



Breast Milk Pasteurization: A Strategy to Prevent Necrotizing Enterocolitis in Preterm Twin Infants

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DESCRIPTION

Necrotizing Enterocolitis (NEC) is a serious gastrointestinal disease that predominantly affects premature infants. It is characterized by inflammation and bacterial invasion of the bowel wall, leading to bowel necrosis. NEC is a leading cause of morbidity and mortality in Neonatal Intensive Care Units (NICUs) worldwide. While the etiology of NEC is multifactorial, involving a combination of immaturity of the gut, enteral feeding, and microbial dysbiosis, bacterial contaminated breast milk has emerged as a potential risk factor.

Understanding necrotizing enterocolitis

NEC typically presents within the first few weeks of life in premature infants, with symptoms including feeding intolerance, abdominal distension, bloody stools, and lethargy. The pathogenesis of NEC is complex and involves an interplay of several factors:

Prematurity: Preterm infants have underdeveloped intestines, which are more susceptible to injury and bacterial translocation.

Feeding: Enteral feeding, particularly formula feeding, is associated with an increased risk of NEC, whereas breast milk has a protective effect due to its immunological components.

Microbial dysbiosis: An imbalance in gut microbiota can contribute to the development of NEC, with pathogenic bacteria playing a critical role.

Bacterial contamination of breast milk

Breast milk is the optimal source of nutrition for infants, providing numerous immunological and developmental benefits. However, breast milk can occasionally be contaminated with pathogenic bacteria during expression, handling, or storage. Common contaminants include *Staphylococcus aureus*, *Escherichia coli*, and *Klebsiella* species. These bacteria can proliferate in

improperly stored milk, posing a risk to the vulnerable preterm infant.

NEC in preterm twins

Preterm twins are at a unique risk for NEC due to several factors.

Shared environment: Twins often share the same environmental exposures, including the same breast milk, which can increase the probability of both twins developing NEC if the milk is contaminated.

Genetic susceptibility: Twins, particularly identical ones, share genetic factors that might influence their susceptibility to NEC.

Similar immaturity: Both twins typically share the same degree of prematurity, making their gastrointestinal systems equally vulnerable.

Case studies and clinical observations

Several case studies and clinical observations have documented instances where bacterial contaminated breast milk was linked to NEC outbreaks in NICUs, particularly affecting preterm twins. These cases highlight the critical need for stringent hygiene practices in milk expression, handling, and storage.

For instance, a notable case involved preterm twins in a NICU where both infants developed NEC after being expressed breast milk from the same batch. Subsequent microbiological analysis revealed high counts of pathogenic bacteria in the milk. This prompted a review of the milk handling procedures, highlighting lapses in hygiene during expression and storage.

Preventive measures and best practices

To minimize the risk of bacterial contamination in breast milk and subsequent NEC in preterm infants, several preventive measures and best practices can be implemented.

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Hygiene practices: Mothers expressing milk should follow strict hand hygiene and use sterilized equipment. NICU staff should ensure that milk is handled and stored under aseptic conditions.

Milk screening: Regular microbiological screening of expressed breast milk can help detect contamination early. While routine screening is not standard practice in all NICUs, it can be beneficial in high-risk settings.

Proper storage: Breast milk should be stored at appropriate temperatures (4°C or lower for short-term storage, and -20°C or lower for long-term storage) to inhibit bacterial growth.

Pasteurization: In cases where contamination is suspected or confirmed, pasteurization of breast milk can be considered. While this process may reduce some of the beneficial immunological properties of the milk, it effectively eliminates bacterial pathogens.

Education and training: Educating mothers and NICU staff about the importance of hygiene in milk expression and handling is potential. Training programs can strengthen best practices and highlight the risks associated with contaminated milk.

Research and future directions

Further research is needed to better understand the relationship between bacterial contaminated breast milk and NEC. Large-

scale epidemiological studies can help identify the prevalence of contamination and its impact on NEC incidence. Additionally, exploring the microbiome of preterm infants and the role of specific bacterial strains in NEC can provide insights into preventive strategies.

Advancements in milk pasteurization techniques that preserve the immunological properties of breast milk while eliminating pathogens could provide a valuable tool in preventing NEC. Furthermore, the development of rapid, point-of-care microbiological screening methods for expressed breast milk could enhance safety in NICUs.

Necrotizing enterocolitis remains a significant challenge in the care of preterm infants, particularly twins who share similar vulnerabilities. While breast milk is the preferred source of nutrition, the risk of bacterial contamination and its potential link to NEC cannot be overlooked. Implementing strict hygiene practices, regular milk screening, proper storage protocols, and educating caregivers are essential steps in mitigating this risk. Through continued research and adherence to best practices, we can enhance the safety of breast milk feeding and improve outcomes for the most vulnerable neonatal populations