

Abstract Highlights

The following highlights explore selected abstracts presented at IDWeek 2023, held in Boston, Massachusetts, USA. They cover key topics, including disparities in sepsis management, methicillin-resistant *Staphylococcus aureus* decolonization in neonatal intensive care, algorithms for the appropriate collection of blood cultures, and respiratory syncytial virus outcomes in adults.

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Blood Culture Algorithms in Emergency Care: Impact on Safety

INAPPROPRIATE blood culture collection can increase the number of false positive results that, in turn, can lead to excess antibiotic use, unnecessary diagnostic procedures, and increased length of hospital stay. In an era focusing on antimicrobial stewardship, strategies to reduce excess antibiotic use will be crucial. Algorithms for appropriate blood culture collection could be one such strategy.

Novel research presented at IDWeek 2023 explored this further. Researchers from Duke University Hospital, Durham, North Carolina, USA, performed a prospective cohort study between December 2022–March 2023 to evaluate whether introduction of an appropriate blood culture algorithm to their emergency department impacted clinical, operational, and safety metrics. Historical controls from December 2020–November 2022 were used for comparison. Exclusion criteria included: patients <18 years of age, heart and lung transplant recipients, and an absolute neutrophil count of $<500 \times 10^9 / L$.

Following electronic, in-person, and online dissemination of the blood culture algorithm, seven emergency department clinicians reviewed algorithm adherence for eligible patients each week, and provided monthly feedback to all emergency department providers. Algorithm adherence, blood culture order volume, blood

culture positivity rate, days of antibiotic therapy, indication, and 30-day hospital readmission rates were evaluated.

Overall, the researchers found that of the 2,168 blood cultures, the majority adhered to the algorithm. In cases where non-adherence did occur, isolated fever or leukocytosis (29%), non-severe community-acquired pneumonia or healthcare-associated pneumonia (6.9%), and non-severe cellulitis (4%) were the most common reasons.

Implementation of the algorithm resulted in a decrease in the average monthly blood culture volume from 1,387 prior to the algorithm to 1,226 afterwards ($p=0.046$), and culture positivity increased from 11.23% to 13.90%. Additionally, no changes in 30-day hospital readmissions pre- and post-intervention (21.1% versus 19.6%; $p=0.300$) or days of antibiotic therapy (786 versus 783 days per 1,000 patient days; $p=0.850$) were noted.

The team concluded that, in an academic tertiary care emergency department, introduction of a blood culture algorithm resulted in increased culture positivity rates, decreased blood culture order volume, and had no impact on 30-day hospital readmission or days of antibiotic therapy. ●

"Implementation of the algorithm resulted in a decrease in the average monthly blood culture volume."

MRSA Infection in Neonatal Intensive Care Units

RESEARCHERS presented a comparison of decolonization methods, and their impact upon methicillin-resistant *Staphylococcus aureus* (MRSA) infection, within the setting of a neonatal intensive care unit, at IDWeek 2023. MRSA and methicillin-susceptible *S. aureus* are both highly infectious diseases, which can quickly overrun hospital wards filled with vulnerable patients. Neonates are particularly vulnerable to developing MRSA infections, which can be life-threatening.

Surveillance and decolonization have the aim of impeding both transmission and infection of MRSA and methicillin-susceptible *S. aureus*, and current clinical practices use the likes of topical mupirocin and chlorhexidine (CHG) wipes to do so. The ultimate aim of this study was to compare whether a combination of topical mupirocin and CHG is more effective than mupirocin alone in preventing MRSA infection in the neonatal population.

Nahid Hiermandi, Pediatric Infectious Diseases Fellow, Baylor College of Medicine, Houston, Texas, USA, and colleagues, performed a retrospective study of MRSA infections in the neonatal intensive care unit of the Texas Children's Hospital Pavilion for Women in Houston, between January 2014–December 2020. The center receives around 900 admissions per year, most of which are in-born. Prior to 2017, the center utilized a surveillance culture method, swapping this for a surveillance PCR test (Xpert MRSA NxG, Cepheid, Sunnyvale, California, USA) from 2017.

In this period, of the 7,890 patients admitted to the neonatal intensive care unit, 128 (1.6%) were found to be MRSA-colonized, and 19 (0.2%) of these had an MRSA infection, defined as the isolation of MRSA from a particular specimen (body fluid, urine, blood, trachea, or cerebrospinal fluid). In the subgroup of 128 MRSA-colonized neonates, patients were assigned to three groups: mupirocin and CHG (18 patients), only mupirocin (76), or neither (34). The mupirocin and CHG treatment eradicated all incidence of MRSA infection; in the mupirocin treatment, 12 patients (15.8%) developed MRSA infection; and receiving neither treatment caused seven infants (20.6%) to develop MRSA infection.

"The mupirocin and CHG treatment eradicated all incidence of MRSA infection."

Limitations of this study included the odds ratio not reaching statistical significance, with a low rate of MRSA colonization; exclusion of infants who were ineligible for CHG treatment due to their age; instances of missing outcomes in infants who were discharged before the onset of their infection; and confounders, such as duration of hospitalization and medical condition, which were not accounted for. ●





Sepsis: Sex and Race Disparities in Time-to-Antibiotics

SEPSIS treatment disparities based on sex and race have been identified in new research presented at IDWeek 2023. Theodore R. Pak, Massachusetts General Hospital, Boston, USA, and colleagues, sought to clarify previous findings from observational studies, suggestive that compared with White males, females and people of color experience worse sepsis outcomes.

The team performed a retrospective analysis of all adults admitted with suspected sepsis or septic shock across five Massachusetts hospitals between 2015–2022 to review, using multivariable logistic regression, whether any associations between sex/race/ethnicity, time-to-antibiotics (3–6 hours versus 0–3 hours), and in-hospital mortality existed.

A diagnosis of suspected sepsis was defined as blood cultures drawn, intravenous antibiotics administered within 24 hours of arrival, and evidence of organ dysfunction. Septic shock was defined as sepsis and hypotension or a lactate of ≥ 4.0 mmol/L.

In total, 48,263 patients were included. The regression analysis adjusted for allergies, comorbidities, infection source, laboratory findings, language, other demographics, and vital signs.

The evaluation highlighted that median time-to-antibiotics for sepsis was higher in females than males at 202 minutes versus 188 minutes, respectively (adjusted odds ratio [aOR]: 1.15; 95% confidence interval [CI]: 1.07–1.25). Similarly, for

septic shock, median time-to-antibiotics was higher in females than males at 159 minutes versus 141 minutes (aOR: 1.09; 95% CI: 1.01–1.17). Furthermore, females with septic shock displayed higher in-hospital mortality (aOR: 1.15; 95% CI: 1.05–1.27), and this persisted after adjusting for time-to-antibiotics (aOR: 1.17; 95% CI: 1.03–1.32). However, no association between sex/race/ethnicity and in-hospital mortality was seen for sepsis without shock.

"Females with septic shock displayed higher in-hospital mortality."

Additionally, disparities in the median time-to-antibiotics for sepsis and septic shock were noted amongst race/ethnicity categories. The greatest disparity was seen between Black and White patients. Median time-to-antibiotics for sepsis was 212 minutes for Black patients compared with 193 minutes for White patients (aOR: 1.23; 95% CI: 1.06–1.43), and 157 minutes for Black patients and 147 minutes for White patients (aOR: 1.27; 95% CI: 1.08–1.48) in septic shock.

From these findings, the authors concluded that females and Black patients were more likely to receive antibiotics later, and females experienced higher mortality in septic shock in a large cohort of patients with sepsis. ●

Clinical Outcomes in Adults with Respiratory Syncytial Virus

RESPIRATORY illness and hospitalization in older adults and those with certain underlying medical conditions is often caused by respiratory syncytial virus (RSV). Research presented by Michael Melgar, Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA, at IDWeek 2023, emphasizes the importance of identifying adults with an increased risk of severe illness as novel RSV vaccines are being developed.

Melgar and team used population-based surveillance conducted through the RSV Hospitalization Surveillance Network (RSV-NET) from 2014–2022, across 75 counties in 12 states in the USA. The analysis included non-pregnant adults (≥ 18 years) who had been hospitalized with laboratory-confirmed RSV infection during each of the eight seasons, spanning October–April, except 2020–2021, which spanned October 2020–September 2021. Percentages of adults with intensive care unit admission were calculated, as well as mechanical ventilation and in-hospital death, stratified by demographic characteristics. The team also calculated age-adjusted percentages with these outcomes, stratified by underlying conditions.

Results showed that there were 13,080 RSV-associated hospitalizations amongst the participants, 61.9% of which were aged ≥ 65 years. Admission to the intensive care unit was recorded in 18.6% of patients, mechanical ventilation in 7.2%, and in-hospital death in 4.2%, the majority of which occurred in adults aged 75 years or older. Patients with non-asthma chronic lung disease and with cardiovascular diseases had the highest age-adjusted percentages of in-hospital death. Immunocompromise and asthma were the most commonly occurring underlying conditions in patients aged 18–49 years (34.8% and 29.8%, respectively).

The researchers concluded that older age and cardiopulmonary conditions were associated with severe illness in adults hospitalized with RSV-associated infections. They added that, as a result, “older adults and adults with cardiopulmonary and immune compromising conditions may benefit from RSV vaccination when licensed products become available.” ●

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