

# neonatal INTENSIVE CARE

Vol. 38 No. 2  
Spring 2025

The Journal of Perinatology-Neonatology





# Closing the Disparity Divide: The Role of Mobile Health (mHealth) in Equitable NICU Support for Families

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## Introduction

Premature birth remains a significant public health concern both globally and in the United States. As the leading cause of infant mortality and long-term morbidity, prematurity poses medical, emotional, and financial challenges for families and healthcare systems alike. Preterm infants face a heightened risk of complications and chronic health conditions that can persist into adulthood. Beyond these medical complexities, families navigating a Neonatal Intensive Care Unit (NICU) stay often experience profound emotional and psychosocial distress. Feelings of fear, anxiety, and uncertainty are common, exacerbated by prolonged hospitalizations and the challenges of caring for a medically fragile infant.

While prematurity affects families across all backgrounds, significant racial and ethnic disparities persist. Black families, in particular, face disproportionately higher rates of preterm birth compared to White and Hispanic families. These inequities not only contribute to unequal health outcomes, but also amplify the emotional burden on affected families, further deepening existing disparities in neonatal care and parental well-being.

This article will examine the inequities within the healthcare system, particularly in NICUs across the country, by exploring key facts, statistics, and previous research. It will also review a 2025 peer-reviewed study published in *The Journal of Pediatrics*, titled “An mHealth Intervention to Support Psychosocial Well-Being of Racially and Ethnically Diverse Families in the NICU.” The study, led by Dr. Craig Garfield, Professor of Pediatrics at Northwestern University and Clinical Advisor at AngelEye Health, examined the impact of a mobile health (mHealth) intervention on parental well-being across three urban NICUs. The results from the study demonstrated that this innovative intervention effectively reduced parental stress, particularly among parents with infants <32 weeks, while increasing social support, specifically among Black NICU families. The intervention has the potential to enhance

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“We know there are huge disparities in care in this country, and the perinatal period may be one of the most glaring examples. As a pediatrician, I recognize it all starts at the beginning...so finding ways to support parents as they transition into parenthood—especially with a fragile new baby—is the most efficient place to focus our resources across the lifespan.”

— Dr. Craig Garfield

outcomes for preterm infants by improving parental well-being and ensuring families feel more informed, engaged, and supported throughout their NICU journey.

Given the emotional toll and complexities of NICU care, additional support is essential to ensure families feel informed, confident, and engaged in their infant’s care. mHealth interventions offer a promising solution as a validated, effective, and scalable way to support parents in the NICU. NICU2Home, the mHealth intervention reviewed in this study, was designed to bridge gaps in parental support by providing accessible education, real-time updates, and emotional reassurance. Empowering parents with knowledge and confidence fosters engagement in their infant’s care and ensures a smoother transition from the NICU to home.

## Prematurity Rates and Racial Disparities

Although preterm birth rates fluctuate slightly each year, they continue to pose a significant public health challenge. In 2022, 10.4% of all US births were preterm.<sup>1</sup> However, significant racial disparities persist, with the preterm birth rate among Black women at 14.6%, compared to 9.4% for White women and 10.1% for Hispanic women.<sup>1</sup> These disparities highlight the urgent need for targeted interventions to address the root causes and improve outcomes for at-risk populations.

The underlying causes of these disparities are multifaceted and deeply systemic. Contributing factors include socioeconomic barriers, limited access to preconception care, short interpregnancy intervals, and persistent healthcare inequities.<sup>2</sup> Additionally, the cumulative effects of chronic stress, racism, and discrimination further elevate the risk of preterm birth.<sup>3,4</sup> These

interconnected challenges impact birth outcomes and contribute to long-term disparities in maternal and infant health, reinforcing the critical need for equitable, evidence-based healthcare solutions that address both medical and social determinants of health.

### **Long-Term Impacts of Prematurity: Health, Development, and Disparities**

Infants born preterm are at increased risk for both short- and long-term medical and developmental complications, including respiratory distress, neurodevelopmental delays, and heightened susceptibility to infections. While the NICU is critical for survival, it also exposes preterm infants to repetitive stressors such as painful procedures, therapeutic interventions, and overwhelming sensory experiences.<sup>5,6</sup> Research has linked these early stressors to adverse neurodevelopmental and behavioral outcomes, impacting language, motor function, and cognitive abilities into childhood.<sup>5-9</sup> Additionally, preterm birth has been associated with a higher risk of autism spectrum disorder (ASD) and emotional or behavioral challenges, many of which may not become evident until school age.<sup>9,10</sup>

Preterm birth remains the leading cause of infant mortality and morbidity.<sup>9</sup> Historically, Black preterm infants had lower neonatal mortality rates compared to White preterm infants.<sup>11,12,13</sup> However, more recent data indicate that this survival advantage diminished in the 1990s, with racial disparities in mortality beyond 33 weeks' gestation continuing to widen.<sup>11,14</sup> Additionally, Black preterm infants face higher rates of severe neonatal complications compared to White infants, including sepsis (13.6% vs. 9.1%), peri- or intraventricular hemorrhage (3.3% vs. 2.6%), intracranial hemorrhage (1.8% vs. 0.6%), and retinopathy of prematurity (2.6% vs. 1.0%). These disparities highlight the urgent need for equitable healthcare interventions to improve outcomes for at-risk populations.

These findings emphasize the urgent need to address the structural inequities contributing to these disparities. Efforts to understand, mitigate, and eliminate these healthcare gaps must remain a priority to improve outcomes for all preterm infants, particularly those from historically marginalized communities.

### **The Silent Struggle of Parents and the Urgent Need for Better Mental Health Support**

While the NICU is critical for the survival of preterm infants, it can be a highly stressful and emotionally overwhelming experience for parents. Studies indicate that 40-50% of NICU mothers experience postpartum depression (PPD), compared to approximately 10-15% of mothers with full-term, healthy infants worldwide.<sup>15,16,17</sup> Risk factors for prolonged depressive symptoms include earlier gestational age of the infant, low birth weight, lack of social support, and ongoing infant illness or disability.<sup>15,17</sup> Fathers are also at risk, with research showing higher rates of depression and PTSD among NICU fathers.<sup>15,18,19,20</sup>

Parental fear, lack of knowledge, altered roles, and diminished confidence can heighten distress both during hospitalization and after an infant's discharge from the NICU. This heightened stress not only affects parental mental health but it can also impede infant development. Studies show that parents experience the most significant stressors from the NICU experience due to the parent-infant separation, the inability to care for their infant, and the disrupted parent-infant bonding.<sup>21,22</sup> Parents struggle with being physically separated from their infants and their limited

parental role as healthcare workers care for their infants. These emotional strains can persist post-discharge, affecting parental well-being and the parent-child relationship if not addressed.

Risk factors thought to worsen parental stress and mental health include the transitions or periods with gaps in mental health support due to the lack of reassurance from medical professionals, managing multiple demands, and social disparities or parents of lower socioeconomic status with limited resources.<sup>23</sup>

However, studies have shown that early and active parental involvement can help mitigate some of these risks, emphasizing the critical need to empower parents through education, support, and equitable healthcare resources. Given the profound emotional toll of a NICU admission, finding ways to support and empower parents is essential. The research underscores that when families are actively engaged and supported, their confidence grows, and they become more effective advocates for their infants.

### **Impact of Parental Engagement, Support, and Confidence on Neonatal Outcomes**

The parent-infant relationship and attachment are vital in neonatal development and long-term outcomes. Research has shown that supporting parental involvement, fostering attachment, and empowering families can help mitigate the stressors associated with a NICU admission while reducing the risk of long-term emotional and developmental challenges.

To ensure families feel comfortable and confident in participating in their infant's care, it is necessary to promote their empowerment by establishing a therapeutic relationship with the healthcare team. With a trusted relationship in place, nurses can transition from being the primary caregivers to taking on the role of a coach, facilitator, and educator.<sup>24</sup> A strong therapeutic relationship is built on a foundation of support and compassion, empowering parents to confidently take on their role as primary caregivers and easing the transition home after discharge. Research demonstrates that when healthcare professionals encourage parental involvement, it strengthens parent-infant attachment, which is essential for the infant's physical, mental, emotional, and social development.<sup>25</sup> Open communication and transparency are key elements in fostering this trusted relationship, ensuring that parents feel informed, supported, and empowered in their role.<sup>24,26</sup>

By actively involving parents and providing them with psychological and educational support throughout the NICU journey, healthcare teams can help families develop the emotional resilience, cognitive understanding, and confidence needed to care for their infants.<sup>5</sup> Family-centered strategies that help parents navigate the challenges of the NICU while promoting trust have been linked to improvements in infant feeding, growth, parental well-being, and self-efficacy.<sup>5</sup> These factors, in turn, are essential mediators of long-term neurodevelopmental and behavioral outcomes.<sup>5</sup>

A study by Pierce (2023) identified two key protective factors that can help shield NICU parents from worsening mental health:

1. **Social support** – Support from family, friends, and the community was cited as the most important factor in reducing stress and improving coping ability.

2. **Support from the healthcare system** – Parents who felt supported and connected to their medical team reported greater optimism and engagement in their infant's care.

Additionally, robust support systems and accessible educational resources have been shown to improve parental self-efficacy and lead to better neonatal outcomes. Effective care coordination plays a pivotal role in enhancing the family experience and supporting the infant's developmental trajectory beyond the NICU.

### Barriers in NICU Care for Black Families

Research has identified significant disparities in the quality of care and support Black families receive in the NICU. Many Black parents report concerns regarding inadequate nursing support, a lack of compassionate and respectful communication, and less attentiveness to their infants' needs.<sup>4,27</sup> These challenges are not solely individual experiences, but are deeply rooted in systemic and structural inequities. Factors such as implicit biases, cultural insensitivity, and socioeconomic barriers further contribute to these disparities.

A recent study by Ondusko et al. (2025) revealed that Black families frequently experience differential treatment in the NICU, reinforcing mistrust in the medical system

and perpetuating structural racism. Parents expressed the need for greater transparency, advocacy, mental health support, and equitable access to resources to improve their NICU experience and ensure their voices are heard.<sup>28</sup> These findings align with previous research, which has shown that minority families

often face barriers to communication, limited involvement in care decisions, and a lack of respect from providers. While explicit discrimination is rare, disrespectful treatment and ineffective communication remain significant barriers to family engagement.<sup>29</sup>

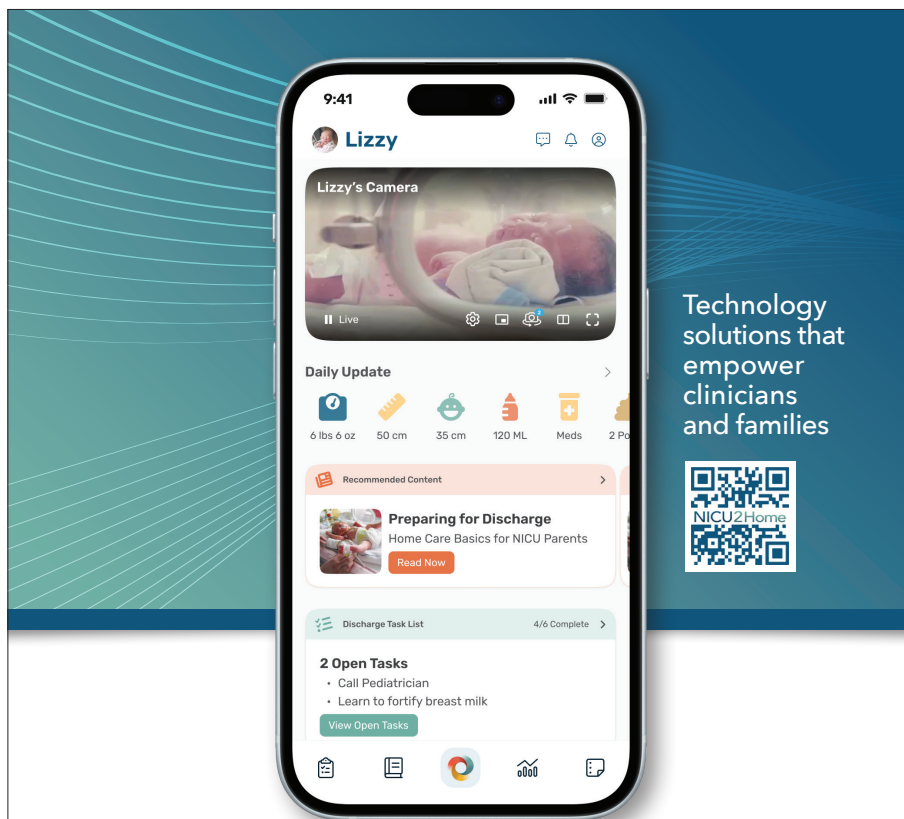
Beyond provider-family interactions, systemic inequities extend to the quality of NICU care. Black and Hispanic

infants are more likely to receive care in lower-quality NICUs, where resource limitations and structural challenges can affect outcomes.<sup>30,31</sup> Research has shown that very low birth weight (VLBW) infants born in NICUs with a higher proportion of minority patients are more likely to experience nurse understaffing, suboptimal practice environments, and reduced access to evidence-based neonatal care.<sup>30,32-34</sup> These disparities underscore the need for systemic reforms that prioritize equity in neonatal care delivery.

### Addressing Disparities Through Support and Communication

Closing these gaps requires a multifaceted approach that prioritizes equitable access to high-quality care, enhanced parental education, and robust support systems

throughout the NICU journey and beyond. To effectively address disparities, it is critical to evaluate both clinical care processes and relational aspects of care, such as nonjudgmental communication and meaningful parental engagement,<sup>30</sup> as well as consider new and innovative approaches.



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All families—especially those navigating the added burden of racial inequities—need comprehensive support that includes clear communication, transparent and relevant information, and a nurturing environment that empowers them to participate in their infant's care and advocacy. Identifying the most effective, accessible, and timely ways to provide this support in a culturally sensitive manner is essential to ensuring equitable neonatal care.

The disparities in neonatal care faced by Black families are not just a matter of statistics—they represent real, lived challenges that profoundly impact the well-being of both infants and parents. Addressing these inequities requires intentional, systemic strategies that prioritize trust, culturally responsive communication, and equitable access to high-quality care and family support services. Closing these gaps requires innovative solutions that enhance communication, support parental confidence, and provide equitable access to resources. One such solution is NICU2Home, a mobile health platform designed to empower NICU families with the information and support they need.

### Technology as a Tool for Parent Support

Mobile health (mHealth) interventions have emerged as promising tools to support parental engagement and bridge some gaps in communication, information sharing, and support for NICU parents. Providing parents with relevant information and education through technology about their infant's clinical condition and progress in the NICU empowers them to take an active role in their infant's care and actively participate in rounds as advocates for their infant. As a result, families are well-prepared to confidently care for their infant both in the NICU and, most importantly, at home after discharge.

NICU2Home is an example of an intervention that exemplifies a multi-faceted approach to supporting families in the NICU and beyond. Developed through collaboration among clinicians, families, and culturally diverse stakeholders, the solution provides accessible, scalable support tailored to meet the unique needs of diverse populations. With a focus on parental support, the features of this intervention are designed to empower and inform parents, fostering their engagement and building their confidence during their infant's NICU stay and transition home.

NICU2Home provides families with accessible, evidence-based education tailored to their infant's clinical journey, ensuring they feel informed and empowered throughout their NICU experience. The platform delivers daily updates on their infant's progress through electronic medical record integration, transparently displays who is caring for their infant, and fosters communication between families and the care team through the messaging feature. It also provides a clear, structured NICU roadmap that helps parents understand their infant's physiological milestones relative to discharge, along with a parent task list to keep them actively engaged and well-prepared for the transition home.

By addressing the social determinants of health (SDOH) and meeting families where they are—emotionally and logistically—the platform offers critical support inclusively and equitably. Additionally, with translation available in over 70 languages, NICU2Home ensures that all families, regardless of linguistic or cultural background, can fully engage in their infant's care.

### Study Conducted Across Three Urban NICUs Underscores Need for mHealth Solution to Address Disparities

A newly released study by Garfield et al. (2025) conducted across three different urban NICUs with a diverse sample of patients evaluated the effectiveness of NICU2Home among parents of preterm infants. The study revealed that parents using the solution experienced a significant reduction in stress and anxiety, especially those with infants born before 32 weeks gestation.<sup>35</sup> Notably, Black parents reported increased social support when engaging with NICU2Home, highlighting its potential to address disparities in parental support.<sup>35</sup> These outcomes underscore the solution's role in enhancing parental well-being and promoting equitable care experiences.

NICU2Home has demonstrated its potential to address gaps in equitable care by enhancing parental engagement, communication, and trust—key factors in mitigating disparities in NICU experiences. This recently published study, the third primary evaluation of NICU2Home, is the first to examine its impact on health equity in the NICU, following prior research on its role in improving parenting self-efficacy, discharge preparedness, and length of stay.<sup>36-37</sup>

A key finding was that Black families using NICU2Home reported higher levels of social support compared to those in the control group. The authors attribute this to the app's ability to provide timely, digestible education, daily clinical updates, and real-time transparency about who their infant's care team includes, fostering trust and inclusion.<sup>35</sup> To gain further insight into the latest study's key takeaways and broader implications, the lead author, Dr. Garfield, was consulted, and he noted:

***“Technology, done correctly, may offer unique opportunities to support families in the perinatal period, especially those families frequently marginalized.”***

Beyond its role in addressing disparities, NICU2Home helps alleviate NICU-related trauma and distress by creating a trusted companion for parents. The app was intentionally designed to balance the right amount of information—neither overwhelming nor insufficient—so that parents feel engaged, empowered, and included in their infant's care. Dr. Garfield emphasized:

***“...with NICU2Home, the information is reliable, vetted, and digestible with a user-friendly reading level. When the ‘right amount of information’ is provided, it minimizes already stressed parents from becoming too overwhelmed.”***

The study's findings highlight the critical role of trust, transparency, and inclusivity in neonatal care, reinforcing what research and this study has demonstrated—families need more support throughout their NICU journey, but the type of support required varies. As Dr. Garfield stated:

***“With my 25 years of experience working with NICU families, nearly all families could use more support during their NICU stay... and stress impacts parents differently, so some families do not trust or feel cared for in the healthcare system.”***

NICU2Home helps build confidence and trust among families, particularly those who may feel disconnected or underserved



in traditional healthcare settings, by providing consistent communication, clear information, and a structured approach to engaging in their infant's care.

### Building Confidence, Fostering Trust, and Improving Outcomes

The NICU experience is often marked by high stress, trauma, and uncertainty, leaving parents feeling overwhelmed and disconnected from their infant's care. NICU2Home helps bridge this gap by providing structure, clarity, and inclusivity, supporting parents and care teams. Through timely education, transparent updates, and a clear roadmap of clinical milestones, it guides parents from uncertainty to confidence, allowing them to engage with information at their own pace and actively participate in their infant's care.

For families who already feel marginalized in the healthcare system, NICU2Home fosters trust and inclusion by ensuring they are valued members of the care team. Real-time updates on their infant's condition and insight into their care team help break down barriers, strengthening communication and connection. By serving as a trusted companion throughout the NICU journey, NICU2Home empowers parents to feel seen, heard, and confident in caring for their infant and trusting their medical team.

While NICU2Home has demonstrated its ability to enhance parental confidence and improve outcomes, ensuring widespread access to these solutions requires a more significant commitment from healthcare institutions, policymakers, and payors. Sustainable change cannot rely on digital solutions alone—it must be part of a broader strategy that prioritizes early intervention, equitable policies, and systemic investments in family-centered care.

### Creating Meaningful Change: Partnerships and Systemic Investment

Reducing disparities in neonatal care begins with fostering strong, transparent partnerships between healthcare teams and families in the NICU. These collaborations empower parents, ensuring they feel informed and actively engaged in their infant's care. However, real and lasting change extends beyond hospital walls—it requires a broader commitment from policymakers, payors, and community organizations to implement sustainable, equitable solutions.

To effectively address the challenges preterm infants and their families face, healthcare institutions, policymakers, and payors must invest in proven, scalable interventions like NICU2Home that bridge critical gaps in communication, education, and emotional support. These initiatives reduce parental stress, improve infant outcomes, and foster a more connected and equitable care experience. As Dr. Garfield emphasized:

***“An investment in the early days will pay off mightily down the line in terms of infant outcomes, maternal and paternal outcomes, and ultimate healthcare expenditures.”***

Supporting NICU parents is not just a moral obligation but crucial to improving long-term health outcomes for infants and families. Research consistently demonstrates that when parents are informed, engaged, and supported, their

children benefit medically and developmentally. However, the responsibility of ensuring equitable care cannot rest solely on individual healthcare providers or parents—it demands systemic change.

By prioritizing early interventions, adopting equitable policies, and funding family-centered digital solutions, healthcare stakeholders can create a future where every NICU family—regardless of socioeconomic background—can access the resources and support they need. The question is no longer whether we should invest in supporting NICU families but how quickly we can mobilize to ensure no family is left behind. The time for action is now.

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oxide therapy.” Linde has made targeted enhancements to the delivery system’s functionality including a streamlined setup process, ergonomic refinements, precise controls, and further compatibility with various ventilators allowing for an enhanced user experience “We look forward to NOXBOX I PLUS’ 510(k) clearance, and we remain steadfast in our commitment to nitric oxide therapy and continuous improvement in our technology,” said Jason Aexel, Director of Clinical Healthcare, Linde Gas & Equipment Inc. Linde’s NOXIVENT (nitric oxide) gas, for inhalation is indicated to improve oxygenation and reduce the need for extracorporeal membrane oxygenation in term and near-term neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension in conjunction with ventilatory support and other appropriate agents. The NOxBOX i delivery system has been in commercial use in 40+ countries since 2013 and in the US since October 2018. Currently, in the US, the NOxBOX i delivery system is being used in hundreds of locations. Contraindication: NOXIVENT is contraindicated in neonates dependent on right-to-left shunting of blood. Rebound: Abrupt discontinuation of NOXIVENT may lead to worsening oxygenation and increasing pulmonary artery pressure The NOxBOX i delivery system and NOXIVENT (nitric oxide) gas, for inhalation must only be used in accordance with the indications, contraindications, warnings, precautions, and other information and conditions of use described in the nitric oxide drug prescribing information and labeling (currently neonates). Refer to this material before use. Important safety information and full prescribing information can be found at [www.noxiventus.com](http://www.noxiventus.com).

### **Groundbreaking Achievements Celebrated**

Etiometry, the leader in clinical decision support software for high-acuity units, celebrates a year of groundbreaking achievements in 2024 and shares its ambitious vision to transform critical care in the year ahead. In 2024, the company achieved significant milestones across scalability, innovation and clinical impact, thereby solidifying its role as an effective tool to drive better patient outcomes and improved economics within the most complex and expensive hospital units. “2024 was a transformative year for Etiometry, driven by significant growth and adoption of our platform across ICUs, innovation and measurable clinical impact,” said Shane Cooke, CEO of Etiometry. “The data our platform uses and provides enables hospital leaders to easily recognize the tangible ways Etiometry supports better outcomes and streamlined workflows—ultimately saving and improving lives.” Clinical data continued to highlight the platform’s impact, including a 36% reduction in ICU length of stay and a 41% decrease in readmissions in the ICU. Further evidence of the powerful impact of the Etiometry Platform was found at a new site that went live in November 2023 and in the ensuing year saw a 19.5% reduction in ICU length of stay as compared to prior to the deployment, along with an approximate 25% reduction in patient time on ventilation. Last year there were more than 2.5 million clinician interactions with Etiometry and logins into the platform reached 200,000—a 50% increase from 2023, reflecting its growing adoption by care teams seeking reliable tools to improve patient outcomes, support newer clinicians with data-driven communications and enhance workflows to help standardize care. Etiometry signed multiple enterprise agreements in 2024, extending its platform’s presence into more adult and pediatric ICUs, including prominent healthcare systems in the Midwest and Mountain

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