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.

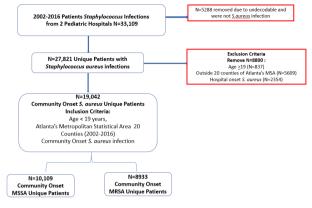
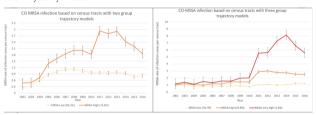


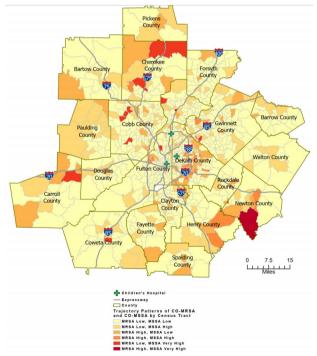
Figure 1. Enrollment Scheme –Unique Patients with CO- MRSA and MSSA Infections

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 *S.aureus* occurrence during this time period belonged to low infection rate groups for both MRSA and MSSA, with a higher proportion occurring in the less densely populated areas, had the highest proportion of the worst infection trend patterns (CO-MRSA high or very high, CO-MSSA high or very high).

Trends of Community-Onset MRSA and MSSA Infection Rates Based on Groupbased Trajectory Models



Spatial patterns for CO-MRSA and CO-MSSA Trajectory Trends in the Atlanta Metropolitan Area Between 2002 to 2016



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. Welbel, MD³; David K. Warren, MD, MPH⁴; William Trick, MD⁵; Sujan Reddy, MD, MSc⁶; Pam C. Tolomeo, MPH, CCRP¹; Jacqueline Omorogbe, MBE¹; Diana Garcia, MPH⁷; Tracey Habrock-Bach, BS²; Onfofre T. Donceras, MS, RN, CIC⁸; Steven M. Gaynes, BS⁹; Leigh Cressman, MA¹⁰; Jason P. Burnham, MD¹¹; David A. Pegues, MD¹²; Ebbing Lautenbach, MD, MPH, MSCE¹; Jennifer Han, MD, MSCE¹³; ¹University of Pennsylvania, Philadelphia, PA; ²Washington University School of Medicine, St. Louis, MO; ⁵Cook County Health and Rush University Medical Center, Chicago, IL; ⁶Centers for Disease Control and Prevention, Atlanta, GA; ⁷Cook County Health, Chicago, Illinois; ⁸John H. Stroger Hospital of Cook County, Chicago, IL; ⁶Crothal Healthcare Inc., Philadelphia, PA; ¹⁰University of Pennsylvania School of Medicine, St. Louis, MO; ¹²Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA; ¹³GlaxoSmithKline, Rockville, MD

for the CDC Prevention Epicenters Program

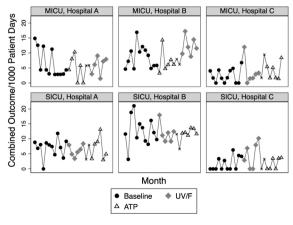
Session: O-01. Addressing MDRO Colonization and Infection

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*, *Clostridioides 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 (incidence rate ratio (IRR) 0.887, 95% confidence-interval (CI) 0.811–0.969, P=0.008) (Table 1), infection with MDROs (IRR 0.924, 95% CI 0.855–0.998, P=0.04), and infection or colonization limited to multidrug-resistant MDR-GNB (IRR 0.856, 95% CI 0.825–0.887, P< 0.001). The UV/F intervention was not associated with a statistically significant impact on these outcomes. Room turnaround time was increased by a median of one minute with the ATP intervention and 4.5 minutes with the UV/F intervention compared to baseline.

Figure 1. MDRO infection or colonization per 1000 patient days by study month



NOTE. MDRO, multi-drug resistant organism; MICU, medical intensive care unit; SICU,

surgical intensive care unit; UV/F, ultraviolet fluorescent marker; ATP, adenosine triphosphate

Table 1. Mixed-effects Poisson regression analysis for MDRO infection or colonization

Variable	Bivariable IRR (95%	P-Value	Multivariable IRR (95%	P-Value
	CI)		CI)	
UV/F	1.103 (0.955 - 1.274)	0.18		
ATP	0.923 (0.863 -0.988)	0.02	0.887 (0.811 -0.969)	0.008
SICU ^a	1.229 (1.033 -1.463)	0.02	1.228 (1.031 -1.463)	0.02
Time from study start	1.001 (0.989 -1.013)	0.88		
Time from intervention start	0.983 (0.967 -1.000)	0.047	0.979 (0.961 -0.997)	0.03
Contact precautions ^b	0.869 (0.412 -1.830)	0.71		

NOTE. MDRO, multi-drug resistant organisms, IRR, incidence rate ratio; CI, confidence

interval; ATP, adenosine triphosphate; UV/F, ultraviolet fluorescent marker; SICU, surgical

intensive care unit

^aCompared with medical intensive care units (MICUs)

^bPercentage of occupied rooms utilizing contact precautions per month

Conclusion. Intensive monitoring of ICU terminal room cleaning with an ATP modality is associated with a relative reduction of infection and colonization with MDROs with a negligible impact on TAT.

Disclosures. Hilary Babcock, MD, MPH, FIDSA, FSHEA (nothing to disclose), David K. Warren, MD, MPH, Homburg & Partner (consultant), Ebbing Lautenbach, MD, MPH, MSCE (nothing to disclose), Jennifer Han, MD, MSCE, GlaxoSmithKline (employee, shareholder).

4. 137 Hospital Cluster-Randomized Trial of Mupirocin-Chlorhexidine vs Iodophor-Chlorhexidine for Universal Decolonization in Intensive Care Units (ICUs) (Mupirocin Iodophor Swap Out Trial)

Susan S. Huang, MD, MPH¹; Edward Septimus, MD²; Ken Kleinman, PhD³; Lauren Heim, MPH⁴; Julia Moody, MS⁵; Taliser R. Avery, MS⁶;

Lauren Heim, MPH '; Julia Moody, MS'; Taliser R. Avery, MS'; Laura E. McLean, MEd⁵; Syma Rashid, MD⁴; Katherine Haffenreffer, BS⁷;

Lauren Shimelman, BA⁸; Whitney Staub-Juergens, DNP⁵;

Caren Spencer-Smith, MS⁵; Selsebil Sljivo, MPH⁷; Ed Rosen, BS⁷; Russell Poland, PhD⁵; Micaela H. Coady, MS⁷; Eunice J. Blanchard, MSN RN⁵; Kimberly Reddish, DNP⁵; Mary K. Hayden, MD, FIDSA, FSHEA⁹; Robert A. Weinstein, MD⁹; Brandon Carver, BA⁵; Kimberly N. Smith, MBA⁵; Jason Hickok, MBA¹⁰; Karen Lolans, BS⁹; Nadia Khan, BS¹¹; S. G. Sturdevant, PhD¹²; Sujan Reddy, MD, MSc¹³; John A. Jernigan, MD, MS¹³; John A. Jernigan, MD, MS¹³; Kenneth Sands, MD, MPH⁵; Jonathan B. Perlin, MD, PhD⁵; Richard Platt, MD, MSc²; ¹University of California, Irvine, Irvine, CA; ²Harvard Medical School, Houston, Texas; ³University of Massachusetts, Amherst, Massachusetts; ⁴UC Irvine School of Medicine, Irvine, California, ⁵HCA Healthcare, Nashville, Tennessee; ⁶Harvard Pilgrim Healthcare Institute, Boston, Massachusetts, ⁷Harvard Pilgrim Health Care Institute, Boston, Massachusetts; ⁸Massachusetts Bay Transportation Authority, Boston, Massachusetts; ⁹Rush University Medical Center, Chicago, Illinois; ¹⁰Ondine, Nashville, Tennessee; ¹¹Emory University Rollins School of Public Health, Decatur, Georgia; ¹²NIH, Baltimore, Maryland; ¹³Centers for Disease Control and Prevention, Atlanta, GA

CDC Prevention Epicenters

Session: O-01. Addressing MDRO Colonization and Infection

Background. ICU universal decolonization with daily chlorhexidine (CHG) baths plus mupirocin nasal decolonization reduces all-cause bloodstream infections (BSI) and MRSA clinical cultures. We assessed nasal iodophor, an antiseptic less susceptible to resistance, in place of mupirocin.

Methods. We conducted a cluster randomized non-inferiority trial in ICUs, comparing universal decolonization with: 1) **Mupirocin-CHG:** daily CHG baths and 5 days of twice daily nasal mupirocin, to 2) **Iodophor-CHG:** same regimen, substituting twice daily 10% povidone-iodine for mupirocin. All adult ICUs in a hospital were assigned to the same strategy. We compared each hospital's outcomes during the 18-month intervention (Nov 2017-Apr 2019) to its own baseline (May 2015-Apr 2017), during which all hospitals used mupirocin-CHG. The primary outcome was ICU-attributable *S. aureus* clinical isolates. Secondary outcomes included ICU-attributable MRSA clinical isolates and all-cause BSI. As randomized and as treated analyses used unadjusted proportional hazards models assessing differences in outcomes between baseline and intervention periods across the two groups, accounting for clustering by hospital and patient.

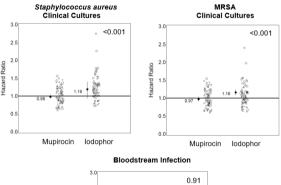
Results. We randomized 137 hospitals with 233 ICUs in 18 states. There were 442,544 admissions in the baseline period and 349,262 in the intervention period. Median ICU length of stay was 4 days. ICU types included mixed medical surgical (56%), medical (9%), surgical (11%), cardiac (15%), and neurologic (9%). CHG adherence was similar in both arms (85%), but adherence was greater for mupirocin (90%) than iodophor (82%). Primary as-randomized results (Table, Figure) exceeded the non-inferiority margin in favor of mupirocin, for *S. aureus* clinical cultures (21% superiority, P< 0.001) and for MRSA clinical cultures (20% superiority, P< 0.001). The regimens had similar BSI hazards. Analyses of fully adherent patients are in progress.

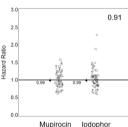
Table. As-Randomized Group Comparisons for Outcomes of Mupirocin lodophor Swap Out Trial

Strategy	period Events/1,000 ICU Attributable Admissions	period Events/1,000 ICU Attributable Admissions	Hazard Ratio ¹	Difference in Differences	P- value				
AS RANDOMIZED ANALYSIS									
PRIMARY OUTCOME: ICU-Attributable Staphylococcus aureus Clinical Cultures									
Mupirocin-CHG	16.9	16.3	0.98 (0.94 - 1.03)	Mupirocin-CHG with	<0.001				
lodophor-CHG	17.9	20.7	1.19 (1.14 - 1.24)	21% greater reduction					
SECONDARY OUTCOME: ICU-Attributable MRSA Clinical Cultures									
Mupirocin-CHG	8.8	8.3	0.97 (0.91 - 1.04)	Mupirocin-CHG with	0.002				
lodophor-CHG	8.8	10.0	1.16 (1.1 - 1.24)	20% greater reduction ²					
SECONDARY OUTCOME: ICU-Attributable Bloodstream Infections									
Mupirocin-CHG	11.8	11.2	0.99 (0.93 - 1.05)	No difference	0.91				
lodophor-CHG	12.3	11.8	0.99 (0.93 - 1.04)	between groups					
¹ HR = Hazard Ratio from unadjusted proportional hazard model analyses; model estimates are not equal to ratio of raw risk due to differential length-of-stay and effect of clustering within hospital 220% reflects rounding error when calculating the difference between hazard ratios (1.16-0.97)									

Figure - Primary and Secondary Outcomes of Mupirocin Iodophor Swap Out Trial

Figure. Group-specific hazard ratios (HR) and 95% confidence intervals (vertical lines) comparing trial outcomes during the intervention versus baseline period. Bubble plots of HRs from individual hospitals relative to their group effects are shown. Bubble size indicates relative number of ICU patients contributing data.





Conclusion. Universal iodophor-CHG was equivalent to mupirocin-CHG for ICU BSI prevention. Mupirocin-CHG was superior to iodophor-CHG for *S. aureus* and MRSA clinical isolates, potentially due to greater adherence to mupirocin.

Disclosures. Susan S. Huang, MD, MPH, Medline (Other Financial or Material Support, Conducted studies in which participating hospitals and nursing homes received contributed antiseptic and cleaning products)Molnlycke (Other Financial or Material Support, Conducted studies in which participating hospitals and nursing homes received contributed antiseptic and cleaning products)Stryker (Sage) (Other Financial or Material Support, Conducted studies in which participating hospitals and nursing homes received contributed antiseptic and cleaning products)Xttrium (Other Financial or Material Support, Conducted studies in which participating hospitals and nursing homes received contributed antiseptic and cleaning products) Edward Septimus, MD, Medline (Other Financial or Material Support, Conducted studies in which participating hospitals received contributed antiseptic products)Molnlycke (Other Financial or Material Support, Conducted studies in which participating hospitals received contributed antiseptic products) Ken Kleinman, PhD, Medline (Other Financial or Material Support, Conducted studies in which participating hospitals received contributed antiseptic products)Molnlycke (Other Financial or Material Support, Conducted studies in which participating hospitals received contributed antiseptic products) Lauren Heim, MPH, Medline (Other Financial or Material Support, Conducted clinical trials and studies in which participating hospitals and nursing homes received contributed antiseptic and cleaning products)Molnlycke (Other Financial or Material Support, Conducted studies in which participating hospitals received contributed antiseptic product)Stryker (Sage) (Other Financial or Material Support, Conducted clinical trials and studies in which participating hospitals and nursing homes received contributed antiseptic product)Xttrium (Other Financial or Material Support, Conducted clinical trials and studies in which participating hospitals and nursing homes received contributed antiseptic product) Julia Moody, MS, Medline (Other Financial or Material Support, Conducted studies in which participating hospitals received contributed antiseptic product)Molnlycke (Other Financial or Material Support, Conducted studies in which participating hospitals received contributed antiseptic product) Taliser R. Avery, MS, Medline (Other Financial or Material Support, Conducted studies in which participating hospitals received contributed antiseptic product)Molnlycke (Other Financial or Material Support, Conducted