The mechanisms associated with COVID-19 in children are not well understood. We sought to define the differences in nasopharyngeal (NP) cytokine profiles according to clinical presentation in children with COVID-19.

Methods. Single-center, prospective study in 137 children and adolescents < 21 years of age hospitalized with COVID-19, and 35 age, sex and race matched pre-pandemic (2016-2019) healthy controls. Children with COVID-19 were categorized according to their clinical presentation: COVID-19-symptomatic, COVID-19-screening, and multi-system inflammatory syndrome (MIS-C). NP swabs were obtained within 24 hours of admission to measure SARS-CoV-2 loads by rt-PCR, and a 92-cytokine panel. Unsupervised and supervised analysis adjusted for multiple comparisons were performed.

Results. From 3/2020 to 1/2021, we enrolled 76 COVID-19-symptomatic children (3.5 [0.2-15.75] years); 45 COVID-19-screening (11.1 [4.2-16.1] years), and 16 MIS-C (11.2 [5.9-14.6] years). Median NP SARS-CoV-2 loads were higher in COVID-19-symptomatic versus screening and MIS-C (6.8 vs 3.5 vs 2.82 log10 copies/mL; p < 0.001). Statistical group comparisons identified 15 cytokines that consistently differed between groups and were clustered in three functional categories: (1) antiviral/regulatory, (2) pro-inflammatory/chemotactic, and (3) a combination of (1) and (2); (11.2 [5.9-14.6] years). Median NP SARS-CoV-2 loads were higher in COVID-19-symptomatic versus screening and MIS-C (6.8 vs 3.5 vs 2.82 log10 copies/mL; p < 0.001). Statistical group comparisons identified 15 cytokines that consistently differed between groups and were clustered in three functional categories: (1) antiviral/regulatory, (2) pro-inflammatory/chemotactic, and (3) a combination of (1) and (2); (Fig 1). All 15 cytokines were higher in COVID-19-symptomatic versus controls (p < 0.05). Similarly, and except for TNF, CCL3, CCL4 and CCL23, which were comparable in COVID-19-symptomatic and screening patients, the remaining cytokines were higher in symptomatic children (p < 0.05). PDL-1 (p = 0.01) and CCL3 (p = 0.03) were the only cytokines significantly decreased in children with MIS-C versus symptomatic COVID-19 children.

Conclusion. The 15 cytokines identified by multiple comparisons were correlated using Person's R software. Red reflects a positive correlation and blue a negative correlation with the intensity of the color indicating the strength of the association.

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We identified distinct groups of CO-MRSA and MSSA infection rate trajectories by grouping census tracts of the 20 county Atlanta Metropolitan Statistical Area (MSA) between 2002 to 2016 with similar temporal trajectories.

Methods. This is a retrospective study from 2002-2016, using electronic health records of children living in Atlanta, Georgia with S. aureus infections and relevant US census data (at the census tract level). A group based trajectory model was applied to generate community onset S. aureus trajectory infection groups (low, high, very high) by census tract and were mapped using ArcGIS.

Results. Three CO-MSSA infection groups (low, high, very high) and two CO-MRSA infection groups (low, high) were detected among 909 census tracts in the 20 counties. We found ~74% of all the census tracts with infection groups (low, high, very high) were detected among 909 census tracts in the 20 counties. We identified distinct groups of CO-MRSA and MSSA infection rate trajectories by grouping census tracts of the 20 county Atlanta Metropolitan Statistical Area (MSA) between 2002 to 2016 with similar temporal trajectories.

Conclusion. Trends of S. aureus infection patterns, stratified by antibiotic resistance over geographic areas and time, identify communities with higher risks for MRSA infection compared to MSSA infection. Further investigation of the determinants of the trajectory groupings and the geographic outliers identified by this study may be a way to target prevention strategies aimed to prevent S. aureus infections.

Disclosures. All Authors: No reported disclosures

3. Stopping Hospital Infections with Environmental Services (SHINE): A Cluster-Randomized Trial of Intensive Monitoring Methods for Terminal Room Cleaning on Rates of Multidrug-Resistant Organisms (MDROs) in the Intensive Care Unit (ICU)

Matthew J. Ziegler, MD MSCE1; Hilary Babcock, MD, MPH, FIDSA, FSHEA2; Hilary Babcock, MD, MPH, FIDSA, FSHEA2; Sharon F. Welbd, MD3; David K. Warren, MD, MPH4; William Trick, MD5; Sujuan Reddy, MD, MS6; Pam C. Tolomeo, MPH, CCRP7; Jacqueline Omorogbe, MBE8; Diana Garcia, MPH9; Tracey Habrock-Bach, BS8; Onofre T. Donceras, BS9; RN, CIC9; Steven M. Gaynes, BS8; Leigh Cressman, MA9; Jason P. Burnham, MD10; David A. Pegues, MD11; Ebhong Lautenbach, MD, MPH, MSCE12; Jennifer Han, MD, MSCE13; University of Pennsylvania, Philadelphia, PA; 14Washington University School of Medicine, St. Louis, MO; 15Rush Presbyterian Hospital, Skokie, IL; 16Washington University, St. Louis, MO; 17Cook County Health and Rush University Medical Center, Chicago, IL; 18Centers for Disease Control and Prevention, Atlanta, GA; 19Cook County Health, Chicago, Illinois; 20John H. Stroger Hospital of Cook County, Chicago, IL; 21Crothall Healthcare Inc., Philadelphia, PA; 22University of Pennsylvania School of Medicine, Philadelphia, PA; 23Washington University in St. Louis School of Medicine, St. Louis, MO; 24Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA; 25GlaxoSmithKline, Rockville, MD for the CDC Prevention Epicenters Program

Session: O-01. Addressing MDRO Colonization and Infection

Background. MDROs frequently contaminate hospital environments. We performed a multicenter cluster-randomized, crossover trial of two methods for intensive monitoring of terminal cleaning effectiveness at reducing infection and colonization with MDROs within ICUs.

Methods. Six medical and surgical ICUs at three medical centers received both intensive monitoring interventions sequentially, in a randomized order. The intervention included surveying a minimum of 10 surfaces each in 5 rooms weekly, after terminal cleaning, with adenosine triphosphate (ATP) monitoring or an ultraviolet fluorescent marker (UV/F). Results were delivered to environmental services (EVS) staff in real-time, with failing surfaces recleaned. The primary study outcome was the monthly rate of infection or colonization with MDROs, including methicillin-resistant Staphylococcus aureus, Clostridiodes difficile, vancomycin-resistant Enterococcus, and multidrug-resistant gram-negative bacilli (MDR-GNB), assessed during a 12-month baseline comparison period and sequential 6-month intervention periods, separated by a 2-month washout. Outcomes during each intervention period were compared to the combined baseline period plus the alternative intervention period using mixed-effects Poisson regression, with study hospital as a random effect.

Results. The primary outcome rate varied by hospital and ICU (Figure 1). The ATP method was associated with a relative reduction in the incidence rate of infection or colonization with MDROs within ICUs.

Conclusion. Trends of S. aureus infection patterns, stratified by antibiotic resistance over geographic areas and time, identify communities with higher risks for MRSA infection compared to MSSA infection. Further investigation of the determinants of the trajectory groupings and the geographic outliers identified by this study may be a way to target prevention strategies aimed to prevent S. aureus infections.

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