1836. Genomic Epidemiology of Methicillin-Susceptible Staphylococcus aureus Colonization and Infection among US Army Trainees at Fort Benning, Georgia

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Session: 185. Staphylococcus aureus: New Perspectives on an Old Foe
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Background. Methicillin-susceptible Staphylococcus aureus (MSSA) is a common cause of skin and soft-tissue infection (SSTI). MSSA genomic epidemiology data are limited. We used whole-genome sequencing (WGS) to examine MSSA strain diversity among military trainees, a group known to be at high risk for S. aureus infection and carriage.

Methods. From July 2012 to December 2014, we conducted a prospective SSTI case-control study among US Army trainees at Fort Benning, GA. Thereafter, we identified MSSA SSTI clusters within select military training classes and performed WGS on clinical and colonizing isolates. We analyzed epidemiologic, clinical, genomic, and phylogenetic data in order to evaluate MSSA strain diversity and patterns of disease transmission.

Results. A total of 67 SSTI cases from 15 training classes were identified. The median (range) number of cases per class was 4 (3–10). Cases presented for care after a median of 39 (6–101) days of training. Of the 67 cases, 42 (63%) were colonized with MSSA at ≥1 anatomic site. A total of 78 MSSA colonizing isolates were identified at the time trainees presented for clinical care; colonizing isolates were found in the nares (37%), throat (31%), inguinal region (21%), and perianal region (12%). Multilocus sequence typing (MLST) assigned 128 (88%) isolates to 20 known types and 17 isolates to novel types. Among clinical isolates, 60 (90%) were assigned to known types. Sequence Type (ST) 8 was the most frequent type, accounting for 45% and 35% of clinical and colonizing isolates, respectively. The phylogenetic tree of isolates revealed seven major clusters, some of which were composed of a diversity of training classes, specimen types, and STs. These major clusters were further segregated into 15 sub-clusters where there was considerable diversity in intrahost variation.

Conclusion. Genomic characterization of MSSA infection and colonization isolates among congregate trainees revealed a broad diversity of strains. There was a clear clonal origin and dissemination of MSSA isolates among close contacts within the ST-8 cluster but this transmission pattern was less apparent for MSSAs from other STs.

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1837. Considerations for a Targeted Approach to Contact Precautions for Patients with MRSA in Hospitals: A Multicenter Cohort Study to Identify High-Risk Patient Characteristics and Healthcare Personnel Interactions

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Background. Healthcare personnel’s (HCP) gloves and gowns are frequently contaminated with antibiotic-resistant bacteria in the intensive care unit (ICU). Guidelines recommend contact precautions for patients with methicillin-resistant Staphylococcus aureus (MRSA); however, this approach remains controversial. This study aimed to identify which patients are more likely to transfer MRSA to HCP gloves or gowns and to identify HCP interactions more likely to lead to glove or gown contamination.

Methods. In a multicenter cohort study of MRSA colonized patients, we observed HCP-patient interactions and cultured HCP’s gloves and gowns before donning. We also assessed the association between bacterial burden and contamination by sampling patients’ anterior nares, perianal area, chest, and arm.

Results. We enrolled 402 MRSA-colonized patients and observed 3,982 HCP interactions. MRSA contamination of HCP gloves and gowns occurred in 14.3% and 5.9% of interactions, respectively. Contamination of either gloves or gown occurred in 16.2% of interactions. Occupational/physical therapists had the highest rates of contamination (OR: 6.96 [95% CI: 3.51–13.79]), followed by respiratory therapists (OR: 5.34 [95% CI: 3.04–9.39]) when compared with the "Other" category. Touching the patient was associated with higher contamination (OR: 2.59 [95% CI: 1.04–6.51]) when compared with touching nothing in the room. Touching only the environment was not associated with glove or gown contamination (OR: 1.43 [95% CI: 1.04–6.51]) when compared with touching nothing.

Conclusion. Contamination of HCP gloves and gowns with MRSA occurs frequently when caring for ICU patients. We identified interactions that are high-risk for transmission. Hospitals may consider optimizing contact precautions by using less precautions for low-risk interactions and more precautions for high-risk interactions.

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1838. Bare Below the Elbows vs. Sleeved Attire: A Pilot Study Comparing Microbial Flora of Healthcare Workers

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Background. Bare Below the Elbows (BBE) is an approach to healthcare worker (HCW) attire that limits patient contact with contaminated HCW clothing. While supported by biological plausibility, the practice is controversial. Critics cite limited evidence that bare skin is less contaminated in comparison to sleeved garments such as white coats. This study is a comparison of the flora and bioburden between BBE and sleeved HCW.

Methods. HCW in 2 progressive care units were asked to allow swab sampling of their dominant wrist/forearm (Figure 1). Non-clinicians were excluded. Hand hygiene was not performed prior to sampling. HCW agreeing to participate completed informed consent, and a survey regarding bathing and laundering. Swabs were inoculated into TSA broths, and incubated for 24 hours at 37°C. Bioburden was estimated using McFarland standard optical densities by 2 independent blinded evaluators. The broth was streaked on blood agar and MacConkey plates. Colonies consistent with

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Results. Sixty-three HCW participated; 30 were BBE and 33 sleeved. A comparison of the 2 groups is shown in Table 1. The majority of bacterial growth was morphologically consistent with skin flora; no Gram-negative rods grew. The bioburden estimates and presence of *Staphylococcus aureus* were not different between the groups (P = 0.099 and 0.325, respectively). Surveys indicated that BBE providers were more likely to be working in freshly laundered garments (P < 0.0001); this was true for all BBE providers except 2 HCW on shift >24 hours. Three sleeved individuals could not remember when they last laundered the garment in which they were providing clinical care.

Conclusion. HCW laundering practices remain suboptimal, particularly among sleeved HCW. The potential impact of hand hygiene on comparative bioburden between sleeved and BBE HCW's remains unknown and is the focus of future investigations.

Table 1: Comparison of BBE and Sleeved Providers:

| Provider type | BBE (N=30) | Sleeved (N=33) | p value |
|---------------|------------|----------------|---------|
| Physician     | 12 (40%)   | 27 (82%)       | <0.0001 |
| Nurse         | 12 (40%)   | 0 (0%)         |         |
| Other         | 6 (20%)    | 5 (15%)        |         |
| Clean garments* | 28 (93%)   | 16 (48%)       | <0.0001 |
| *Staphylococcus aureus* | 7(23%) | 4(12%) | 0.325 |
| MRSA: %   | 6(20%)     | 4(12%)         | 0.498   |
| Optical density** | mean(SD)  | 2.8(1.8)       | 3.5(1.5) | 0.099 |

*defined as garment laundered in the last 24 hours

**OD estimated using McFarland Standards

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1839. Contact Precautions’ Effects on MRSA Transmission in Department of Veterans Affairs Hospitals

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Session: 185. Staph aureus: New Perspectives on an Old Foe

Background. In 2007, the Department of Veterans Affairs (VA) implemented the methicillin-resistant *Staphylococcus aureus* (MRSA) Prevention Initiative nationally in acute care facilities (ACFs). The initiative included universal nasal surveillance for MRSA colonization and implementation of contact precautions (CP) for identified carriers for the duration of their stay. Despite subsequent declines in MRSA infection rates in the VA, debate on CP efficacy continues, due to limited and inconclusive direct evidence. This study estimated CP impact on MRSA transmission in the VA.

Methods. We analyzed 1 year of data from 36 VA ACFs in 2014 using a Bayesian transmission model. The data included admission, discharge, and surveillance and clinical test results for MRSA. Per the MRSA Prevention Initiative protocol that placed known carriers on CP, we assumed patients were on CP starting 12 hours after a positive surveillance test, 24 hours after a positive clinical culture, or at admission if the patient had a positive test within 365 days prior to admission. Our model produced estimates of ward-specific transmission rate, surveillance test sensitivity, importation probability, and the CP effect parameter (CP<e>). For CP<e> < 1, CP reduced transmission. Additionally, we combined the estimates of CP<e>s using a random-effects model with inverse variance weights to derive pooled estimates and corresponding standard errors.

Results. Facility size varied with a median daily census of 70 patients per day (range: 44–111). During the study period, 144,386 individuals were admitted into one of 36 ACFs, for 215,207 total admissions. The median percentage of admissions requiring contact precautions was 11.0% (range: 6.4%–16.1%). The estimated CP<e>s was less than one in each of the 36 facilities with a median of 0.43 (range: 0.25–0.68). Our pooled estimate of CP<e>s across all facilities was 0.47 (95% CI: 0.40, 0.55).

Conclusion. We found evidence of reduced MRSA transmission from patients on CP. This result was statistically significant in 5 of the 36 facilities and our pooled estimate suggests contact precautions could reduce the transmission rate by half. Further work is needed to account for imperfect compliance with CP, and for patients on CP for other reasons.

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1872. Neurodevelopment in Apparently Normal Infants from Zika Virus Positive Pregnancies

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Session: 196. Pediatric Emerging Viral Diseases

Background. Congenital Zika syndrome (CZS) is seen in 5–12% of newborns from Zika virus (ZIKV)-infected pregnancies and includes severe neurologic abnormalities. However, the majority of ZIKV-exposed newborns do not have CZS. The risk of neurodevelopmental impairment for infants without CZS following in utero ZIKV is not well known. The objective was to determine whether infants without CZS exposed to ZIKV in utero, have normal neurodevelopment.

Methods. We performed a longitudinal study of neurodevelopment in Colombia for infants exposed to ZIKV in utero who had a normal fetal brain MRI (Mulkey et al, JAMA Peds 2019) and normal head circumference at birth. Infant development was assessed by a neurologist. The AIMS were video-recorded (range: 44–111). During the study period, 144,386 individuals were admitted into one of 36 ACFs, for 215,207 total admissions. The median percentage of admissions requiring contact precautions was 11.0% (range: 6.4%–16.1%). The estimated CP<e>s was less than one in each of the 36 facilities with a median of 0.43 (range: 0.25–0.68). Our pooled estimate of CP<e>s across all facilities was 0.47 (95% CI: 0.40, 0.55).

Conclusion. We found evidence of reduced MRSA transmission from patients on CP. This result was statistically significant in 5 of the 36 facilities and our pooled estimate suggests contact precautions could reduce the transmission rate by half. Further work is needed to account for imperfect compliance with CP, and for patients on CP for other reasons.

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