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METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS SCREENING OF NEONATAL INTENSIVE CARE UNIT STAFF IN AN OUTBREAK SETTING

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Abstract

In December 2020, our infection prevention (IP) department noted an increase in *Methicillin-resistant Staphylococcus aureus* (MRSA) isolates over baseline in the Neonatal Intensive Care Unit (NICU). Our hospital sees a steady influx of parents colonized with MRSA and our weekly screening process regularly discovers neonates that subsequently become colonized with MRSA. A doubling of the number of cases per month led to deeper investigation. Epidemiologic data were collected on the neonates and matched to their mother's screening cultures (when obtained). Sensitivity patterns were matched, and staff noted that a single sensitivity pattern predominated.

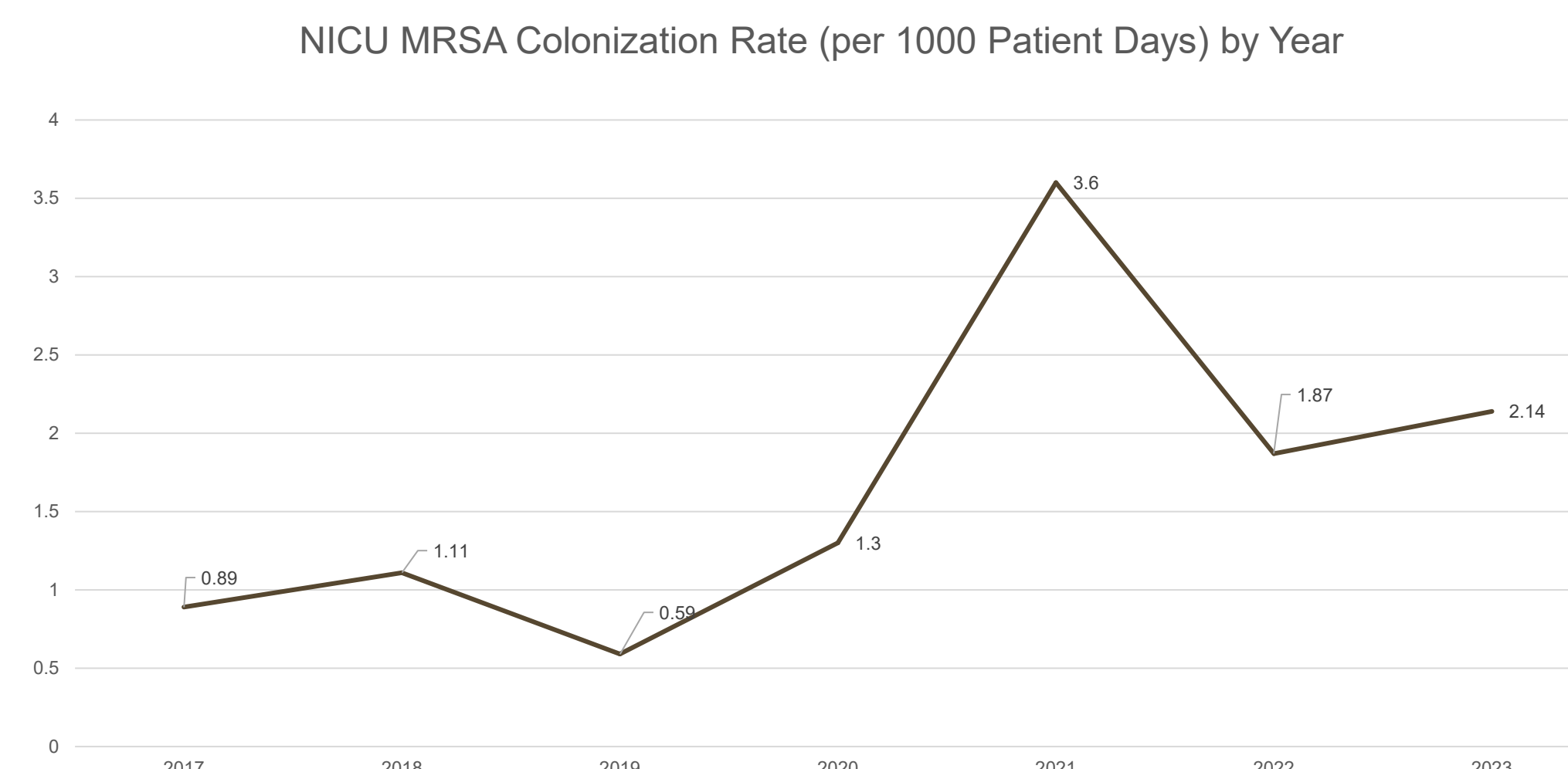
Introduction

MRSA colonization and infections in NICU are not new and continue to be a challenge for NICU staff to manage. It has been difficult to discern whether the MRSA originates from other family members and visitors or whether there is Healthcare Worker (HCW) transmission to the neonates. Since colonization almost always precedes infection, preventing colonization is essential to preventing serious MRSA infections.¹

Common misconceptions expressed by staff include “we are all colonized with MRSA” and “once you have MRSA, you cannot get rid of it”. There is also the persistent perception that any outbreak can be traced back to a “thing,” but the Epidemiologist knows to follow the nose. In the context of a 2-year-long MRSA outbreak, we had the opportunity to screen 175 NICU staff members for MRSA by nasal PCR. It was recognized from the outset that up to 15% of MRSA carriage is rectal/perirectal with negative nares, but it was felt that rectal colonization was less likely to lead to spread as good handwashing was observed and proper use of personal protective equipment (PPE). Obtaining staff compliance with this voluntary program would not likely be successful if rectal screening were performed.

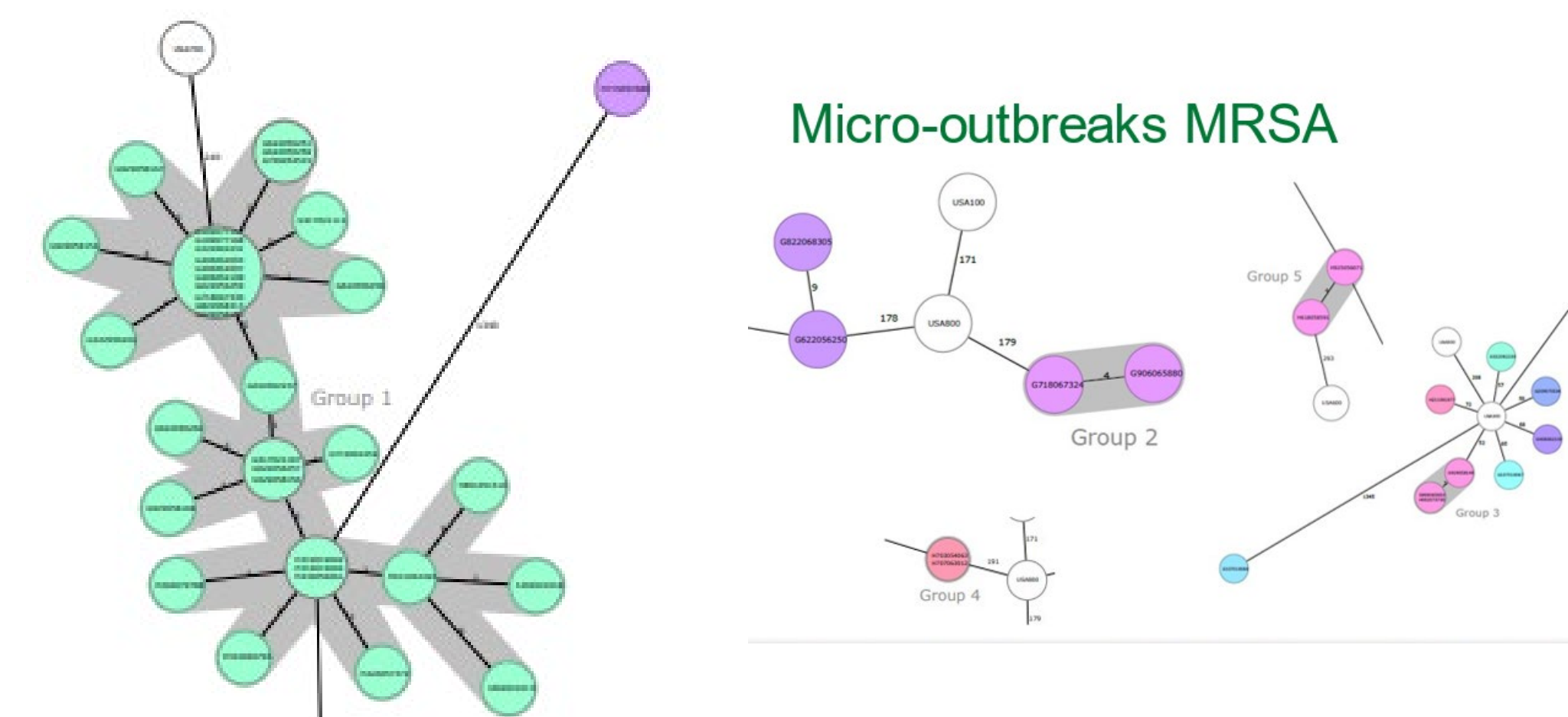
Methodology

After numerous interventions had been attempted without successful change in the epidemic curve, IP and NICU leadership concluded the next step would be screening staff for MRSA/MSSA carriage by PCR. No staff were known to be ill, infected, or colonized with MRSA per Employee Health Services (EHS). Critical decisions made by the steering committee included that staff would be notified of testing based on epidemiologic data that had been extensively obtained recognizing that our charting/tracking system would miss some HCW/patient interactions because staff “help out” or happen to be walking by a room and answer a call light. We included providers, nursing, physical therapists, respiratory therapy, sitters, and volunteers in our screening. Staff were notified by email to present to EHS on-site when they were free to get screened. The cost of screening was borne by the IP department. Results were called or emailed back to the employee/volunteer. NICU leaders did not get the results to maintain coworker confidentiality. Only EHS and IP had access to the name and result. Those found to be positive for MRSA were counseled by Infectious Diseases (Dr. Stienecker) and offered the decolonization regimen of either 10 days of trimethoprim-sulfa or doxycycline plus rifampin, chlorhexidine gluconate (CHG) soap to use daily, CHG mouthwash to use twice daily and a tube of mupirocin ointment to be used in the nose twice daily for 5 days and with all bowel movements around the rectum for 2-4 weeks. Positive HCWs were kept off work for 48 hours of initial therapy and then allowed to resume full duties. The time off was not counted as an occupational occurrence or pulled from personal time off (PTO). The HCW stopped by the pharmacy where they received the decolonization regimen at the hospital's expense (which was approximately \$125).



Discussion

Data about community colonization rates are difficult to discern because NICU families may originate outside of the general community that utilizes the hospital containing the Level 3 or Level 4 NICU, but available surrogate markers include the hospital antibiogram and screening of mothers and fathers of NICU babies. We have not had consistent screening of mothers or fathers for MRSA carriage but have trended our hospital antibiogram with a unique *Staphylococcal aureus* culture (excluding screening) rate of 38-46% MRSA. Compared to other hospital antibiograms of academic hospitals, a more typical rate is about 32% (personal communication/unpublished data). In examining the reasons for a suspected higher colonization rate of the general population, it was noticed that our provider culture does not use a decolonization regimen along with treatment and may provide an explanation as to why our community rate is higher. Published rates of MRSA community colonization are around 4-7%^{2,3} while Methicillin-sensitive *Staphylococcus aureus* (MSSA) is about 25%. In a study from Israel, the prevalence of MRSA in pregnant women at the time of delivery was 6% and maternal -to neonate transmission rate was 27.8%.⁴ Given the extensive epidemiologic investigation, a source from outside of the HCW pool was extremely unlikely. Given the time and space, only a human source fits the data. Much effort had been spent on interventions including Adenosine Triphosphate (ATP) testing, handwashing stations, and Ultraviolet (UV) light boxes for staff phones and devices. There were opportunities for patient care, policies, and equipment that were optimized during this period of scrutiny. The CDC Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: *Staphylococcus aureus* was closely scrutinized.⁵



Results

A total of six rings of coworkers were identified and sequentially tested. Testing consisted of a MRSA/MSSA (*Methicillin-sensitive Staphylococcus aureus*) polymerase chain reaction (PCR) followed by culture if MRSA positive. Of 175 employees tested, five were found to be positive. One of the staff matched the WGS epidemic strain. Three of the staff were not part of the cluster by whole genome sequencing (WGS). One employee's isolate failed to grow. 4 of the staff refused to test. All MRSA colonized employees were decolonized. Incidentally, 30 of the staff were noted to be colonized with MSSA but none were associated with any clustering. The NICU has been free of the epidemic strain for the past six months. 4 employees refused to be tested.

Conclusion

Only 2.9% of the HCW/volunteers that were epidemiologically associated with the colonized babies were found to be positive dispelling the notion that colonization is prevalent on a point-prevalence study. None of the babies found to be colonized developed an active infection. Although we clearly had one large cluster that was epidemiologically linked, we also had other small clusters of 1-3 cases of MRSA unrelated to the outbreak cluster that clearly demonstrates that the unit is constantly under threat from parents/visitors colonized with MRSA and pose a risk for another outbreak. Of the 5 HCWs found to be positive: 3 did not match the epidemic strain (or the micro-clusters), 1 did not grow and 1 was a match. All were decolonized and the epidemic stopped, but ongoing active surveillance is needed to prevent another outbreak from occurring. We could not establish whether the HCW found to have MRSA was the index source or simply became colonized by an infant that had become colonized by a family member/visitor.

References

- Zervou FN, Zacharioudakis IM, Ziakas PD, Mylonakis E. MRSA colonization and risk of infection in the neonatal and pediatric ICU: a meta-analysis. *Pediatrics*. 2014 Apr;133(4):e1015-23. doi: 10.1542/peds.2013-3413. Epub 2014 Mar 10.
- Batra R, Eziefule AC, Wyncoll D, Edgeworth J. Throat and rectal swabs may have an important role in MRSA screening of critically ill patients. *Intensive Care Med*. 2008 Sep;34(9):1703-6. doi: 10.1007/s00134-008-1153-1. Epub 2008 May 24. PMID: 18500421.
- Stein M, Dabaja-Younis H, Kassis I, Hussein K, Shachor-Meyouhas Y. Evaluation of Pediatric Screening for Resistant Pathogens in an Israeli Tertiary Center. *Isr Med Assoc J*. 2022 Dec;25(12):836-841. PMID: 36573780.
- Matok LA, Azrad M, Leshem T, Abuzahya A, Khamaisi T, Smolkin T, Peretz A. Mother-to-Neonate Transmission of Antibiotic-Resistant Bacteria: A Cross-Sectional Study. *Microorganisms*. 2021 Jun 8;9(6):1245. doi: 10.3390/microorganisms9061245. PMID: 34201210; PMCID: PMC8229721.
- Milstone AM, Elward A, Brady MT et al. Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: *Staphylococcus aureus* Sept 2020 <https://www.cdc.gov/infectioncontrol/guidelines/NICU-saureus>

Disclosure statement:
Dr. Stienecker, MD, FIDSA, FSHEA, CIC is a consultant for Medline Industries