Introduction

Recommendations for Prevention and Control of Infections in NICU Patients: *S. aureus* (2020)

AT A GLANCE

Introduction from the Recommendations for Prevention and Control of Infections in NICU Patients: *S. aureus* (2020) guideline.

ON THIS PAGE

Introduction

The first *Staphylococcus aureus* (*S. aureus*) outbreak in infants in hospital nurseries was reported in the literature in the late 1800s.[24] This organism is now the most commonly reported healthcare-associated infection (HAI) pathogen in United States neonatal intensive care units (NICUs).[25] Rates of invasive *S. aureus* infections are high in neonates, especially in preterm and low birthweight infants.[26] Methicillin-resistant *S. aureus* (MRSA) infections in the neonatal population have been described since the early 1980s,[27] and numerous outbreaks in NICUs have been reported.[6,28–39] Although outbreaks of *S. aureus* among patients, especially MRSA, pose significant challenges for NICUs,[40] *S. aureus* is endemic in the NICU as well,[21] giving rise to the need for prevention strategies in both outbreak and endemic settings. While MRSA has long been the focus of prevention efforts due to the difficulty in treating and eradicating it, recent studies have demonstrated that methicillin-sensitive *S. aureus* (MSSA) has morbidity and mortality equal to MRSA and occurs more frequently in NICU patients.[26,40]

When work on this Guideline effort began in 2009, the draft recommendations focused only on MRSA. At that time, the literature base for MSSA in NICUs was sparse and deemed insufficient to support a full literature review on the topic. Since then, studies have been published demonstrating the burden of MSSA disease and prevention in the NICU. While MRSA remains epidemiologically significant and a priority pathogen, MSSA infections far exceed MRSA infections in the NICU, so prevention strategies for *S. aureus* as a whole are needed.

Neonates who acquire *S. aureus* colonization are at increased risk of *S. aureus* infection.[21] The ultimate goal driving efforts to prevent and control *S. aureus* transmission in NICUs is the prevention of disease in vulnerable neonates. Any neonatal infection can be associated with long-term sequelae, including negative long-term neurocognitive outcomes and poor prognosis. In practice, NICU patients with MRSA, and in some cases MSSA, are decolonized with the intent of preventing progression to invasive diseases and limiting further transmission. Limited evidence about optimal decolonization regimens exists in this population, and new drugs and alternative therapies for decolonization are rarely studied in neonates and are unlikely to achieve approval for widespread implementation. Strategies to mitigate risk when colonization occurs are urgently needed, but in the meantime, efforts to prevent transmission and subsequent colonization should therefore be prioritized.

This document is based on current understanding of the transmission dynamics of *S. aureus* in the NICU setting.[41,42] New laboratory methods, including whole genome sequencing (WGS), suggest that related strains account for the largest proportion of transmission events in NICUs, presumably from patient-to-patient spread via indirect contact transmission, but multiple unrelated strains may be transmitted concurrently in parallel and new, unrelated strains are introduced frequently.[43–46] The reservoirs for new and existing strains are incompletely understood. Infection prevention measures targeting spread from healthcare personnel and the hospital environment — the focus of this document — may not be sufficient to prevent all transmission. Specifically, parents are a known reservoir from which neonates can acquire *S. aureus* colonization, and an intervention targeting parents may reduce transmission.[47] Further studies are needed to determine when strategies to interrupt transmission from parents, such as hand hygiene educational intervention or decolonization, can prevent neonatal *S. aureus* disease.

This document makes specific recommendations about interventions to be implemented when there is evidence of ongoing transmission of *S. aureus*, an increased incidence of *S. aureus* infection, or in an outbreak setting. However, no discrete benchmark or threshold for *S. aureus* or MRSA infection rates indicates when additional efforts are required. It is necessary for healthcare facilities to use their own data to determine

when to add interventions and where to target prevention efforts when infections are occurring. As part of a comprehensive infection prevention and control strategy, facilities can employ a quality improvement framework to maximize efficiency in reducing infections. Tools such as CDC's Targeted Assessment for Prevention (TAP) Strategy Toolkit[48] enable hospitals to target locations within facilities, assess gaps, and implement interventions to prevent and control *S. aureus*.

This Guideline was developed to provide evidence-based recommendations for the prevention of *S. aureus* in this vulnerable population. For important topics where evidence was insufficient to formulate evidence-based recommendations, companion guidance is available to inform the delivery of healthcare in NICUs: SHEA neonatal intensive care unit (NICU) white paper series: Practical approaches to *Staphylococcus aureus* disease prevention. Additionally, guidance is available elsewhere regarding the management of multidrug-resistant organisms (MDROs) in healthcare settings , including limiting MRSA outbreaks.[49]

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