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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. Prospective identifying patients at highest risk for hospital-acquired and ventilator-associated bacterial pneumonia (HABP/VABP) by implement- ing 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 receiv- ing 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levels of respiratory support were prospectively followed for meeting the definition of HABP/VABP recommended in US FDA draft guidance.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 using a multivariable logistic regression model. Risk factors were selected using backward selection with α=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 1.42, 95% CI 1.22–1.65), 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-habpwp.shinyapps.io/web_based_tool.

Conclusion. Using a web-based scoring system, ICU patients at highest risk for hospital-acquired and ventilator-associated pneumonia 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
Thursday, October 4, 2018: 2:00 PM

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 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–influenza virus infection—viral–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).

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–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 an unambiguous expert panel etiology determination: 24 viral and 3 viral–bacterial coinfections. Out of the 24 patients assigned viral–bacterial coinfection, 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 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–influenza virus infection—viral–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).

Implementation studies are required to evaluate its utility in safely decreasing unnecessary antibiotic use for RSV patients.
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 publications (mean: 2.64 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 3.3%), 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 adjusting for multiple factors known to influence these outcomes. Greater efforts should be made to address equity in academic ID.

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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 Pantone–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 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 CRP (9 vs. 7 days, P = 0.01). 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.

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