

THE IMPACT OF UNIT DESIGN ON FAMILY EXPERIENCES IN THE
NEONATAL INTENSIVE CARE UNIT AT KINGSTON GENERAL HOSPITAL

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Abstract

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Kingston General Hospital

Hillary M. McGregor Hughes

The involvement of families in the care of their infant in the Neonatal Intensive Care Unit (NICU) may be influenced by the unit environment (O'Brien et al., 2013). The purpose of this study is to explore the influence of the open pod NICU through the research question: What is the impact of unit design in the NICU at Kingston General Hospital (KGH) on the lived experiences of families? A qualitative descriptive design was followed using semi-structured interviews conducted with family members of infants in the NICU at KGH. Themes constructed through thematic analysis of transcripts included *Needing more space*, *Creating a comfortable environment*, *Having a sense of community*, *Desiring consistency in staffing* and *Barriers to being present*. The narrative of these themes aligns with Donabedian's (2003) theoretical model of structure, process and outcome. The findings from this research indicated that being cared for in an open pod NICU impacted their family experiences, displaying areas for improvement in future NICU designs.

Keywords: Family experience, FiCare, Neonatal Intensive Care Unit, NICU, NICU environment, NICU design, Open pod NICU

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Glossary

The following terms used in this paper are associated with the definitions provided. Consistent language is used throughout for synonymic terms used in the reviewed literature.

FiCare: A philosophy and model extending from family-centred care for partnering with families to support them in being active participants in their infant's care in the NICU (Ansari et al., 2023).

Open pod: An open space where a cluster of infants are all cared for together (Feeley et al., 2020). Also referenced in the literature as open bay, open ward or an open nursery.

Person- and family-centred care: A philosophy, theory, paradigm or model of care focusing on the whole person and the multitude of contributing factors, including their family, that play a role for that person in achieving health. In the literature, "person" has been used interchangeably with client, patient, consumer, user and individual (RNAO, 2015). Family is described as the partner(s) in care. "Centred care" is also referenced as -focused care, -oriented care, -directed care and -driven care (RNAO, 2015).

Single-family room: A private room for an infant to receive care with space for their family to stay with them (Tandberg et al., 2018). Also referred to as a single-patient room or double-occupancy room

Chapter One: Study Background and Purpose

Introduction

In the Neonatal Intensive Care Unit (NICU) at Kingston General Hospital (KGH), family members of the infant are regarded as essential and valued members of the care team. The implementation of the Family Integrated Care (FiCare) philosophy leads to positive outcomes for the wellbeing of infants and their families (Church et al., 2020; Gómez-Cantarino et al., 2020; O'Brien et al., 2013; Waddington et al., 2021). One of the four pillars of supporting family engagement is a conducive environment for FiCare (Benzies et al., 2017). The unit design is a significant element of the environment in the NICU and is unique to each hospital.

The NICU at KGH is a designated level two and level three neonatal care facility. As detailed by Critical Care Services Ontario (CCSO) (2023), this classification of NICU outlines that both moderately ill and severely ill infants are cared for at KGH. It is one of only eight hospitals in Ontario providing the highest level of intensive care to infants in need (CCSO, 2023). The reasons an infant may be ill and require NICU care are extensive but may include being born preterm, having a difficult birth, requiring surgery, needing respiratory support, and/or having a low birth weight, low blood sugar and/or an infection needing monitoring and treatment. The design of the unit is an open pod style with each pod homing five to seven infants. Level two and level three infants are cared for together within the same pods. In the open pod environment, there are no physical barriers separating infant spaces and no transition space between care spaces, as the isolettes or cribs are only separated by several feet. There are five pods identified alphabetically A to E, however, only four are typically being used for infant care. The

NICU also has one isolation room and one associated “care by parent” room for use one or two nights prior to discharge. Additionally, there is a family room and breast pumping room on the same floor of the hospital available for families of NICU patients to use. The current NICU was constructed in 1987 as part of the KIDD Wing and has had minor renovations and updating over the years (Angus, 1994).

While the literature supports the implementation of FiCare, the individual design of the NICU within each hospital is a variable factor (Waddington et al., 2021). This has resulted in research often being focussed on the other pillars of FiCare including staff education and support, parent education and psychosocial support (Benzies et al., 2017). However, the NICU environment remains an influencing factor on family experiences and the success of FiCare (O’Brien et al., 2013).

There is limited research available examining the impact of unit design on experiences families value in the NICU. This study uses a qualitative descriptive methodology to explore the impact of the unit design of the NICU at KGH on lived experiences of families. Providing families an opportunity to share their experiences will illustrate an important perspective on the unit design. This research is a starting point to learn from families and provide insight into creating an environment that supports FiCare.

Significance of Study

The positive outcomes that are associated with FiCare are extensive and significantly impact the lives of infants and their families (Church et al., 2020; Gómez-Cantarino et al., 2020; O’Brien et al., 2013; Waddington et al., 2021). The environment of the NICU is an influencing factor in the implementation and experience of FiCare (O’Brien et al., 2013). Infants and their families can spend months in the NICU while

receiving necessary medical care. Providing the opportunity for families to share their experiences and the impact of the unit design on these experiences can contribute valuable insight into how the NICU environment can best support families. Gathering this knowledge is an opportunity to see how the structure of the NICU can strengthen the FiCare experience.

Study results will add to the literature of what family members value in the NICU space. Growing this body of research will inspire the construction and renovation of NICUs to best support FiCare. Ultimately, through supporting FiCare practices, the design of NICUs may lead to improved outcomes for infants, their families and the healthcare system (O'Brien et al., 2013). The construction of a new NICU was part of a previous redevelopment plan for KGH (Pereira, 2023). These plans have since been halted in 2023 to reassess the needs of the community (Infrastructure Ontario, 2023). It is anticipated that future plans for redevelopment will still include the engineering of a new NICU space. This additional time creates the opportunity to gather valuable insight and have the perspective of families be the building blocks to designing a NICU that strengthens FiCare and positive family experiences.

Positionality

Personal history, social identity, and underlying beliefs all contribute to how a researcher enters the process of qualitative inquiry (Kennedy et al., 2024). I recognize that my own experiences and perspectives shape my positionality, influencing my role as the researcher in this study. My role as a researcher intersects with my other identities impacting how I engage in the research process (Bukamal, 2022). To promote an

understanding of my background in entering this research role I have provided context to personal lived experiences and self-identification.

I am born and raised in Canada and have never permanently resided in another country. I am a Caucasian female and identify as female. I have grown up in a middle-class nuclear family and now have a family of my own. I strongly value my family relationships and my parental role. I have always cared deeply for the families of infants I care for in the NICU. However, my compassion towards their birth and postpartum experience being altered with a NICU admission has been amplified since becoming a parent myself. In building the study through a constructivist paradigm, my knowledge constructing this research interest is viewed as an asset to the research development (Kennedy et al., 2024).

As the primary investigator for this research study, I acknowledge my personal experience inspired my interest to this topic of research. I have been a registered nurse in the NICU at KGH for nine years. This exposure to families navigating their journey in the NICU generated my interest in learning more about their care experiences and perspectives on how the unit is designed. In engaging with families in this study, I expected that families would share experiences that describe the positive and negative impacts of the unit design. Having worked with families for so many years in the NICU with FiCare philosophies, I recognize the importance of family experiences. In providing care in the NICU with FiCare values, family members are often in the NICU environment as much or more than healthcare staff. This intensive exposure to the NICU environment is a unique experience that is undoubtedly very different than those of us who are healthcare providers. Exploring their valued family experiences and the impact of the unit

design on these experiences will lead to knowledge that can improve unit designs to facilitate positive families experiences.

Purpose of Study

The primary objective of this research was to explore how an open pod NICU impacts the lived experiences of families. This study examined the following research question: What is the impact of unit design in the NICU at KGH on the lived experiences of families? Secondary objectives of this research study included; elucidating the experiences that families value with their infant in the NICU and exploring opportunities to improve upon the unit design in order to facilitate FiCare. The outcomes of achieving these objectives have implications for nursing, hospital stakeholders and future research.

Background

The involvement of family and patients as active participants in their own care is a widespread movement in the delivery of healthcare services across Canada and globally. This engagement has led to improved safety, quality and patient experience in healthcare organizations (Baker, 2014). Ontario Health (2022) promotes this philosophy announcing the “Government of Ontario, through the Ministry of Health, provides guidance and support to Health Service Providers across the province to build, renovate and maintain their health care facilities; the aim of which is to enable the delivery of high-quality, patient-centred care”(p. 6).

A person- and family- centred approach to care is essential in the nursing profession and is a core component of the nursing role. The College of Nurses of Ontario (CNO) (2019) expects nurses to use their knowledge and skills to provide wholistic care centred around the patient in line with practice standards in order to cultivate a

therapeutic nurse-patient and family relationship. It is further detailed that nurses share a responsibility in creating and sustaining a quality practice setting which is inclusive of supporting family-centred care. The Registered Nurses Association of Ontario (RNAO) has published a best practice guideline, Person- and Family-Centred Care synthesizing available research into evidence-based recommendations for nurses. Part of these recommendations include collecting feedback from the patient and family on their experience being centred around their values and driving change to the healthcare system based on this feedback (RNAO, 2015). The priority of person- and family- centred care in the healthcare system and nursing practice is shifting the need for health research to be grounded in patient and family experience.

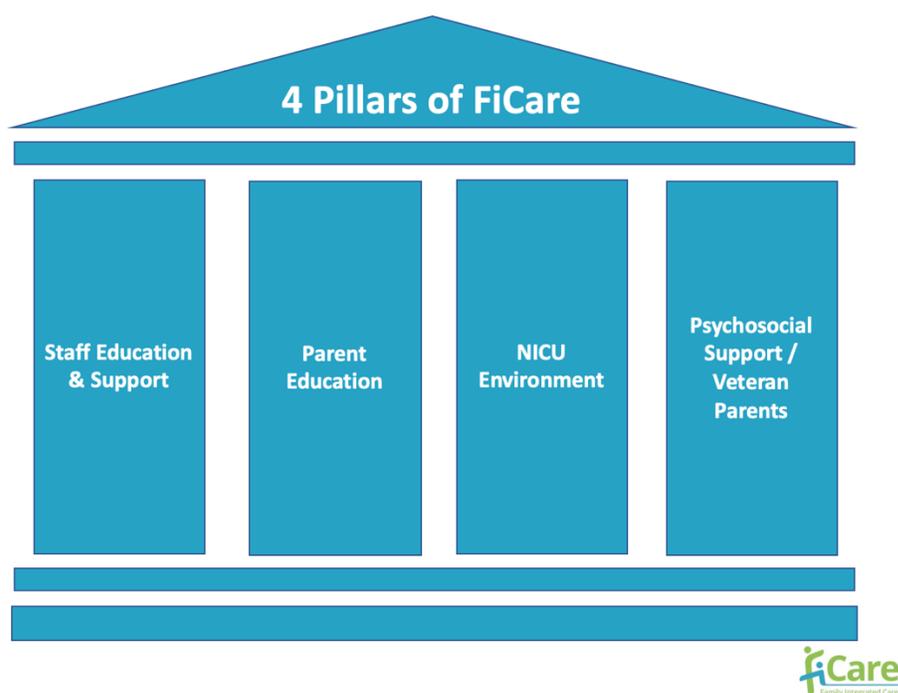
The evolution of care practices has been tremendous in NICUs around the world as a result of the movement towards patient- and family- centred care. As detailed by Lussky et al. (2005), family members were historically not allowed to enter the NICU, let alone be an integral part of their infant's care team. In the nineteenth century, nurseries were established as hospital births became more accessible, normalizing the separation of mother baby dyad. Isolation protocols to reduce the spread of disease continued with the establishment of NICUs in the 1960's to provide higher level medical care to infants. It was typical for family members to not even be allowed to visit in the unit until the 1980's. As the value of family care practices for infants such as skin-to-skin holding became recognized, the role of family evolved (Ramanathan et al., 2001).

In time, this led a team of health professionals and parents at Mount Sinai Hospital in Toronto to develop the FiCare model (Family Integrated Care, 2025) illustrated in Figure 1. The model was first published in 2013 as part of O'Brien et al.'s

FiCare pilot study. It is constructed of four pillars: staff education and support, parent education, NICU environment and psychosocial support. KGH was a NICU site in the pilot study and, therefore, has been a partner in FiCare since the beginning of its implementation in Canada (Family Integrated Care, 2022). This philosophy of practice has led to family members of infants requiring medical care transitioning from supportive roles to being active members of the care team in the NICU.

Figure 1

FiCare model



Note. Illustrated FiCare model from Family Integrate Care’s (2024) “*FiCare Toolkit & Resources*”.

The development and integration of FiCare has completely changed the approach and delivery of healthcare in NICUs across Canada and in many other countries around the world. The impact of this transition has been significant in influencing infant

outcomes, the wellness of families and the efficiency of healthcare systems (Benzies et al., 2017; Church et al., 2020; Hei et al., 2021; O'Brien et al., 2018). Randomized control trials have demonstrated the implementation of FiCare leads to infants having reduced oxygen needs, fewer nosocomial infections, less antibiotic use, superior exclusive breastfeeding rates and improved weight gain (Hei et al., 2021; O'Brien et al., 2018). A study by Church et al. (2020) discovered how the impact of FiCare extends beyond the immediate NICU stay as it has been noted that infants have positive behavioural outcomes at 18 months. These outcomes include reduced negative emotionality and less challenges with eating, sleeping and sensory sensitivities after experiencing FiCare in the NICU. Research examining the whole family shows that the incorporation of FiCare philosophies significantly decrease parental stress and anxiety (Gómez-Cantarino et al., 2020; O'Brien et al., 2018). These are all contributing factors leading to infants having an earlier discharge home from the NICU (Hei et al., 2021).

Within Alberta's integrated healthcare system, a randomized control trial among their level two NICU's showed the integration of FiCare reduced infants' length of stay by just over two and a half days with no increase in emergency room visits or readmissions (Benzies et al., 2017). A subsequent study by Lopatina et al. (2024) showed that the NICUs with FiCare have a lower mean total cost per infant. Additionally, the estimated cost of implementing the FiCare initiative was significantly offset by monetary value added back to the system. The positive impact that FiCare can have for the infant, family and the healthcare system is an important consideration when looking at research related to NICU designs and the NICU environment being a core pillar of FiCare (Benzies et al., 2017).

According to Statistics Canada (2023), the number of premature births is higher than ever with the rate of prematurity increasing from 7.1% to 8.3% over the past 30 years. As the need for NICU care is projected to increase, it is important for stakeholders to be aware of FiCare and its positive outcomes. The benefits extend not only to the infant and family, but also to the healthcare system from an efficiency and economic perspective. The unit design of the NICU may seem like a small component of FiCare but facilitating valued family experiences can create family engagement extending to support other elements of the FiCare framework (O'Brien et al., 2013). Using this research study to assemble family perspectives on their experiences related to the NICU design supports the transition to providing care in the NICU using FiCare philosophies. This is in alignment with current nursing practice standards along with provincial, federal and global initiatives for a patient- and family-centred approach to healthcare (Baker, 2014; CNO, 2019; Ontario Health, 2022).

Chapter Two: Literature Review

In this chapter the author will provide a review of the literature on the research topic. A systematic process was followed to critically appraise each article discovered in the literature search to determine its purpose and strength of evidence (LoBiondo-Wood, et al., 2018). Each study was reviewed multiple times to evaluate the process of the research study for its validity and overall quality. Research was critically assessed for its trustworthiness, reliability, and relevance to the research question. Analysis of the outcomes previously published on this subject created the foundation of knowledge which guided the development of the research process and the methodology for this study.

Literature Review Process

A comprehensive literature search was completed using the Cumulative Index to Nursing and Allied Health Literature (CINAHL) database. The search of the literature was completed between May 2023 and January 2025. Various parameters were utilized in the search strategy to strengthen the relevancy of the literature reviewed. Articles published within the last fifteen years, between 2009-2024, were assembled for review. Filtering the research to the last fifteen-years was a choice to ensure the findings were relevant and recent. Research in the NICU environments predating 2009 would not be inclusive of the FiCare philosophy and, overall, would likely have limited family involvement due to how care has previously been facilitated in the NICU setting (Lusky et al., 2005). As the research question specifically explored valued family experiences, I was looking for the approach of care delivery to be at a minimum family-centred where the research was being conducted to relate to KGH's FiCare model. Additional qualifying

factors for these studies included being available to access in full text and in the English language. The following words were identified as key terms related to the research question and were used in various combinations to search the databases: *NICU or neonatal intensive care unit or nursery, unit design or open pod or open bay or single patient room and family experience or FiCare or family integrated care or family centred care or family or parent or caregiver*. The reference lists of the articles discovered through this search were also examined for additional literature relevant to the research question. This culminated in 19 research articles selected for review which was comprised of literature reviews and a combination of quantitative and qualitative research studies.

In the literature search there were no articles that directly answered the proposed research question. Only two of the articles were Canadian, providing very little insight into the structure of the healthcare system as an influencing factor and no context to the social economic climate of the community KGH serves. From the literature, several themes were uncovered providing a description of different unit designs of NICUs and their influence on outcomes that may be associated with a family's experience. These themes included family presence, sources of stress, enhanced breastmilk feeding, infant outcomes, family satisfaction and COVID-19 restrictions.

Family Presence

According to the literature, the design of the unit influences the capacity of how families are able to be present in the NICU and support their infant (Broom & Kecskes, 2020; Campbell-Yeo et al., 2021; Feeley et al., 2020; Pineda et al., 2012; Tandberg et al., 2018). Single-family rooms can increase the amount of visitation time infants have from

their family (Pineda et al., 2012; Tandberg et al., 2018). Feeley et al. (2020) examined mothers' presence before and after a transition from an open pod NICU to a NICU with single-family rooms. It was reported that mothers in the single-family rooms were present more hours per week at the beginning of their admission and in the time leading up to their infant's discharge in comparison to those in open pods. Similarly, Tandberg et al. (2018) found that mothers with infants in single-family rooms had a central tendency of being at the bedside 20 hours a day which is significantly more than seven hours a day in the open pods. An increase of four hours was found in the amount of time fathers were present in the NICU. The single-family room design facilitates families being able to be physically present for more time in the NICU, hence, enabling greater participation in care activities and supporting their infant's development (Broom & Kecskes, 2020; Larsen et al., 2024; Tandberg et al., 2018).

Family being in the NICU is a natural factor that coincides with participation in their infant's care. The privacy of the single-family rooms promotes earlier initiation of skin-to-skin holding and longer skin-to-skin holding (Tandberg et al., 2018). Family activity was compared by Broom and Kecskes (2020) between single family rooms and an open pod design. The results of this study correlate that the more time family spend with their infant in the NICU translates to a statistically significant increase in time spent caring for their infant and holding skin-to-skin. An observational cohort study by Campbell-Yeo et al. (2021) showed that single family rooms had more family presence but similar involvement in participating in infant care. There was no difference in the involvement of mothers between the two units' layouts, however, there was a considerable increase in fathers' participation in care activities in single-family rooms.

The impact of the unit design is a significant influencing factor in the amount of family presence and the volume of family interactions infants have in the NICU.

Sources of Stress

Another area of interest within the literature was sources of stress for families. Having an infant requiring admission to the NICU to receive medical care is an unplanned emotional experience that causes significant stress for families. The design of the unit can be a catalyst as to how the environment contributes to the family's stress (Feeley et al., 2020; C. Jones et al., 2023; Pineda et al., 2012; van Veenendaal et al., 2022). When an infant is admitted to the NICU, they are typically separated from their mother who is receiving postpartum care in a different area of the hospital until being discharged home, often well before their infant. This separation is unnatural, instigating a stress response which is exasperated when the constrictions of the NICU design force family to feel like visitors (Beck et al., 2009; van Veenendaal et al., 2022). The single-family room design creates space for family to feel more like a family unit with their infant and less like a visitor (Beck et al., 2009). Using the Parental Stress Scale: Neonatal Intensive Care Unit (PSS:NICU) Feeley et al. (2020) compared parental stress across different NICU designs. Significantly less overall NICU stress was reported from mothers in single-family rooms. Breaking down the PSS:NICU results further displayed that there was greater stress in the open pods resulting from being surrounded by overstimulating sights and sounds, as well as the feeling of being restricted in their parental role. This was reiterated by van Veenendaal et al. (2022) who reported that there was reduced maternal stress in the NICU with single-family rooms, which coincided with increased presence and participating more in care activities.

Although NICU single-family room designs may lessen stress, there is some conflicting evidence reporting that is not true in all circumstances. The isolation of the single-family rooms may, in fact, increase stress for mothers (C. Jones et al., 2023). This was found to be true by Pineda et al. (2012) with mothers in single-family rooms reporting more stress. The contributing factors to the stress are theorized to be multifactorial related feelings of solitude, lack of support from other families and heightened feelings of responsibility and obligation. The environment of the open pod NICU can create a community with the support of multiple staff and other family members in the room (L. Jones et al., 2016). Lack of unanimity among the results of studying the impact of family stress between unit designs calls for further research and exploring the possibility of building a hybrid design where multiple root causes of family stress that have been identified may be addressed.

Enhanced Breastmilk Feeding

In reviewing the literature, it is communicated that infants in the NICU have an enhanced breastmilk feeding experience when being cared for in units with a single-family room design (Domanico et al., 2011; Grundt et al., 2021). Infants receiving more breastmilk in the NICU is multifaceted and is captured in different ways depending on the stage of the infant in their NICU journey. This was exposed by Grundt et al. (2021) through their longitudinal prospective observational study comparing breastfeeding milestones of infants and mothers between different NICU designs. When staying in single-family rooms, mothers had a significantly earlier first expressions of breastmilk, infants received greater amounts of mother's milk, infants attempted breastfeeding sooner and exclusive breastfeeding was more common for infants at discharge to four months of

age corrected. Previously, Domanico et al. (2011) have found similar results with infants in single-family rooms receiving breastmilk for 90% of their hospital stay as opposed to those in open pods receiving breastmilk for only 66% of their hospital stay. This translated to higher rates of breastfeeding for infants on discharge from single-family rooms. Having more privacy allows mothers to feel comfortable spending more time doing breastfeeding related activities, such as expressing milk (Broom & Kecskes, 2020).

In their integrative review, C. Jones et al. (2023) describes how current research highlights that families feel there is increased support for breastmilk feeding in the single-family room environment. These infants then have the benefit of the improved outcomes and development that are well known to be associated with breastmilk feeding. Additionally, within the NICU environment, these achievements were noted to be infants succeeding with full enteral feeds at an earlier gestational age and accelerating in their weight gain. Although this research does not examine all the same variables of breastmilk feeding, they are all concepts that relate to infants having increased breastmilk as a result of the NICU design being single-family rooms.

Infant Outcomes

The developmental outcomes of infants are significantly influenced by their diagnoses and reasons for requiring medical support. The literature suggests that the environment created by the NICU design is also a contributing factor, however, this research has some conflicting results in what designs lead to positive or negative outcomes (C. Jones et al., 2023; Lester et al., 2016; Silva et al., 2024). This theme needs to be further explored to be an influencing factor in unit design decisions, but the outcomes

and complexities of the measures are discussed as they remain important considerations in NICU designs.

In a study by Silva et al. (2024), infant behaviours were distinguishable between premature babies who received care in a single-family room and those who received care in an open pod. Infants are exposed to chronic stress in their NICU journey, thereby impacting their developing nervous system. It is recognized in this study that the single-family rooms may provide a degree of environmental protection for infants biobehavioural regulation. Infants that were surrounded by a calmer environment presented with increased total self-regulation behaviours and decreased total stress behaviours, especially in the category reflective of their motor systems. In a follow up study of premature infants, Lester et al. (2016) reported that infants cared for in single family rooms had improved neurodevelopmental outcomes at 18-months. The underlying influencing factor to greater cognitive and language composite scores was high maternal involvement, which was documented as being one and a half times more likely when cared for in a single-family room.

Developmental outcomes were extensively examined at two years of age by Pineda et al. (2014) as part of a prospective longitudinal cohort study. Premature infants who received care in a single-family room had lower language scores as well as lower motor scores. It is discussed that these outcomes may be related to sensory deprivation during a time of rapid brain development experienced by infants in the single-family room (C. Jones et al., 2023). The environment of the nursery community may benefit and provide support not only to the mothers, but also developmentally for the infants (L. Jones et al., 2016). In addition to this literature presenting inconsistencies in associated

outcomes related to NICU designs, this research is focused on the premature population receiving NICU care. Although prematurity is an admitting diagnosis for many NICU patients, infants can require medical care for a wide variety of reasons which is not reflected in any of these studies discussing infant outcomes related to NICU design.

Family Satisfaction

In the literature, the satisfaction of families is obvious as an important contributing factor to the family experience. The design of the NICU is an influencing factor as to how families assess their satisfaction with being in the NICU (Stevens et al., 2012). Families report higher satisfaction when they are cared for in an NICU with a single-family room design (Broom, M., & Kecskes, Z., 2020; Feeley et al., 2020; Stevens et al., 2012; Tandberg et al., 2018). This is fostered by a feeling of having increased time, support and respect from the NICU staff (Broom & Kecskes, 2020; Feeley et al., 2020; Larsen et al., 2024; Tandberg et al., 2018). In interviewing family members, researchers Broom and Kecskes (2020) found that families express contentment in having their own private space to relax and care for their infant. Families also express that in single-family rooms they feel more like active members of their infant's care team and have increased motivation to engage in medical rounds and other FiCare activities (Broom, M., & Kecskes, Z., 2020; Stevens et al., 2011; Tandberg et al., 2018). These circumstances all foster the higher level of satisfaction families report in having single-family rooms in the NICU (Stevens et al., 2012).

Covid-19 Restrictions

A more recent area of interest within the literature follows the rapid onset of Covid-19. Its unknown outcomes greatly impacted the delivery of healthcare in NICUs

around the world. Retrospective research is just beginning to unveil that the design of the NICU was a factor in the extent of restrictions imposed on NICU families (Ozawa et al., 2021). In their global cross-sectional survey, Darcy Mahoney et al. (2020) reported that there was less of a difference in parental presence during the Covid-19 pandemic in NICUs with single-family room designs. In these NICUs, family visiting was still reduced but not as dramatically as units with a more open design where the risk of transmission was perceived to be higher. Of the NICUs that responded to their survey, 65% of single-family room units continued 24-hour visiting whereas only 45% of open pod design were able to maintain this access for families. This trend was echoed by Ozawa et al. (2021) where all NICUs reported reduced visiting for parents during Covid-19 but permitted visiting time was significantly less in NICUs with an open pod design. It is noted in both studies, regardless of unit design, family visiting was limited to parents only and, in some units, one parent exclusively or one parent at a time (Darcy Mahoney et al., 2020; Ozawa et al., 2021).

Summary of Literature Review

Exploring the available literature highlights the complexity of variables in researching family experience as it relates to NICU design. There is a limited amount of research discussing this topic which identifies numerous themes for consideration. The examined literature only touches on these themes exposing the need for further research on this topic. Most of these themes indicate a single-family room design is preferable for families. However, when looking at sources of stress and infant outcomes there are some negatives discussed in association with the isolation experienced in single-family rooms. Additional research is needed to learn from the lived experiences of families to develop a

better understanding of the impact of the NICU design on these experiences. This research is needed within our Canadian healthcare system, especially at a local level within the province of Ontario. NICUs may have similar design concepts but the elements within the design can vary greatly, emphasizing the importance of specifically researching the open pod unit at KGH. This research study is a small step in beginning to address this gap in the literature.

Chapter Three: Research Methodologies

In the following chapter the author has detailed the study's design and methodologies. The procedural steps taken in the implementation and execution of this research are described. This includes the study's research design, sample, ethical considerations, data collection, data analysis and trustworthiness. This study uses a qualitative descriptive design to explore how an open bay NICU impacts the lived experiences of families.

Methodology and Research Design

In a qualitative methodology, the researcher collects and analyzes non-numerical data to understand human experiences as well as the meaning and impact of these experiences (Merriam et al., 2019). Using a qualitative approach is well suited for inquiries of a phenomenon or concept that is not yet well understood (Ayton et al., 2023). It is a naturalistic and interpretive method to explore complex variables that cannot be captured as a unit of measurement (Creswell & Poth, 2017). The type of qualitative research design can focus the study further, depending on the research question being asked, to strategically yield deeper and more comprehensive study results (Merriam et al., 2019).

A qualitative descriptive methodology is an approach of qualitative research that allows information to be obtained directly from those experiencing a specific phenomenon (Bradshaw et al., 2017). The flexibility and simplicity of this design is adaptable in diverse contexts which is extremely useful for healthcare research (Doyle et al., 2020). As explained by Sullivan-Bolyai et al. (2005), the interview guide in qualitative descriptive research can be somewhat more prescriptive concentrating on

areas not well understood to direct future interventions. Qualitative descriptive research aims to describe a phenomenon using a categorical approach to data analysis directly reflecting participant experience (Ayton et al., 2023; Sullivan-Bolyai et al., 2005). This methodology can facilitate questions regarding the functionality of a space, as well as facilitating or hindering factors, making it a favourable approach specific to healthcare environment research (Colorafi & Evans, 2016).

Rational for Research Approach

A qualitative descriptive approach was chosen to answer the research question; What is the impact of unit design in the NICU at KGH on the lived experiences of families? The review of the literature yielded no research directly answering the research question and only a limited amount of research on this topic. The sparsity of preceding evidence directed the methodology of this study to be qualitative (Morse & Field, 1995). The descriptive design allowed for a straightforward and comprehensive summary of family experiences as they related to the unit design of the NICU at KGH (Ayton et al., 2023). Qualitative descriptive research is functional as the objective can be collecting data to direct the improvement of healthcare, thereby aligning with the purpose and objectives of this research study (Sullivan-Bolyai et al., 2005).

Research Philosophy

The philosophical underpinnings of the research process have guided the steps taken in executing this research study. Seeking to learn from the families acquired knowledge through their lived NICU experiences aligned the study with a constructivist paradigm within the descriptive research design (Pretorius, 2024; Sandelowski, 2000). A philosophical ontological approach has been taken throughout this research by

investigating what can be learned from family's real-world experiences (Bradshaw et al., 2017). In this research, the experiences communicated reflected the realities families are living within the current NICU design. The meaning families attributed to their experiences provided insight and communicated an understanding of the impact of the unit design (Bradshaw et al., 2017).

This research is further guided in following a constructivist paradigm as an overarching philosophical framework. Families have a unique and personal perspective that is valuable in creating knowledge informed from their experience (Denicolo et al., 2016). The beliefs of the constructivist paradigm are woven throughout this research, grounding its qualitative descriptive design. This included the pursuit to understand the meaning ascribed to a human experience, the intersubjective relationship of the researcher in interpreting the data, the ontology and subjectivity of realities being studied, the construction of knowledge from everyday experiences and the aim to present a balanced interpretation of results (Ayton et al., 2023). These core elements of the constructivist paradigm shaped the philosophical framework of this research study.

Bracketing

In conducting qualitative research, bracketing is a process used to assist in mitigating preconceptions that may influence the research process and outcome data (Neubauer, 2019). It is not humanly possible for researchers to achieve total objectivity, nor is it the goal, as the positionality of the researcher in qualitative studies is integral to the research design (Ahern, 1999; Creswell & Poth, 2017). However, it is expected that a genuine attempt is made for the researcher to bracket themselves to the best of their abilities (Ahern, 1999). Engaging in the bracketing process increases the researcher's

personal awareness to reduce the potential of their subjective views clouding the research process and outcomes (Tufford & Newman, 2012). Steps have been taken throughout this study to put aside personal values to not impose preconceived knowledge, attitudes, and beliefs that may influence the study and data (Ahern, 1999; Neubauer, 2019). Engaging in bracketing creates self-awareness to be able to recognize and suspend biases that may influence how the data is gathered, interpreted and presented (Schmidt & Hunter, 1998; Tufford & Newman, 2012). The outcome of this practice is for the data to reflect the lived experiences of families and not the experiences of the researcher (Creswell & Poth, 2017). Bracketing is not a straightforward process as it is connected throughout every stage the research study (Tufford & Newman, 2012). This provided direction in supporting processes to centre the research in families personal experiences and how to embrace my position as the researcher using active reflexive practices (Pretorius, 2024). The study was developed to value the participant's subjective realities that were co-constructed by their experiences and interactions in the NICU (Bradshaw et al., 2017; Pretorius, 2024). Through the interviews with families their constructed knowledge was explored and recognized as being important through the lens of this paradigm.

Reflexivity

Reflexivity is participating in the examination of one's assumptions, emotions, interests, theories and values as they may relate to the research study (Ahern, 1999). This practice is ongoing throughout the different stages of the research process (Braun & Clarke, 2006). In a qualitative study it is assumed that, with engaging in reflexive practice and bracketing, we acknowledge there remains a degree of which our experience and internal construction of reality influence the research (Ahern, 1999). Engaging in these

practices allows for clear communication of the researcher positioning themselves in the research study (Creswell & Poth, 2017).

Personal Reflexivity

As part of the process of this research study, I took many steps to engage in reflexive practices. These steps led to balancing the practice of bracketing, as to not influence the research with my own biases, along with embracing my clinical exposure that led me to be in a position to recognize the value and need for this research. Prior to beginning this study, I engaged in self-reflection to expand my self-awareness and recognize my personal biases. I recognized how my life experiences, such as being a NICU nurse as well as a mother, impacts my perspective. Additionally, I acknowledged my privileged position of being a university educated healthcare provider. I was very aware of the influence my position may have on how families felt towards me and responded to questions in the interviews. To avoid being the care provider for infants of family members I was interviewing, I did not work in the NICU during the time of participant recruitment and interviews. This was clearly communicated in the letter of information and consent reviewed with family members prior to participation. This separation allowed for my relationship with participants to strictly be built from the role of a researcher. It removed any exposure I could have had to additional information on the care of the infant and family that may have influenced the interviews and data. Additionally, having this degree of separation may have allowed participants to feel more open and less vulnerable about sharing the full spectrum of their experiences.

I continued reflexivity throughout this study by journaling at all stages of the research process. This journal consisted of my reflections, questions and decisions I made

in facilitating this study. Having this outlet allowed for a clear separation of my experience from the data being collected, hence, creating a clear audit trail (Ahern, 1999; Merriam et al., 2019). This is further described as part of this study's data analysis as the steps taken in identifying themes directly from participant quotes are detailed. In the process of this research study, I strived to achieve a balance in positioning myself as the researcher in completing this study. Achieving total objectivity was unrealistic, nor was desired, as it would not have allowed for the positive insight my insider status brought to the design of this study (Ahern, 1999; Merriam et al., 2019).

Sample

The sampling process is central to the methodology in qualitative research as it determines the sources of the research data (Robinson, 2014). Most qualitative research, including this study, use non-probability sampling which is identifying participants through a method that is not random (Merriam et al., 2019). In determining the sampling approach in qualitative research, there are three main considerations; who to select as participants, the sampling strategy and the size of the sample (Creswell & Poth, 2017).

In creating this research study, selecting the population of interest was identified congruently with developing the research question. The research question specified that the interest of this study was in the experience of family members of infants in the NICU at KGH. Criterion purposeful sampling was used to further identify participants for this study. This sampling strategy is ideal to identify people who have had a certain experience to gather information-rich data (Creswell & Poth, 2017).

The inclusion criteria for this study consists of families of infants who have been in the NICU at KGH longer than four weeks within the time period of July 2023 to

February 2025 and are English speaking. This criterion was purposefully chosen based on the 2022 census data for the NICU at KGH, which indicated infants were admitted for an average of 31 days or between four and five weeks. This was determined by averaging the length of stay of all categories of babies based on their gestation age at birth (28 weeks or less, 29-33 weeks, 34-36 weeks and 37 weeks or greater) when admitted to the NICU. Having at least four weeks exposure time to the NICU environment ensured family members had enough time in the unit to have a variety of experiences to speak about in the interview. There are no additional exclusion criteria as the study is inclusive to families of all types of infants that require a stay in the NICU. Family was defined broadly in this research study to be inclusive and reflective of the diverse composition and structures of families in today's society. Any family member who identified as a primary caregiver to an infant being cared for in the NICU at KGH was welcomed to participate.

Participants self-identified for this study, if interested, after seeing a recruitment poster with study information (Appendix A). These posters were displayed at KGH in the NICU family room and in the hallway leading into the NICU. In scanning the quick response (QR) code on the poster, participants were directed to acknowledge statements confirming their eligibility to participate in this study. Interested participants were also able to respond if they would like to be contacted by phone or email. The survey platform Qualtrics was used to collect these responses. Interested participants were then contacted with additional scripted information (Appendix B) within a week of their survey completion. In the situation where two family members of the same infant chose to participate, they were provided with the option to be interviewed together.

In qualitative inquiry, the size of the sample cannot be predetermined as adequate sample size is determined when thematic saturation is achieved (Guest et al., 2006). This milestone is described as being reached when no new ideas are emerging from the participant interviews (Creswell & Poth, 2017). In qualitative data collection, especially in the healthcare field, thematic saturation is considered the gold standard in justifying adequate sample size (Guest et al., 2006). As the exact sample size could not be predicted, it was stated in the research ethics applications that anywhere from two to sixteen participants may be interviewed. This participant range was selected after reviewing qualitative research studies with a similar design and examining the number of participant interviews that were completed. A large sample range was chosen to provide flexibility as it was unknown during the REB application process how many interviews would be needed to reach thematic saturation, however, an amendment to the REB applications could have been submitted if participant recruitment needed to extend outside the proposed sample size to answer the research question. Smaller samples in qualitative research are accepted to support the collection of richly textured information that is purposive to the research experiences being studied (Vasileiou et al., 2018).

Ethical Considerations

Ethical issues were considered throughout the research process. The respect, justice and concern for the welfare of participants were core guiding principles in the design and implementation of this study (Creswell & Poth, 2017). Prior to commencing this research, ethical approval was received from both the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board (Appendix C) and by the Trent University's Research Ethics Board (Appendix D). Research permission was

also obtained from Kingston Health Sciences Centre to conduct research at their Kingston General Hospital site.

The design of this research study included two methods of obtaining consent, either verbally or written. Both consent processes occurred prior to the interview. Verbal consent was obtained from participants using the verbal letter of information script and consent form (Appendix E) and tracked using a verbal consent log (Appendix F). This process was used for family members participating in virtual interviews using Microsoft Teams. For in-person interviews, the letter of information and consent for study participation (Appendix G) was reviewed by the interviewer and signed by the participant. However, if a participant was illiterate, verbal consent would have been obtained using the verbal consent script. Prior to giving consent, participants were provided multiple opportunities to have any questions answered.

Both letters of information and consent forms communicated crucial information for the ethical integrity of this research study. It was reiterated to family members their participation was voluntary and would have no impact on the medical care of their child. They may choose to not answer any interview questions or stop participating at any point. I disclosed that, as the principal investigator, I have previously worked in the NICU at KGH but was not working there at the time and would not have provided care for their child. Although there is minimal to no risk with participation in this study, it is recognized that talking about their NICU experience may be emotional for family members. It was encouraged that they call the Telephone Aid Line Kingston if they felt upset after the interview.

How the data would be used and the how their identity would be protected was detailed to participants. They were informed that results of this study will be used for my Master's level thesis. In addition, I intend to publish this research in academic journals and present at conferences. Any quotes that are used will be anonymized. Transcribed interviews will be coded with a study ID number thereby removing any participant identification. The code file (Appendix H) that links real names with study ID numbers will be stored securely and separately from the data on an encrypted USB file. Other identifying locations, landmarks or hospitals besides KGH that were discussed were replaced with a generic descriptor, such as "town an hour and a half away from Kingston" in brackets during transcription. The study data will be stored on an encrypted hard drive on Trent University's server and will be destroyed five years after the study's completion. It was communicated to family members that there were no direct benefits to them as the participant and study results will add to the literature of what family members value in the NICU space.

Data Collection

In qualitative descriptive research, there can be various data collection strategies using observations, interviews and/or documents to understand the views and experiences of an individual or group (Doyle et al., 2020; Merriam et al., 2019). Semi-structured interviews are the most commonly used data collection approach in qualitative descriptive research and is the chosen data collection method for this study (Kim et al., 2017). Interviews for this research were completed in person at KGH or virtually using Microsoft Teams at a convenient time for the family member(s). Providing choice in where and how the interview was conducted was purposeful to empower participants and

allow them to choose a comfortable environment and a convenient method for them to be interviewed (Elwood & Martin, 2000).

The recruitment and interview process for this study occurred between November 2024 and January 2025. The end date was originally set as December 2024, however, an amendment for extension was submitted and accepted by both Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board and by the Trent University's Research Ethics Board to extend until February 2025. In-person interviews were held in a designated interview room in the W.J. Henderson Centre for Patient-Oriented Research within KGH. In-person interviews were audio-recorded using a digital recorder and virtual interviews were video recorded using Microsoft Teams, however, participants were informed that they may choose to turn off their camera if they wished to only be audio recorded. Three family members chose to be interviewed using Microsoft Teams and two family members chose in person interviews at KGH. Three interviews were conducted in total as two interviews had two participants from the same family.

The interviews were semi-structured and followed an interview script in order to focus the dialogue (Appendix I). This format of interview provided the freedom to ask follow-up questions and explore pertinent ideas that emerged further from participant responses (Adeoye-Olatunde & Olenik, 2021). The interview script was constructed with questions and prompts for participants to share their valued family experiences in the NICU and the impact of the unit design on these experiences. It was approximated that the interviews would be 20 minutes long, however, the actual interviews ranged between 18 to 32 minutes in length. Participants received a ten-dollar electronic gift card to Tim Horton's in appreciation for their time participating in this study. Reflexive journaling

was completed by the researcher following each interview to create an audit trail and reflect on the knowledge I gained in engaging in that interview (Ahern, 1999; Merriam et al., 2019).

Data Analysis

The analysis of qualitative descriptive research is data driven and often occurs simultaneously with data collection (Doyle et al., 2020). The congruency of these processes allows for it to be realized when thematic saturation is achieved and interviews can be concluded (Guest et al., 2006). Data analysis for this study was completed by myself as the primary investigator with ongoing discussion and review with my supervisor. Braun and Clarke's (2006) phases of thematic analysis in qualitative research were used as steps to guide the data analysis of this research study.

Phase One: Familiarization with the data

Recorded interviews were transcribed within two weeks of the interview date and the recordings were deleted. Interviews were manually transcribed verbatim providing the opportunity to gain familiarity with the data and make primary analytic notes (Merriam et al., 2019). Being actively engaged in listening, reading and re-reading the interview scripts built a strong foundation in becoming well acquainted with the data.

Phase Two: Generating preliminary codes

The coding process involved systematically reading and filtering through the data line by line and assigning a word or few words to reflect the essence of that segment (Ayton et al., 2023). Codes were generated using an in vivo coding process. These codes were created from the participants own words and were used to capture the meaning and characteristic of the data (Creswell & Poth, 2017). This inductive approach allowed the

data to be interpreted using the participants own terminology keeping it close as possible to how it was communicated. This coding process was not linear as each interview went through multiple rounds of coding as more interviews were completed and new codes were established (Ayton et al., 2023).

Phase Three: Searching for themes

The process of axial coding was completed by organizing and forming categories which sorted codes together based on their relevancy to each other (Merriam et al., 2019). From these groups, themes were then developed capturing the meaning of the overarching central concepts of the codes (Doyle et al., 2020). Tables were used by the researcher to visualize and organize codes to create preliminary themes.

Phase Four: Reviewing themes

Braun and Clarke (2006) identified two levels in which the themes are reviewed in this process. Level one is verifying that all of the coded extracts align in a logical way with the identified theme. Level two is examining the validity of the themes in accurately representing the entire data set. Both of these steps involved reading over the entire data set to fine tune the coding. This stage concluded with having a clear picture of the themes, the relationship between themes and the narrative they were building together.

Phase Five: Naming and defining themes

This stage discussed the themes in depth and the interpretation of participant quotations (Doyle et al., 2020). The essence of the theme, how it reflects the data and the scope of the theme should all be defined in working through this phase of analysis (Braun & Clarke, 2006). The names of the themes are also refined to be clear, concise,

captivating and informative of what the title is representing in the data (Braun & Clarke, 2022).

Phase Six: Writing a report

This is a key component of data analysis as the production of a report narrates the themes and includes supporting study data (Doyle et al., 2020). The merit and validity of analysis should be evident through a scholarly analytic narrative as an answer to the research question (Braun & Clarke, 2022). This is captured in the results and discussion chapters of my Master's thesis.

Trustworthiness

In designing and conducting this research study, methodical and rigorous steps have been taken to instill trust in this qualitative research (Nowell et al., 2017). These elements of natural inquiry are inspired by Guba and Lincoln's (1982) criteria of credibility, transferability, dependability, and confirmability. Credibility is described as being achieved when the realities of participants are appropriately represented. In analyzing the transcribed interviews, in vivo coding was used to reflect how participants communicated their experience as closely as possible to how it was stated in the interview.

This analysis process was utilized, along with intertwining supporting quotes, through thematic discussions to inspire confidence in the research findings (Ayton et al., 2023). Thorough description of the open pod design of the NICU was provided and study recruitment was inclusive to all structures families whose infant required NICU care. The description of context and research process provides the slight possibility of transferability, however, the goal of this research was to learn about the family's

experience specifically at KGH. Confirmability reflects how the study results are grounded in the participants experience (Nowell et al., 2017). In this research process, reflexivity and bracketing have been practiced to not transfer any personal bias (Ayton et al., 2023; Guba & Lincoln, 1982). The position and involvement of the researcher has been clearly communicated throughout this study. Dependability reflects the reliability and replicability of a study (Guba & Lincoln, 1982). The methodology of this research study has been extensively detailed and an audit trail was maintained. It is presumed from this information that this study could be repeated maintaining some consistency (Ayton et al., 2023). The integration of these strategies was purposeful to inspire trust in the quality of this research study.

Chapter Four: Results

In this chapter, the author presents the study data of participant responses to the interview questions. This includes a description of the participants interviewed and the data collected through the process of analysis. The findings of the interviews were analyzed by following Braun and Clarke's (2006) phases of thematic analysis which are detailed in the methodology chapter of this paper. Through the participants interviews, five overarching themes were identified in response to the research question. These themes were constructed from families sharing their experiences from the NICU that they felt were important enough to speak about in answering the interview questions. These questions yielded data focused on their valued family experiences and the impact of the unit design on these experiences in the NICU at KGH. Quotes are anonymously presented from participants and the speaker is identified as participants one through five (P1-P5).

Participant Characteristics

In this research study, a total of five participants were interviewed when thematic saturation was achieved, therefore, recruitment was stopped. Three of these family members communicated their relationship as mothers and two as fathers of infants in the NICU. Only two of the family members interviewed lived within the city of Kingston where their child was receiving care in the NICU. This was all of the participants first experience having an infant in the NICU, however, three of the family members communicated that they had twins who were both receiving or received NICU care. The amount of time family members had spent in the NICU when engaging in this interview varied from five weeks to more than three months. Additionally, two of the participants

disclosed that they had experienced other NICUs as their infants had been transferred throughout their journey requiring medical care. Detailed participant demographics were not collected for this research study as it was not pertinent to the results of the study in order to answer the research question. However, being able to contextualize the sample further would have assisted with the generalizability of the findings (Guba & Lincoln, 1982).

The Analysis Process

In following Braun and Clarke's (2006) phases of thematic analysis, the process of developing themes from the data was strictly followed and is clearly described in this chapter. Phase one of analysis included the transcription and reading of the data to develop a strong familiarization with the interviews. This was essential to the following phases to ensure the described results communicated overarching essence of interviews. Phase two of analysis involved determining the significance line by line of the interview transcripts. In vivo coding was used, which involved taking a segment of the participants words to form the code. This code captured the meaning of that portion of the response. However, if the segment shared meaning with a previously established code from a different segment of the interview or from a different interview, it was assigned again to represent the thought or experience being communicated.

Table 1*Examples of In Vivo Coding*

Participant Response	Code
“Maybe like more of a home environment. Because exactly, I've been in there for three months. It's not a nice spot to be.” (P1)	More of a home environment
“And also, I felt kind of, not necessarily uncomfortable, but I didn't want to be in the way and spend like 24 hours a day in the NICU. So, I would go for a couple of hours and then I would come back home and then I would go back a couple of hours later.” (P2)	In the way
“It is nice being in a pod setup. We've been able to connect with some of the parents that have been going through the same thing. So, I definitely wouldn't get rid of the pod style, just less cluttered pods.” (P5)	Nice being in a pod setup

This coding process involved rereading the transcripts many times to confirm the code reflected what was being communicated by the participants. Previous transcripts were also being reviewed as new codes were generated to see if they resonated with what another participant was communicating or if a new code captured the essence more appropriately than a previously chosen code. This led to phase three of analysis where the process of axial coding was used to cluster like codes. Creating these categories began to display common ideas being communicated from participants. From these groups, relevant codes were assembled in forming preliminary themes which reflect the central ideas and concepts from the interviews.

Table 2*Axial Coding and Themes*

Theme	Axial coding
Needing more space	Crowded Space is very small In the way Chaotic experience
Creating a comfortable environment	Want a little bit of privacy More of a home environment Nice being in a pod setup
Desiring consistency in staffing	Enough staff to fully staff each baby Decrease the rotation of staff
Barriers to being present	Difficult commuting situations Visiting protocol
Having a sense of community	They trust us Parent participation Build a rapport Feeling of community Connecting with parents

Proceeding to phase four, these themes went through two levels of review. The level one review process verified the alignment of the codes with the developed themes. The level two review involved all of the transcripts being reread to make sure that the themes accurately represented the data set. The fifth phase of analysis will be communicated in the following section of this paper as each theme will be individually discussed in depth. This will include a description of the theme, evidence of how this theme was developed, the codes categories creating the thematic foundation as well as quotes from participants.

Needing More Space

The initial theme of *Needing more space* is central to how participants described their family experiences in relation to the NICU design. This was strongly communicated throughout every interview with all five participants. There was a range in what families

described as their valued family experiences while caring for their child in the NICU.

What is consistent across all participant responses was *Needing more space* in the unit, as this significantly influenced their family experiences. This theme evolved from four codes that together formed the theme of needing more space. The foundational codes of this theme include *Crowded*, *Space is very small*, *In the way* and *Chaotic experience*.

The significance of the word *Crowded* describes a space feeling too full of objects and/or people making it difficult to move around. This code originated from family members describing the challenges in using privacy screens around their infant's care space.

Again, that interacts with the design of the room. If the room wasn't so crowded it wouldn't be a problem. (P4)

It is disclosed by participants that part of what makes the NICU crowded is having too many babies in each pod. Each baby has their own dedicated supplies and equipment adding to the volume of items in the pod. They explained,

Yeah, it's cluttered. I mean it's hard because obviously they want to be able to provide as much care to as many babies as possible, but definitely the pods are set up for six babies and really space wise it feels like it should be four. (P5)

Different participants communicated similar statements reinforcing the extent of this challenge in the unit design. The words chosen in the participant responses captures significant feelings and emotions. In sharing their experience, a family member stated, "The problem is that there is just too much crap" (P4) which really conveyed their frustration with the care environment. In talking about feeling crowded, families had

immediate ideas of how the space could be more accommodating for all of the equipment.

Less cluttered and a bit more flexible of a space design. If something could be rearranged in different ways. In ways that is easy instead of being so rigid where things had to be because of how it's been laid out. (P4)

This shared idea bridges to the next code being the *Space is very small*. This code encompasses similar describing factors family members used in talking about the KGH's NICU design. The mention of the term "space" was very frequent in all interviews speaking to the importance of creating this code and it being included in the language of the overarching theme of *Needing more space*. "One of the drawbacks to that is that the NICU space is very small." (P2) This message was consistent among interviewees and was negatively associated with their family experiences and a limiting factor to their ability to participate in FiCare.

I definitely don't think that they have enough space. Especially like we have twins, like, I had to ask for them to be together. So that's important to me. I just think, yeah, they need more space. Like your babies are in there for so long, that's where you're going to spend your time with your babies. (P1)

Space is a core element in the footprint of the NICU and can be integral to many elements of the unit design. It was recognized that this challenge of space impacts not only families, but also everyone working in the NICU environment. "They don't have any space." (P1)

Um it's hard because I think they are doing the best that they can, but again it's limited space. Like if my husband and I are there and then the couple next door,

they're like there's not very much space or privacy. Like I really just feel like it's all about space and I know that's hard because there's so many babies in the NICU, but that's a big thing is privacy and space. (P1)

One family member had the experience of being transferred to a few NICUs with their infant throughout their stay. Subsequently, they had been exposed to several NICU designs and shared this feeling about a different unit.

But one of the things I really enjoyed about the NICU there is the space that the children have is significantly bigger and very private. (P2)

Communicating that the NICU *Space is very small* was important for all participants conveying how much of an impact this had on their NICU experience. This is a contributing factor to the next code in analysis that family members felt *In the way*.

They don't have any space. Like you're stepping over each other. If you're trying to breastfeed, they have to go find like covers for you. (P1)

The statement of being *In the way* describes an unwelcoming experience within the NICU environment. Participants illustrate the limitations of movement at the bedside.

Cause if everybody has a parent in visiting you can't move and you're like climbing over chairs and then every baby is attached to cords, you're not easily moveable for someone to get around you and all that stuff. (P5)

This was deterring for family members and was communicated as a unfavourable feeling from participants. This perception led to family members sharing that it impacted their presence at the beside of their infant, ultimately impacting the FiCare experience.

And also, I felt kind of, not necessarily uncomfortable, but I didn't want to be in the way and spend like 24 hours a day in the NICU. So, I would go for a couple of

hours and then I would come back home and then I would go back a couple of hours later. (P2)

Family members felt that being in the NICU environment was a *Chaotic experience*. This state of chaos is described as being fuelled by not having organizational flow in the environment. The functionality of the equipment in the physical care space provided is challenging as “none of the things fit in together well.” (P5)

Like if there is an IV pole that also holds the warmers, the wheels don't like nicely fit under the crib or anything like that. So you are constantly working around these things that have different wheels that are all over the place as well. It would be sweet if the cribs just had like a post on them.” (P5)

Additionally, participants recounted the impact of the overwhelming sensory stimulation surrounding them in the NICU contributing to their *Chaotic experience*. “They have to turn on lights to do procedures but all of a sudden everyone is stimulated by the lights.” (P4) There was also a lot of noise as “every time a monitor goes off it sounds like it could be your monitor, you don't know which monitor went off.” (P4)

I find that, you know, we're trying to ask questions, but then other babies are beeping, and other doctors are walking through. And it's a very chaotic experience. (P1)

Creating a Comfortable Environment

The theme of *Creating a Comfortable Environment* evolved from family members answers to questions regarding the impact of the unit layout. The cluster of codes supporting this theme were prevalent across all of the interviews. These codes were created from the voices of participants and include *More of a home environment*, *Nice*

being in a pod setup and *Want a little bit of privacy*. This theme encompasses why and how participants feel *Creating a Comfortable Environment* in the NICU may be achieved.

When describing their family experience, the participants communicated desiring NICU design elements consistent with *More of a home environment*. Families can spend months in the NICU as their infant requires medical care, which is a long time to spend in a very clinical environment. A participant captured this in suggesting the NICU should be “Maybe like more of a home environment. Because exactly, I've been in there for three months. It's not a nice spot to be.” (P1)

Participants communicate that it would be positive if they “could spend more time there and relax” (P4) especially “if there was a bed or something there” (P4) for them to use.

Yeah, definitely being able to stay and maybe take nap and then just wake up to feed. So like right now we're working on feeding and she breastfeeds much better than she bottle feeds but there is nowhere for me to stay and sleep or anything so I can't be here all day to breastfeed to get her to be able to do all oral feeds faster.
(P5)

The furniture in the pods was extensively discussed as many elements are transitional for different care activities but items like the “chairs themselves are very difficult to move.” (P4) A mom describes that “When you're breastfeeding, the bigger chairs are nicer.” (P5) Another participant states “there are no surfaces to put anything on” (P4) in their baby's care space. Additionally, the importance of natural light was communicated from several families.

The other nice thing is that this hospital has beautiful views through the windows. There is lots of good sunlight, the feel can be very positive. You can see the weather and what's happening. (P4)

A family designated to a different pod shared a very different experience but communicates a similar message.

And there's a space in the NICU that doesn't have windows, and it's really dark during the day. I know for the babies that that's probably a great thing, but spending a lot of time in the NICU, in an area that doesn't have windows is not great. (P2)

One participant shared their experience in a different NICU and the positives they found in that unit design for their family.

But one of the things I really enjoyed about the NICU there is the space that the children have is significantly bigger and very private. There's like a chair there for you, and like a little cubby for you to keep some things. And just kind of feels a little bit more comfortable rather than clinical, may I say?" (P2)

The next code discovered in analysis was *Nice being in a pod setup*, directly created from a participant statement. This captures the positive concepts of this style of NICU communicated through the lived experiences of families. One of the strongest supporting elements that participants spoke to was how the open pod layout helped facilitate building supportive relationships with other families.

It is nice being in a pod setup. We've been able to connect with some of the parents that have been going through the same thing. So, I definitely wouldn't get rid of the pod style, just less cluttered pods. (P5)

Participants further describe how they feel not being in an open-pod setup would “be quite isolating” (P4) and it is nice to know you are not “the only one going through this experience.” (P4) It is also communicated that in addition to having other families, there are always nurses in the pods making it less isolating.

Cause right now, say we’re in a thing with six babies, there are two to three nurses. So like even if a nurse is not assigned to your baby if they are beeping something red and your nurse is busy, there is someone else right there to aid. So that would be more difficult in a single room if it wasn’t a one to one care thing. (P5)

Families explain how they watch staff “function well” (P4) in the open pods because there are multiple nurses and situations like “breaks are not a degradation in care”. (P4) Although positives of the open-pod design were communicated from all participants, there were still negatives discussed with the open pod layout.

The final code contributing to in data analysis of building the theme *Creating a comfortable environment* is that families *Want a little bit of privacy*. In response to questions surrounding the impact of unit design on their experience in the NICU, participants discussed the challenges of the openness of the pods.

So, everything that is shared about your baby's situation, their care is overheard by everyone around you. So, in that sense you could say it lacks a little bit of privacy. (P2)

The unit design poses challenges for confidentiality within each pod and among the different pods as “you can hear the other room” (P5). Participants *Want a little bit of privacy* for participating in care activities with their infant too.

But once they are in the cribs and they can be handled all the time, you start doing non-nutritive or you start breastfeeding. I think definitely having a private space where you can do those things would be really nice. (P2)

One participant expressed that they would prefer their “own space” (P1) such as their infant being in a single-patient room. However, all of the other participants communicated that this would be welcomed when their infant was less critical and closer to going home.

I would say what I would hope for is a NICU that was arranged with some of those, and there be a use for them depending on where you were in the process but not that you would have universal individual rooms. But definitely something that could create, especially something more flexible where you could create privacy and take it away as needed would really be helpful. (P4)

The lack of privacy in the open pod design can be “pretty exhausting” (P4) for families and is a limiting factor in *Creating a comfortable environment*.

Desiring Consistency in Staffing

The theme of *Desiring consistency in staffing* was generated from participants sharing what they wish to see in the NICU based on their personal experiences. In analysis, this was captured through the codes *Enough staff to fully staff each baby* and *Decrease the rotation of staff* which were developed verbatim from participant statements. These codes arose in several interviews reflecting the priority participants felt in communicating these ideas and concepts from family experiences.

The code category of *Enough staff to fully staff each baby* was constructed from participants sharing their perception of how the unit is able to staff with their current open

pod design and their staffing concerns with the idea of single-family rooms. Families describe the current staffing ratios they have experienced.

I feel like it would help if the nurses had like only one baby on their line, not like three or four, because whenever I come in and I want to, like I said, ask about my child, they're also doing three other babies and we don't get that one to one time to see how our baby was doing. (P1)

It is communicated that staffing appears to be a challenge for the participants perspectives. "Okay, I feel like it's hard like to have enough staff to fully staff each baby, but I feel like it needs to be more personable for sure." (P1) As a result of the different experiences family members had in the NICU the idea of single-family rooms in the NICU was met with some apprehensions. "Obviously, we're not staffed to be a one to one care thing in individual rooms so that would be a concern." (P5)

For example, the nurses cared for multiple babies. So if we were in a private room would that nurse have just our baby, or would they be caring for multiple babies? And if it is a private room, how would they ensure that they're there when they need to be there for whatever interventions or care is necessary to the child. I think that's the biggest one. (P2)

The idea of single-family rooms brings up a lot of questions from families based on their experience of having a child in a NICU with an open pod design.

In addition to the topic of staffing ratios, families spoke of wishing there to be a *Decrease in the rotation of staff*. This was talked about by several participants as impacting their experience and something that should be considered in conjunction with the unit design. Even though it does not directly tie to the research question, the

prevalence of this code and the necessity families felt in speaking to this make it important to report as part of the results of interviews.

This doesn't necessarily have anything to do with like facilities itself, but maybe decreasing the rotation of staff so that you get to know the people who are caring for your child. And they get to know your child as well. Which maybe add a sense of comfort and confidence to leaving your baby alone with these strangers, you know, to put it like simplified. (P2)

Families shared that their infant had a “really high rotation of nurses” (P2) while in the NICU which is communicated as a challenge. However, when there was consistency, the impact is positive on the family experience as one participant states they “had the same person multiple times it’s been really good”. (P4)

I would say having the same nurse multiple days in a row has been really valuable because then it really helps with the continuation of care I find. (P5)

Barriers to Being Present

In sharing their lived NICU experiences *Barriers to Being Present* was established as a theme that was woven through all of the interviews. This theme encompasses the codes of *Difficult commuting situations* and *Visiting Protocol*, both of which were highlighted from participant statements. The majority of the participants interviewed did not live within the city of Kingston and this was something families felt was important to speak to in connection with the unit design. The frequency of these codes was greater in interviews with out of town participants as the *Barriers to Being Present* were more significant than for families local to Kingston.

Difficult commuting situations were alluded to by all participants. Even when they did not live far from KGH “the commute is a lot” (P1), just going back and forth to the hospital. Having the resources to get to KGH to visit their infant and stay close to the hospital was shared as being challenging for families. One participant described commuting to the hospital in the following emotional statement. “It was horrible. Oh gosh, it was a struggle.” (P2)

There were many contributing elements to the *Difficult commuting situations* including living location, socioeconomic factors and the family members mental health. Family members shared that their home is far from KGH, “like an hour and 40 minutes, so gas alone and the time” (P2) is significant. One participant explained that their partner was “a new permanent resident and didn't have his G2.” (P2)

So, transportation for him was a nightmare because we depended upon friends and family and the via train, which is quite expensive for him to get back and forth to visit us. For myself, I basically stayed in Kingston at the Almost Home for their entire stay, so I was walking back and forth from the Almost Home to the hospital. So that was okay, and the Almost Home is a great resource. (P2)

Almost home was talked about by several families as a house where “they can rest nearby the hospital, not in, but nearby” (P4) when they are from outside of the Kingston area with an infant in the NICU. However, even living close to KGH, the task of commuting is burdensome.

I still find it exhausting to like be going back and forth to home and the hospital.

We're grateful that we're not one of the families, like there are so many families

that are from Belleville or Trenton or Brockville, cause we're the closest level three." (P5)

Participants expressed challenges with affordability and availability of parking located near KGH which is captured within *Difficult commuting situations*. The "driving back and forth, paying for parking" (P1) is described as being hard for families.

It's like a five-minute drive and a ten-minute walk because of the way parking works. Parking is the biggest challenge. (P4)

Elements of a *Visiting protocol* are alluded to by family members which are contributing *Barriers to being present*. Families shared their experience having to be a visitor, to leave the hospital and come back to see their infant. "In Kingston it was difficult because you can't stay in the NICU and you can't stay in the hospital." (P2)

We live here in Kingston, so we have the opportunity to be here quite often. For example, we can be there for rounds usually and that sort of stuff. Either several visits a day or a long visit each day is easily possible for us. (P4)

One family described the unit design of a different NICU that allowed them to stay in hospital, which completely removed any *Visiting protocol*.

...they have three adjoined care by parent rooms that are directly connected to the NICU for parents who are breastfeeding, who want stay the night or who are in need of being by the side of their child during their stay for whatever reason. And that was a really wonderful experience to be able to stay in the hospital connected to the NICU but in a private space with my own refrigerator and microwave and just some basic amenities. (P2)

Participants expressed with visiting that “there are rules that are sort of not told to you until you break them.” (P5) It is shared that “all of the signs and all of the spiels say that you can come 24 hours a day, which is almost true, but not fully true” (P5) for visiting.

But definitely having sort of a parent onboarding at the beginning as part of the admission process. Just kind of running over how it works, what you’re allowed to do, what you’re not allowed to do. And then like a little handout you could take home to review later. (P5)

The accumulation of these pieces of a *Visiting protocol* contribute to building the *Barriers to being present* for families.

Having a Sense of Community

The theme of *Having a sense of community* arose across all family interviews illustrating the bond that develops between people spending time together in the NICU and sharing the common goal of providing the best care for their infant. This theme was strongly intertwined throughout the interviews with all participants. Five codes were developed from the participant’s voices supporting this theme including *Parent participation*, *Building a rapport*, *They trust us*, *Connecting with parents* and *Feeling of community*. Although some aspects of this theme were facilitated by the proximity of families within the unit design, it is clear that *Having a sense of community* is fostered through many practices within the NICU at KGH.

In the interviews, many families described being involved in meaningful aspects of their infant’s care captured as *Parent participation*. Families shared what care practices they valued experiencing with their infant and how they were a part of the care

team. Participants communicated that it was “a very connected time” (P4) for them being involved in their infant’s care activities.

So, bathing them, changing their diapers, taking their temperatures, like doing as much as possible to be involved while they were there in hospital. (P2)

In addition to providing care, participants communicated the importance of holding and “having skin to skin contact” (P2) with their infant.

Um but having the time to hold them every time I was there, it was very it was very nice because it was just important. It was a great prize to go in and being able to hold them and talk to them. (P3)

Family members described “doing as much as possible to be involved” (P2) reflecting the FiCare philosophy.

Yes, so we do her diaper changes. We do the bottle feeds. We give her meds orally. We take her temperature. Um, because we’ve been so involved, like we find we are quite involved in the doctor’s decision-making process. (P5)

Families communicated part of *Having a sense of community* is created by *Building a rapport* with the care team. This is expressed as being facilitated through family and NICU staff interactions.

Lots of teaching help from the staff. So, I find when I go in if I have questions the nurses are really happy to help us. They teach us how to like properly bottle feed, take temps. Any questions we’ve had they’ve been really helpful that way. Like a teaching reference. (P1)

Participants shared the support they received in learning from NICU staff and that they “are there to help you” (P5). Having staff as a resource is positive as a participant expresses that “this is a benefit to us” (P4).

The staff was great. They were always there for any question we had. They always were, I mean, you could always see that they knew what they were doing. They actually care about the babies because you can notice that they actually got that passion about taking care of the babies. (P3)

Family members identified the importance of “being able to interact with the nursing staff” (P2) and *Building a rapport* to “help them care for my girls” (P2).

Participants state *They trust us* in reference to NICU staff. This code captures the important feeling of trust felt by families in developing the theme of *Having a sense of community*. Family members express that the development of trust is foundational in “letting parents have that contact with the babies.” (P3)

It’s probably more that they trust us, than that we trust them. I mean it’s a bit of both but just the fact that they’re just like you can do temperature check and diaper change without worrying if were doing it right. It’s just someone who knows you and is like oh yeah, you can go do these things and care for your child while you’re there and everyone is comfortable about it. That’s really nice. (P4)

Having the shared goal of providing the best care to the infant is mutual between family and staff.

Like they will often ask for our opinions which is nice. They trust that we want to do what’s best for our daughter. (P5)

In addition to working with and developing trust with staff, the theme of *Having a sense of community* is inclusive of families *Connecting with parents*. The positives of families connecting with other families was highlighted from many participants.

It was really nice to be able to connect with those parents who are going through something similar to you. So being near them it was actually quite nice. (P2)

Participants shared “the connection with the families” (P2) being facilitated by the unit design. The layout of the unit makes it so “there are parents around and you have conversations with them, and that's really nice.” (P2)

It is nice being in a pod setup. We’ve been able to connect with some of the parents that have been going through the same thing. So, I definitely wouldn’t get rid of the pod style, just less cluttered pods. (P5)

Additional parent activities were also discussed in helping families by *Connecting with parents*.

We did or I did a CPR class with St. John's ambulance. And there was another opportunity to do like a meet and greet mixer thing that I also went to, which was quite nice. So yeah, they only do them, I think like once a month. So, I don't know how many people are actually in the NICU to catch that. Like if people are there for that long, but those kinds of activities are really nice in terms of the experience in general. (P2)

The final code in the code category, *Feeling of community*, is strongly connected to the overarching theme development *Having a sense of community*. Participants shared that this feeling was supported by the NICU staff as well as the unit design. When discussing what family members value as part of their experience in the NICU, ongoing

communication with the NICU staff was highlighted. One participant expressed the positive of “How the nurses interact with us, for sure. They treat us like family.” (P1)

I did always really appreciate that when I called or when I went in, if I knew the nurse and they welcomed me back and they gave me an update and they remembered details about my children's care. That was always really comforting.
(P2)

These feelings were similar among many participants sharing that “it was very nice the way that this staff is” (P3). In talking about the unit design participants described the *Feeling of community* as being facilitated by the open pod design.

Anything we would miss if we were in a private room? Um, yeah, I guess definitely the feeling of community. (P5)

And that community would extend to the other parents, but also the nurses that are not assigned to your baby because they are assigned to another baby that is right nearby. You might have had them last week or something and you know them. So, there's some camaraderie around that as well. It just builds a sense that you belong. (P4)

Following Braun and Clarke's (2006) phases of thematic analysis led to thematic saturation following interviews with five participants. The experiences families shared in answering the questions from the interview script did not result in opposing feedback. This resulted in codes easily being applied between interviews and cohesive theme development. The developed themes are all important in illustrating how family experiences were impacted by the unit design in the NICU at KGH. The final phase of

analysis, writing a report, is displayed here in this results chapter as well as in the next chapter of discussion within this paper.

Chapter Five: Discussion

In the following chapter, the author continues to explore the findings of this research study and how they are situated in the broader context of research and healthcare. The themes that were generated from the data will be discussed further in comparison with the existing literature on the subject of family experiences and NICU designs. The relationships between the themes from the data are introduced and the resulting narrative is presented. This led to the incorporation of Donabedian's theory and model as the structure aligns in illustrating these relationships and reflects guiding further understanding of the study results. Additionally, this chapter recognizes the limitations of this research study. The final section of this chapter acknowledges implications of this research at the level of nursing practice, nursing education, hospital stakeholders and future research.

Discussion of Findings

The themes that were constructed from the family interviews in this research study provided an introduction to the impact that the NICU design at KGH had on family experiences. As concluded from the literature review chapter, there is limited evidence on the subject of unit design and family experiences in the NICU and no research at a local level specific to KGH. Consequently, as the reviewed research was broader, it was expected that the difference in themes between the reviewed research and the results of this study could be significant. However, despite there being variation in the identified themes, some outcomes overlapped between the reviewed research and this research study. The following discussion will focus on the meaning and significance of themes

that were identified in the analysis of the family interviews as well as their relevance to existing literature will be explored.

Needing More Space

The first theme of *Needing more space* was built through the codes discovered in analysis including *Crowded*, *Space is very small*, *In the way* and *Chaotic experience*. The concept of *Needing more space* is a valuable insight to the unit design of the NICU at KGH. Participants highlighted that the environment was very *Crowded* and the *Space is very small* when involving themselves in experiences they value with their infant. The square footage allotted to each infant in the hospital within the NICU is only a fraction of what is provided for older patients. Even in comparison to the pediatric unit at KGH, where infants who are only a bit older are cared for, their rooms are approximately two to three times bigger than the designated space in a pod for each infant and their family. In listening to family members share the importance of *Needing more space*, it is obviously a significant factor in creating an environment that facilitates FiCare.

The need for more space for infants and their families in the NICU is discussed within the literature. Similar to research by Beck et al. (2009), this study identifies the need for more space for infants and their families in the NICU. This space is required to facilitate family involvement and encourage FiCare. The concept of space with the NICU design and families having their own space was also interpreted in thematic analysis of family interviews by Broom and Kecskes (2020). The consistency among research adds strength to the validity of this finding. The statement that family members feel *In the way* in the NICU at KGH is in line with other studies reporting families wanting to not be interrupted while participating in care activities with their infant (Broom & Kecskes,

2020). Although it is not explicitly outlined the various studies, it is likely that families feeling *In the way* was a contributing factor to families spending less time in the NICU with their infant in open pod designed units compared to those with single-family rooms (Broom & Kecskes, 2020; Larsen et al., 2024; Tandberg et al., 2018).

It is understood from the participants answers to the interview questions that the *Chaotic experience* they described having in the NICU is rooted in *Needing more space*. Contributing factors such as constant alarms and bright lights described by family members were also discussed in other studies looking at open pod NICUs (Domanico et al., 2011). These factors contributing to overstimulation were similarly shared by Feeley et al. (2020), however, this outcome measure was reported in this study as higher maternal stress scores. The environmental factors leading to a need for space in the NICU design was paralleled by quotes from a family member in their focus group stating, “it was real chaos” (Beck et al., 2009). The experiences that families share in the research study echo similar results to previously published literature through the theme of *Needing more space*. This is an important consideration in the footprint of the unit design of the NICU at KGH should there be the opportunity for remodelling or reconstruction in the future.

Creating a Comfortable Environment

The second theme evolving from data analysis is *Creating a comfortable environment*. In the interviews with participants, it is shared that contentment of families in the NICU may be increased with incorporating suggested concepts in the unit design. These design elements are described as supports to them while being in the NICU with

their infant in *More of a home environment*. This was further associated with the codes *Want a little bit of privacy* and *Nice being in a pod setup*.

What family members share in wanting *More if a home environment* includes elements that would all contribute to the experience of comfort in the NICU. Participants share physical furnishings they feel would benefit their experience. This is inclusive of the comfortable chairs in each of the care spaces, a bed for family members and storage for their personal belongings. More structural design features include windows for natural light, counter space, and as previously discussed, more physical space. These descriptors of what family members envision as more of a home environment are elements that are described in the literature as part of a single-family room design (Jones et al., 2023; Tandberg et al., 2018). As the research does not differentiate between these added comfort elements and the design being a single-family room, it is difficult to say how the results of the different studies would compare if the open pod designs incorporated these elements to make the NICU *More of a home environment*.

The literature reviewed of single-family rooms reported results that may reflect the families being more comfortable in that NICU environment. Although comfort was not reported on as an independent measurement, there are findings that may be outcome indicators describing comfort. As discussed by Tanberg et al. (2018), there is earlier initiation of skin-to-skin holding and longer skin-to-skin holding in single-family rooms. It is likely a catalyzing factor for participation in infant care activities when families have a higher level of comfort within the NICU environment. Additionally, the elements of single-family room design that create *More of a home environment*, which seemingly contribute to the increased family presence, is well supported across the literature (Broom

& Kecskes, 2020; Larsen et al., 2024; Tandberg et al., 2018). More research is needed looking at a single-family room NICU and open pod NICU that are both equipped with comparable furnishings and setup for families. This would provide valuable insight to the association of comfort and being *More of a home environment* than the actual unit design structure or the furnishings and setup of the infant's care space.

The challenge of isolating variables extends to the discussion of the prevalent code that families *Want a little bit of privacy*. In the literature, the NICU designs that are investigated are either single-family rooms that have complete privacy for families or open pod designs that are described as having no privacy for families. The idea shared by some participants of “more flexible of a space design” (P4) or a hybrid between the two designs was not found in the examined research. Privacy was identified as an important element of *Creating a comfortable environment* in the interviews with family members which was echoed in the reviewed literature. In addition to Broom & Kecskes (2020) identifying that family members spend more time in the NICU with a single-family room design, their interviews with family members led to the importance of privacy being concluded as a key theme. These results were paralleled by the statement of one participant who hypothesized “having a private space might encourage you to stay more, stay longer and participate in even more of their care” (P2). The concept of privacy is identified as being especially valuable for specific infant care practices for families such as skin-to-skin holding and breastfeeding. Research studies reported earlier and longer skin-to-skin holding as well as earlier and more sustained breastfeeding when infants are cared for in a single-family room (Grundt et al., 2021; Tandberg et al., 2018). It is evident, through both examining the interviews in this study and the published literature,

that privacy has a significant role in *Creating a comfortable environment* and impacting family experiences in the NICU.

It was interesting, however, that despite family members expressing they *Want a little bit of privacy* they also felt it was *Nice being in a pod setup*. Although these codes do not completely contradict each other, it is reasonable to anticipate less privacy in an open pod design NICU as opposed to one with single-family rooms. Interestingly, they shared relevance in their purpose being communicated across interviews as both codes contributed to the theme development of *Creating a comfortable environment*.

The feeling of comfort felt within the open pod design was rooted in the presence of others. Family members described how in the pod environment they were surrounded by other family members and their infants as well as NICU staff. Participants identified how “seeing that there are other folks going through it” (P4) normalized being in the NICU and made their journey less lonely. This impact of environment on the connection between family members of infants in the NICU is not a new concept. With the implementation of single-family rooms in NICUs, some studies have reported increased maternal stress attributed to the isolation in the environment in which they are caring for their infant (C. Jones et al., 2023; Pineda et al., 2012). Although not all of the literature examining single-family rooms are congruent with these outcomes, the development of interpersonal connections was described by family members as being facilitated by the open pod design (L. Jones et al., 2016). These relationships, fostered by the environment, are not only contributing to the theme of *Creating a comfortable environment* but are also a fundamental part of *Having a sense of community*.

Having a Sense of Community

The third theme that arose from the analysis of interviews, *Having a sense of community*, was a theme interwoven through family members shared NICU experiences. The described feeling of being part of a community was identified as being connected to the open pod design, however, as shared in the family interviews, the feeling of community experienced was influenced by more than their immediate environment in the NICU. In analyzing the interviews, five codes were identified that mutually connected in the theme development of *Having a sense of community*. These codes include *Connecting with parents*, *Feeling of community*, *Build a rapport*, *They trust us* and *Parent participation*.

The importance of the parents in the NICU *Connecting with parents* of other infants is the developed support system which is shared from the interviews of this study, as well as in previously published literature (L. Jones et al., 2016). These interactions families described as being facilitated within the open-pod design were foundational in the emotional development of *Feeling of community*. In the interviews, family members discussed the value of being surrounded by this community within the NICU as well as at organized parent activities. The research highlights the importance of being surrounded by this community of infants as well. The open pod design facilitates auditory stimulation for premature infants during a period of critical brain development which may promote higher language and motor scores as they grow up (C. Jones et al., 2023; Pineda et al., 2014). The connection of the environment and community was extensively highlighted by families in their NICU experience, but it is interesting to consider how the surrounding community may extend to also impact the infant.

Participants shared how much they valued their interactions with NICU staff and how they treated them “like family” (P1). It is identified through the participant interviews that families *Building a rapport* with staff contributes to families feeling that *They trust us*. In *Building a rapport*, families spoke to the teaching they received from staff and how they referred to them to learn as their baby’s care needs evolved throughout their NICU journey. All family members spoke to the learning that happened during their NICU experiences which led to a reciprocal relationship with staff where “they trust us, then that we trust them” (P4). It is intriguing reviewing these comments and thinking about the potential impact of the unit design on the development of these relationships and confidence between the members of the care team, including the infant’s family. In Stevens et al. (2011) research examining NICU design and family satisfaction, they did find greater levels of overall satisfaction in single-family room designs. However, when looking at the different categories of measurement, there was no difference in the satisfaction families felt with nursing between different NICU designs. It is evident that the design may influence the ability for connections to form between NICU families and it may influence the relationships between family and staff to a certain degree. However, there is not enough research focussed to be able to separate the influence of the types of people who work in the NICU and how their impact may transcend the design of the NICU in creating a sense of community for families.

In responding to the interview questions, families shared the importance of their involvement in the care of their infant, also known as FiCare. The design elements are discussed in the themes of *Needing more space* and *Creating a comfortable environment*, however, family members also spoke to how these elements impacted their *Parent*

participation. What was expressed by family members is that they loved being “involved while they were there in hospital” (P2). Families of infants in the NICU want to be present and they want to participate in all their infant’s care activities. This involvement was essential to feeling part of the community in the NICU. The positive impact of FiCare on the infant and their family is supported by extensive evidence across many research studies (Church et al., 2020; Gómez-Cantarino et al., 2020; O’Brien et al., 2013; Waddington et al., 2021). The importance of FiCare was identified throughout all the family interviews with the code *Parental presence*. In examining the NICU design, the research indicates single-family rooms as facilitating more FiCare. As single-family rooms support families to be at the bedside more hours per day, inadvertently, family participation is easily promoted in care activities (Broom & Kecskes, 2020; Larsen et al., 2024; Tandberg et al., 2018). This is an important consideration in helping to facilitate FiCare within the NICU environment and growing the family’s sense of community in the NICU.

Desiring Consistency in Staffing

In analysis of this study’s interviews, the fourth theme that evolved was family member’s *Desiring consistency in staffing*. Although this theme is not tightly linked to the unit design of the NICU, its prevalence in interviews with family members made it important to report. Additionally, this theme provides rationale to some of the themes with a higher degree of relevance to the research question. This theme is comprised of two codes identified in analysis, *Enough staff to fully staff each baby* and *Decrease the rotation of staff*. At first glance, these codes may not appear to be tied to the research question focussed on the NICU design. However, examining the context of these codes

unveils the purpose of family members sharing this information in relation to the design of the NICU at KGH.

Family members initiated the subject of staffing independently as it was not a topic broached by the interview questions. The importance of having *Enough staff to fully staff each baby* evolved in talking about the idea of single-family rooms designs in NICUs. Participants shared what they experienced in the open pod NICU describing nurses as having “like three or four” (P1) infants in their assignments. Firstly, family members described that they felt the nurse to infant ratio could be less to make it “more personable” (P1). Although not specifically outlined by the participants, it is inferred that the family members were interested in having more time with their infant’s nurse. Secondly, when discussing the idea of single-family rooms in the NICU, family members were immediately wondering how that workflow would look for the nurses as they would want to have a nurse available to their infant at all times. “Obviously, we’re not staffed to be a one to one care thing in individual rooms so that would be a concern.” (P5) These are interesting points that were not anticipated from the family members. Since they are part of the care team in participating in FiCare, it is evident they are quite in tune with the workflow of the NICU and how the unit design would impact staffing. Safe staffing would definitely have to be a consideration with any unit design, especially given the current nursing crisis in Ontario resulting in frequent staff shortages (Registered Nurses Association of Ontario, 2023).

Family members communicated through their experiences in the NICU how much they value the NICU staff in caring for their infant. Although it was stated “that they knew what they were doing” (P3), family members did not comment on the staff’s

performance of medical skills. Family members did feel it was important to have met and know the staff caring for their infant. Furthermore, they appreciate a staff who really knows their babies and who can easily answer their questions. To *Decrease the rotation of staff* responds to the continuity family member's value in the NICU. The ability to facilitate more time and support from NICU staff has been reported in single-family room NICUs in several research studies (Broom & Kecskes, 2020; Feeley et al., 2020; Larsen et al., 2024; Tandberg et al., 2018). Although consistency in staffing is a difficult variable to isolate, it is possible less one-on-one time is facilitated between staff and families in the open pod design NICU because of the surroundings being disruptive.

Barriers to Being Present

The fifth and final theme, *Barriers to being present*, highlights the challenges families encounter to being present in the NICU and participating in the care activities they value with their infant. This theme was constructed with the codes *Difficult commuting situations* and *Visiting protocol* which were depicted in the NICU experiences families shared. This theme exposes the difficulties families face in being present and participating in FiCare while having a child in the NICU.

In the family interviews, many *Difficult commuting situations* were communicated in their NICU experience. As the NICUs are limited to bigger cities, the infant is often transferred there antenatally or postnatally from their home community. This can be a significant distance for families if their infant requires level three care which is offered in fewer centres. In some situations, they are from a northern Ontario community having to be flown to Kingston. The travel can be a significant amount of time for families and can be a financial burden depending on their socioeconomic

circumstances (Feeley et al., 2020; Tandberg et al., 2018). This was definitely communicated from families in their experiences traveling significant distances to the hospital from home, having to stay in Kingston away from home to visit their infant and the significant cost associated with this commuting. The financial burden is high between transportation and parking, which forces some families to have one partner who keeps working during this difficult time (Broom & Kecskes, 2020; Tandberg et al., 2018) It is important to note that family members expressed *Difficult commuting situations* even when they lived within the city of Kingston where KGH is located. The act of having to commute is described as “exhausting” (P5) as the open pod design in the NICU at KGH does not have sleep chairs, beds or attached sleep rooms. Families staying at the hospital is not an option which is not the case in many NICUs, especially those with single-family room designs (Broom & Kecskes, 2020; Feeley et al., 2020; Larsen et al., 2024; Tandberg et al., 2018).

Families not being able to stay in hospital creates significant *Barriers to being present* for families making them feel like a visitor to their own infant. These situations within the families experiences were associated with the code *Visiting protocol*. Families shared how challenging being present and involved was during their infant’s NICU stay as “you can't stay in the NICU and you can't stay in the hospital.” (P2) The open pod design of the NICU at KGH does not have the capacity in space, furnishings or privacy for family members to stay and have the ability to relax and sleep. These environmental circumstances automatically label the infant’s family members as visitors. Within the FiCare framework, family members are to be part of the care team for their infant and having them describe following *Visiting protocol* is a significant barrier to the goals of

FiCare. Feeling like a visitor and having to separate from their infant in the NICU significantly increases the family's stress (Beck et al., 2009; van Veenendaal et al., 2022). The FiCare philosophy encourages families to be in the NICU with their infant(s) as much as possible but the unit design providing an unsupportive environment impedes the FiCare experience for families (O'Brien et al., 2013). Beck et al. (2009) shares the power shift they observed with implementing a family centred NICU design with private rooms and beds for parents. These surroundings triggered participation and autonomy of FiCare. This was consistent with other research showing increased family involvement in care activities in NICUs with single-family room designs. Without the environmental supports for sustained family presence, families are labelled as visitors as they are obligated to follow *Visiting protocol*.

This is an important consideration going forward, especially in referencing the research from the Covid-19 pandemic. It was not discussed by families in this research study as they were not impacted by any Covid-19 restrictions during the period of time their infant was in the NICU. In examining the different NICU designs, specifically those with single-family rooms, Covid-19 had less of an impact in parental presence (Darcy Mahoney et al., 2020). However, NICU's that were more open concept in their design had more significant visiting restrictions enforced on their families (Darcy Mahoney et al., 2020; Ozawa et al., 2021). This inspires thinking about the influence of the unit design on the acceptance of family as essential members of the care team or being categorized as visitors. In this research, and across the literature, the impact of the environment on families involvement FiCare is significant. Examining all of the evidence

together, the unit design of the NICUs may determine how the hospital labels and includes the families of their NICU infants as either essential care providers or as visitors.

Connecting to Theory

The inductive nature of this study allowed NICU family members to share their experiences in their own words creating data descriptive of their experiences. In analyzing the interviews, connections between the developing themes started to become noticeable. The narrative written throughout the themes in analysis aligned with the foundational elements of Donabedian's theoretical framework. This enabled the themes to be presented in a structure that highlighted the relationship between themes and assess their overall impact on NICU design.

The framework of Donabedian's (2003) theory is used in nursing to evaluate the enabling mechanisms that contribute to the quality of nursing care. It examines links between structure, process, outcome and their impact on quality of care (Donabedian, 2005). As detailed by Ayanian and Markel (2016), using these pillars to examine care allows for a broader understanding of what contributes the quality of care being provided in a medical setting. This theory investigates what is going on and the circumstances instead of simply identifying what is wrong.

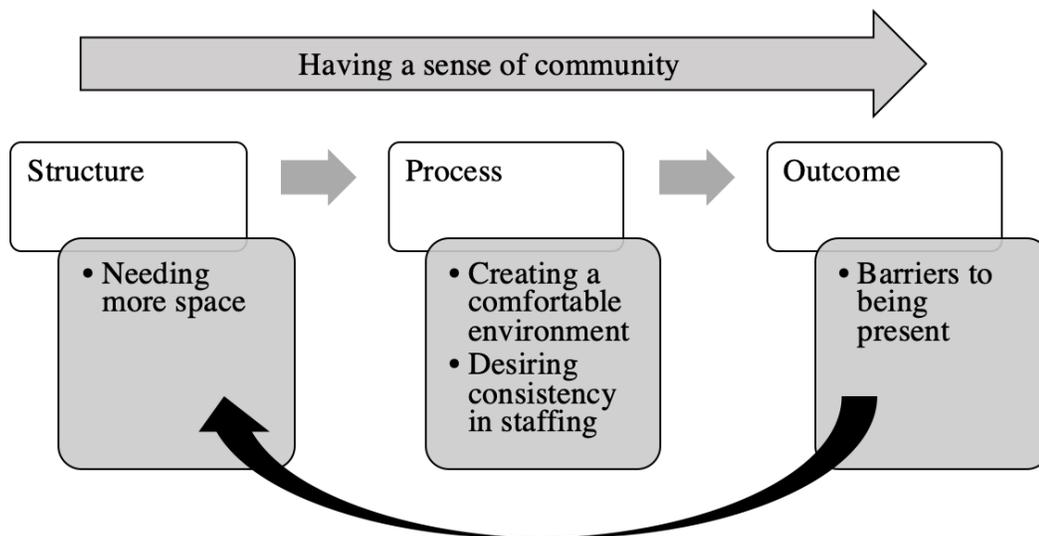
In Donabedian's (2003) theory a model has been used to guide healthcare systems in evaluating the quality of nursing care. This model details structure, process and outcome, as well as how one category impacts the other. Having a visual representation of the multidimensional variables in healthcare settings is beneficial in the assessment of its quality. The structure describes the facility, equipment and its functionality. The process examines how care is delivered, who is involved and how it is accepted. The

outcome reports the effect of the of health measures or achievements. This theory is inclusive of examining social and psychological elements of quality in healthcare which is pertinent when integrating human experience as a quality indicator.

The themes that were uncovered in the interviews with family members triggered the use of the Donabedian's theory and model as the themes fell naturally into the evolution of structure, process and outcome. The use of this model guides the narrative of the themes that illustrates opportunity for healthcare improvements. The thematic development in the study has the potential to suggest changes that would improve the quality of family experiences in the NICU (Santana et al., 2018). Please see the adapted Donabedian model in Figure 2 depicting the thematic results of the family interviews.

Figure 2

NICU family experiences through Donabedian's model



Note. Adapted from "An introduction to quality assurance in health care." by A. Donabedian, (p. 47), 2003, Oxford press.

Examining Figure 2, there are a few small adaptations as to how the Donabedian model conforms to presenting the interview themes. To begin, *Having a sense of community* is an overarching theme throughout the concepts of structure, process and outcome. This is represented through an arrow ovetop showing its consistent presence. Additionally, when reviewing this model, an arrow was added to the bottom of the diagram connecting outcome back to structure. The Donabedian (2005) model progresses with one concept preceding to the next in a linear method resulting in a means-end approach. The inclusion of the arrow connecting the outcome back to structure creates a feedback loop which transforms this model to be circular in nature.

The knowledge gained from family experiences led to theme development and creating an understanding of unit design at KGH. The feedback loop communicates the opportunity for quality improvement going forward where this outcome can impact the structure of NICUs in the future. Hypothetically speaking, a NICU structure with more space could lead to a more comfortable environment for families which may result in an outcome of increased family presence and involvement in FiCare.

Study Strengths and Limitations

The results of this research need to be considered in light of the strengths and limitations of this study. There are positive qualities that are brought to this study by characteristics integrated through my influence as the researcher. Additionally, in the process of conducting this research, elements were noted that may impact the validity of the study results. The recognition of these strengths and limitations will allow for use of the study data that is well informed.

Through the reflexive practices integrated in this research I have shared my significant experience in the NICU developing my strong knowledge base. Having worked as a registered nurse in the NICU at the bedside, as a research assistant and in profession practice has led to my extensive experience working with families in the NICU and developing expertise in this subject. This background and insider status allowed me to identify this research need, which was further confirmed in reviewing the literature. Strong self-awareness allowed bracketing to remove any potential biases I recognized as well as separate myself from caring for infants and families in the NICU at KGH during the process of this study. The familiarity I had with the NICU at KGH provided the opportunity for common language to be used in developing the interview

guide to facilitate clear communication with words that would be part of their everyday language having an infant in that environment.

The approach taken in the thoughtful structure and methodology of this study also contributed to the positive attributes of this research study. The qualitative descriptive design was purposeful in answering the research question, with the process of the study and steps of analysis communicated comprehensively to provide transparency and instill trust in this research (Nowell et al., 2017). Additionally, to achieve this study, significant perseverance was required in navigating the process between the research ethics boards of multiple institutions and hospital research boards.

I recognize, in addition to the many strengths of this study, there are inevitably limitations I am cognizant of as the researcher. The first limitation of this study is rooted in the participant sample of this study. The study sample was purposeful with family members self-identifying to participate. As this was not random, it is possible that certain profiles of family members were more likely to reach out and involve themselves in research creating an unintentional sample bias. The size of the sample is small as only five participants were interviewed. As there was a significant amount of homogeneity in the data, saturation was achieved early in analysis. Possibly, with a larger sample, a degree of diversity may have been encountered. However, with having a smaller sample size, the transferability of this research is reduced as it is less likely to be reflective of the larger population, especially outside of the community for which KGH provides hospital services (Guba and Lincoln, 1982). Additionally, only family members from the open pod unit at KGH were included in this research study. Having interviews with family members from different sites with open pod designs would enhance the understanding of

the impact of the unit design independent of hospital specific practices. These considerations of the research sample in this study impacts the generalizability of the research results (Guba & Lincoln, 1982). Therefore, the application of the results from this research is most appropriate for the NICU at KGH.

The process of establishing trust in the study results could be more robust in this research process. Due to challenges with feasibility, the operationalization of member checking for the results and analysis of the data was not completed. Having this feedback from participants would increase the credibility and trust in representing the family experiences in the study results (Guba & Lincoln, 1982; Nowell et al., 2017).

Finally, limitations existed related to the role and experience of the primary researcher in conducting this qualitative research. Reflexivity and bracketing were practiced throughout the research process to reduce the transfer of any personal bias. However, achieving complete objectivity in qualitative research is unrealistic (Aytton et al., 2023; Guba & Lincoln, 1982; Merriam et al., 2019). The focus remained on clear communication of the position and involvement of the researcher throughout all steps of the study. Additionally, elements of the research may have been influenced in the study being led by a novice researcher. The acquisition of knowledge and ongoing learning was constant throughout this research process.

Nursing Implications

In completing this research, the experiences families value in the NICU and the impact of the unit design at KGH was explored. Throughout the process of this study it is recognized that the meaning of this research within a broader healthcare context is

important. In the following section, this study will be discussed as it relates to nursing practice, nursing education, hospital stakeholders and future research.

Significance to Nursing Practice

This research study relates and integrates to nursing practice in many ways. The scope of nursing is reflected in the focus of this research inquiry as well as the importance of nurse led research in healthcare. The data collected from the interviews with family members provides insight as to what they value in interacting with nurses during their time in the NICU.

Within the nursing scope, it is expected that nurses practice wholistic care and foster therapeutic nurse-patient and family relationships. This is regulated through governing bodies such as CNO and RNAO by integrating these criteria in practice standards and best practice guidelines (CNO, 2019; RNAO, 2015). The nursing role is inclusive of evaluating quality in the practice setting, collecting feedback and inspiring change in healthcare settings and systems (CNO, 2019; RNAO, 2015). These factors position nursing to be ideal situations to do research focussing on the healthcare environment. This research study highlights the value of integrating research in nursing practice as the areas of research needed are easily identifiable while working frontline in the healthcare system. Additionally, nurses have the developed skills to thoughtfully engage patients and families in research.

The experiences family members shared in response to the interview spoke strongly to the relationships they developed with staff in the NICU, especially nurses. This was evident especially within the theme *Having a sense of community*. Families spoke to the importance of building relationships and establishing trust, which are

foundational in establishing a therapeutic relationship with families (CNO, 2019). The support and teaching nurses provide in the NICU is essential to involve family members in care activities with their infant and support them to grow confident in participating in this care. Regardless of the NICU design, families communicated being happy with the nursing staff (Stevens et al., 2011). However, family members perceived that they received more support and time with staff in single-family room NICU designs (Broom & Kecskes, 2020; Feeley et al., 2020; Larsen et al., 2024; Tandberg et al., 2018).

Nurses work alongside family members in helping them care for their infant. This research provides insight to an environment that supports valued family experiences and, ultimately, FiCare. Knowing the significant benefits of FiCare for infants, it is important for NICU nurses to continue to advocate for the needs of NICU families and a NICU design that is conducive to FiCare (Church et al., 2020; Gómez-Cantarino et al., 2020; O'Brien et al., 2013; Waddington et al., 2021).

Considerations for Nursing Education

As healthcare circumstances continue to evolve from a community to world level, the education nurses require needs to adapt with these changes. This is true for nurses who are already practicing as well as nurses who are in their educational journey to become licensed nurses. With the focus of healthcare shifting to be person- and family-centred, the curricula for nurses should be evolving to integrate this philosophy in all aspects of nursing care (Baker, 2014; Ontario Health, 2022). For already practicing nurses, this integration has been occurring gradually over many years. The avenues of exposure to the person- and family-centred care philosophy are endless, but may include

updates by nursing regulating bodies, ongoing education, hospital and healthcare centre policies and values, as well as practice updates by nursing educators.

Filtering the philosophy of person- and family-centred care down to the level of this research study, education is focused on the communication of learned information and new knowledge. Sharing family experiences and themes that evolved from the interviews will help increase the expertise and awareness of other nurses. Having knowledge and understanding the rationale reduces resistance to change, especially for healthcare professionals (Cane et al., 2012). Therefore, understanding that families want a NICU environment with more space and home comforts may make the change easier for staff if there are renovations to the unit design at KGH in the future.

The dissemination of this research is planned to occur through several methods. In addition to this research being reported in this paper, it is to be shared at healthcare conferences and will be submitted for publication. A poster presentation has already occurred at the Kingston Nursing Research Conference (KNRC) this year where the results of this study were shared with fellow nursing educators, practice leaders and directors.

Implications for Hospital Stakeholders

Stakeholders for KGH and other hospitals with NICUs can use the family perspective gathered in this study to make informed decisions to support FiCare in the NICU. Ultimately, the research question focussed on the impact of the unit design of the NICU on their family experience. The data that was collected from this research can provide detailed insight to what family members value in the NICU environment. Having this knowledge easily accessible is opportune should there be proposed NICU

renovations or redevelopment at KGH, as it had been previously discussed (Infrastructure Ontario, 2023; Pereira, 2023). Family members want to be involved as much as possible in the care of their child in the NICU, but they need an environment in the NICU that supports FiCare.

Research examining NICUs with unit designs that facilitate FiCare support the fact that family members are present more hours per day and participate more with the care of their infant (Broom & Kecskes, 2020; Larsen et al., 2024; Tandberg et al., 2018). Increased FiCare not only has significant positive health outcomes for the infant and family, but also the healthcare system (Church et al., 2020; Gómez-Cantarino et al., 2020; O'Brien et al., 2013; Waddington et al., 2021). This family involvement results in earlier discharge for infants from the NICU and significant cost savings for the healthcare system (Benzies et al., 2017; Lopatina et al., 2024). Supporting all of the pillars of FiCare, including the environment, is not only logical from a health outcomes perspective, but also a business perspective for hospitals. As many hospital stakeholders have an obligation to the financial accountability of their decisions, the research showing the positive financial outcomes of NICU designs supporting FiCare are important to include.

Some stakeholders have already been communicated with at the KNRC. Others will be reached at different conference opportunities or in sharing a publication. I am fortunate to currently be the Clinical Learning Specialist for the NICU at KGH. Within this position, I have the opportunity to work with higher level leadership and share my research to be taken into consideration when making decisions for future NICU designs.

Recommendations for Future Research

This study is a starting point for research in an area with a significant gap in the literature. There is a limited amount of research available that is focussed on the unit design of NICUs and the impact on family experiences. Prior to this study, no research had been completed at the local level within KGH examining the unit design of the NICU in any capacity. This research can be used as a building block to inspire further research, such as focus groups with larger participant samples. However, given the focus of this topic on family experience, significant value would be added to the whole research process if the study could be done in collaboration with NICU family members. Having this partnership in research provides an opportunity to enhance the meaning of the research as well as improve the design of the study (McCarron et al., 2021).

Additionally, the available literature remains weak in several categories of review. Themes such as sources of stress and infant outcomes have some conflicting evidence where different studies contradict each other in their recommendations for open pod design or single-family room design. This indicates that more research is required even within these broader categories of interest related to NICU design.

Participants in this study brought up innovative ideas such as flexible room designs, or hybrid room designs in the NICU. How these would be designed and their impact in facilitating FiCare remains unknown. Further research exploring more than the open pod and single-family room NICUs is needed. There would be the opportunity with this innovation to incorporate the positive elements of both designs. The sense of community and support in the open pod design could be facilitated for families but also provide space, parent beds and privacy when needed.

Chapter Six: Conclusion

In this research study, families provided insight to their lived experiences of having an infant in the NICU. These experiences were explored as they answered interview questions focused on the impact of the unit design on the care activities they value with their infant. This study was constructed to incorporate the overarching healthcare focus of person- and family- centred care at the level of FiCare in the NICU.

This research followed a qualitative descriptive design to answer the research question; What is the impact of unit design in the NICU at KGH on the lived experiences of families? Interviews were completed with family members who had an infant in the NICU at KGH for longer than four weeks. From the interviews, the five themes that were interpreted included *Needing more space*, *Creating a comfortable environment*, *Having a sense of community*, *Desiring consistency in staffing* and *Barriers to being present*. The narrative of these themes was communicated through an adapted Donabedian (2003) model which described the quality of the environment as it relates to structure, process and outcome. The findings of this study will add to the limited library of available literature focussed on NICU design and family experience.

The results of this research illustrated the experience families valued with their infant in the NICU. Through the lived experiences of families, opportunities to improve upon the NICU design are identified to facilitate FiCare. These outcomes emphasized the importance of the therapeutic relationship families develop with nurses in the NICU. Additionally, these results encourage nursing education rooted in family-centred care and generate many ideas for further research opportunities, such as collaborating in family partnered research. Going forward, the communication and education of the hospital

stakeholders will be crucial to the integration of elements of unit designs which support FiCare. Supporting family presence is pivotal to family involvement and, subsequently, positive outcomes for both the infant and family (Church et al., 2020; Gómez-Cantarino et al., 2020; O'Brien et al., 2013; Waddington et al., 2021).

In completing this research, the objectives for this study have all been achieved or are in progress. This research has the ability to influence the environment of the NICU which is a key pillar in the FiCare framework (Benzies et al., 2017). The possibilities that could evolve from this research, as well as future research in this area, is inspiring. It is hopeful that not only the NICU at KGH, but NICUs across all healthcare systems, will evolve to designs that will support families in participating in the care practices they value while their infant is receiving necessary medical care in hospital.

References

- Adeoye-Olatunde, O. A., & Olenik, N. L. (2021). Research and scholarly methods: Semi-structured interviews. *Journal of the American College of Clinical Pharmacy*, 4(10), 1358–1367. <https://doi.org/10.1002/jac5.1441>
- Ahern, K. J. (1999). Ten Tips for Reflexive Bracketing. *Qualitative Health Research*, 9(3), 407–411. <https://doi.org/10.1177/104973239900900309>
- Angus, M. (1994). *Kingston General Hospital: a social and institutional history. Volume II: 1965-1992*. Kingston General Hospital.
- Ansari, N. S., Franck, L. S., Tomlinson, C., Colucci, A., & O'Brien, K. (2023). A Pilot Study of Family-Integrated Care (FICare) in Critically Ill Preterm and Term Infants in the NICU: FICare Plus. *Children (Basel)*, 10(8), 1337-. <https://doi.org/10.3390/children10081337>
- Ayanian, J. Z., & Markel, H. (2016). Donabedian's Lasting Framework for Health Care Quality. *The New England Journal of Medicine*, 375(3), 205–207. <https://doi.org/10.1056/NEJMp1605101>
- Ayton, D., Tsindos, T., Berkovic, D., Darshini Ayton, Tess Tsindos, & Danielle Berkovic. (2023). *Qualitative Research – a practical guide for health and social care researchers and practitioners*. Monash University
- Baker, G. R. (2014). *Evidence boost: A review of research highlighting how patient engagement contributes to improved care*. Retrieved from <http://www.cfhi-fcass.ca/sf-docs/default-source/reports/evidenceboost-rossbaker-peimprovedcare-e.pdf?sfvrsn=8>

- Beck, S. A., Weis, J., Greisen, G., Andersen, M., & Zoffmann, V. (2009). Room for family-centered care – a qualitative evaluation of a neonatal intensive care unit remodeling project. *Journal of Neonatal Nursing : JNN*, *15*(3), 88–99.
<https://doi.org/10.1016/j.jnn.2009.01.006>
- Benzies, K. M., Shah, V., Aziz, K., Isaranuwachai, W., Palacio-Derflinger, L., Scotland, J., Larocque, J., Mrklas, K., Suter, E., Naugler, C., Stelfox, H. T., Chari, R., & Lodha, A. (2017). Family Integrated Care (FICare) in Level II Neonatal Intensive Care Units: study protocol for a cluster randomized controlled trial. *Current Controlled Trials in Cardiovascular Medicine*, *18*(1), 467–467.
<https://doi.org/10.1186/s13063-017-2181-3>
- Bradshaw, C., Atkinson, S., & Doody, O. (2017). Employing a Qualitative Description Approach in Health Care Research. *Global Qualitative Nursing Research*, *4*, 2333393617742282–2333393617742282.
<https://doi.org/10.1177/2333393617742282>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.
<https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2022). *Thematic analysis : a practical guide*. SAGE.
- Broom, M., & Kecskes, Z. (2020). Exploring the impact of a Dual-Occupancy NICU design on parental experience. *Journal of Neonatal Nursing : JNN*, *26*(4), 217–221. <https://doi.org/10.1016/j.jnn.2020.01.007>

- Bukamal, H. (2022). Deconstructing insider–outsider researcher positionality. *British Journal of Special Education*, 49(3), 327–349. <https://doi.org/10.1111/1467-8578.12426>
- Campbell-Yeo, M., Kim, T., Disher, T., Richardson, B., Dol, J., Bishop, T., Delahunty-Pike, A., Dorling, J., Glover, M., Inglis, D., Johnson, T., Macmillan, D., Mcgrath, P., Monaghan, J., Orovec, A., Simpson, D. C., Skinner, N., Whitehead, L., & Wozney, L. (2021). Do Single-Family Rooms Increase Parental Presence, Involvement, and Maternal Well-Being in Neonatal Intensive Care? *The Journal of Perinatal & Neonatal Nursing*, 35(4), 350–361. <https://doi.org/10.1097/JPN.0000000000000600>
- Cane, O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science : IS*, 7(1), 37–37. <https://doi.org/10.1186/1748-5908-7-37>
- Church, P. T., Grunau, R. E., Mirea, L., Petrie, J., Soraisham, A. S., Synnes, A., ... O'Brien, K. (2020). Family Integrated Care (FICare): Positive impact on behavioural outcomes at 18 months. *Early Human Development*, 151, 105196–105196. <https://doi.org/10.1016/j.earlhumdev.2020.105196>
- College of Nurses of Ontario (CNO). (2019). Therapeutic nurse-client relationship, revised 2006. https://www.cno.org/Assets/CNO/Documents/Standard-and-Learning/Practice-Standards/41033_therapeutic.pdf
- Colorafi, K. J., & Evans, B. (2016). Qualitative Descriptive Methods in Health Science Research. *HERD*, 9(4), 16–25. <https://doi.org/10.1177/1937586715614171>

- Creswell, J. & Poth, C. (2017). *Qualitative inquiry & research design : choosing among five approaches* (Fifth edition.). Sage Publications.
- Critical Care Services Ontario. *Neonatal Intensive Care*. (2023, September 13).
<https://criticalcareontario.ca/about/neonatal-intensive-care/>
- Darcy Mahoney, A., White, R. D., Velasquez, A., Barrett, T. S., Clark, R. H., & Ahmad, K. A. (2020). Impact of restrictions on parental presence in neonatal intensive care units related to coronavirus disease 2019. *Journal of Perinatology*, *40*(Suppl 1), 36–46. <https://doi.org/10.1038/s41372-020-0753-7>
- Denicolo, P., Long, T., & Bradley-Cole, K. (2016). *Constructivist approaches and research methods : a practical guide to exploring personal meanings* (1st ed.). SAGE Publications Ltd.
- Domanico, R., Davis, D. K., Coleman, F., & Davis, B. O. (2011). Documenting the NICU design dilemma: comparative patient progress in open-ward and single family room units. *Journal of Perinatology*, *31*(4), 281–288.
<https://doi.org/10.1038/jp.2010.120>
- Donabedian, A. (2003). *An introduction to quality assurance in health care*. New York: Oxford University Press.
- Donabedian, A. (2005). Evaluating the Quality of Medical Care. *The Milbank Quarterly*, *83*(4), 691–729. <https://doi.org/10.1111/j.1468-0009.2005.00397.x>
- Doyle, L., McCabe, C., Keogh, B., Brady, A., & McCann, M. (2020). An overview of the qualitative descriptive design within nursing research. *Journal of Research in Nursing*, *25*(5), 443–455. <https://doi.org/10.1177/1744987119880234>

- Elwood, S. A., & Martin, D. G. (2000). “Placing” interviews: Location and scales of power in qualitative research. *The Professional Geographer*, 52(4), 649–657. <https://doi.org/10.1111/0033-0124.00253>
- Family Integrated Care. (2022). *FICARE pilot - partners*. Family Integrated Care. Retrieved April 26, 2025 from <https://familyintegratedcare.com/research/ficare-pilot-partners/>
- Family Integrated Care. (2024). *FiCare Toolkit & Resources*. Family Integrated Care. Retrieved April 26, 2025 from <https://familyintegratedcare.com/the-ficare-approach/ficare-toolkit-resources/>
- Family Integrated Care. *Research*. Family Integrated Care. (2025). Retrieved April 26, 2025 from <https://familyintegratedcare.com/research/>
- Feeley, N., Robins, S., Genest, C., Stremler, R., Zelkowitz, P., & Charbonneau, L. (2020). A comparative study of mothers of infants hospitalized in an open ward neonatal intensive care unit and a combined pod and single-family room design. *BMC Pediatrics*, 20(1), 38–38. <https://doi.org/10.1186/s12887-020-1929-1>
- Gómez-Cantarino, S., García-Valdivieso, I., Moncunill-Martínez, E., Yáñez-Araque, B., & Ugarte Gurrutxaga, M. I. (2020). Developing a family-centered care model in the Neonatal Intensive Care Unit (NICU): A new vision to manage healthcare. *International Journal of Environmental Research and Public Health*, 17(19). <https://doi.org/10.3390/ijerph17197197>
- Guba, E. G., & Lincoln, Y. S. (1982). Epistemological and methodological bases of naturalistic inquiry. *Educational Communication and Technology : EC & TJ.*, 30(4), 233–252. <https://doi.org/10.1007/BF02765185>

- Grundt, H., Tandberg, B. S., Flacking, R., Drageset, J., & Moen, A. (2021). Associations Between Single-Family Room Care and Breastfeeding Rates in Preterm Infants. *Journal of Human Lactation*, *37*(3), 593–602. <https://doi.org/10.1177/0890334420962709>
- Guest, G., Bunce, A., & Johnson, L. (2006). How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability. *Field Methods*, *18*(1), 59–82. <https://doi.org/10.1177/1525822X05279903>
- Hei, M., Gao, X., Li, Y., Gao, X., Li, Z., Xia, S., Zhang, Q., Han, S., Gao, H., Nong, S., Zhang, A., Li, J., Wang, Y., Ye, X. Y., & Lee, S. K. (2021). Family Integrated Care for Preterm Infants in China: A Cluster Randomized Controlled Trial. *The Journal of Pediatrics*, *228*, 36-43.e2. <https://doi.org/10.1016/j.jpeds.2020.09.006>
- Infrastructure Ontario. (2023, December 13). *Kingston General Hospital Phase 2 redevelopment*. Infrastructure Ontario. <https://www.infrastructureontario.ca/en/what-we-do/projectssearch/kingston-general-hospital-phase-2-redevelopment/>
- Jones, L., Peters, K., Rowe, J., & Sheeran, N. (2016). The Influence of Neonatal Nursery Design on Mothers' Interactions in the Nursery. *Journal of Pediatric Nursing*, *31*(5), e301–e312. <https://doi.org/10.1016/j.pedn.2016.05.005>
- Jones, C. W., Moya, F., & Lynch, N. (2023). Unintended Consequences of the Neonatal Intensive Care Unit Environment: Integrative Review of Single-Family Room Unit Design. *Advances in Neonatal Care*, *23*(2), 151–159. <https://doi.org/10.1097/ANC.0000000000001023>

- Kennedy, E., Castanelli, D. J., Molloy, E., & Bearman, M. (2024). Addressing positionality in qualitative research: Significance, challenges and strategies. *The Clinical Teacher*, 21(6), e13820-n/a. <https://doi.org/10.1111/tct.13820>
- Kim, H., Sefcik, J. S., & Bradway, C. (2017). Characteristics of Qualitative Descriptive Studies: A Systematic Review. *Research in Nursing & Health*, 40(1), 23–42. <https://doi.org/10.1002/nur.21768>
- Larsen, J. N., Hansson, H., Beck, S. A., & Zoffmann, V. (2024). Single-family rooms in neonatal intensive care: A qualitative analysis of fathers', mothers' and nurses' experiences. *Journal of Neonatal Nursing : JNN*, 30(6), 725–730. <https://doi.org/10.1016/j.jnn.2024.07.009>
- Lester, B. M., Salisbury, A. L., Hawes, K., Dansereau, L. M., Bigsby, R., Laptok, A., Taub, M., Lagasse, L. L., Vohr, B. R., & Padbury, J. F. (2016). 18-Month Follow-Up of Infants Cared for in a Single-Family Room Neonatal Intensive Care Unit. *The Journal of Pediatrics*, 177, 84–89. <https://doi.org/10.1016/j.jpeds.2016.06.069>
- LoBiondo-Wood, G., Haber, J., & Cameron, C. (2018). Chapter 3: Critical reading strategies: Overview of the research process. In G. LoBiondo-Wood & J. Haber (Eds.), *Nursing research in Canada: methods, critical appraisal, and utilization* (8th Canadian ed., pp. 115-129). Elsevier Canada.
- Lopatina, E., Faris, P., Spackman, E., & Benzies, K. M. (2024). Effects of Alberta Family Integrated Care (FICare™) on the Health Care Resource Utilization and Cost Two Months Post-Discharge: A Cluster Randomized Controlled Trial in Neonatal

Intensive Care Units. *Nursing Economic*, 42(3), 131–141.

<https://doi.org/10.62116/NEC.2024.42.3.131>

Lussky, R. C., Cifuentes, R. F., & Siddappa, A. M. (2005). A history of neonatal medicine- past accomplishments, lessons learned, and future challenges. Part 1- the first century. *The Journal of Pediatric Pharmacology and Therapeutics*, 10(2), 76–89. <https://doi.org/10.5863/1551-6776-10.2.76>

McCarron, T. L., Clement, F., Rasiyah, J., Moran, C., Moffat, K., Gonzalez, A., Wasylak, T., & Santana, M. (2021). Patients as partners in health research: A scoping review. *Health Expectations : An International Journal of Public Participation in Health Care and Health Policy*, 24(4), 1378–1390.

<https://doi.org/10.1111/hex.13272>

Merriam, S. B., Tisdell, E. J., & Gavin, M. (2019). *Qualitative Research*. Jossey-Bass.

Morse, J. M., & Field, P.-A. (1995). *Qualitative research methods for health professionals* (2nd ed.). Sage Publications.

Neubauer, B. E., Witkop, C. T., & Varpio, L. (2019). How phenomenology can help us learn from the experiences of others. *Perspectives on Medical Education*, 8(2), 90–97. <https://doi.org/10.1007/s40037-019-0509-2>

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 1–13. <https://doi.org/10.1177/1609406917733847>

O'Brien, K., Bracht, M., Macdonell, K., McBride, T., Robson, K., O'Leary, L., Christie, K., Galarza, M., Dicky, T., Levin, A., & Lee, S. K. (2013). A pilot cohort analytic study of Family Integrated Care in a Canadian neonatal intensive care unit. *BMC*

Pregnancy and Childbirth, 13 Suppl 1(Suppl 1), S12–S12.

<https://doi.org/10.1186/1471-2393-13-S1-S12>

O'Brien, K., Robson, K., Bracht, M., Cruz, M., Lui, K., Alvaro, R., da Silva, O., Monterrosa, L., Narvey, M., Ng, E., Soraisham, A., Ye, X. Y., Mirea, L., Tarnow-Mordi, W., Lee, S. K., & FICare Study Group and FICare Parent Advisory Board (2018). Effectiveness of Family Integrated Care in neonatal intensive care units on infant and parent outcomes: a multicentre, multinational, cluster-randomised controlled trial. *The Lancet. Child & adolescent health*, 2(4), 245–254.

[https://doi.org/10.1016/S2352-4642\(18\)30039-7](https://doi.org/10.1016/S2352-4642(18)30039-7)

Ontario Health. (2022, December 21) *Hospital Capital Planning and Policy Manual*.

Ontario Health.

<https://www.ontariohealth.ca/sites/ontariohealth/files/202212/HospitalCapitalPlanningAndPolicyManual-EN.pdf>

Ozawa, M., Sakaki, H., & Meng, X. (2021). Family Presence Restrictions and Telemedicine Use in Neonatal Intensive Care Units during the Coronavirus Disease Pandemic. *Children (Basel, Switzerland)*, 8(7), 590.

<https://doi.org/10.3390/children8070590>

Pereira, J. (2023, November 13). *Province announces support for phase 2 redevelopment*.

Kingston Health Sciences Centre.

<https://kingstonhsc.ca/khscconnect/news/province-announces-support-phase-2-redevelopment>

- Pineda, R. G., Stransky, K. E., Rogers, C., Duncan, M. H., Smith, G. C., Neil, J., & Inder, T. (2012). The single-patient room in the NICU: maternal and family effects. *Journal of Perinatology, 32*(7), 545–551. <https://doi.org/10.1038/jp.2011.144>
- Pineda, R. G., Neil, J., Dierker, D., Smyser, C. D., Wallendorf, M., Kidokoro, H., Reynolds, L. C., Walker, S., Rogers, C., Mathur, A. M., Van Essen, D. C., & Inder, T. (2014). Alterations in Brain Structure and Neurodevelopmental Outcome in Preterm Infants Hospitalized in Different Neonatal Intensive Care Unit Environments. *The Journal of Pediatrics, 164*(1), 52-60.e2. <https://doi.org/10.1016/j.jpeds.2013.08.047>
- Pretorius, L. (2024). Demystifying Research Paradigms: Navigating Ontology, Epistemology, and Axiology in Research. *Qualitative Report, 29*(10), 2698–2715. <https://doi.org/10.46743/2160-3715/2024.7632>
- Ramanathan, K., Paul, V. K., Deorari, A. K., Taneja, U., & George, G. (2001). Kangaroo Mother Care in very low birth weight infants. *Indian Journal of Pediatrics, 68*(11), 1019–1023. <https://doi.org/10.1007/BF02722345>
- Registered Nurses Association of Ontario. (2015) Person- and Family-Centred Care. <https://rnao.ca/bpg/guidelines/person-and-family-centred-care>
- Registered Nurses Association of Ontario. (2023) Political Action Bulletin- Ontario's RN Understaffing Crisis: Impact and Solution. <https://rnao.ca/media/3163/download?inline>
- Robinson, O. C. (2014). Sampling in Interview-Based Qualitative Research: A Theoretical and Practical Guide. *Qualitative Research in Psychology, 11*(1), 25–41. <https://doi.org/10.1080/14780887.2013.801543>

- Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing & Health*, 23(4), 334–340. [https://doi.org/10.1002/1098-240X\(200008\)23:4<334::AID-NUR9>3.0.CO;2-G](https://doi.org/10.1002/1098-240X(200008)23:4<334::AID-NUR9>3.0.CO;2-G)
- Santana, M. J., Manalili, K., Jolley, R. J., Zelinsky, S., Quan, H., & Lu, M. (2018). How to practice person-centred care: A conceptual framework. *Health Expectations : An International Journal of Public Participation in Health Care and Health Policy*, 21(2), 429–440. <https://doi.org/10.1111/hex.12640>
- Schmidt, F. L., & Hunter, J. E. (1998). The Validity and Utility of Selection Methods in Personnel Psychology: Practical and Theoretical Implications of 85 Years of Research Findings. *Psychological Bulletin*, 124(2), 262–274. <https://doi.org/10.1037/0033-2909.124.2.262>
- Silva, N. de F., Linhares, M. B. M., & Gasparido, C. M. (2024). Stress and self-regulation behaviors in preterm neonates hospitalized at open-bay and single-family room Neonatal Intensive Care Unit. *Infant Behavior & Development*, 76, 101951-. <https://doi.org/10.1016/j.infbeh.2024.101951>
- Statistics Canada. (2023, September 25). *Births and stillbirths, 2023*. <https://www150.statcan.gc.ca/n1/daily-quotidien/240925/dq240925c-eng.pdf>
- Stevens, D. C., Helseth, C. C., Khan, M. A., Munson, D. P., & Reid, E. J. (2011). A Comparison of Parent Satisfaction in an Open-Bay and Single-Family Room Neonatal Intensive Care Unit. *HERD*, 4(3), 110–123. <https://doi.org/10.1177/193758671100400309>
- Stevens, D. C., Helseth, C. C., Thompson, P. A., Pottala, J. V., Khan, M. A., & Munson, D. P. (2012). A Comprehensive Comparison of Open-Bay and Single-Family-

- Room Neonatal Intensive Care Units at Sanford Children's Hospital. *HERD*, 5(4), 23–39. <https://doi.org/10.1177/193758671200500403>
- Structure and Neurodevelopmental Outcome in Preterm Infants Hospitalized in Different Neonatal Intensive Care Unit Environments. *The Journal of Pediatrics*, 164(1), 52–60.e2. <https://doi.org/10.1016/j.jpeds.2013.08.047>
- Sullivan-Bolyai, S., Bova, C., & Harper, D. (2005). Developing and refining interventions in persons with health disparities: The use of Qualitative Description. *Nursing Outlook*, 53(3), 127–133. <https://doi.org/10.1016/j.outlook.2005.03.005>
- Tandberg, B. S., Frøslie, K. F., Flacking, R., Grundt, H., Lehtonen, L., & Moen, A. (2018). Parent-Infant Closeness, Parents' Participation, and Nursing Support in Single-Family Room and Open Bay NICUs. *The Journal of Perinatal & Neonatal Nursing*, 32(4), E22–E32. <https://doi.org/10.1097/JPN.0000000000000359>
- Tufford, L., & Newman, P. (2012). Bracketing in Qualitative Research. *Qualitative Social Work : QSW : Research and Practice*, 11(1), 80–96. <https://doi.org/10.1177/1473325010368316>
- van Veenendaal, N. R., van Kempen, A. A. M. W., Broekman, B. F. P., de Groof, F., van Laerhoven, H., van den Heuvel, M. E. N., Rijnhart, J. J. M., van Goudoever, J. B., & van der Schoor, S. R. D. (2022). Association of a Zero-Separation Neonatal Care Model With Stress in Mothers of Preterm Infants. *JAMA Network Open*, 5(3), e224514–e224514. <https://doi.org/10.1001/jamanetworkopen.2022.4514>
- Vasileiou, K., Barnett, J., Thorpe, S., & Young, T. (2018). Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of

qualitative health research over a 15-year period. *BMC Medical Research Methodology*, 18(1), 148–148. <https://doi.org/10.1186/s12874-018-0594-7>

Waddington, C., Veenendaal, N. R., O'Brien, K., & Patel, N. (2021). Family integrated care: Supporting parents as primary caregivers in the neonatal intensive care unit. *Pediatric Investigation*, 5(2), 148–154. <https://doi.org/10.1002/ped4.12277>

Appendix A

Recruitment Poster



Participants Wanted for Research Study

“Impact of Unit Design on Family Experiences in the NICU”



- The purpose of this study is to learn from the lived experiences of families spending time in the Neonatal Intensive Care Unit (NICU) at Kingston General Hospital (KGH).
- Family members who have had a child in the NICU for four weeks or longer within the time period of July 2023 to December 2024 are welcome to participate.
- This study will involve one interview that will be less than 30 minutes in length that you may choose to do at KGH or virtually.
- In appreciation of your time, you will receive a \$10 Tim Horton's gift card.

If you are interested in participating in this study, or would like more information, please reach out by scanning the following QR code:



Alternatively, you may reach out to Hillary McGregor Hughes *BNSc, RN, MScN Candidate* at hillarymcgregor@trentu.ca

Supervisor: Cyndi Gilmer RN, DHlthSc **Contact:** cyndigilmer@trentu.ca
This study has received ethical approval by the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board and Trent University's Research Ethics Board.

Version Date: April 11th, 2024

Appendix B

Telephone and Email Script



Phone and Email Script for Initial Contact with Interested Participants

Study Title: *Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital*

Phone Script

- ✓ Hello, my name is Hillary McGregor Hughes and I am a Master's of Science in Nursing student from Trent University. An individual provided this phone number to receive more information about participating in the study *Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital*. Am I talking to the correct person? **If no:** Is there another member of your household who may have provided this phone number? **If no:** Thank you for your time. Goodbye.
- ✓ **If yes:** Is now a good time to talk?
- ✓ **If no:** Is there a better time to call back? *Date/time:*
- ✓ You are being contacted today because you have previously indicated that you meet the eligibility criteria for this research study and are interested in more information in participating.
- ✓ The purpose of this study is to learn from the lived experiences of families spending time in the NICU environment.
- ✓ This study involves one interview that will be less than 30 minutes and questions will be focused on the impact of the unit design and physical environment on your experience.
- ✓ This interview can be done virtually or in person at Kingston General Hospital.
- ✓ There is minimal to no risk with participation in this study. I do recognize talking about your NICU experience may be stressful for you and a resource will be provided for you to reach out to following the interview.
- ✓ There are no direct benefits to you as the participant. The study results will add to the literature of what family members value in the NICU space.
- ✓ As a token of appreciation, you will receive a \$10 electronic gift card to Tim Horton's for participating within the week following your interview.
- ✓ Participation in this research study is voluntary and will have no impact on the medical care of your child. You may choose not to answer any questions or stop participating at any point.
- ✓ Do you have any questions about anything we have talked about so far?

Version Date: April 12th, 2024



- ✓ **If yes: (Answer questions)** Have all of your questions been answered?
- ✓ Are you interested in participating in this study?
- ✓ **If no:** Thank you for your time. Goodbye.
- ✓ **If yes:** Great. Let's set up a date and time for your interview.

Email Script

To Whom It May Concern:

My name is Hillary McGregor Hughes and I am a Master's of Science in Nursing student from Trent University facilitating the research study *Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital*. I am reaching out to you today because you have indicated that you meet the eligibility criteria for this research study and are interested in more information in participating. The purpose of this study is to learn from the lived experiences of families spending time in the NICU environment. This study involves one interview that will be less than 30 minutes and questions will be focused on the impact of the unit design and physical environment on your experience. This interview can be done virtually or in person at Kingston General Hospital.

There is minimal to no risk with participation in this study. I do recognize talking about your NICU experience may be stressful for you and a resource will be provided for you to reach out to following the interview. There are no direct benefits to you as the participant. The study results will add to the literature of what family members value in the NICU space. Participation in this research study is voluntary and will have no impact on the medical care of your child. You may choose not to answer any questions or stop participating at any point.

Please email me with any questions or if you are interested in participating and we will arrange a date and time for your interview.

Thank you for your time,

Hillary McGregor Hughes
BNSc, RN, MScN Candidate
 hillarymcgregor@trentu.ca

Version Date: April 12th, 2024

Appendix C

Queen's University Health Sciences and Affiliated Teaching Hospitals Research

Ethics Board's Approval



Queen's University Health Sciences & Affiliated Teaching Hospitals Research Ethics Board (HSREB)

RE: HSREB Initial Ethics Approval

May 07, 2024

Mrs. McGregor Hughes:
VP Research\External Department (please specify in comments section)
Trent University

TRAQ #: 6041149

Study Title: "Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital"

Supervisor: Dr. Cyndi Gilmer

Review Type: Delegated

Date of Full Board Meeting: N/A

Date Ethics Approval Issued: May 07, 2024

Date of Expiry of Ethics Approval: May 07, 2025

Dear Mrs. McGregor Hughes:

Thank you for submitting the above referenced study to The Queen's University Health Sciences & Affiliated Teaching Hospitals Research Ethics Board (HSREB). HSREB has reviewed the study and granted initial ethics approval for this study as of the date noted above.

Documents Approved:

Document Name	Comments	Version Date
Letter of Information/Consent Form (combined document)	Clean- Letter of Information & Consent for Study Participation- May 6th, 2024	2024/05/06
Letter of Information/Consent Form (combined document)	Clean- Verbal Letter of Information Script and Consent Form- May 6th, 2024	2024/05/06
Recruitment Letter/Email/Notice/Poster	Phone and Email Script	2024/04/12
Survey	Qualtrics Survey (linked to recruitment poster)	2024/04/13
Other document	Verbal Consent Log	2024/04/11
Other document	Master Linking Log	2024/04/11
Recruitment Letter/Email/Notice/Poster	Recruitment Poster	2024/04/11
Interview Guide	Interview Script	2024/03/10

Documents Acknowledged:

- Supervisor's Letter

- Peer review

No deviations from, or changes to, the protocol should be initiated without prior written approval from HSREB, except when necessary to eliminate immediate hazard(s) to study participants.

On behalf of the HSREB, I wish you success in your research.

Sincerely,



Dean A. Tripp, PhD
Chair, Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board (HSREB)
Professor, Dept of Psychology, Anesthesiology & Urology
Queen's University
Kingston, ON K7L 3N6
HSREB@queensu.ca

HSREB operates in compliance with, and is constituted in accordance with, the requirements of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2); the International Conference on Harmonisation Good Clinical Practice Consolidated Guideline (ICH GCP); Part C, Division 5 of the Food and Drug Regulations; Part 4 of the Natural Health Products Regulations; Part 3 of the Medical Devices Regulations and the provisions of the Ontario Personal Health Information Protection Act (PHIPA 2004) and its applicable regulations. HSREB is qualified through the CTO and CHEER REB Qualification Program and is registered with the U.S. Department of Health and Human Services (DHHS) Office for Human Research Protection (OHRP). Federalwide Assurance Number: FWA#: 00004184, IRB#: 00001173. HSREB members involved in the research project do not participate in the review, discussion or decision.

Appendix D

Trent University's Research Ethics Board's Approval



June 10, 2024

File #: 29098

Title: Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital (multijurisdictional study)

Dear Mrs. McGregor Hughes,

The Research Ethics Board (REB) has given approval to your proposal entitled "Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital (multijurisdictional study)".

When a project is approved by the REB, it is an Institutional approval. It is not to be used in place of any other ethics process.

To maintain its compliance with this approval, the REB must receive via ROMEO:

An Annual Update for each calendar year research is active;

A Study Renewal should the research extend beyond its approved end date of December 31, 2024;

A Study Closure Form at the end of active research.

This project has the following reporting milestones set:

Renewal Due-2024/12/31

To complete these milestones, click the Events tab in your ROMEO protocol to locate and submit the relevant form.

If an amendment to the protocol is required, you must submit an Amendment Form, available in the Events tab in your ROMEO protocol, for approval by the REB prior to implementation.

Any questions regarding the submission of reports or Event forms in ROMEO can be directed to Anna Kisiala, Coordinator, Research Conduct and Reporting, at annakisiala@trentu.ca

On behalf of the Trent Research Ethics Board, I wish you success with your research.

Best Wishes,

A handwritten signature in black ink, appearing to read "Blair Niblett", with a long, horizontal flourish extending to the right.

Dr. Blair Niblett
REB Chair
Phone: 705-748-1011 ext. 7052
Email: blainiblett@trentu.ca

c.c.: Anna Kisiala
Coordinator, Research Conduct and Reporting

Appendix E

Verbal Letter of Information Script and Consent Form



Page 1 of 2

Verbal Letter of Information Script and Consent Form

Study Title: *Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital*

- ✓ Hello, my name is Hillary McGregor Hughes and I am a Master's of Science in Nursing student from Trent University. I am working under the supervision of Cyndi Gilmer.
- ✓ I am inviting you take part in a research study titled, "*Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital*".
- ✓ I am inviting families of children who have received care in the Neonatal Intensive Care Unit (NICU) at Kingston General Hospital (KGH) to take part in a research study. Family members who have had a child in the NICU for four weeks or longer within the time period of July 2023 to December 2024 are welcome to participate.
- ✓ The purpose of this study is to learn from the lived experiences of families spending time in the NICU environment.
- ✓ If you agree to take part, I will interview you using Microsoft Teams. The interview will be recorded using Microsoft Teams and later transcribed. This interview will be less than 30 minutes and questions will be focused on the impact of the unit design and physical environment on your experience.
- ✓ There is minimal to no risk with participation in this study. Talking about your NICU experience may be stressful for you. If you feel upset after the interview, please call the Telephone Aid Line Kingston (TALK) at 613-544-1771.
- ✓ Study results will add to the literature of what family members value in the NICU space.
- ✓ You will receive a \$10 electronic gift card to Tim Horton's for participating within the week following your interview.
- ✓ This study has received ethical approval by the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board and by the Trent University's Research Ethics Board.
- ✓ Participation in this research study is voluntary and will have no impact on the medical care of your child. You may choose not to answer any questions or stop participating at any point.
- ✓ You may request to have your data withdrawn from the study until September 2024 by contacting me at hillarymcgregor@trentu.ca.
- ✓ Your confidentiality will be protected, to the extent permitted by applicable laws.
- ✓ Your confidentiality will be protected as transcribed interviews will be coded with a study ID number removing any participant identification. The code file that links real names with study ID numbers will be stored securely and separately from the data on an encrypted USB file.
- ✓ The study data will be stored on an encrypted hard drive on Trent University's server and will be destroyed five years after the study completion. This will be overseen by my supervisor Dr. Cyndi Gilmer.
- ✓ The Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board (HSREB) and/or Queen's University's representatives may require access to study-related records to monitor the ethical conduct of the research. HSREB is bound by confidentiality agreements concerning any personal information.

Version Date: May 6th, 2024



Page 2 of 2

- ✓ I plan to use the results of this study for my Master's level thesis, publish in academic journals and present at conferences.
- ✓ I will include quotes from some of the interviews when presenting my findings. I will never include any real names with quotes. I will do my best to make sure quotes do not identify participants. During the interview, please let me know if you say anything you do not want me to quote.
- ✓ For any ethical concerns, please reach out to the Queen's University HSREB at 1-844-535-2988 or hsreb@queensu.ca.
- ✓ If you have any questions about this research, please contact me at hillarymcgregor@trentu.ca or my supervisor Dr. Cyndi Gilmer at cyndigilmer@trentu.ca.
- ✓ This verbal consent process and Letter of Information provides you with the details to help you make an informed choice. All your questions should be answered to your satisfaction before you decide whether or not to participate in this research study. Please keep a copy of this Letter of Information that we have sent you for your records.
- ✓ I will be documenting your verbal consent in our research records. You have not waived any legal rights by consenting to participate in this study.

I confirm the participant has verbally consented to the following:

- I have explained all aspects of this study to the participant as outlined on the Letter of Information.
- I answered all of the participant's questions to their satisfaction and the participant had sufficient time to consider their participation in this study.
- The participant was informed that they may choose to stop their participation at any time for any reason with no impact on the care of their child.
- The participant was informed that their legal rights would not be affected by consenting to participate in this study.
- The participant was provided with a copy of the Letter of Information for their records.
- The participant consented to the use of recording and anonymized quotes.
- The participant verbally agreed to participate in this study.

Participant Study ID

Signature of Principal Investigator Conducting the Verbal Consent Discussion

Printed Name

Hillary McGregor Hughes

Date of Verbal Consent

Version Date: May 6th, 2024

Appendix F

Verbal Consent Log



Verbal Consent Log for Documenting Informed Consent

Study Title: *Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital*

Participant Study ID	Consent obtained for:	Date of verbal consent discussion	Name of individual conducting the verbal consent discussion	Signature of individual conducting the verbal consent discussion
	<input type="checkbox"/> All questions asked by the participant were addressed <input type="checkbox"/> A copy of the Letter of Information (LOI) was read to the participant <input type="checkbox"/> Verbal consent was obtained for study participant Explicit verbal consent obtained for: <input type="checkbox"/> Audio Recording <input type="checkbox"/> Video Recording <input type="checkbox"/> Use of Quotes		Hillary McGregor Hughes	
	<input type="checkbox"/> All questions asked by the participant were addressed <input type="checkbox"/> A copy of the LOI was read to the participant <input type="checkbox"/> Verbal consent was obtained for study participant Explicit verbal consent obtained for: <input type="checkbox"/> Audio Recording <input type="checkbox"/> Video Recording <input type="checkbox"/> Use of Quotes		Hillary McGregor Hughes	
	<input type="checkbox"/> All questions asked by the participant were addressed <input type="checkbox"/> A copy of the LOI was read to the participant <input type="checkbox"/> Verbal consent was obtained for study participant		Hillary McGregor Hughes	

Version Date: April 11th, 2024

Appendix G

Letter of Information and Consent for Study



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Letter of Information & Consent for Study Participation

Study Title: *Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital*

Principal Investigator: Hillary McGregor Hughes BNSc, RN, MScN Candidate

Supervisor: Cyndi Gilmer RN, DHlthSc

I am inviting families of children who have received care in the Neonatal Intensive Care Unit (NICU) at Kingston General Hospital (KGH) to take part in a research study. Family members who have had a child in the NICU for four weeks or longer within the time period of July 2023 to December 2024 are welcome to participate. The purpose of this study is to learn from the lived experiences of families spending time in the NICU environment. If you agree to take part, I will invite you to participate in one interview that will be less than 30 minutes. You may choose to do this at KGH or virtually. In person interviews will be audio-recorded using a digital recorder and virtual interviews will video recorded using Microsoft Teams, however, you may choose to turn off your camera if you wish to only be audio recorded. Questions will be focused on the impact of the unit design and physical environment on your experience. There is minimal to no risk with participation in this study. Having a child in the NICU is an emotional experience for families and talking about it may be stressful for you. If you feel upset after the interview, please call the Telephone Aid Line Kingston (TALK) at 613-544-1771. There are no direct benefits to you as the participant. Study results will add to the literature of what family members value in the NICU space. I plan to use the results of this study for my Master's level thesis, publish in academic journals and present at conferences. Interviews will be de-identified during transcription and any quotes that are used will be anonymized. You will receive a \$10 electronic gift card to Tim Horton's for participating within the week following your interview.

Participation in this research study is voluntary and will have no impact on the medical care of your child. You may choose not to answer any questions or stop participating at any point. You may request to have your data withdrawn from the study until September 2024 by contacting me at hillarymcgregor@trentu.ca. As the principal investigator, I have previously worked in the NICU at KGH, but I am not working there at this time and will not have provided care for your child. Interviews will be recorded and transcribed within two weeks of your interview. Your confidentiality will be protected as transcribed interviews will be coded with a study ID number removing any participant identification. The code file that links real names with study ID numbers will be stored securely and separately from the data on an encrypted USB file. The study data will be stored on an encrypted hard drive on Trent University's server and will be destroyed five years after the study's completion. This will be overseen by my supervisor Dr. Cyndi Gilmer. Participants' confidentiality will be safeguarded to the extent permitted by the applicable laws. The Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board (HSREB) and/or Queen's University's representatives may require access to study-related records to monitor the ethical conduct of the research. HSREB is bound by confidentiality agreements concerning any personal information. For any ethical concerns, please reach out to the Queen's University HSREB at 1-844-535-2988 or hsreb@queensu.ca.

Version Date: May 6th, 2024



The details in this Letter of Information provides you with knowledge to help you make an informed choice. Before choosing whether or not to participate in this research study, all of your questions should be answered. A copy of this consent form will be provided to you for your personal records and a copy will be kept by myself as the researcher. You have not waived any legal rights by consenting to participate in this study. This study has received ethical approval by the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board and by Trent University's Research Ethics Board. If you have any questions about this research, please contact me at hillarymcgregor@trentu.ca or my supervisor Cyndi Gilmer at cyndigilmer@trentu.ca.

By signing below, I am acknowledging that I have read this Letter of Information and all of my questions have been answered. By consenting, I have not waived any legal rights in the event of research-related harm.

- Yes, you have my permission to record
 No, you do not have my permission to record
 Yes, you have my permission to use anonymized quotes
 No, you do not have my permission to use anonymized quotes

Participant signature: _____

Printed Name: _____

Date: _____

Signature of principal investigator: _____

Hillary McGregor Hughes

Date: _____

Contact Information

Principal Investigator

*Hillary McGregor Hughes
 BNSc, RN, MScN Candidate
 hillarymcgregor@trentu.ca*

Supervisor

*Cyndi Gilmer
 RN, DHIthSc
 cyndigilmer@trentu.ca*

Trent University Research Conduct and Reporting Coordinator

*Anna Kisiala
 annakisiala@trentu.ca*

Version Date: May 6th, 2024



Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board

1-844-535-2988
 hsreb@queensu.ca

Appendix I

Interview Script

Interview Script

Study Title: *Impact of unit design on family experiences in the Neonatal Intensive Care Unit at Kingston General Hospital*

Opening

- A. Hello, nice to meet you _____. My name is Hillary McGregor Hughes and I will be facilitating your interview this morning/afternoon. I am interviewing you as a Masters of Nursing Science candidate from Trent University. For clarity, I am not affiliated with KGH.
- B. Today I will be asking you some questions based on your experience of having a baby in the NICU here at Kingston General Hospital.
- C. We are looking to learn from your NICU experience in order to gain an understanding of how the unit environment has impacted your family experiences.
- D. This interview will be about 20 minutes. Does this work for you at this time? Do you have any questions before we start?

Body

- A. General information
 1. Is or was this your first experience having a baby in the NICU?
 - a. Was Kingston General Hospital where your other child/children was/were cared for as well?
 2. Did you know that your child was going to have to be admitted to the NICU prior to their birth?
 3. How long has your child been (or was) cared for in the NICU?
- B. Valued family experience
 1. What are the experiences you value with your baby in the NICU?
 2. What are your favourite care activities to participate in when you are with your baby?
- C. Impact of unit layout
 1. Tell me about your experiences in the NICU.
 - a. I noticed you discussed negative impacts of the unit design on your experience, can you think of any positives?
 - or**
 - b. I noticed you discussed positive impacts of the unit design on your experience, can you think of any negatives?
 2. Your baby is being cared for in a nursery with other babies. How has this environment made you feel in caring for your child?

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3. How do you think your family experience would be different if they had their own room?
 - a. Is there anything you would miss about the open pod experience?
 - b. Would you have any concerns with your child being in a single patient room?
4. Can you share your experience of commuting from your home to the hospital to be with your child?
 - a. Is there anything that would improve this visiting process for you?

D. Additional information

- a. Is there anything else you would like to share with me today related to your experience in the NICU at Kingston General Hospital?

Closing

- A. Thank you for taking the time to share your experience with me today. If you feel upset after this interview, please call the Telephone Aid Line Kingston (TALK) at 613-544-1771.
- B. If you are interested, I would be happy to email the results of this study to you following the analysis of the interviews.
- C. Please feel free to reach out to me at any time with any further questions or concerns at hillarymcgregor@trentu.ca.