



Use of Technology in the NICU: Impact of Virtual Visitation on Parental Stress and Nursing  
Workload

Ashley N. Brantley

A DNP Project  
Submitted to the Faculty  
of California Baptist University  
in Partial Fulfillment of the Requirements  
for Degree of Doctor of Nursing Practice

California Baptist University  
Riverside, California  
December 11, 2022

**Table of Contents**

Dedication.....	4
Acknowledgements.....	5
Executive Summary.....	6
Problem Statement and Significance.....	6
Project Scope.....	9
Problem Statement.....	9
Environmental Context.....	10
SWOT Analysis.....	11
Faith Integration.....	12
Theoretical Framework.....	14
Literature Review.....	16
Project Objectives and Outcomes.....	19
Methods and Implementation.....	21
Finances and Resources.....	24
Results.....	25
Outcome Analysis.....	28
Implications for Practice.....	30
Recommendations.....	31
Conclusion.....	32
References.....	33
Appendix A .....	41
Appendix B.....	42

Appendix C.....	45
Appendix D.....	47
Appendix E.....	49
Appendix F.....	52
Appendix G.....	53
Appendix H.....	54
Appendix I.....	57
Appendix J.....	58
Appendix K.....	63
Appendix L.....	68
Appendix M.....	69
Appendix N.....	75

### **Dedication**

This scholarly project is dedicated to my two guardian angels, my mother, Cynthia Medlock, and my grandfather, Lafayette Medlock. During their lives, they faced many challenges but still worked hard and were determined to provide the best for their families. Their ability to make it through difficult times motivates and inspires me daily. Thank you both for giving me strength, unconditional love, and the confidence to triumph over all circumstances. Until we meet again, I love you.

### Acknowledgements

First and foremost, I would like to thank God because nothing in my life would be possible without Him. I would also like to acknowledge all the faculty and staff at California Baptist University (CBU), especially Dr. Karen Bradley. Thank you for being such a kind, funny, and understanding advisor. I appreciate your willingness to be flexible and accommodate my schedule. Also, thank you, Marilla Keck, for sending me reminder/check-in emails. You are indeed the "unsung hero" of the doctoral program.

I want to say a huge thank you to the staff and parents at Kaiser Sunset NICU for participating in the project. Additionally, thank you Zuzanna Kubicka, for allowing me to use data collection tools from her project, *"Use of an internet camera system in the neonatal intensive care unit: parental and nursing perspectives and its effects on stress."* Thank you to my editor, Katie Varela, statistician, Kirstie Eastwood, and special thanks to Dr. Helena Calloway, Dr. Ann Chu, and Dr. Ronda Sawyer for helping and encouraging me throughout the program. A special "shout-out" to my DNP "family": Edith, Anita, Angie, Lori, Isabel, Tara, Laura, and Jincy. By God's grace, we started this journey together, and I appreciate you all for your support and will miss our text thread. I may be biased, but I think we will always be the best doctoral cohort at CBU.

I want to acknowledge my family, who has always encouraged me to "reach for the stars." Your support and unwavering love during this time have been pivotal to my success. To Charles, thank you for being patient, calm, understanding, and quick to discourage me from engaging in "loser talk". thank you. Lastly, to my sister, Shannon, and my cousin-brother, Tyre, thank you both for being my "secret" editors and cheerleaders. You two are my best friends and I do not know what I would do without you. Love you both, so very much.

## **Executive Summary**

Approximately 10 to 15% of infants are admitted to the neonatal intensive care unit (NICU) immediately after birth to receive specialized care (Dunham & Marin, 2021). While some infants only require brief hospitalization, others may spend weeks and sometimes even months in the NICU. Prolonged NICU hospitalization separates parents and infants during a critical bonding period. Although parents strongly desire physical and emotional connections to their infants, hospitalization causes parents to feel guilt, shame, stress, and anxiety (Roque et al., 2017).

Kaiser Sunset NICU implemented a remote streaming system to allow parents to remain connected to their infants during hospitalization. Through virtual visitation, parents have unlimited remote access to infants, which decreases stress (Kubicka et al., 2021). Although virtual visitation in the NICU has positively impacted parents, neonatal nurses have expressed varied opinions about the technology due to the responsibility of managing the daily operations of the webcams while simultaneously providing nursing care (Joshi et al., 2016). As a result, this project aimed to evaluate the implementation of a remote streaming system on parental stress and nursing workflow.

## **Problem Statement and Significance**

### **Background and Significance**

In the United States, one out of every 10 births is preterm, and approximately 150,000 critically ill or premature infants per year are admitted to the NICU (Degnarain, 2020). Although the survival rates and outcomes of hospitalized infants have improved, the experience can be tumultuous and unpredictable, and could last for weeks and sometimes even months.

Consequently, parents of infants admitted to the NICU can experience extreme psychological distress.

### ***Definition of Parental Stress***

Following the birth of a critically ill or premature infant, parental experiences in the NICU are often characterized by psychological stress and anxiety. Approximately 28 to 40% of mothers of infants admitted to a NICU were diagnosed with depression and perinatal post-traumatic stress disorders (Roque et al., 2017). Fathers of infants requiring NICU hospitalization also reported significant stress and needed reassurance and support (Ionio et al., 2016). Factors associated with these emotions were unnatural physical separation, uncertainty surrounding the infant's health and prognosis, the foreign and highly acute NICU environment, loss of parental control and role confusion, and daily life stressors, such as obligations to work and family demands (Reimer et al., 2021).

### ***Causes of Parental Stress in the NICU***

A significant factor influencing parental stress in the NICU is the physical separation between parents and infants (Kirolos et al., 2020). Physical separation can lead to emotional detachment and alienation (Kilcullen et al., 2020). The lack of physical and emotional connection during NICU hospitalization inhibits normal parental-infant bonding and cognitive development because infant brain development is influenced by quality physical and emotional closeness immediately after birth (Dunham & Marin, 2020; Flacking et al., 2012). The COVID-19 pandemic exacerbated the physical separation between parents and infants due to increased restrictions imposed by infection control and social distancing protocols (Vance et al., 2021). These restrictions have been associated with parental emotional challenges, feelings of isolation, and decreased bonding (Muniraman et al., 2020). Additionally, these restrictions have tested

family-centered care policies and practices and have undoubtedly intensified parental stress in the NICU (Cena et al., 2021).

Although parental visitation is encouraged, some factors hinder physical visitation in the NICU. Barriers to parental visitation can be related to the unfamiliar, intimidating, and unfriendly intensive care environment (Lee et al., 2012). Other barriers are related to parental responsibilities outside of the hospital, such as returning to work, caring for other children and family members, physical health status, the distance and location of the NICU, and a lack of transportation or financial means to physically visit the NICU (Lewis et al., 2019).

Parents of infants in the NICU are also at an increased risk for experiencing higher stress levels if the infant is born severely unstable, critically ill, premature, or growth restricted (Petteys & Adoumie, 2018). Obeidat et al. (2019) noted that infants with complex medical conditions do not experience the same bonding as healthy infants. When birth occurs prematurely, or an infant is critically ill, the infant is whisked away from the parents to receive care, leading to a loss of closeness and physical contact during the first few hours after birth. This initial bonding period is essential because it introduces long-term parental-infant attachment (Medina et al., 2018). Suboptimal bonding causes hormonal, epigenetic, and neuronal development impairments in preterm infants (Kommers et al., 2016).

### ***Impact of Parental Stress***

Elevated stress levels have deleterious social consequences on NICU parents, as well. Compared to parents of healthy infants, parents of premature and sick infants are at an increased risk for divorce (Trause & Kramer, 1983). Carter et al. (2005) found that family conflict, depression, stress, anxiety, trauma, guilt, and financial problems contributed to parental stressors. Also, it is noted that parents of NICU infants with poor neurodevelopmental outcomes were 50%



more likely to undergo marital separation one year following the infant's birth (Nusinovici et al., 2017).

As a result of the previously listed risk factors, parental stress management in the NICU is extremely important since stress has been shown to negatively impact the health outcomes of infants both during and after NICU hospitalization. In addition, NICU hospitalization places infants at an increased risk for developmental and cognitive delays (Dunham & Marin, 2020). Because parental stress can worsen these risks (Greene et al., 2015), it is essential to find ways to support the emotional needs of parents during infant hospitalization.

### **Project Scope**

Telemedicine has been found to facilitate patient care delivery and improve access to care (Alvandi, 2017). Although relatively uncommon in the NICU, various telemedicine modalities have been proven beneficial in fostering family-centered care and enhancing bonding between parents and infants during hospitalization (Epstein et al., 2017). One such modality that can be utilized to achieve this desired outcome is the implementation of a remote streaming webcam to bridge the gap between parent-infant separation and subsequently decrease parental stress. Introducing video webcams into the NICU at Kaiser Los Angeles Medical Center (also known as Kaiser Sunset) aimed to understand the impact of remote streaming on parental stress. Because NICU nurses are the primary operators of the remote streaming webcams, the project also evaluated how the implementation of the technology impacted nursing practice outcomes in the NICU.

### **Problem Statement**

Parental contact with hospitalized infants is vital to decrease parental stress and enhance emotional stability, security, and confidence (Heidari et al., 2017). Identifying and implementing

interventions aimed at reducing parental stress and enhancing well-being is critical to improving neonatal health outcomes, quality of care, and parental involvement and engagement (Vance et al., 2021). The purpose of this project was to understand how the implementation of remote streaming webcams affected overall parental stress and nursing workflow in the NICU.

### **Environmental Context**

Kaiser Sunset NICU is a 33-bed regional tertiary care center that provides the highest level of care to infants with complex medical needs throughout Los Angeles County and neighboring cities in southern California. In 2021, according to the Kaiser Sunset NICU transport team, approximately 40% of hospitalized infants were transferred from other medical facilities throughout southern California. Based upon information provided by the Finance and Quality departments, the average length of stay in Kaiser Sunset NICU was slightly over 10 days, and 25% of hospitalized infants were very premature (less than 32 weeks) and had a birth weight of less than 1,500 grams.

Kaiser Sunset NICU accepts infants transferred from hospitals more than 30 miles away to receive specialized care. The Ronald McDonald House (RMH) program is available to help parents overcome distance and financial barriers to enhance their ability to be present and participate in caring for the hospitalized infant through the provision of subsidized housing near Kaiser Sunset NICU (Ronald McDonald House Charities of Southern California, n.d.). At Kaiser Sunset NICU, one of the responsibilities of the social worker is to refer parents who live at least 30 miles away from the hospital and whose infant has an expected length of stay in the NICU of at least seven days to the RMH program. Because neither the RMH program nor Kaiser Sunset provide childcare services, parents with other children may be unable to take advantage of the

program. It should be noted that the RMH program is shared with Children's Hospital, Los Angeles, and acceptance is based on availability.

Another challenge to parental visitation at Kaiser Sunset NICU was the implementation of visiting restrictions during the pandemic. As a preventative measure, limitations were placed on hospital visitors. Prior to the pandemic, the NICU welcomed parents, siblings, family members, and relatives 24 hours a day, seven days a week. However, beginning in March 2020, only parents were allowed to visit infants in the NICU. Furthermore, when a parent tested positive for COVID-19, visitation was not allowed for up to 10 days. Due to these limitations, it quickly became apparent that there was a need to provide parents with resources to improve emotional support through the enhancement of family-centered care practices when parents were unable to visit the NICU. The inability of parents to bond as a family unit during NICU hospitalization validates Cena et al.'s (2021) premise that this contributes to parental stress.

### **SWOT Analysis**

A SWOT analysis was conducted to determine the strengths, weaknesses, opportunities, and threats related to the implementation of video webcams in the NICU (see Appendix A). A primary strength of the project was that it was funded by the Southern California Kaiser Permanente health system as a part of a regional initiative aimed at enhancing aggregate care experience and family-centered care practices in the NICU. In 2020, video webcams were purchased for several Kaiser facilities, including Baldwin Park, Downey, Panorama City, and Kaiser Sunset. Thus, the project was well funded and financially supported regionally. Another strength of the project was that it was implemented during a time when there was a significant need to foster non-traditional means to facilitate bonding, parental-infant closeness, and family-

centered care when parents and families were physically unable to visit the NICU. Additional strengths, weaknesses, opportunities, and threats are shown in Appendix A.

### **Faith Integration**

The family is the masterpiece of God's creation, and, when God created humans, He designed individuals to live in families. The family is the focal point of God's plan for happiness and progress. God's love is manifested through the unconditional, unwavering devotion of families. God's expectation is that parents will provide children with love. Family relationships are extremely important to God, especially the parent-child relationship. God's adoration for infants and children is expressed in Psalm 127:3, which states, "Behold, children are a heritage from the Lord, the fruit of the womb is a reward" (New King James Version, 1982). Mark 10:13-17 describes how Jesus blesses little children. In verses 16 and 17, Jesus stated, "Verily I say unto you, whosoever shall not receive the kingdom of God as a little child, he shall not enter therein. And he took them up in his arms, put his hands upon them, and blessed them" (King James Version, 2022).

When looking at these scriptures, it is evident that God views all infants as valuable and precious gifts in need of parental love. Upon admission of their child to the NICU, parents struggle to demonstrate the natural love that God desires because of the unfamiliar and intimidating NICU environment. The early separation between parents and infants makes establishing a loving parent-infant connection challenging, since hospitalization often limits parental involvement and interaction. Additionally, parents can internalize and feel responsible for the infant's hospitalization, further intensifying feelings of parental stress and anxiety (Obeidat et al., 2009).

Implementing webcams in Kaiser Sunset NICU enabled parents and infants to experience love by enhancing and facilitating emotional connections during physical separation. Not only does this technology promote God's will for children to be loved, but it also provides opportunities for parent-infant engagement and interaction and facilitates bonding, which may result in decreased parental stress. *Webcams* are a mechanism that can bring physically distanced parents and hospitalized infants closer, thereby allowing parents to have a presence and role in the NICU, which contributes to a healthier transition home (Lakshmanan et al., 2019).

Compassion is a fundamental value of the nursing profession and a primary faith principle guiding the development of this project. Karam (2021) noted that nurses have been rated as the most trusted and honest profession for the last 19 years by the Gallup organization. Nurse-led interventions encompass the core components of patient care education, advocacy, guidance, and emotional support to family units during hospitalization (Kieft et al., 2014). Thus, nurses are considered instrumental in the creation of safer and healthier healing environments for parents and families. Altimier (2015) noted that compassion is a complex emotion that lies between empathy, understanding of the patients' and families' concerns, and sympathy, feeling the patients' and families' emotions, combined with the desire to alleviate distress experienced by patients and families.

The Bible contains many examples of characters who exhibited compassion and demonstrated God's heart and love toward others. For example, Paul encourages the Ephesians to "be kind and compassionate towards one another, forgiving one another, just as God forgave you" in Ephesians 4:32 (New International Version, 2011). 1 John 3:17 states, "If anyone has a material possession and sees a brother or sister in need but has no pity on them, how can the love of God be in them?" (New International Version, 2011). The most outstanding example of

compassion was demonstrated in the selfless sacrifice of Jesus and His death for the sins of mankind so that all can have eternal life. Titus 2:14 states, “He gave his life to free us from every kind of sin, to cleanse us and to make us his very own people, totally committed to doing good deeds” (King James Version, 2022).

The implementation of webcams in the NICU was a project that demonstrated compassion and aimed at mitigation of parental stress and suffering while supporting and promoting parent-infant attachment. Enabling parents to visualize hospitalized infants virtually resulted in the facilitation of emotional connection and engagement between parents and infants.

### **Theoretical Framework**

The Compassionate Family Care Framework (CFCF) by Leslie Altimier and Jean Watson’s Theory of Human Caring were the conceptual frameworks used to guide this project. The CFCF was developed in 2015 and is a contemporary model that assists healthcare providers in delivering compassionate, family-centered care, specifically to patients and families in the NICU. The CFCF describes the ABCs of compassionate care: (a) stands for affiliative relationships, (b) represents bi-directional communication, and (c) defines compassionate partnerships (Altimier, 2015). Altimier stated that affiliative relationships refer to the parent’s need for connection during infant hospitalization. Bi-directional communication is a transparent two-way dialogue between healthcare providers and parents. Lastly, compassionate partnerships are addressed by the letter (c). Compassionate partnerships enable the parent to participate as the primary decision-maker related to the infant’s care. Collaborative partnerships between healthcare providers and parents are said to address parental suffering through mutual decision-making and interventions that focus on developmentally supportive care (Altimier, 2015).

The CFCF framework or model supported the implementation of webcams because this intervention aims to support parents' emotional needs and improve parental well-being. Virtual visitation in the NICU established parent-infant connections (affiliative relationships), which alleviated parental stress and allowed parents to feel more included. Wigert et al. (2013) validated this when stating that increased parental involvement can initiate open and honest communication between parents and healthcare providers (bi-directional communication). This communication is essential in establishing collaborative partnerships between the NICU staff and parents. Ultimately, virtual visitation is a family-centered care practice that fosters a culture of collaboration and transparency and makes parents in the NICU feel valued (Umberger et al., 2018).

Jean Watson's theory of caring is another theoretical framework that supported the implementation of webcams in the Kaiser Sunset NICU. Watson's theory of caring was developed in 1997 and highlights the essential need for human-to-human interaction in nursing and proposes that nursing is a human science (Asadi et al., 2019). The theory further asserts that, if the nurse-patient relationship lacks caring, this will result in the patient feeling anger and despair and lead to a decreased sense of well-being (Pajnkihar et al., 2017). Watson's theory addresses 10 principles or *Caritas processes* in which human caring is at the center and designates the nurse as responsible for creating a caring human experience with the patient (Watson, 2006).

Parents are an integral part of the healthcare team in the NICU (Vance et al., 2021). It is hoped that cultivating an environment of care will benefit hospitalized infants, parents, and staff by enhancing each interaction and establishing a trusting nurse-patient relationship while promoting health and improving quality of care (Molina-Mula & Gallo-Estrada, 2020). Watson's

theory of caring supports the implementation of virtual visitation in the NICU since it addresses the nursing role in compassionately offering virtual visitation to support the parent-infant relationship. Nurses in the NICU are the primary clinicians accountable for the oversight, operation, and positioning of webcams, thus facilitating the parents' ability to view the infant when unable to be physically present. Therefore, virtual visitation has enhanced the nurse-parent relationship in the NICU.

### **Literature Review**

A literature search was conducted to better understand the impact of utilizing webcams in the NICU. Databases utilized for this search were the Cumulative Index to Nursing and Allied Health Literature (CINAHL), OneSearch, Google Scholar, and PubMed. The search terms used were video web cameras, webcams, virtual visitation, telemedicine, neonate, infant, child, newborn, baby, NICU, and neonatal intensive care unit. The literature review included studies performed in NICUs published between 1997 and 2021. Since webcam usage is a relatively new intervention in the NICU, there is limited information concerning its application and utilization. However, several research articles, primarily qualitative studies, discussed a variety of successful NICU telemedicine interventions aimed at decreasing parental stress, enhancing recovery for the infant and mother, and improving overall parental emotional well-being.

Of the databases searched, a total of 19 articles were reviewed, and it was found that most researchers utilized a qualitative research study design. Several articles utilized both qualitative and quantitative data, using questionnaires to evaluate parental outcome measures such as bonding, stress, and emotional well-being. Based on evidence from previous literature reviews and research studies, key themes that emerged were associated with the parental and professional nursing perspectives related to the implementation of telemedicine in the NICU.



### **Parental Perspectives**

Research has shown that, whether a NICU admission is anticipated or not, parents and families experience fear, uncertainty, anger, guilt, anxiety, stress, and depression (Dunham & Marin, 2020). Epstein et al. (2017) found that parents of infants admitted to the NICU describe the experience as stressful and overwhelming. According to data from a study by Malouf et al. (2021), 41.9% of parents experience anxiety, and 39.9% of parents experience post-traumatic stress for up to one month after an infant is hospitalized. Another study revealed that the undesirable emotions experienced by parents lasted long after hospitalization and negatively impacted infant development and parent-infant bonding (Nicol-Harper et al., 2007). While multiple factors contribute to parental stress in the NICU, according to Miles et al. (2007), stress is primarily attributed to the physical separation of parent and infant. As a result, there has been increasing recognition of a need to integrate alternative methods and innovations to foster contact between parents and infants in the NICU (Epstein et al., 2017).

The use of telemedicine has been shown to allow for better long-term care management, improved access to care, and increased patient satisfaction (Alvandi, 2017). Telemedicine has been instrumental in facilitating communication and interaction between key stakeholders in the NICU environment (Azzuqa et al., 2021). Although telemedicine is increasing in popularity, primarily due to visitation restrictions imposed by COVID, the use of technology to facilitate parental visitation is relatively new, especially in the NICU. From November 1997 through April 1999, a NICU in the United States implemented Baby Carelink, one of the first internet-based technology video conferencing systems. Using Baby Carelink technology, parents performed video visits and received discharge education and instructions through a text messaging feature. A total of 26 infants were enrolled in the study to evaluate the impact of the Baby Carelink

system. Gray et al. (2000) found that the Baby Carelink system improved family satisfaction by supporting families' emotional and educational needs. This study demonstrated that using technology in the NICU enhanced parents' feelings of emotional infant closeness and improved collaboration between parents and healthcare providers (Kirolos et al., 2020).

A study by Rhoads et al. (2015) evaluated parents' beliefs about implementing webcams in the NICU. Overall, parents perceived this technology as positive and felt that viewing their infant on the webcam decreased parental stress and anxiety. This study also noted that webcams gave family members, grandparents, and siblings the opportunity to "visit" the infant during hospitalization. Studies by Kerr et al. (2017) and Kirolos et al. (2020) noted that webcams facilitated family involvement and helped parents introduce extended family to hospitalized infants. Epstein et al. (2017) stated that parents found unrestricted family access to be a highly beneficial characteristic of webcams.

### **Professional Perspectives**

Professional perspectives are essential considerations when implementing new technology. Current data suggest that, while many nurses perceive webcams as positive and supportive intervention in the NICU, such use can cause parents increased anxiety and stress and impact nurses' workflow. Kubicka et al. (2021) conducted a quantitative study revealing that most staff nurses believed webcams gave parents and families in the NICU relief. However, it also left some parents feeling anxious and scared when the nursing staff turned off the webcam abruptly due to an adverse event.

A study by Kilcullen et al. (2020) noted that parents frequently misinterpreted the infant's and the nurse's actions on-screen. Joshi et al. (2016) conducted a study that looked at how virtual visitation impacted nursing workflow. Although nurses believed web cameras helped decrease

parental anxiety and establish better relationship with the staff, nurses reportedly were required to spend an additional 15 to 30 minutes manipulating the webcams. The study by Kubicka et al. (2021) revealed similar findings and suggested that the implementation of webcams resulted in increased stress to both nurses and parents.

The literature review suggests that parents and nurses generally believe that implementing webcams in the NICU is associated with lower parental stress levels. However, the evidence also suggests that the technology increases both parental and nursing stress and negatively impacts nursing workflow in the NICU. For virtual visitation in the NICU to be sustainable, involving frontline nursing staff in the implementation plan is critical to ensure success. As primary operators of the webcams, feedback from frontline nursing staff is vital. The striking differences between nurses' and parents' perceptions of webcams in the NICU present vivid challenges to implementing and accepting this technology. However, the overwhelmingly positive effects webcams have on parents in reducing stress suggest that webcams are proving to be a beneficial addition to the NICU environment and are a viable alternative to physical visitation.

### **Project Objectives and Outcomes**

Kaiser Sunset NICU is committed to helping parents remain connected to infants during hospitalization. This project sought to explore how the implementation of remote streaming webcams would impact parental stress and nursing workflow. The project's success was measured by short- and long-term objectives. The short-term goals of implementing webcams in the NICU focused on webcam installation, staff training, developing processes and a workflow for the new technology, participant recruitment, and survey completion and collection. Beginning in 2021, the short-term objectives of the project were as follows:

1. Collaborate with hospital information technology (IT) staff and the webcam manufacturer to install webcams in all bed spaces in Kaiser Sunset NICU by December 2021.
2. Partner with the webcam manufacturer to develop training for the remote streaming system in early February 2022.
3. Perform virtual nursing and clerical staff in-services and training sessions with the webcam manufacturer educator throughout March 2022.
4. Recruit at least 30 parents eligible to participate in the project and willing to provide feedback about parental perceptions of implementing and using video webcams in the NICU from May through June 2022.
5. Recruit at least 30 eligible nurses to participate in the project and willing to provide feedback about professional perceptions of implementing and using video webcams in the NICU from May through June 2022.
6. Evaluate the impact of webcams on parental stress in the NICU.
7. Assess the effectiveness of the webcams on the nurses' workflow in the NICU.

The long-term goals and outcomes of implementing video webcams in the NICU highlighted the benefits provided to both parents and infants. Long-term objectives focused on developing a foundation for the project to ensure and maintain sustainability. Long-term objectives included the following:

1. Decrease overall parental stress and anxiety experienced by parents in the NICU by ameliorating physical separation and enhancing bonding.
2. Increase parental access to the NICU by mitigating barriers to physical visitation and improving the parental care experience.
3. Improve the nurse-parent relationship in the NICU.

4. Enhance parent involvement and family-centered care practices in the NICU.

### **Methods and Implementation**

The primary purpose of this project was to evaluate how the implementation of remote streaming webcams would impact parental stress and the nursing workflow in the NICU. Prior to implementation, the project was submitted for review to the Institutional Review Boards (IRB) for the Southern California Kaiser Permanente Health System and California Baptist University. The project was determined to be a quality improvement initiative by both institutions.

Prior to webcam implementation, the project leader collaborated with the Kaiser Sunset IT staff, a clinical educator, and a technology specialist from the webcam system manufacturer. The project was implemented in three phases: pre-implementation, implementation, and evaluation.

#### **The Pre-Implementation Phase (February through April 2022)**

##### ***Policy Development, Informed Consent, and Other Forms***

Because the remote streaming webcam system is used in other Kaiser facilities, a regional policy (see Appendix B) and informed consent forms (see Appendix C) already developed were utilized for this project. The project leader developed an interest form (see Appendix D) and an information sheet (see Appendix E) depicting how the remote streaming webcam system functioned.

##### ***Webcam Configuration***

Prior to the implementation of webcams, IT specialists from Kaiser Sunset and the webcam manufacturer conferred to ensure that all webcams purchased could establish and maintain an internet connection while in use in the NICU.

A clinical educator from the webcam manufacturer presented general information about the webcam system during a staff meeting in February 2022. In May 2022, the NICU staff participated in a 30-minute training session during which a pre-recorded training video from the manufacturer was shown, and staff was given the opportunity to practice operating the webcams. The pre-recorded video link was distributed to all staff members and made available on the Kaiser Sunset NICU intranet site and YouTube.

### **The Implementation Phase (May through June 2022)**

#### ***Participant Recruitment***

The project leader recruited parents of infants already admitted to the NICU and new admissions with an anticipated length of stay of at least five days. Parents could speak and read English and had access to a device capable of live video streaming. Parents were required to provide feedback about the webcams through a questionnaire. Eligible parent participants received an interest sheet, an informed consent form, and an information sheet about the webcam system. Upon agreement to participate, parents signed a written consent and were given a unique username and password (see Appendix F) to log in to the assigned webcam for infant viewing. Parents could access the web camera system anytime except between 07:30 to 10:00 a.m. and 07:30 to 10:00 p.m. These “scheduled downtimes” were designated so nursing staff could perform shift handoff and first assessments without manipulating the webcam and to increase staff acceptance of the new technology. Infant participants were identified by yellow signage posted at the bedside (see Appendix G).

#### ***Data Collection Tools***

Parent and nurse participants completed surveys adapted from, “*Use of an internet camera system in the neonatal intensive care unit: Parental and nursing perspectives and its*

*effects on stress*” (Kubicka et al., 2021 (see Appendix H). The tools replicated for this project were validated, quantitative, de novo questionnaires that captured the parental and nursing perceptions of the remote streaming webcam system and its impact on parental stress and the nursing workflow. The project leader received approval from the author of the study, Zuzanna Kubicka, to utilize both questionnaires via email (see Appendix I).

Parents received a questionnaire (see Appendix J) 5 to 10 days after assignment and implementation of the infant to a webcam. On day 5, the project leader distributed a hard copy paper-and-pencil version of the questionnaire to parents at the bedside. The project leader reminded parents to complete the surveys either via a telephone call or in a face-to-face daily reminder during the 5-to-10-day designated time interval. Parents were instructed to submit the completed questionnaires in the project leader’s mailbox at the front desk.

Nursing participants completed one questionnaire (see Appendix K) about perceptions regarding the remote streaming system. The project leader emailed the 10-question survey to all nursing staff 15 to 30 days after the commencement of the project. The participating nurses also completed a demographic questionnaire. The project leader allowed the nursing staff to complete a hard copy of the questionnaire and provided in-person reminders to the nursing staff members to complete the survey. Survey completion was anonymous, and informed consent was implicated by completing the evaluation tool.

## **Finances and Resources**

### **Budget**

#### ***Expenditures***

Most expenses related to the project included start-up and ongoing costs. The initial start-up costs included purchasing the remote streaming system (webcams and mounting poles) and

internet software licenses for each webcam. Ongoing costs consisted of a recurring annual service agreement and staff training. Over a 2-day period, a hospital information technology specialist and the webcam manufacturer worked in tandem to configure and install the webcams in the NICU. At the time, a hospital information technologist in Los Angeles County earned \$34.00 per hour (ZipRecruiter, n.d.) thereby resulting in a cost of approximately \$544. The annual service agreement included the salary of the webcam manufacturer to configure and install the webcams.

### ***Staff Training***

The project leader and an educator from the webcam manufacturer conducted staff training. Included were 50 staff nurses, two ward clerks, two assistant managers, and one clinical nurse specialist. This education occurred during quarterly staff meetings and resulted in no need to pay for the hours staff spent completing training. For newly hired staff, this training was incorporated during the general orientation process. Registry and traveler staff could view the pre-recorded video by scanning a QR code on the webcam.

Minimal expenses were incurred to produce the participant information sheets, consent forms, and questionnaires. Incentives such as gasoline and fast-food gift cards were purchased for parents and nursing participants who completed the surveys. The expense worksheet (Appendix L) estimates the total cost of implementing this project.

### ***Return on Investment***

The financial impact of using a remote streaming system in the NICU can improve patient satisfaction by decreasing parental stress. The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) provides a nationally standardized survey that measures patient care experience and satisfaction from the patient's perspective (Centers for



Medicare and Medicaid Services, n.d.). HCAHPS scores are essential because of financial incentives and reimbursements. The patient's perception of the quality-of-care experience also translates into improved clinical outcomes and increased loyalty. Alternatively, a poor experience can lead to a patient avoiding a specific healthcare facility, which, if sustained over time, can result in a significant loss. Although patient satisfaction was not an outcome measured for this project, the remote streaming system could enhance the patient care experience by providing the parents with unlimited access to their infants in the NICU.

## **Results**

### **Parent Participants**

#### ***Demographic Characteristics***

A total of 31 parents, including 16 mothers and 15 fathers, were willing participants in the project. Parental demographic information was determined using descriptive statistical techniques, noting that most parent participants were married (71%) and between the ages of 24 to 35 (67.7%). Of the infants, 51.6% were born at more than 35 weeks gestational age at the time of the survey, and 41.9% of the infants were over 4 weeks old. Although 35.5% of parent participants lived 10 miles or less from the hospital, 25.8% of parent participants were noted to live more than 30 miles from the hospital. In addition, 74.2% of parent participants were Latino/Hispanic. It was noted that 48.4% of the parents had some form of a college education. See Appendix M for detailed information about parent participants' demographic characteristics.

#### ***Perceptions on Webcam Use and Effects***

Parent participants provided responses about perceptions of webcam usage and effectiveness in the NICU. Chi-square goodness-of-fit tests were conducted to determine whether

the responses to each question were equally distributed, indicating varying opinions (no consensus) among parents.

The chi-square goodness-of-fit tests indicated that a significant difference existed in the responses to several questions. All parents agreed that viewing infants on the webcam made them feel better and more hopeful. Most parents reported that viewing the webcams provided reassurance about nursing care and reported willingness to share access to the remote streaming system with family and friends. Additionally, almost all participating mothers agreed that the webcam enhanced breastmilk production. Regarding the functionality of the remote streaming system, most parents reported rarely or never experiencing technical difficulties, calling the NICU with a concern, question, or request to “fix” something, and denied becoming upset or angry with nursing care while accessing the remote streaming system. Slightly over half of the parent participants disagreed that viewing infants on the webcam created feelings of helplessness, and that the use of the webcams increased anxiety. All parent participants reported that webcams did not increase stress. Appendix M contains a complete and detailed summary of parental survey responses.

## **Nurse Participants**

### ***Demographic Characteristics***

A total of 33 nurses participated in the project. Demographic information regarding nurse participants was assessed using descriptive statistical techniques. 72.7% of nurses had more than 11 years of nursing experience, and 54.6% had worked at Kaiser Sunset NICU for more than 11 years. It was also seen that 72.7% had bachelor’s degrees, and 60.6% were over 40 years of age.

### ***Perceptions on Webcam Use and Effects***

Nursing participants responded to perceptions of webcam use and its effects in the NICU. Chi-square goodness-of-fit tests were conducted to determine whether the responses to each question were equally distributed, indicating varying opinions (no consensus) among nurses. Based on the responses, over half of the nursing participants (57.5%) reported that the remote streaming system increased stress for nurses, and 63.6% also noted that it increased the workload for nurses working in the NICU. Most nursing participants (66.7%) agreed that parental telephone calls into the NICU increased. However, nursing participants disagreed (75.7%) that parental visits increased when webcams were used.

Over half of the nursing participants reported experiencing technical and mechanical problems while operating the remote streaming system (60.7 and 60.6%, respectively), and most (72.7%) said parents often called with a concern, question, or request to fix something seen on the webcam. Additionally, over half of the nursing participants reported rarely experiencing a parent becoming upset or angry about nursing care while viewing the remote streaming system. Based on the nursing participants' responses, there was no statistically significant evidence indicating that webcams in the NICU improved the quality of care ( $p = 0.182$ ) or increased parental stress ( $p = 0.089$ ). All nursing participant responses are featured in Appendix N.

### **Outcome Analysis**

The project's primary objectives were to assess how the implementation of remote streaming webcams in the NICU impacted parental stress and nursing workflow. Overall, the project leader found that parent participants reported fewer negative emotions, such as helplessness, anxiety, and stress, while nursing staff reported several undesirable effects of remote streaming, such as increased stress and workload. Regardless of the results, the project

was successful since it provided the implementation and opportunities for evaluating new technology in the NICU.

Because the nursing staff and parents were highly engaged and willing to participate, it was easy to recruit participants for the project. However, motivating participants to evaluate the project by completing the questionnaires was challenging. As a result, the project leader had to give participants several verbal, written, and face-to-face reminders to ensure that the surveys were completed during the designated time intervals. Although some nursing and parent participants reported experiencing technical difficulties while using the remote streaming system, all webcams remained functional during the project and only required minor troubleshooting, such as turning the webcam off, then back on to restore functionality. During the project, none of the webcams became broken or lost or stopped working.

Despite successes, the project's implementation was delayed due to several unexpected challenges. Because the project was implemented during the height of the COVID-19 pandemic, when there was an increased census and large influx of patients, the IT staff was often deployed on special assignments to support other departments and areas of the hospital. Thus, the webcams were not configured and installed in the NICU until March 2022, although the initial goal had been December 2021. Nursing work stoppages, staff turnover (from both Kaiser Sunset and the webcam manufacturer), increased census, and staffing challenges throughout the medical center and in the NICU delayed staff training. Although these circumstances could not be mitigated, the project leader provided updates to the key stakeholders and established revised timelines for implementation.

Results indicated that the parents' perceptions of webcam use in the NICU increased hopefulness and decreased stress, anxiety, and helplessness ( $p < 0.001$ ). In contrast, nursing

perceptions of webcam use indicated increased stress ( $p = 0.043$ ) and workload ( $p = 0.13$ ) for NICU nurses. Although most of the nursing participants stated that parental phone calls increased while webcams were in use ( $p = 0.003$ ), most parent participants reported never or rarely calling the NICU with a concern, question, or request to “fix” something seen on the webcam ( $p < 0.001$ ). Another gap identified through data analysis was that most parent participants rarely or never experienced technical problems with the webcams ( $p = 0.006$ ). In contrast, most of the nursing participants often or sometimes experienced technical issues with the webcams ( $p = 0.001$ ).

Other notable results revealed that, although the nurses’ perceptions of webcam use improving quality of care in the NICU was not statistically significant ( $p = 0.182$ ), participants in the “mother” role reported that it helped them pump breastmilk ( $p < 0.001$ ). Additionally, most parents reported being happy to share webcam access with family members and friends ( $p < 0.001$ ) and that being able to see their infants on the webcams provided reassurance about nursing care.

Although there were circumstances resulting in delayed implementation and inconsistencies in the results, the overall project was deemed successful because a new technology was implemented in the Kaiser Sunset NICU. A plan exists to disseminate information about this project at the Academy of Neonatal Nursing Advanced Practice Neonatal Conference in March 2023. An abstract was submitted (pending acceptance) to present at the American Organization for Nurse Leaders national conference in May 2023. Lastly, outcomes from this project will be disseminated to other Kaiser NICUs during regional leadership meetings in 2023.

### **Implications for Practice**

This project demonstrated that parents' perceptions of remote streaming technology in the NICU were overwhelmingly positive. Based on feedback data, parents reported decreased stress, anxiety, and feelings of helplessness while using webcams to view infants remotely. Given the mother participants' data regarding pumping breast milk, the project can contribute to further research about the association between webcam usage and breastmilk production in mothers of hospitalized infants. Because parents reported a willingness to share webcam access with family members and friends, further opportunities exist to provide research about how webcam usage impacts family-centered care.

Overall, the nursing perceptions of remote streaming in the NICU were found to be negative. Although this perception highlights challenges with the implementation of new technology in nursing, an opportunity exists to improve staff training and education, so the integration of remote streaming in nursing practice in the NICU becomes a common family-centered care practice. Because parents reported feeling reassured about the nursing care their infants receive when watching the webcam, there is an opportunity to further explore whether remote streaming technology improves communication and trust between parents and healthcare professionals in the NICU.

### **Recommendations**

This project is sustainable because it was evidence-based and demonstrated positive effects on the parents of hospitalized infants. Kaiser Permanente is a healthcare system committed to providing the best possible member experience (Rivera, 2016). Remote streaming is aligned with Kaiser's vision because it is an innovative technology that improves the care

experience in the NICU environment. Because of this, webcam usage in the NICU will continue to be supported by local and regional leaders in the Kaiser system.

Continuous engagement from parents and nursing staff is critical to maintaining and sustaining remote streaming in the NICU. Parents and families should be encouraged to utilize webcams, and nursing staff should be motivated to provide objective feedback about webcam usage and how it impacts workflow. The NICU nursing leadership team's commitment to identifying and mitigating barriers to remote streaming is essential to enable the staff to perceive the technology as positive and beneficial. Future plans involve implementing a continuous evaluation process to assess outcomes and ensure the evolution of the remote streaming system in the NICU. Kilcullen et al. (2020) stated that collaboration with frontline nursing staff with daily, ongoing experiences using webcams in clinical practice is vital to finding practical solutions for implementing a remote streaming webcam system as a standard of care. Educational videos and information about the remote streaming system that is easily accessible and available for reference are also critical to improving utilization among parents and nurses. Lastly, support from hospital IT staff and webcam manufacturers also necessary to maintain sustainability.

### **Conclusion**

Technology is increasingly present in hospitals to improve patient safety and quality of care. Parents in the NICU experience high levels of stress due to a variety of reasons. However, parent-infant separation is a significant contributor to stress (Le Bris et al., 2020). The implementation of remote streaming systems in the NICU has been shown to provide parents with opportunities to "virtually visit" infants when unable to be physically present.

This project's intent was to evaluate how webcam usage in the NICU impacted parental stress and nursing workflow. Results indicated that webcams decreased parental stress and that parents were more accepting and positive about webcam usage, while nurses reported experiencing increased stress and workload. While parents and nurses expressed differing opinions about the use of the technology, both groups agreed that webcam usage decreased parental stress. Therefore, it is essential to provide psychosocial support to the parents of hospitalized infants. Remote streaming webcam systems may provide the highest level of patient- and family-centered care experience during a very stressful and emotionally challenging time in the Neonatal Intensive Care Unit.



### References

- Altimier, L. (2015). Compassionate family care framework: A new collaborative compassionate care model for NICU families and caregivers. *Newborn & Infant Nursing Reviews, 15*, 33-41. <https://dx.doi.org/j.nainr.2015.01.005>
- Alvandi, M. (2017). Telemedicine and its role in revolutionizing healthcare delivery. *The American Journal of Accountable Care, 5*(1), e1-e5.
- Asadi, N., Memarian, R., & Vanaki, Z. (2019). Motivation to care: A qualitative study on Iranian nurses. *Journal of Nursing Research, 27*(4), e34. <https://doi.org/10.1097/jnr.0000000000000294>
- Azzuqa, A., Makkar, A., & Machut, K. (2021). Use of telemedicine for subspecialty support in the NICU setting. *Seminars in Perinatology, 45*(5), 151425. <https://doi.org/10.1016/j.semperi.2021.151425>
- Carter, J. D., Mulder, R. T., Bartram, A. F., Darlow, B. A. (2005). Infants in a neonatal intensive care unit: Parental response. *Archive of Diseases in Childhood Fetal and Neonatal Edition, 90*(2), F109-13. <https://doi.org/10.1136/adc.2003.031641>
- Cena, L., Biban, P., Janos, J., Lavelli, M., Langfus, J., Tsai, A., Youngstrom, E. A., & Stefana, A. (2021). The collateral impact of the COVID-19 emergency on neonatal intensive care units and family-centered care: Challenges and opportunities. *Frontiers in Psychology, 24*, 12. <https://doi.org/10.3389/fpsyg.2021.630594>
- Centers for Medicare and Medicaid Services. (n.d.). *HCAHPS: Patient's perspectives of care survey*. <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalHCAHPS>

- Degnarain, N. (2020, Jun 13). *What it's like to have a child in the NICU during Covid-19*. Forbes. <https://www.forbes.com/sites/nishandegnarain/2020/06/13/whats-it-like-having-a-child-in-the-nicu-during-covid-19/?sh=811b7b96e9ea>
- Dunham, M. M., & Marin, T. (2020). NICU maternal-infant bonding: Virtual visitation as bonding enhancement tool. *The Journal of Perinatal & Neonatal Nursing*, *34*(2), 171-177. <https://doi.org/10.1097/JPN.0000000000000484>
- Epstein, E. G., Arechiga, J., Dancy, M., Simon, J., Wilson, D., & Alhusen, J. L. (2017). An integrative review of technology to support communication with parents in the NICU. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, *46*(3). <https://doi.org/10.1016/j.jogn.2016.11.019>
- Flacking, R., Lehtonen, L., Thomson, G., Axelin, A., Ahlqvist, S., Moran, V. H., Ewald, U., Dykes, F., & Separation and Closeness Experiences in the Neonatal Environment (SCENE) group. (2012). Closeness and separation in neonatal intensive care. *Acta Paediatrica*, *101*(10), 1032-1037. <https://doi.org/10.1111/j.16512227.2012.02787.x>
- Gray, J. E., Safran, C., Davis, R. B., Pompilio-Weitzner, G., Stewart, J. E., Zaccagnini, L., & Pursley, D. (2000). Baby CareLink: Using the internet and telemedicine to improve care for high-risk infants. *Pediatrics*, *106*(6), 1318-1324. <https://doi.org/10.1542/peds.106.6.1318>
- Greene, M. M., Rossman, B., Kousiki, P., Kratovil, A., Khan, S., & Meier, P. P. (2015). Maternal psychological distress and visitation to the neonatal intensive care unit. *Acta Paediatrica: Nurturing the Child*, *104*(7), e306-e313. <https://doi.org/10.1111/apa.12975>

- Heidari, H., Hasanpour, M., & Fooladi, M. (2017, March 1). Stress management among parents of neonates Hospitalized in NICU: A qualitative study. *Journal of Caring Science, 6*(1), 29-38. <https://doi.org/10.15171/jcs.2017.004>
- Ionio, C., Colombo, C., Brazzoduro, V., Mascheroni, E., Confalonieri, E., Castoldi, F., & Lista, G. (2016). Mothers and fathers in NICU: The impact of preterm birth on parental distress. *Europe's Journal of Psychology, 12*(4), 604. <https://doi.org/10.5964/ejop.v12i4.1093>
- Joshi, A., Po-Huang Chyou, Tirmizi, Z., & Gross, J. (2016). Web camera use in the neonatal intensive care unit: Impact on nursing workflow. *Clinical Medicine & Research, 14*(1), 1-6. <https://doi.org.libproxy.calbaptist.edu/10.3121/cm.2015.1286>
- Kaiser Permanente Los Angeles. (n.d.). *Los Angeles health care: Kaiser Permanente*. <https://thrive.kaiserpermanente.org/care-near-you/southern-california/los-angeles/>
- Karam, S. (2021, January 15). Nurses break record as most trusted profession for 19 years running. *ONS Voice*. <https://voice.ons.org/news-and-views/nurses-break-record-as-most-trusted-profession-for-19-years-running>
- Kieft, R., de Brouwer, B. B. J. B., Francke, A. L., & Delnoij, D. M. J. (2014). How nurses and their work environment affect patient experiences of the quality of care: A qualitative study. *BMC Health Services Research, 14*, 249. <https://doi.org/10.1186/1472-6963-14-249>
- Kerr, S., King, C., Hogg, R., McPherson, K., Hanley, J., Brierton, M., & Ainsworth, S. (2017). Transition to parenthood in the neonatal care unit: a qualitative study and conceptual model designed to illuminate parent and professional views of the impact of webcam technology. *Biomed Central Pediatrics, 17*(1), 158. <https://doi.org/10.1186/s12887-0170917-6>

- Kilcullen, M. L., Kandasamy, Y., Evans, M., Kanagasigam, Y., Atkinson, I., van der Valk, S., Vignarajan, J., & Baxter, M. (2020). Neonatal nurses' perceptions of using live streaming video cameras to view infants in a regional NICU. *Journal of Neonatal Nursing, 26*(4), 207-211. <https://doi.org/10.1016/j.jnn.2020.01.012>
- King James Version Bible. (2022). Christianbook.  
<https://www.christianbook.com/page/bibles/translations/kjv?navcat=Bibles|Translations>  
KJV
- Kirolos, S., Sutcliffe, L., Clausen, M.G., Abernethy, C., Shanmugalingam, S., Bauwens, N., Orme, J., Thomson, K., Grattan, R., & Patel, N., (2020). Asynchronous video messaging promotes family involvement and mitigates separation in neonatal care. *Archives of Diseases in Childhood Fetal Neonatal Edition, 106*(2), 172-177.  
<https://doi.org/10.1136/archdischild-2020-319353>
- Kommers, D., Oei, G., Chen, W., Feijs, L., & Bambang-Oetomo, S. (2016). Suboptimal bonding impairs hormonal, epigenetic and neuronal development in preterm infants, but these impairments can be reversed. *Acta Paediatrica, 105*(7), 738-51.  
<https://doi.org/10.1111/apa.13254>
- Kubicka, Z., Zahr, E., Clark, P., Williams, D. Berbert, L., & Arzuaga, B. (2021). Use of an internet camera system in the neonatal intensive care unit: parental and nursing perspectives and its effects on stress. *Journal of Perinatology, 41*, 2048-2056.  
<https://doi.org/10.1038/s41372-021-00934-w>

- Lakshmanan, A., Kubicek, K., Williams, R., Robles, M., Vanderbilt, D. L., Mirzaian, C. B., Friedlich, P. S., & Kipke, M. (2019). Viewpoints from families for improving transition from NICU-to-home for infants with medical complexity at a safety net hospital: A qualitative study. *BMC Pediatrics*, *19*, 223. <https://doi.org/10.1186/s12887-019-1604-6>
- Lee, H. C., Martin-Anderson, S., & Dudley, R. A. (2012). Clinician perspectives on barriers to and opportunities for skin-to-skin contact for premature infants in neonatal intensive care units. *Breastfeed Medicine*, *7*(2), 79-84. <https://doi.org/10.1089/bfm.2011.0004>
- Lewis, T. P., Andrews, K. G., Shenberger, E., Betancourt, T. S., Gunther, F., Sunita, P., & McConnell, M. (2019). Caregiving can be costly: A qualitative study of barriers and facilitators to conducting kangaroo mother care in a US tertiary hospital neonatal intensive care unit. *BMC Pregnancy Childbirth*, *19*, 227. <https://doi.org/10.1186/s12884019-2363-y>
- Le Bris, A., Mazille-Orfanos, N., Simonot, P., Luherne, M., Flamant, C., Gascoin, G., ÓLaighin, G., Harte, R., & Pladys, P. (2020) Parents' and healthcare professionals' perceptions of the use of live video recording in neonatal units: a focus group study. *BMC Pediatrics*, *20*, 143. <https://doi.org/10.1186/s12887-020-02041-9>
- Malouf, R., Harrison, S., Burton, H. A. L., Gale, C., Stein, A., Franck, L. S., & Alderdice, F. (2021). Prevalence of anxiety and post-traumatic stress (PTS) among the parents of babies admitted to neonatal units: A systematic review and meta-analysis. *EClinical Medicine*, *21*, 43. <https://doi.org/10.1016/j.eclinm.2021>

- Medina, I. M. F., Granero-Molina, J., Fernández-Sola, C., Hernández-Padilla, J. M., Ávila, M. C., & Rodríguez, M. D. M. L. (2018). Bonding in neonatal intensive care units: Experiences of extremely preterm infants' mothers. *Women and Birth, 31*(4), 325-330. <https://doi.org/10.1016/j.wombi.2017.11.008>
- Miles, M. S., Holditch-Davis, D., Schwartz, T. A., & Scher, M. (2007). Depressive symptoms in mothers of prematurely born infants. *Journal of Developmental and Behavioral Pediatrics, 28*(1), 36-44. <https://doi.org/10.1097/01.DBP.0000257517.52459.7a>
- Molina-Mula, J., & Gallo-Estrada, J. (2020). Impact of nurse-patient relationship on quality of care and patient autonomy in decision-making. *International Journal of Environmental Research and Public Health, 17*(3), 835. <https://doi.org/10.3390/ijerph17030835>
- Muniraman, H., Ali, M., Cawley, P., Hillyer, J., Heathcote, A., Ponnusamy, V., Coleman, Z., Hammonds, K., Raiyani, C., Gait-Carr, E., Myers, S., Hunt, K., Govande, V., Jain, A., & Clarke, P., Clark, R., Doherty, C., Raju, V., & Clarke, P. (2020). Parental perceptions of the impact of neonatal unit visitation policies during COVID-19 pandemic. *BMJ Paediatrics Open, 4*(1), e000899. <https://doi.org/10.1136/bmjpo-2020-000899>.
- Nicol-Harper, R., Harvey, A. G., & Stein, A. (2007). Interactions between mothers and infants: Impact of maternal anxiety. *Infant Behavior and Development, 30*(1), 161-167. <https://doi.org/10.1016/j.infbeh.2006.08.005>
- Obeidat, H. M., Bond, E. A., & Callister, L. C. (2009). The parental experience of having an infant in the newborn intensive care unit. *Journal of Perinatal Education, 18*(3), 23-29. <https://doi.org/10.1624/105812409X461199>

Pajnikihar, M., Štiglic, G., & Vrbnjak, D. (2017). The concept of Watson's carative factors in nursing and their (dis)harmony with patient satisfaction. *PeerJ*, 5, e2940.

<https://doi.org/10.7717/peerj.2940>

Petteys, A. R., & Adoumie, D. (2018). Mindfulness-based neurodevelopmental care: Impact on NICU parent stress and infant length of stay; A randomized controlled pilot study.

*Advances in Neonatal Care*, 8(2), e12-e22.

<https://doi.org/10.1097/ANC.000000000000047>

Nusinovici, S., Olliac, B., Flamant, C., Müller, J.B., Olivier, M., Rouger, V., Gascoin, G.,

Basset, H., Bouvard, C., Rozé, J. C., Hanf, M. (2017, November 16). Impact of preterm birth on parental separation: a French population-based longitudinal study. *BMJ Open*,

7(11), e017845. <https://doi.org/10.1136/bmjopen-2017-017845>

Reimer, A., Mause, L., Hoffman, J., Mantel, P., Stumpel, J., Dresbach, T., & Scholten, N.

(2021). Webcam use in German neonatological units: An interview study on parental expectations and experiences. *BMC Health Services Research*, 21(970).

<https://doi.org/10.1186/s12913-021-06901-7>

Rhoads, S. J., Green, A., Gauss, H. C., Mitchell, A., Pate, B., & Dowling, D. (2015). Web

camera use of mothers and fathers when viewing their hospitalized infant. *Advances in*

*Neonatal Care*, 15(6), 440-446. <https://doi.org/10.1097/ANC.0000000000000235>

Rivera, M. L. (2016). Chapter 2 leadership: Care experience. *KFH/HP Nursing Report*.

<https://lookinside.kaiserpermanente.org/wp-content/uploads/2017/02/Nursing-Report-2016-Leadership.pdf>

Ronald McDonald House Charities of Southern California. (n.d.) *About the house: Los Angeles*

*Ronald McDonald House*. <https://rmhsc.org/losangeles/about>

- Roque, A. T. F., Lasiuk, G. C., Radünz, V., & Hegadoren, K. (2017). Scoping review of the mental health of parents of infants in the NICU. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 46(4), 576-587. <https://doi.org/10.1016/j.jogn.2017.02.005>
- Trause, M. A., & Kramer, L. I. (1983). The effects of premature birth on parents and their relationship. *Developmental Medicine & Child Neurology*, 25(4), 459-465. <https://doi.org/10.1111/j.1469-8749.1983.tb13790.x>
- Umberger, E., Canvasser, J., & Hall, S. L. (2018). Enhancing NICU parent engagement and empowerment. *Seminars in Pediatric Surgery*, 27(1), 19-24. <https://doi.org/10.1053/j.sempedsurg.2017.11.004>
- Vance, A. J., Malin, K. J., Miller, J., Shuman, C. J., Moore, T. A., & Benjamin, A. (2021). Parents' pandemic NICU experience in the United States: A qualitative study. *BMC Pediatrics*, 21(1), 558. <https://doi.org/10.1186/s12887-021-03028-w>
- Watson, J. (2006). Caring theory as an ethical guide to administrative and clinical practices. *Nursing Administration Quarterly*, 30(1), 48-55. <https://doi.org/10.1097/00006216-200601000-00008>
- Wigert, H., Dellenmark, M. B., & Bry, K. (2013). Strengths and weaknesses of parent-staff communication in the NICU: A survey assessment. *BMC Pediatrics*, 13(71). <https://doi.org/10.1186/1471-2431-13-71>
- Yeo, C., Ho, S. K., Khong, K., & Lau, Y. (2011). Virtual visitation in the neonatal intensive care: Parental experience with the use of internet and telemedicine in a tertiary neonatal unit. *The Permanente Journal*, 15(3), 32-36. <https://doi.org/10.7812/tpp/11-063>
- ZipRecruiter. (n.d.). *Healthcare salary (\$63,000 - October 2022)*. <https://www.ziprecruiter.com/Salaries/Healthcare-Salary>



**APPENDIX A**  
**SWOT ANALYSIS**

<p style="text-align: center;"><b>Strengths (+)</b></p> <ul style="list-style-type: none"> <li>• Remote streaming webcams were purchased as a regional initiative</li> <li>• Webcams provide an alternative method to physical visitation</li> <li>• Significant demand for remote streaming services</li> </ul>	<p style="text-align: center;"><b>Weaknesses (-)</b></p> <ul style="list-style-type: none"> <li>• Insufficient webcams were available for each hospitalized infant</li> <li>• Reassignment of information technology (IT) staff occurred to support operational needs</li> </ul>
<p style="text-align: center;"><b>Opportunities (+)</b></p> <ul style="list-style-type: none"> <li>• Implementation of a new technology</li> <li>• Provide an alternative method of visitation for parents</li> <li>• Engage and empower parents</li> <li>• Enhance family-centered care and overall care experience</li> <li>• Reduce parental stress</li> </ul>	<p style="text-align: center;"><b>Threats (-)</b></p> <ul style="list-style-type: none"> <li>• Limited evidence and guidelines existed regarding best practices for the implementation of webcams</li> <li>• Staff resistance to implementing new technology</li> <li>• Inconsistent and unreliable wireless connection in the NICU</li> <li>• Limited availability of IT caused delays in webcam configuration and setup</li> </ul>

**APPENDIX B**  
**REMOTE STREAMING CAMERA SYSTEM POLICY**



**KAISER PERMANENTE**  
**Los Angeles Medical Center Policies and Procedures**

Location: <b>NEONATAL INTENSIVE CARE UNIT (NICU)</b>	Old Policy Number:	On-Line Policy Number: <b>7023</b>
Section: <b>EQUIPMENT</b>	Effective Date: <b>06/22</b>	Page: <b>1 of 3</b>
Title: <b>NICVIEW® Camera System</b>	Review / Revise Date:	
Approved by: <b>NURSING POLICIES &amp; STANDARDS COUNCIL – 06/22</b> <b>MEDICAL REVIEWER – ARASH MOGHIMI, MD</b>	<input type="checkbox"/> Medical Center Wide <input checked="" type="checkbox"/> Department Specific <input type="checkbox"/> Ambulatory <input type="checkbox"/> Hospital	<input checked="" type="checkbox"/> Non-Clinical <input type="checkbox"/> Clinical
Owner/Responsible Party: <b>NEONATAL INTENSIVE CARE UNIT - CNS</b>		

**Workplace Safety Key Points (WSKP) are included in this document for your protection.**

1. Always use Standard Precautions including Personal Protective Equipment (PPE) when handling any blood/body fluid, liquids, and chemicals (e.g. disinfectant) or when handling spills.
2. Handwashing is the single most effective means of controlling the spread of infection; remember to always **WASH YOUR HANDS.**
3. Use proper body mechanics and equipment during patient transfer and/or repositioning. When lifting, bend at the hips and/or knees and keep your back straight. Ensure your work area is ergonomically correct.
4. Dispose of Sharps according to policy and procedure. **NO NEEDLE RECAPPING**

**PURPOSE:**

- To provide a process and procedures for the use of online streaming video to enhance Patient and Family Centered Care in the NICU.

**SCOPE:**

- This policy applies to all employees who are employed by any of the following entities: Kaiser Foundation Health Plan, Inc. and Kaiser Foundation Hospitals (together, KFHP/H), KFHP/H's subsidiaries; Southern California Permanente Medical Group (SCPMG).
- This policy is applicable to infants in the Neonatal Intensive Care Unit (NICU) who meet eligibility criteria defined in this Policy.

**DEFINITION:**

- NICVIEW® is a HIPAA compliant, SSL encrypted, one-way, non-recording live streaming camera system that enables families and their support system to view their infant when they are unable to be at the bedside

**POLICY:**

1. Infants admitted to the Neonatal Intensive Care Unit (NICU) will have the NICVIEW® Camera System available for parents/legal guardian to view their infant.
  - a. Participation in the program may be limited due to the number of cameras that are available for use and the stability of the infant.
2. Informational/instructional materials will be provided to parents/legal guardian upon admission. Parent/legal guardian is given the choice to participate. Parent/legal guardian has the right to decline this service.

### Los Angeles Medical Center Policies and Procedures

Location: <b>NEONATAL INTENSIVE CARE UNIT (NICU)</b>	Policy #: <b>7023</b>	Effective Date:	Page: <b>2 of 3</b>
---	--------------------------	-----------------	------------------------

3. The Registered Nurse (RN) or Ward Clerk (WC) will explain the benefits of NICVIEW® to parents/legal guardian and how the system will work for them or any family members to whom access is provided. The written consent form (see *Attachment A - NICVIEW® Written Consent to Transmit Video Images*) and parent information sheet will be reviewed during parent admission orientation.
  - a. If a parent agrees to participate after reviewing the consent form:
    - 1) Obtain written consent and place in paper chart. (Appendix 1 Written NICVIEW® Consent to Transmit Video Images) or electronic consent (e-consent) into the electronic medical record (EMR).
    - 2) Upon logging in, the parent/legal guardian, will be required to once again consent to the terms of NICVIEW® live stream viewing by checking the agreement box.
    - 3) The NICVIEW® signed paper consent will be placed in the paper chart and scanned into the EMR after discharge. No additional scanning will be necessary for the e-consent.
4. Authorized parents/legal guardian have access only to their infant's bed.
5. NICVIEW® is only available in the NICU and will be the only unit to issue usernames and passwords.
6. Parent/legal guardian user ID and passwords will be randomly generated and issued by the NICVIEW® system. They will not be kept in the NICU.
  - a. If parents/legal guardian are not able to recall their user ID and password it can be reprinted from NICVIEW® upon proper verification of patient medical record number and patient location.
  - b. If at any time their user ID and passwords is compromised, new user credentials will be assigned by the NICVIEW® system and the lost user ID will no longer be valid.
7. The nursing staff and medical team (including neonatology, respiratory therapy, radiology, and any other department with staff that interact with the baby) have the right to determine when NICVIEW® may be turned to PRIVACY MODE which includes, but not limited to, periods of hands-on care, clinical/medical procedures, and/or technical issues

#### PROCEDURE:

1. Prior to making an account for each patient in the NICVIEW® website:
  - a. The RN will ensure the consent is signed and, in the paper or electronic medical record.
  - b. The designated staff or WC will enroll the patient in NICVIEW® and ensure that the patient is assigned to the camera corresponding to the correct bed space.
2. An actively streaming camera will be indicated by a visible image on the camera screen.
3. People icons visible on the observer screen indicate that a person (or the number of persons) are logged onto the streaming video.
4. Verification of the presence of the camera is noted during the warm handoff at the change of shift by the oncoming and off going RN's and during daily rounds.
5. Cameras are cleaned by the RN with hospital approved disinfectant wipes during the surface wipe down before shift start and as needed.
6. When the infant is in an open crib, the camera should never be placed directly over the infant.
7. NICU Charge RN's, NICU RN's, Educator, Clinical Nurse Specialist (CNS), WC and Nursing Leaders are given usernames and passwords to log into the NICVIEW® online program.
8. Assigning Camera and Generating an Access Code:
  - a. Login as a Staff Member on any NICU computer.
  - b. Ensure that camera is present at the bedside, positioned in place on a stationary IV pole/arm attached to the bed, and the cable plugged in using the nearest pre-designated port.
  - c. Cameras will be named by the patient's last name and equipment identification number (EIN).
  - d. To Assign a Camera
    - 1) Select camera.

### Los Angeles Medical Center Policies and Procedures

Location: <b>NEONATAL INTENSIVE CARE UNIT (NICU)</b>	Policy #: <b>7023</b>	Effective Date:	Page: <b>3 of 3</b>
---	--------------------------	-----------------	------------------------

- 2) Click "ASSIGN" next to the appropriate camera number, type location. Note this page gives the full credential details (parent username and password) for that camera. The username and password are married. This page can be printed or emailed directly to the parent(s).
    - a). A two-person verification of patient name, email and bed-space will be performed by RN, CNS and/or WC.
  - 3) Enter the verified email address and/or Click "PRINT FOR PARENT"
  - 4) Click "ASSIGN CAMERA"
9. To Resend User Credential Details
- a. Click "RESEND" next to the appropriate camera number
  - b. Enter an email address or "PRINT FOR PARENT" to resend the credentials
10. To Use the Move Function—moving credentials to another bed space.
- a. Click "MOVE" next to the appropriate camera number.
  - b. Choose the Camera Number and its location that you would like to move the User Credentials to.
  - c. Click "MOVE"
  - d. User Credentials will now be associated with the new camera and deleted from the previous camera.
11. To Suspend the Camera Stream — "PRIVACY" mode
- a. Touch the screen of the desired camera and note that a caring message will be visible on the screen. The video stream will be suspended until the screen is touched again and the patient's image is again visible on the screen.
  - b. Camera may be placed on "Privacy" when caregiver provides bedside care.
12. To Discharge a Username
- a. Select camera from the home screen
  - b. Click "DISCHARGE"
  - c. Remove location, click save
  - d. Close individual camera view.
13. Equipment cleaning
- a. Camera is cleaned by unit staff using hospital approved disinfectant wipes
    - 1) Once a shift,
    - 2) Before and after each use,
    - 3) After discharge, and
    - 4) As needed.
  - b. After discharge,
    - 1) RN shall clean and remove the camera and charging cable and return to the front desk.
    - 2) RN shall leave the stationary arm attached to the bed or IV pole for cleaning.
    - 3) Ward Clerk shall inventory the returned camera and charging cable and place inside designated storage location.
    - 4) EVS shall clean the stationary arm attached to the bed or IV pole after bed is designated as ready for cleaning.

**APPENDIX C****CONSENT FOR USE OF REMOTE STREAMING CAMERA SYSTEM**

I, the undersigned parent/legal guardian, hereby give my permission and authorize Kaiser Permanente Hospital to activate and deploy the Remote Streaming Camera System (hereafter termed the “System”), which will be located either on or near my infant’s hospital bed, so that I can view my infant during his/her hospital stay.

I understand the following about the use of the System:

- The purpose of the System is to view my infant and promote family bonding. **LOS ANGELES MEDICAL CNTRL** Medical Center and the health care team have the right to turn on/off the System at time that **LOS ANGELES MEDICAL CNTRL** Medical Center or the health care team so determines. I understand that **LOS ANGELES MEDICAL CNTRL** Medical Center and the health care team shall not turn on the System or view streaming images while nursing services or medical procedures are being provided.
- I am responsible for the username and password provided to me to access the System. No other users will have access to my infant’s video unless I give them access to the username and password.
- Internet access is needed to view my infant with the System. Kaiser Permanente is not responsible for providing me with internet access or service.
- The System incorporates the bank level secure encryption of the video streaming to protect the streaming images provided.
- Recordings and/or copies of any streaming image(s) accessed on the System are expressly forbidden.
- The System is a streaming device that does not save or store any images, video or information of my infant or myself. The System also does not record, store or broadcast audio.
- The System is only available in the Newborn Intensive Care Unit (NICU) at Kaiser Permanente’s, - **LOS ANGELES MEDICAL CNTRL** Medical Center.
- Information will be gathered related to the use of the remote viewing camera. Information collected will include how often each log-in is accessed and for how long. The information will be available to Kaiser Permanente’s, **LOS ANGELES MEDICAL CNTRL** Medical Center and to owner/representative of the System. Such information will be collected to help enhance the System but shall not be used for marketing purposes.
- I may not be able to view my infant during times when technical problems occur with the System or its software.
- Technical support requests should not be submitted to Kaiser Permanente because the System manufacturer is responsible for all technical support. I must then submit any technical support report requests to the email contact information and/or phone number(s) provided to me by Kaiser Permanente.

- I understand that Kaiser Permanente's, LOS ANGELES MEDICAL CNTR L Medical Center and the health care team make no warranty or promise concerning the availability of the System at any particular time or for any particular duration.
- I also understand that provision of and access to the System are not part of the covered benefits offered by my Kaiser Permanente health plan. Kaiser Permanente's LOS ANGELES MEDICAL CNTR L Medical Center reserves the right to discontinue use of the Remote Streaming Camera at any time and for any reason.
- Kaiser Permanente's LOS ANGELES MEDICAL CNTR L Medical Center and the health care team are not responsible for the security of the internet access device or internet service that I use to access the System, as I have chosen to access System in my sole discretion. Accordingly, I hereby absolve and release Kaiser Permanente's LOS ANGELES MEDICAL CNTR L Medical Center and the health care team from any legal responsibility, liability, cost, expense, attorneys' fees, or damages which I may incur as a result of any breach, or inappropriate or illegal access to, or use or disclosure of such internet access device or internet service.

**Expiration Date:** This consent shall only be effective while in Kaiser Permanente's NICU. The consent shall expire when my infant is discharged from Kaiser Permanente's, LOS ANGELES MEDICAL CNTR L Medical Center.

**Withdrawal of Consent:** I understand that I may revoke this consent at any time by notifying the health care team.

**Release of Liability:** I agree that Kaiser Permanente, LOS ANGELES MEDICAL CNTR L Medical Center and its staff are hereby released from any and all legal responsibility, liability, cost, expense, attorneys' fees and/or damages for my use of the System, and for access and release of my information to the extent indicated and authorized herein.

**Re-Disclosure:** I understand that once the above-described information is disclosed by me to a third party, it may no longer be protected by privacy laws.

Parent Signature:

Date:

---

**APPENDIX D**  
**PARENT INTEREST FORM**

Hello NICU Parents,

One of the most challenging times that families experience is when they must leave their newborn in the hospital. Bonding between parents and their new baby is as important in the NICU as it is at home.

Remote streaming camera systems help families bond with their hospitalized infants. The remote streaming system consists of a small webcam that is placed at the infant's bedside. It allows parents to view their infant in real-time through a secure online portal.

The webcam is free of charge and if you have access to the internet, then you can use the remote streaming system. The "real-time" video image is transmitted by a webcam (without sound). Infants can be viewed from any internet-enabled device, such as computer, laptop, tablet, or smartphone. Each family is provided with an individual username and password.

If you are interested in viewing your infant via the remote streaming system, please answer the questions below and check yes. After you submit this paper to the front desk clerk, you will need to sign a separate hospital consent, which allows you to access the remote streaming system. Thank you so much for your participation. If you have any questions, please email, [Ashley.N.Brantley@kp.org](mailto:Ashley.N.Brantley@kp.org).

Baby's Name:

Parent(s) Name:

Parent(s) Phone Number:

Parent(s) Email Address:

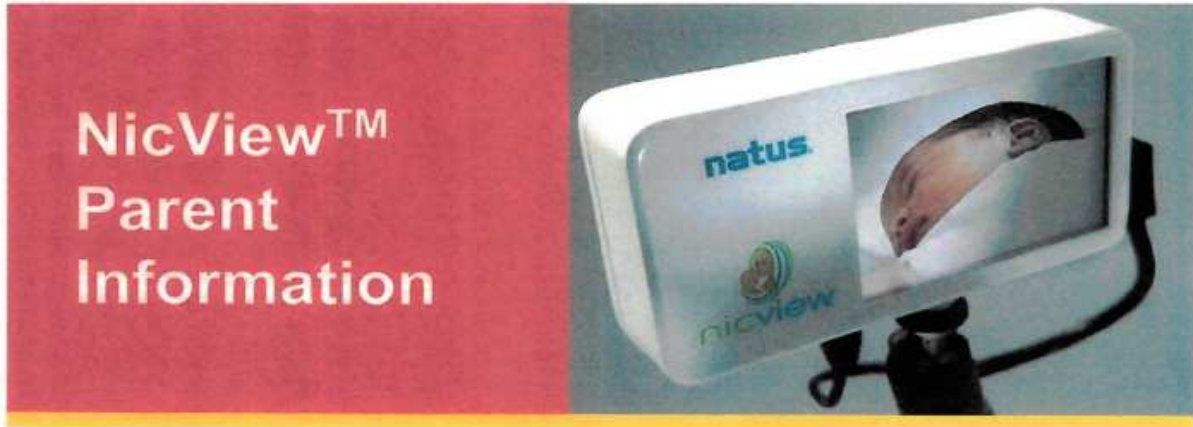
- Yes, I am interested in participating in the remote streaming camera system program
- No, I am not interested in participating in the remote streaming camera system program

Please return to the completed form to the NICU front desk. Thank you 😊 !



## APPENDIX E

## PARENT INFORMATION FORMS

**What will I see?**

Once you are logged in, you will start receiving streaming images of your baby

However, if the nurse is caring for your baby, the camera may be temporarily 'off-line' in which case you will see an 'off-line' image (see image to the right). Please check back shortly. Remember, your baby's care is our TOP priority and your baby's image may be off-line frequently. Please be patient and know your baby is receiving great care

**There will be times when...**

- Your baby has had a wet burp, spits up, or has mucous
- Baby has lost his/her pacifier
- Eye patches have slipped or phototherapy is turned off
- Your baby will not be available to view due to feeding or medical care

The care you see and experience when you are in the NICU is the same when you are home. Babies will cry, wiggle, and spit up. These are all natural baby responses. We ask for your patience during these times and please know your nurse is providing great care to your baby. Consider connecting with your nurse and letting them know what time(s) you will be logging in so your baby may be ready

**What if I need assistance logging in, or the camera needs to be adjusted?**

Technical support is available 24/7 for family members. Please call 855-Nic-View (855-642-8439) for all your technical needs





## NICVIEW® Streaming Camera System

PARENT INFORMATION

### NICVIEW

THE NEXT BEST THING TO BEING THERE

### WHAT IS NICVIEW?

NICVIEW is an innovative small camera system placed at designated bed spaces in the NICU and allows parents, family and friends to view their infant in real-time, 24/7, through a secure on-line portal.

This service helps families develop that bond with their preemie or hospitalized infant even when they can't be in the NICU with them. NICVIEW can add peace of mind and provide reassurance when you can't be at the bedside.

The camera delivers a secure image stream for parents and family members to view their baby remotely. Family members can securely access NICVIEW from anywhere there is an internet connection via a laptop, smartphone, or tablet. The service is compatible with any internet capable device and most popular browsers.



### IS NICVIEW SECURE?

NICVIEW produces a streaming image that travels securely with up to 256-bit SSL encryption, the current web standard, similar to online banking. Cameras do not transmit sound and do not record video. No other users will have access to your baby's images unless you have provided them the log-in credentials.



### HOW DO I ACCESS NICVIEW?

Once you have signed a consent form to use the NICVIEW Streaming Camera System, you will be provided a print-out with your unique log-in credentials. These credentials can also be emailed or texted to you and are for you to share with your family and friends if you desire.

Please remind family and friends not to share your log-in credentials with others without your permission.

To access private streaming images of your baby:

1. Scan the QR code to the right or go to [www.NICVIEW.net](http://www.NICVIEW.net)
2. Enter your unique log-in User Name and Password to connect. The first time you or a family member log-in from a new computer, tablet, or smart phone, you may be asked to acknowledge a one-time consent.



## NICVIEW® Streaming Camera System

PARENT INFORMATION

### HELPFUL INFORMATION ABOUT NICVIEW FOR PARENTS

- The intent of the camera is to be a comfort and connection for you and your family. If you find the NICVIEW camera creates anxiety or is a distraction, please let the staff know and the camera can be turned off.
- The camera is mounted to one side of your baby's bed and should not be moved. If you feel the camera lens needs to be repositioned, call the NICVIEW technical service number at the bottom of the viewing screen. The camera lens can be repositioned remotely.
- If your baby has a blanket over his/her incubator to protect from ambient light, your view will be darkened.
- If your baby is under phototherapy, the color will be distorted.
- The camera will be off-line when care is being provided for your baby.

### WHAT IF I HAVE TECHNICAL TROUBLE, NEED ASSISTANCE LOGGING IN, OR THE CAMERA NEEDS TO BE ADJUSTED?

NICVIEW provides technical support 24/7 for family members.

Please call **855-NIC-VIEW (855-642-8439)** for all your technical needs. If contacting us from outside of the US, please visit our online technical support at [www.nicview.net/help.aspx](http://www.nicview.net/help.aspx).



### NICVIEW FAMILY APPLICATION AVAILABILITY

The NICVIEW Family Application may not be available for all NICVIEW cameras, so you may receive this message. If so, please go to the website for access to your baby's secure image.



### DOWNLOAD THE NICVIEW FAMILY APP FOR MOBILE DEVICES



#### iOS Application

1. To install this free app, go to the Apple APP Store, and search for NICVIEW Family
2. Click on the "Free" button
3. Click "Install"
4. Tap on the NICVIEW Family App icon
5. Choose the "US" Region
6. Login with the username and password you received from the hospital
7. Provide the app with your relation to the baby (e.g. "Mom", "Dad", "Grandma", etc.)



#### Android Application

1. To install this free app, go to the Google Play Store, and search for NICVIEW Family
2. Read through the APP permissions screen, click ACCEPT
3. Tap on the NICVIEW Family App icon
4. Choose the "US" Region
5. Login with the username and password you received from the hospital
6. Provide the app with your relation to the baby (e.g. "Mom", "Dad", "Grandma", etc.)

PIN 015824-002A

**APPENDIX F****PARENT LOG-IN CREDENTIALS****KAISER PERMANENTE®****Los Angeles Medical Center****Where do I go on the Internet?**

Using any standard browser you can use the address below to find our site, and login to view your child.

<https://www.nicview.net>

**How do I login?**

Enter the user name and password provided below to securely login and view your child.

User Name: cherrybear2352

Password: 4m%K\$3BwJ#p9

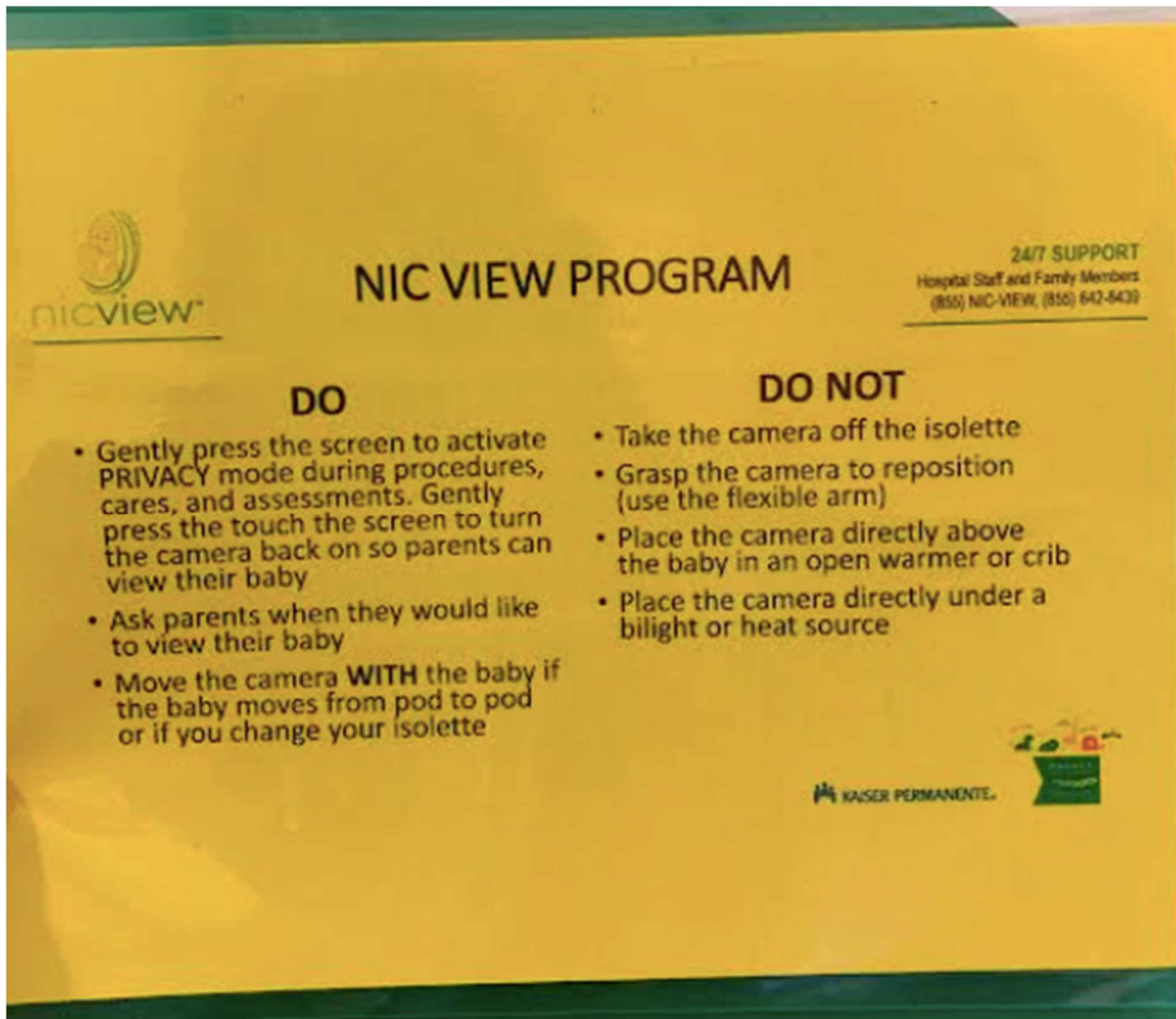
**What if I have problems?**

Please call 1-855-NICVIEW (642-8439) if you have questions on how to use the NICVIEW service.




## APPENDIX G

## INFANT PARTICIPANT SIGNAGE



The image shows a yellow sign for the NIC VIEW PROGRAM. At the top left is the 'nicview' logo, which consists of a stylized baby face icon above the text 'nicview'. In the top right corner, it says '24/7 SUPPORT Hospital Staff and Family Members (855) NIC-VIEW, (855) 642-6439'. The main title 'NIC VIEW PROGRAM' is centered. Below the title, there are two columns of instructions: 'DO' and 'DO NOT'. The 'DO' column lists three bullet points: 'Gently press the screen to activate PRIVACY mode during procedures, cares, and assessments. Gently press the touch the screen to turn the camera back on so parents can view their baby', 'Ask parents when they would like to view their baby', and 'Move the camera WITH the baby if the baby moves from pod to pod or if you change your isolette'. The 'DO NOT' column lists three bullet points: 'Take the camera off the isolette', 'Grasp the camera to reposition (use the flexible arm)', and 'Place the camera directly above the baby in an open warmer or crib' and 'Place the camera directly under a bilight or heat source'. At the bottom right, there is a small logo for 'KAISER PERMANENTE' and a small graphic of a house with a red roof.

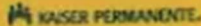

 **NIC VIEW PROGRAM** 24/7 SUPPORT  
Hospital Staff and Family Members  
(855) NIC-VIEW, (855) 642-6439

**DO**

- Gently press the screen to activate **PRIVACY** mode during procedures, cares, and assessments. Gently press the touch the screen to turn the camera back on so parents can view their baby
- Ask parents when they would like to view their baby
- Move the camera **WITH** the baby if the baby moves from pod to pod or if you change your isolette

**DO NOT**

- Take the camera off the isolette
- Grasp the camera to reposition (use the flexible arm)
- Place the camera directly above the baby in an open warmer or crib
- Place the camera directly under a bilight or heat source

APPENDIX H

DATA COLLECTION TOOLS FROM ORIGINAL STUDY

Use of an internet camera system in the neonatal intensive care unit: parental and nursing perspectives...

2051

Table 1 Participant demographics.

	Count (%)		Fisher's exact p value
	Off webcam N = 79(%)	On webcam N = 80(%)	
IA: parent demographics			
Parental role			
Mother	56 (70.89)	52 (65)	0.6081
Father	23 (29.11)	26 (32.5)	
Marital/cohabiting status			
Living with a wife, husband, or partner	75 (94.94%)	73 (91.25%)	0.9274
Single parent	1 (1.27%)	1 (1.25%)	
Other	2 (2.53%)	2 (2.5%)	
Parent age			
Under 20 years	3 (3.8%)	0 (0%)	0.3078
21–30 years	21 (26.58%)	17 (21.25%)	
31–40 years	47 (59.49%)	54 (67.5%)	
Over 40 years	6 (7.59%)	7 (8.75%)	
Current NICU experience			
First	68 (86.08%)	66 (82.5%)	0.5445
Second	6 (7.59%)	10 (12.5%)	
Third	1 (1.27%)	2 (2.5%)	
Fourth (or More)	1 (1.27%)	0 (0%)	
Infant gestational age at birth			
26 weeks or before	2 (2.53)	3 (3.75)	0.9889
27–29 weeks	7 (8.86)	6 (7.5)	
30–32 weeks	16 (20.25)	17 (21.25)	
33–34 weeks	14 (17.72)	15 (18.75)	
More than 34 weeks	38 (48.1)	36 (45)	
Infant postnatal age at time of survey completion			
1–2 weeks	42 (53.16%)	41 (51.25%)	
>2–3 weeks	7 (8.86%)	9 (11.25%)	
>3–4 weeks	6 (7.59%)	11 (13.75%)	
Over 4 weeks	21 (26.58%)	16 (20%)	
Singleton versus multiples			
One	68 (86.08)	63 (78.75)	0.1508
Two	5 (6.33)	13 (16.25)	
More than two	3 (3.8)	1 (1.25)	
Distance from home to hospital			
15 min or less	23 (29.11%)	21 (26.25%)	0.4707
16–30 min	25 (31.65%)	34 (42.5%)	
31–45 min	21 (26.58%)	13 (16.25%)	
46 min to an hour	7 (8.86%)	6 (7.5%)	
Over an hour	3 (3.8%)	4 (5%)	
Type of health insurance			
None/self-paying	0 (0%)	0 (0%)	0.507
Private insurance	55 (69.62%)	59 (73.75%)	
Medicaid/MassHealth	22 (27.85%)	15 (18.75%)	

Table 1 (continued)

Highest level of schooling completed			
Some high school	3 (3.8%)	1 (1.25%)	0.0182
High school graduate/GED	10 (12.66%)	1 (1.25%)	
Some college	17 (21.52%)	25 (31.25%)	
Bachelor's degree	28 (35.44%)	26 (32.5%)	
Graduate or professional degree	19 (24.05%)	24 (30%)	
Race			
African American	2 (2.53%)	4 (5%)	0.404
American Indian or Alaska Native	1 (1.27%)	0 (0%)	
Asian	12 (15.19%)	6 (7.5%)	
White	61 (77.22%)	65 (81.25%)	
Other	3 (3.8%)	2 (2.5%)	
Ethnicity			
Hispanic	2 (2.53%)	5 (6.25%)	0.257
Non-Hispanic	67 (84.81%)	69 (86.25%)	
IB: nursing demographics <sup>a</sup>			
			N = 35 (%)
Years working in study NICU			
<3 years			12 (34.3)
4–5 years			1 (2.9)
6–10 years			4 (11.4)
11–20 years			12 (34.3)
More than 20 years			6 (17.1)
Missing			0
Years working as a nurse			
<3 years			4 (11.4)
4–5 years			1 (2.9)
6–10 years			4 (11.4)
11–20 years			7 (20)
More than 20 years			16 (45.7)
Level of education			
Associates degree			11 (31.4)
Diploma			3 (8.6)
Bachelor's degree			20 (57.1)
Master's degree			1 (2.9)
Age			
<20			0 (0%)
20–29			4 (11.4%)
30–39			7 (20%)
40–49			5 (14.3%)
>50			19 (54.3%)

<sup>a</sup>Nursing demographic data presented here were collected at the end of the study (on webcam period).

about the nursing care baby received. Parents felt that webcam use did not increase their anxiety, stress, or feelings of helplessness.

**Table 2** Parent and nursing perceptions of webcam use.

2A: parent perceptions	Count (%) <i>N</i> = 80	<i>p</i> value
Watching my baby on webcam usually makes me feel better, more hopeful		
Completely agree	47 (58.75)	0.0039
Somewhat agree	22 (27.5)	
Somewhat disagree	3 (3.75)	
Completely disagree	1 (1.25)	
No answer/do not know	0 (0)	
Watching my baby on webcam usually makes me feel helpless		
Completely agree	4 (5.0)	0.0001
Somewhat agree	17 (21.25)	
Somewhat disagree	20 (25.0)	
Completely disagree	31 (38.75)	
No answer/do not know	1 (1.25)	
Watching my baby on webcam usually makes me feel anxious		
Completely agree	5 (6.25)	<0.0001
Somewhat agree	14 (17.5)	
Somewhat disagree	26 (32.5)	
Completely disagree	28 (35)	
No answer/do not know	0 (0)	
Watching my baby on the camera helped me with pumping breast milk		
Completely agree	27 (33.75)	0.4515
Somewhat agree	5 (6.25)	
Somewhat disagree	3 (3.75)	
Completely disagree	4 (5)	
No answer/do not know	34 (42.5)	
I am happy to share access to the webcam with other family members		
Completely agree	38 (47.5)	0.3497
Somewhat agree	10 (12.5)	
Somewhat disagree	12 (15)	
Completely disagree	8 (10)	
No answer/do not know	5 (6.25)	
Watching my baby on webcam helped me to feel reassured about the nursing care my baby received		
Often	45 (56.25)	0.0136
Sometimes	21 (26.25)	
Rarely	1 (1.25)	
Never	2 (2.5)	
Do not know/no answer	3 (3.75)	
Overall, viewing my baby over the webcam system increased my stress while s/he was in the NICU		
Often	1 (1.25)	0.0247
Sometimes	4 (5)	
Rarely	10 (12.5)	
Never	54 (67.5)	
Do not know/no answer	3 (3.75)	

**Table 2** (continued)

2B: nursing perceptions	Count (%) <i>N</i> = 35	<i>p</i> value
The use of webcams in the NICU improved the quality of care infants receive		
Completely agree	1 (2.9)	0.4594
Somewhat agree	4 (11.4)	
Somewhat disagree	10 (28.6)	
Completely disagree	16 (45.7)	
No answer/do not know	1 (2.9)	
The use of webcams increased parental stress while their child was in the NICU		
Completely agree	6 (17.1)	0.1385
Somewhat agree	21 (60)	
Somewhat disagree	5 (14.3)	
Completely disagree	2 (5.7)	
No answer/do not know	0	
The use of webcams increased stress for nurses working the NICU		
Completely agree	10 (28.6)	0.6372
Somewhat agree	13 (37.1)	
Somewhat disagree	7 (20)	
Completely disagree	4 (11.4)	
No answer/do not know	0	
The use of webcams increased the workload of nurses working in the NICU		
Completely agree	6 (17.1)	0.4657
Somewhat agree	11 (31.4)	
Somewhat disagree	11 (31.4)	
Completely disagree	6 (17.1)	
No answer/do not know	0	
Parental telephone calls into the NICU increased when webcams were in use		
Completely agree	11 (31.4)	0.1988
Somewhat agree	14 (40)	
Somewhat disagree	5 (14.3)	
Completely disagree	3 (8.6)	
No answer/do not know	1 (2.9)	
Parental visits to the NICU increased when webcams were in use		
Completely agree	0	0.5549
Somewhat agree	0	
Somewhat disagree	11 (31.4)	
Completely disagree	16 (45.7)	
No answer/do not know	7 (20)	
The use of webcams has increased the risk of liability malpractice suits in the NICU		
Completely agree	5 (14.3)	0.1135
Somewhat agree	8 (22.9)	
Somewhat disagree	7 (20)	
Completely disagree	1 (2.9)	
No answer/do not know	13 (37.1)	

**Table 5** Potential adverse effects of webcam use.

<b>Parent-reported webcam effects</b>		
	Count (%)	<i>p</i> value
<i>N</i> = 80		
Did you ever become upset or angry with the nursing care your baby was receiving as a result of watching the webcam monitor?		
Yes, once a day or more often	1 (1.25)	0.0001
Yes, more than once across baby's stay but less than once a day	4 (5)	
Yes, once during baby's stay	10 (12.5)	
No	58 (72.5)	
No answer/do not know	0 (0)	
When watching the webcam monitor, did you ever telephone the NICU with a concern, question or a request to "fix" something you saw on the webcam?		
Yes, once a day or more often	3 (3.75)	0.0537
Yes, more than once across baby's stay but less than once a day	6 (7.5)	
Yes, once during baby's stay	10 (12.5)	
No	52 (65)	
No answer/do not know	1 (1.25)	
Did you experience any technical difficulties using the webcam system?		
Yes	48 (60)	0.3021
No	24 (30)	
No answer/do not know	0 (0)	
<b>Nursing-reported webcam effects</b>		
	Count (%)	<i>p</i> value
<i>N</i> = 35		
Over the past month, has a parent become upset or angry with the nursing care you were providing to their baby as a result of watching the webcam?		
Often	0	0.3064
Sometimes	7 (20)	
Rarely	1 (2.9)	
Never	25 (71.4)	
Do not know/no answer	1 (2.9)	
Over the past month, has a parent telephoned you in the NICU with a concern, question or request to "fix" something they saw on the webcam?		
Often	6 (17.1)	0.1678
Sometimes	16 (45.7)	
Rarely	7 (20)	
Never	5 (14.3)	
Do not know/no answer	0	
Over the past month, have you experienced technical problems with the webcams (such as delays, frozen images, or parent could not connect using the app)?		
Often	9 (25.7)	0.2227
Sometimes	17 (48.6)	
Rarely	2 (5.7)	

**Table 5** (continued)

Never	4 (11.4)
Do not know/no answer	1 (2.9)
In the past month, have you experienced any mechanical problems with the webcams (such as camera falling off, needing to fix the position because parents could not see, difficulty moving it)?	
Often	9 (25.7)
Sometimes	15 (42.9)
Rarely	4 (11.4)
Never	4 (11.4)
Do not know/no answer	1 (2.9)

reported experiencing technical and mechanical difficulties, respectively.

**Discussion**

This study is the first to our knowledge to evaluate associations between webcam use in the NICU and parental stress as well as nursing stress and work-related burnout using standardized validated tools. It is also the first study to allow for matching of parent and nursing perceptions during the same test period. The decision to only assess nursing stress, rather than including other types of providers, was based on published data suggesting that webcams primarily affect those working at the bedside [8–10]. In addition, when previously queried, physicians and nurse practitioners in our NICU reported to be unaffected by the presence of webcams, whereas bedside nurses had varying opinions about their use and possible benefits.

The results of this study illustrate striking differences in parents and nursing perceptions. Parents' perceptions with respect to the effects of using webcams while their infants were hospitalized were consistently positive. Stress measuring tools verified this finding for parents with scores being significantly lower when they were using the webcam irrespective of parental role (mothers versus fathers), age, or race. Conversely, the majority of nurses reported a consistently negative perception of webcam use in the NICU, which was consistent with previous anecdotal evidence of nursing dissatisfaction with webcam use in our NICU. However, while these perceptions were negative, nursing work-related stress and burnout were not found to be significantly different between the two periods, illustrating a lack of measurable adverse effects.


Multiple factors have been found to contribute to higher levels of parental stress in the NICU including parental age, gender, ethnicity, very premature birth, twin delivery, length of hospitalization, lower socio-economic status,



## APPENDIX I

## PERMISSION TO USE DATA COLLECTION TOOLS

---

 **Ashley Brantley** <anbrantleyrn@gmail.com> Fri, Jul 23, 2021, 3:49 PM ☆ ↶ ⋮  
to zkubicka5 ▾


Hello,

My name is Ashley Brantley and I am a Doctor of Nursing Practice student at California Baptist University in Riverside, California. For my final project, I am implementing web cameras in a regional neonatal intensive care unit (NICU) in Los Angeles, California. I would like to better understand how this will impact nursing workflow, stress/anxiety and job satisfaction. Additionally, I would like to become more informed about how it impacts parents. In the article you authored, 'Neonatal nurses' perceptions of using live streaming video cameras to view infants in a regional NICU, you utilized an evaluation tool to better understand the parents and nurses point of view. Is there any way I can utilize your tool for my project?

Thank you for your time and consideration,

Ashley Brantley, MSN, MPH, CNS, RNC-NIC  
Department Administrator  
Kaiser Los Angeles Medical Center  
Neonatal Intensive Care Unit

---

 **Ashley Brantley** <anbrantleyrn@gmail.com> Fri, Jul 23, 2021, 5:26 PM ☆ ↶ ⋮  
to Zuzanna ▾

No problem Zuzanna! Thank you so much for your quick response. I will definitely list you in the references and I will contact you if I need additional assistance.

Ashley

On Jul 23, 2021, at 5:01 PM, Zuzanna Kubicka <[zkubicka5@gmail.com](mailto:zkubicka5@gmail.com)> wrote:

Ashley! You are welcomed to the tool, just list us in references. PSS- nicu was created by another author. We validated another tool to assess nursing perceptions of Webcam / parental perception of Webcam. Let me know how I can help further. Zuzanna Kubicka

Sent from my iPhone

**APPENDIX J****PARENT QUESTIONNAIRE**

1. Parental Role:
  - a. Mother
  - b. Father
  - c. Other
2. Marital Status:
  - a. Married/living together
  - b. Single
  - c. Other
3. Parent Age:
  - a. Under 18
  - b. 18-24 years
  - c. 25-44 years
  - d. 35-44 years
  - e. 45-54 years
4. Infant Gestational Age at Birth:
  - a. 26 weeks or before
  - b. 26.1-29 weeks
  - c. 29.1-31 weeks
  - d. 31.1-33 weeks
  - e. 33.1-35 weeks
  - f. More than 35 weeks

## 5. Infant's Postnatal Age at the Time of Survey Completion:

- a. Less than one week
- b. 1-2 weeks
- c. 2-3 weeks
- d. 3-4 weeks
- e. Over 4 weeks

## 6. How far do you live from the hospital?

- a. 10 miles or less
- b. 11-20 miles
- c. 21-30 miles
- d. More than 30 miles

## 7. Highest Level of Education Completed:

- a. Some high school
- b. High school graduate
- c. Some college
- d. Bachelor's degree
- e. Graduate or professional degree

## 8. Race:

- a. African American
- b. American Indian or Native American
- c. Asian
- d. Latino/Hispanic
- e. White

f. Other

***Webcam Use and Effects***

1. Watching my baby on webcam usually makes me feel better, more hopeful:
  - a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/do not know
  
2. Watching my baby on webcam usually makes me feel helpless:
  - a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/do not know
  
3. Watching my baby on webcam usually makes me feel anxious:
  - a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/do not know
  
4. Watching my baby on webcam helped me with pumping breastmilk:
  - a. Completely agree
  - b. Somewhat agree

- c. Somewhat disagree
  - d. Completely disagree
  - e. Not applicable
5. I am happy to share access to the webcam with my family members and friends:
- a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/do not know
6. Watching my baby on webcam helped me to feel reassured about the nursing care my baby was receiving:
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never
  - e. No answer/do not know
7. Overall, viewing my baby over the webcam system increased my stress while s/he was in the NICU:
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never
  - e. No answer/do not know

8. Did you ever become upset or angry with the nursing care your baby was receiving while watching the webcam?
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never
  - e. No answer/do not know
9. When watching the webcam, did you ever call the NICU with a concern, question, or request to “fix” something you saw on the webcam?
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never
  - e. No answer/do not know
10. Did you experience any technical difficulties using the webcam system?
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never
  - e. No answer/do not know

**APPENDIX K**  
**NURSING QUESTIONNAIRE**

1. How many years have you been a nurse?
  - a. Less than 3 years
  - b. 3-5 years
  - c. 6-10 years
  - d. 11-20 years
  - e. More than 20 years
  
2. How many years have you worked at the project setting NICU?
  - a. Less than 3 years
  - b. 3-5 years
  - c. 6-10 years
  - d. 11-20 years
  - e. More than 20 years
  
3. What is your highest level of education?
  - a. Diploma
  - b. Associates degree
  - c. Bachelor's degree
  - d. Master's degree
  - e. Doctoral degree
  
4. What is your age?
  - a. Less than 20 years
  - b. 20-29 years

- c. 30-39 years
- d. 40-49 years
- e. Over 50 years

***Webcam Effects and Use***

1. The use of webcams in the NICU improved quality of care infants receive:
  - a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/Do not know
2. The use of webcams increased parental stress while their child was in the NICU:
  - a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/Do not know
3. The use of webcams increased stress for nurses working in the NICU:
  - a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/Do not know
4. The use of webcams increased the workload of nurses working in the NICU?



- a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/Do not know
5. Parental telephone calls into the NICU increased when webcams were in use:
- a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/Do not know
6. Parental visits in the NICU increased when webcams were in use:
- a. Completely agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Completely disagree
  - e. No answer/Do not know
7. Over the past month, has a parent become upset or angry with the nursing care you were providing to their baby while watching the webcam?
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never

- e. No answer/Do not know
8. Over the past month, has a parent called you in the NICU with a concern, question or request to “fix” something they saw on webcam?
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never
  - e. No answer/Do not know
9. Over the past month, have you experienced technical problems with the webcams (such as delays, frozen images, or complaints from parents about being unable to connect using the app)?
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never
  - e. No answer/Do not know
10. Over the past month, have you experienced any mechanical problems with the webcams (such as falling off, needing to fix position because parents could not see, difficulty moving it)?
- a. Often
  - b. Sometimes
  - c. Rarely
  - d. Never

e. No answer/Do not know

**APPENDIX L**  
**EXPENSE WORKSHEET**

<b>Description/Category</b>	<b>Cost Breakdown</b>	<b>Total Cost</b>	<b>Explanation</b>
Webcamera Kit	Quantity: 15 Price: \$1825.00	\$27,375.00	Startup costs for individual webcams and mounting poles
Web-based Software	Quantity: 15 Price: \$385	\$5,775.00	Webcam software
Service Agreement	Quantity: Annual Price: \$6, 630.00	\$6, 630	Service agreement with webcam manufacturer
Training	(50) RNs (2) Ward Clerks (2) Managers (1) CNS	50x75= \$3, 750 2x\$30= \$60 2x80= \$160 1x70= \$70	Staff attended a one-hour training session. No additional staff were needed for coverage
Information Technology (IT) Staff	(1) IT personnel installed webcams	8x\$34= \$544	IT installed and mounted webcams during an eight-hour workday
Incentives	(31) gasoline cards (30) fast food gift cards	31x\$20= \$620 30x\$20= \$600	Incentives for parent and nursing participants

## APPENDIX M

## RESULTS: PARENT PARTICIPANTS

Table 1

*Parent Demographics Characteristics (n=31)*

	<i>N</i>	%
<b>Parental role</b>		
Mother	16	51.6
Father	15	48.4
<b>Marital status</b>		
Married/living together	22	71.0
Single	9	29.0
<b>Age</b>		
18-24	4	12.9
25-34	21	67.7
35-44	6	19.4
<b>Infant gestational age at birth</b>		
26 weeks or before	4	12.9
26.1-29 weeks	6	19.4
29.1-31 weeks	1	3.2
33.1-35 weeks	4	12.9
More than 35 weeks	16	51.6
<b>Infant's current age</b>		
Less than 1 week	5	16.1

	<i>N</i>	%
1-2 weeks	6	19.4
2-3 weeks	2	6.5
3-4 weeks	5	16.1
Over 4 weeks	13	41.9
<b>Distance from hospital</b>		
10 miles or less	11	35.5
11-20 miles	8	25.8
21-30 miles	4	12.9
More than 30 miles	8	25.8
<b>Highest education</b>		
Some high school	2	6.5
High school graduate	6	19.4
Some college	15	48.4
Associate degree	1	3.2
Bachelor's degree	7	22.6
<b>Race/ethnicity</b>		
African American (Non-Hispanic)	2	6.5
American Indian or Alaska Native	1	3.2
Latino/Hispanic	23	74.2
White	3	9.7
Other	2	6.5

**Table 2***Parent Perceptions of Webcam Use*

	f	%	p
<b>Watching my baby on webcam usually makes me feel better, more hopeful</b>			
Completely agree	23	74.2	<0.001***
Somewhat agree	8	25.8	
Somewhat disagree	0	0.0	
Completely disagree	0	0.0	
No answer/Do not know	0	0.0	
<b>Watching my baby on webcam usually makes me feel helpless</b>			
Completely agree	4	12.9	<0.001***
Somewhat agree	9	29.0	
Somewhat disagree	3	9.7	
Completely disagree	15	48.4	
No answer/Do not know	0	0.0	
<b>Watching my baby on webcam usually makes me feel anxious</b>			
Completely agree	0	0.0	0.001**
Somewhat agree	10	32.3	
Somewhat disagree	4	12.9	
Completely disagree	15	48.4	
No answer/Do not know	2	6.5	
<b>Watching my baby on the camera helped me with pumping breastmilk<sup>a</sup></b>			
Completely agree	9	56.3	<0.001***

	f	%	<i>p</i>
Somewhat agree	5	31.3	
Somewhat disagree	0	0.0	
Completely disagree	1	6.3	
No answer/Do not know	1	6.3	

**I am happy to share access to the webcam with my family members and friends**

Completely agree	19	61.3	<0.001***
Somewhat agree	5	16.1	
Somewhat disagree	2	6.5	
Completely disagree	3	9.7	
No answer/Do not know	2	6.5	

**Watching my baby on webcam helped me to feel reassured about the nursing care my baby was receiving**

Often	21	67.7	<0.001***
Sometimes	8	25.8	
Rarely	0	0.0	
Never	2	6.5	
No answer/Do not know	0	0.0	

**Overall, viewing my baby over the webcam system increased my stress while s/he was in the NICU**

Often	0	0.0	<0.001***
Sometimes	1	3.2	
Rarely	7	22.6	



	f	%	<i>p</i>
Never	22	71.0	
No answer/Do not know	1	3.2	

Note. \**p* < 0.05, *p* < 0.01, \*\*\**p* < 0.001, <sup>a</sup>mother role only, n=16.

**Table 3**

*Parent-Reported Webcam Effects*

	f	%	<i>p</i>
<b>Did you ever become upset or angry with the nursing care your baby was receiving while watching the webcam?</b>			
Often	0	0.0	<0.001***
Sometimes	3	9.7	
Rarely	8	25.8	
Never	18	58.1	
No answer/Do not know	2	6.5	

**When watching the webcam, did you ever call the NICU with a concern, question, or request to “fix” something you saw on the webcam?**

Often	2	6.5	<0.001***
Sometimes	3	9.7	
Rarely	11	35.5	
Never	14	45.2	
No answer/Do not know	1	3.2	

---

	f	%	<i>p</i>
<b>Did you experience any technical difficulties using the webcam system?</b>			
Often	3	9.7	0.006**
Sometimes	8	25.8	
Rarely	8	25.8	
Never	12	38.7	
No answer/Do not know	0	0.0	

---

*Note.* \* $p < 0.05$ ,  $p < 0.01$ , \*\*\* $p < 0.001$ .

## APPENDIX N

## RESULTS: NURSING PARTICIPANTS

**Table 1***Nursing Demographics Characteristics (n=33)*

	<i>N</i>	%
<b>How many years have you been a nurse?</b>		
3 to 5 years	4	12.1
6 to 10 years	5	15.2
11 to 20 years	11	33.3
More than 20 years	13	39.4
<b>How many years have you worked at the project setting NICU?</b>		
Less than 3 years	4	12.1
3 to 5 years	6	18.2
6 to 10 years	5	15.2
11 to 20 years	13	39.4
More than 20 years	5	15.2
<b>Highest level of education?</b>		
Associates degree	5	15.2
Bachelor's degree	24	72.7
Master's degree	3	9.1
Doctoral degree	1	3.0
<b>Age</b>		
20-29 years	5	15.2

	<i>N</i>	%
30-39 years	8	24.2
40-49 years	11	33.3
Over 50 years	9	27.3

**Table 2***Nursing Perceptions of Webcam Use*

	<i>f</i>	%	<i>p</i>
<b>The use of webcams in the NICU improved quality of care infants receive</b>			
Completely agree	8	24.2	0.182
Somewhat agree	8	24.2	
Somewhat disagree	9	27.3	
Completely disagree	7	21.2	
No answer/don't know	1	3.0	
<b>The use of webcams increased parental stress while their child was in the NICU</b>			
Completely agree	8	24.2	0.089
Somewhat agree	6	18.2	
Somewhat disagree	11	33.3	
Completely disagree	7	21.2	
No answer/don't know	1	3.0	
<b>The use of webcams increased stress for nurses working in the NICU</b>			
Completely agree	8	24.2	0.043*
Somewhat agree	11	33.3	

	f	%	<i>p</i>
Somewhat disagree	9	27.3	
Completely disagree	4	12.1	
No answer/don't know	1	3.0	
<b>The use of webcams increased the workload of nursing working in the NICU</b>			
Completely agree	11	33.3	0.013*
Somewhat agree	10	30.3	
Somewhat disagree	8	24.2	
Completely disagree	4	12.1	
No answer/don't know	0	0.0	
<b>Parental telephone calls into the NICU increased when webcams were in use</b>			
Completely agree	13	39.4	0.012*
Somewhat agree	9	27.3	
Somewhat disagree	6	18.2	
Completely disagree	4	12.1	
No answer/don't know	1	3.0	
<b>Parental visits to NICU increased when webcams were in use</b>			
Completely agree	2	6.1	<0.001***
Somewhat agree	1	3.0	
Somewhat disagree	18	54.5	
Completely disagree	7	21.2	
No answer/don't know	5	15.2	

*Note.* \* $p < 0.05$ ,  $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 3***Nursing-Reported Webcam Effects*

	f	%	p
<b>Over the past month, has a parent become upset or angry with nursing care you were providing to their baby while watching the webcam?</b>			
Often	1	3.0	<0.001***
Sometimes	10	30.3	
Rarely	5	15.2	
Never	15	45.5	
No answer/don't know	2	6.1	
<b>Over the past month, has a parent called you in the NICU with a concern, question or request to "fix" something they saw on webcam?</b>			
Often	11	33.3	0.003**
Sometimes	13	39.4	
Rarely	3	9.1	
Never	5	15.2	
No answer/don't know	1	3.0	

---

	f	%	p
<b>Over the past month, have you experienced technical problems with the webcams (such as delays, frozen images, or complaints from parents about being unable to connect using the app?)</b>			
Often	5	15.2	<0.001***
Sometimes	15	45.5	
Rarely	4	12.1	
Never	9	27.3	
No answer/don't know	0	0.0	
<b>In the past month, have you experienced any mechanical problems with the webcams (such as camera falling off, needing to fix position because parents could not see, difficulty moving it?)</b>			
Often	9	27.3	0.043*
Sometimes	11	33.3	
Rarely	4	12.1	
Never	8	24.2	
No answer/don't know	1	3.0	

---

Note. \* $p < 0.05$ ,  $p < 0.01$ , \*\* $p < 0.001$ .