial Coinfection in Children With Respiratory Syncytial Virus Infection

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Session: 87. Respiratory Infections: An Update
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Background. A major challenge in the effective management of children with RSV infection is the clinical difficulty of distinguishing a simple viral from viral–bacterial coinfections. As a result, despite the low rates of viral–bacterial coinfection, RSV patients are often prescribed antibiotics with recent reports demonstrating more than 60% antibiotic overuse rates (Van Houten et al. 2018). Here, we examined whether a host-immune signature combining the viral-induced proteins TRAIL and IP-10 with the bacterial-induced protein CRP (ImmunoXpert; Oved et al. 2015) can distinguish simple viral from viral–bacterial coinfection in RSV patients.

Methods. We studied 402 febrile children enrolled as part of "Curiosity," a prospective study designed to develop and validate the host-immune signature. Infection etiology—viral or viral-bacterial coinfection—was determined by a panel of experts following a review of patients' clinical, laboratory, radiological, microbiological, and follow-up data. RSV strains were detected using a respiratory multiplex PCR applied to nasal swabs (Seeplex-RV15).

Results. Out of the 402 children with suspected acute infection 29 had a positive RSV detection (Figure 1); of them, 27 had a unanimous expert panel etiology determination: 24 viral and 3 viral–bacterial coinfections. Out of the 24 patients unanimously assigned viral by the expert panel, 13 were given antibiotics, indicating a 54% antibiotic overuse rate. The host-immune signature correctly identified all 3 viral-bacterial coinfection cases, as well as 22 out of the 24 (92%) simple viral patients. This finding supports that the signature has the potential to reduce antibiotic overuse by 6.5-fold (from an overuse of 13/24 = 54% to 2/24 = 8%, $P < 0.001$).

Conclusion. Our results demonstrate high antibiotic overuse rates for RSV patients, consistent with previous reports. The host-immune signature correctly distinguished simple viral from viral–bacterial coinfection and therefore may have the potential to aid physicians in the correct management of children with RSV infection. Implementation studies are required to evaluate its utility in safely decreasing unnecessary antibiotic use for RSV patients.

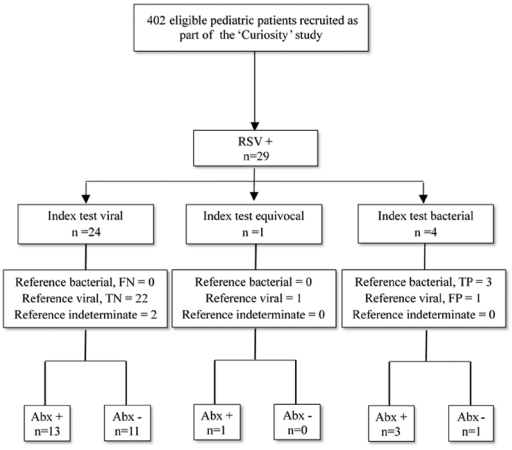

Figure 1. Recruitment and flow of pediatric patients with positive RSV detection

Flow diagram is in line with the Standards for Reporting Diagnostic Accuracy (STARD); RSV – respiratory syncytial virus, Abx – antibiotic treatment, TP – true positive, FP – false positive, TN – true negative, FN – false negative. The index test is available in Europe as ImmunoXpert (CE-IVD), not yet cleared by the FDA.

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875. Sex Differences in Academic Achievement and Faculty Rank in Academic Infectious Diseases

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Session: 90. Featured Oral Abstract
Thursday, October 4, 2018: 4:05 PM

Background. Sex differences in faculty achievement in academic medicine have been described, but little is known about these differences in infectious diseases (ID). This study assesses differences in faculty rank between female and male infectious disease faculty with academic appointments at US medical schools.

Methods. We analyzed a complete database of US physicians with medical school faculty appointments in 2014. This database consists of a linkage between the American Association of Medical Colleges faculty roster and a comprehensive physician database from Doximity, a professional networking website for doctors and includes physician age, sex, years since residency completion, publications, National Institutes of Health grants, and registered clinical trials for all academic physicians by specialty. We estimated sex differences in key metrics of academic achievement, including publications and faculty rank, among faculty physicians within ID. Multivariable regression models with medical school-specific fixed effects were used to assess sex differences in full professorship by specialty and the relationship between these factors and achieving the rank of full professor within ID.

Results. Among 2,016 academic ID physicians [Female: 742 (37%)], women accounted for 48.1% of assistant professors, 39.7% of associate professors, and 19.2% of full professors, when compared with men at each level. Women faculty members were younger than men (mean: 48.4 years vs. 54.0 years, $P < 0.001$) and had fewer total (mean: 24.1 vs. 37.8, $P < 0.001$) and first/last author publications (mean: 16.7 vs. 32.2, $P < 0.001$). In adjusted models, the rate of full professorship (vs. assistant or associate) among female compared with male infectious disease physicians was large and highly significant (absolute adjusted difference = −8.0%; 95% confidence interval [CI]: −11.9% to −4.1%). This adjusted difference was greater in ID than in cardiology (−4.7%, 95% CI: −7.9% to −1.3%), hematology (−1.5%, 95% CI: −6.2% to 3.2%), or endocrinology (−0.2%, 95% CI: −4.9% to 4.6%).

Conclusion. Significant sex differences in publications and achieving the rank of full professor exist in academic ID, after adjustment for multiple factors known to influence these outcomes. Greater efforts should be made to address equity in academic ID.

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

918. Typhoid Fever in the US Pediatric Population, 1999–2015, and the Potential Benefits of New Vaccines

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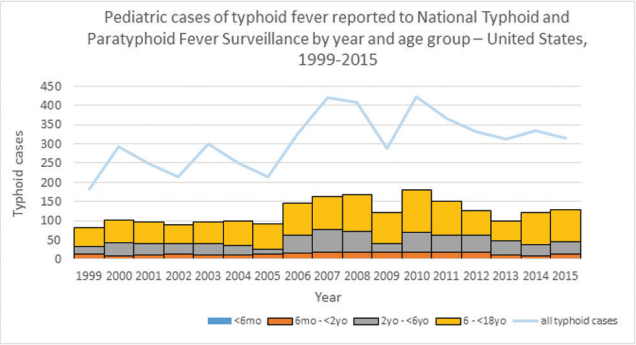
Session: 112. Bacterial Infections and Antimicrobial Stewardship
Friday, October 5, 2018: 8:45 AM

Background. In the United States, typhoid fever is rare. About 300 typhoid cases are reported to CDC annually through the National Typhoid and Paratyphoid Fever Surveillance (NTPFS) system. Most are acquired during international travel and while visiting friends and relatives. CDC recommends pretravel vaccination of at-risk children with one of two currently available vaccines: oral (age ≥6 years) or injectable (age ≥2 years). In anticipation of licensure of new protein-conjugate typhoid vaccines that could be administered to children ≥6 months old, we characterized clinical, epidemiologic, and antimicrobial resistance data of pediatric typhoid fever cases reported to CDC.

Methods. We reviewed laboratory-confirmed *Salmonella enterica* serotype Typhi infections reported to NTPFS and antimicrobial resistance data on Typhi isolates in the National Antimicrobial Resistance Monitoring System (NARMS) from 1999 to 2015.

Results. Of 2,051 pediatric (≤18 years) cases of typhoid fever, 80% had traveled internationally within 30 days of illness onset (most frequently to South Asia [82%]), 81% were hospitalized (median duration 6 days; range 0–77 days), and none died. Eight hundred twenty-seven (40%) were <6 years old; 219 (26%) were 6 months–2 years old. While 76% of pediatric cases were vaccine eligible (travelers ≥2 years old), only 6% were known to be vaccinated. Of 2,020 isolates tested for antimicrobial susceptibility, 1,211 (60%) had decreased susceptibility or resistance to ciprofloxacin, of which 277 (23%) were also resistant to ampicillin, chloramphenicol, and trimethoprim/sulfamethoxazole (multidrug-resistant [MDR]). None were resistant to ceftriaxone or azithromycin. MDR isolates were more likely in children than adults (16% vs. 9%, $P < 0.05$) and in travel-associated than domestically acquired cases (16% vs. 6%, $P < 0.05$).

Conclusion. Among pediatric cases of typhoid fever, 94% of currently vaccine-eligible travelers were unvaccinated. Emphasis on current vaccine indications and an effective pretravel typhoid vaccine for children between 6 months and 2 years old available during routine immunization visits could begin to reduce the burden of disease, and help prevent drug-resistant infections, in this vulnerable age group.



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

919. Clinical and Microbiologic Characteristics Associated With Long-Term Orthopedic Complications Following *Staphylococcus aureus* Acute Hematogenous Osteoarticular Infections in Children

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Session: 112. Bacterial Infections and Antimicrobial Stewardship
Friday, October 5, 2018: 8:45 AM

Background. *Staphylococcus aureus* is the most common cause of acute hematogenous osteoarticular infections (AHOAIs) in children. While the vast majority of patients do well, a small proportion experience significant morbidity, including chronic infection and pathologic fractures. We sought to describe clinical and microbiologic variables present on the index admission that may predict long-term orthopedic complications (OC).

Methods. Cases of *S. aureus* AHOAI were identified from 2011 to 2016 at Texas Children's Hospital (TCH). All cases were reviewed for the development of OC until April 1, 2018. OC included chronic osteomyelitis (CO), growth arrest/limb length discrepancy, avascular necrosis, chronic dislocation, and pathologic fracture (PF) with or without angular deformity. All *S. aureus* isolates were characterized by PCR for Panton–Valentine Leukocidin (PVL) genes and *agr* group. Statistical Analyses were performed with STATA.

Results. A total of 252 cases were identified meeting inclusion criteria (figure). Twenty-four (9.5%) developed OC; of which, 50% were CO and 25% PF. Patients who developed CO more often had positive blood cultures during the index admission ($P < 0.001$), surgical drainage after hospital day 2 (33.3% vs. 8.8%, $P = 0.02$) as well as a longer time to 50% reduction in C-reactive protein (CRP, 9 vs. 7 days, $P = 0.01$). Patients who developed PF more often had infection due to PVL-positive organisms (83.3% vs. 38.6%, $P = 0.03$) and had a longer duration of fever after admission (9.5 vs. 2.5 days, $P = 0.03$). Overall, OC were associated with ICU admission ($P = 0.04$), a slower decline in CRP ($P = 0.02$) and a greater proportion of patients with surgery after hospital day 2 ($P = 0.04$) as well as infection secondary to *agr* III isolates ($P = 0.03$). There was no statistically significant relationship between OC and patient age, affected bone, time to initiation of effective antimicrobial therapy, duration of intravenous therapy, or final antibiotic choice.