Results. US300-LV exhibited a larger number of differentially expressed genes when exposed to Hg (n = 114) compared with Cu treatment (n = 16). The most common functional groups of genes upregulated after Hg exposure included those involved in amino acid metabolism (n = 18). In contrast, 45 genes were downregulated after Hg exposure, mostly associated to host immune system defense (n = 11). qRT-PCR confirmed that the most upregulated genes were those involved in urea hydrolyase activity, Hg resistance and the transcriptional regulator Cro. Of 9 genes that were downregulated, functional groups included ype VII secretion system, immune modulators and leucocidins. Copper treatment resulted in only 12 genes that were upregulated including those in the COMER element (n = 6), amino acid metabolism (n = 3), ROS response (n = 1), host immune system defense (n = 1) and unknown function (n = 1). Downregulated genes were those associated to host immune system defense (n = 2), energy generation (n = 1) and unknown function (n = 1).

Conclusion. Differential adaptive responses after exposure to HM in US300-LV suggest a role in the evolution of antimicrobial resistance and successful spread in the region. Metabolic adaptations involving amino acid metabolism seem to play a role in the evolution of HM resistance in MRSA.

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558. Evaluating Length of Stay Data for Use in Targeting Prevention of Methicillin-Resistant Staphylococcus aureus (MRSA) Bloodstream Infections
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Background. Evidence suggests that interventions such as MRSA decolonization are useful in the prevention of MRSA bloodstream infections (BSI) both during hospitalization and post-discharge. However, decolonization may be costly and have diminishing effectiveness when used on all inpatients. Hospital length of stay (LOS) is a known risk factor for MRSA BSI. To determine whether LOS could be useful in prioritizing patients for intervention, we aimed to evaluate (i) distribution of time from admission to hospital-onset (HO) MRSA BSI, and (ii) frequency and LOS of hospitalizations that preceded community-onset (CO) MRSA BSI.

Methods. MRSA-positive blood cultures among adults admitted to New York hospitals from 2013 to 2016 were identified in the Centers for Disease Control and Prevention’s (CDCs) National Healthcare Safety Network (NHSN). We linked these data to admissions in New York’s hospital discharge dataset, the Statewide Planning and Research Cooperative System (SPARCS), where the NHSN blood culture collection date was between a patient’s SPARCS admission and discharge dates and there was an exact match for birth date, gender and facility. Time to MRSA BSI was defined as the number of days from admission (day 1) to collection of a blood culture positive for MRSA. We defined positive blood cultures collected on days 1–3 as CO, and those collected day 4 as HO.

Results. We linked 10,425 (79%) MRSA BSIs from NHSN to SPARCS. 78% (8,147) of MRSA BSIs were CO and 22% (2,278) were HO. The median time to HO MRSA BSI was 10 days (IQR 6–21) (Figure 1), in contrast to the median LOS for all hospitalizations of 4 days (IQR 3–7). By definition, 35% of all hospitalizations were never at risk of HO MRSA BSI because their LOS was < 4 days. Among CO MRSA BSI, 48% were discharged from a hospital in the 90 days preceding their BSI (Figure 2). The median LOS of these prior hospitalizations was 8 days (IQR 3–14), and 87% were at least 4 days in length.

Conclusion. Over half of HO MRSA BSI occur on or after day 10 of hospitalization and a large fraction of CO MRSA BSI had a lengthy hospitalization shortly before their BSI diagnosis. Our results suggest that patients likely to have a long LOS could be evaluated as potential targets for prevention strategies (e.g., decolonization) to reduce both HO and CO MRSA BSI.

Figure 1. Cumulative percent of hospital-onset MRSA bloodstream infections by day since admission, percent of hospitalizations with a length of stay (LOS) at least 4 days, and percent of patient-days contributed by hospitalizations with a LOS at least 4 days. New York, 2013-2016

Figure 2. Number of weeks from most recent hospital discharge to community-onset (CO) MRSA bloodstream infection (BSI), stratiﬁed by previous hospitalization of stay (LOS) and LOS ≥4 days vs. <4 days in New York hospitals, 2013-2016

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559. Two Different Beasts: Comparing Epidemiology of Healthcare-Associated vs. Community-Acquired Methicillin-Resistant Staphylococcus aureus Bacteria
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Background. Methicillin-resistant staphylococcus aureus (MRSA) bloodstream infection (BSI) is associated with significant morbidity and mortality. Healthcare-Associated (HCA) MRSA infections occurring ≥48 hours after hospitalization or in those with prior healthcare exposure has traditionally been associated with severe invasive disease, while community-associated (CA) MRSA infection (occurring within 48 hours of hospitalization and without prior healthcare exposure) has been observed in otherwise healthy individuals. We characterized the epidemiology, resistance patterns, and clinical outcomes associated with MRSA BSI over a 5 year period comparing patients with community-onset bacteria to those with hospital onset bacteria.

Methods. We performed a retrospective chart review of 151 MRSA bloodstream infections from 2013–2018 at the University of Alberta Hospital (Edmonton, Canada). We assessed each BSI by: classification (CA vs. HCA), presence of MRSA risk factors, source of infection, MRSA resistance, rate of ICU admission, and 30-day mortality.

Results. The median age of all patients with MRSA BSI was 53 years (range 23–94). MRSA BSI occurred more commonly in males for both CA and HCA infections (53% and 62%). HCA-MRSA infections had a higher rate of previous MRSA colonization (64.8% compared with CA-MRSA patients (41.7%). Injection drug use was higher in CA-MRSA infections (47% vs. 11%). The most common source of CA-BSI was injection drug use (30%) while line-associated infections were the most common in HCA-BSI. Clindamycin resistance was common (46–53% susceptible) while resistance to tetracyclines (91–97% susceptible) and trimethoprim/sulfamethoxazole (98–100% susceptible) was uncommon. HCA-MRSA BSI was associated with a higher rate of ICU admission (44% vs. 33%) and 30-day mortality (18.7% vs. 11.7%).

Conclusion. Invasive MRSA infection continues to be associated with significant morbidity and mortality. We found that healthcare-associated MRSA BSI was associated with a high rate of prior MRSA colonization as well as a higher rate of ICU admission and 30-day mortality. There are significant differences in the demographics of patients with CA BSI compared with HCA BSI. Interventions to prevent these infections need to be targeted to the geographic location of acquisition.

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560. Relating Whole-Genome Sequencing of Methicillin-Resistant Staphylococcus aureus Isolates to Transmission Dynamics and Efficacy of Control Interventions
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Background. Methicillin-resistant staphylococcus aureus (MRSA) colonization of hospitalized patients is associated with higher readmission rates and increased morbidity. Depending on the mechanisms of transmission, numerous potential control interventions exist to reduce the burden of disease. However, given the preponderance of asymptomatic