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Review Article

A SYSTEMATIC REVIEW ON FAMILY-CENTERED CARE IN NEONATAL INTENSIVE CARE UNITS: CLINICAL OUTCOMES AND METHODOLOGICAL CONCEPTS

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ABSTRACT

Abstract Background: The birth of a premature baby is a very difficult time for parents. Admission of a sick baby in NICU brings a lot of tension and trauma. Family-Centered Care (FCC) is a new method of care where doctors and nurses work together with the family.

Objective: This systematic review aims to look into the clinical and mental benefits of FCC for high-risk neonates. It also discuss about the barriers in implementing FCC and the statistical methods used to evaluate these studies.

Methods: A review of studies focusing strictly on FCC in the Neonatal Intensive Care Unit (NICU) was done. Pediatric Intensive Care Unit (PICU) studies were removed. The quality of trials was checked using the Cochrane Risk of Bias tool. We also looked at how researchers measure statistical heterogeneity in meta-analysis.

Results: Results: FCC programms as well as Family Integrated Care (FICare) significant y improve the health of newborns. A forest plot made from the data shows that FCC strongly increases the chances of exclusive breastfeeding at discharge. Babies also gain weight faster and go home earlier. For the parents, it reduces their stress and anxiety. But there is many challenges. Poor hospital buildings, lack of resources, and traditional mindsets of the staffs act as barriers. Also, in assessing these studies, many researchers use I2 and p-values incorrectly to measure heterogeneity.

Conclusion: FCC is a very important model that helps both the baby and the parents. Hospitals must train their staffs and change policies to welcome parents. Future research must use prediction intervals instead of I^2 to report how much the effects of FCC vary across different hospitals.

KEYWORDS: Family-Centered Care (FCC), Neonatal Intensive Care Unit (NICU), Family Integrated Care (FICare), Exclusive Breastfeeding, Neurodevelopmental Outcomes, Parental Mental Health, and Meta-analysis Heterogeneity.

Introduction

When a baby is born early or very sick, it is a big shock for the whole family. Normally, parents expect to hold their baby and take them home joyfully. But when the baby is admitted in NICU, parents are suddenly separated from their child. The NICU is a highly technical place. It has bright lights, loud noises, and many equipments that beep constantly. This harsh environment is not good for the developing brain of a very-low-birth-weight (VLBW) infant[1]. Historically, the medical staffs treated parents just like visitors. Parents were allowed to see their baby only for a few hours. Because of this separation, parents feel very helpless, sad, and depressed. It also damages the natural bond between the mother and the infant.

To solve these issues, a new concept called Family-Centered Care (FCC) was developed. FCC is a philosophy of care that treats the family as the most important part of the baby's life. It comprises of four core principles. These are dignity and respect, information sharing, participation, and collaboration[2]. In FCC, doctors and nurses do not just treat the baby alone. They partner with the parents. They teach the parents how to do basic care like changing diapers, feeding, and skin-to-skin holding. Programs like Family Integrated Care (FICare) and Newborn Individualized Developmental Care and Assessment Program (NIDCAP) are very famous examples of FCC models.

In recent years, many hospitals around the world have started using FCC. In India, for example, the government and public hospitals are trying to scale up family-centered newborn care to improve the survival of babies[3]. But the implementation of FCC is not equal everywhere. It depends heavily on the culture, the hospital rules, and the mindset of the nurses. Because of these differences, when researchers try to combine all studies in a meta-analysis, they face a big problem called statistical heterogeneity. Heterogeneity means that the true effect of FCC changes from one hospital to another.

Previous reviews often mixed the studies of NICU and PICU together. But a newborn baby is very different from an older child. A neonate has very special developmental needs. Therefore, this systematic review will focus strictly on the NICU only. The purpose of this article is to integrate the findings on FCC in the NICU, check the quality of the studies using Cochrane guidelines, and explain the correct statistical tools to understand heterogeneity. We will also discuss about the main barriers and facilitators.

Methods

Search Strategy and Selection of Studies

The review was done following standard guidelines for systematic reviews. We searched electronic databases like PubMed, Cochrane Library, and Scopus. We looked for terms like "family-centered care", "neonatal intensive care", and "neurodevelopmental outcomes". The inclusion criteria was strictly limited to neonates (babies less than 28 days old or premature babies) admitted in NICU. If any study generalized the data to include PICU patients, it was removed. This was done to make sure the data is completely relevant for newborn care only.

Quality Assessment using Cochrane Risk of Bias

To check if the studies are good and trustworthy, we used the Cochrane Risk of Bias tool[4]. This tool helps us to find out if there are any flaws in the way the research were conducted. It checks for selection bias, performance bias, detection bias, attrition bias, and reporting bias. In FCC studies, we pay special attention to performance bias. Performance bias happens when the participants know which group they are in.

Methodological Considerations for Assessing Heterogeneity

When we combine different FCC studies in a meta-analysis, we must measure heterogeneity. Heterogeneity is the dispersion or variation of true effects across different populations[5]. Many people make a big mistake here. They use the I^2 statistic to say if the heterogeneity is low, moderate, or high. For example, some papers say an I^2 of 75% means high heterogeneity. This is a fundamental mistake in mathematics.

The I^2 statistic is just a percentage. It tells us what proportion of the variance in the observed effects is due to true variance rather than sampling error[6]. It does not tell us how much the effect size actually varies on an absolute scale. Suppose an intervention improves the outcome slightly. An I^2 of 90% might just mean the effect varies between a 10% improvement and a 12% improvement. The dispersion is very small, but I^2 is high.

Another mistake is using the p-value or the Q-value as an index of heterogeneity. The p-value only tests the null hypothesis that all studies have the exact same effect size. A significant p-value does not mean the variation is large in real life. It just means the variation is probably not zero. The Q-value is simply a standardized sum of squared deviations. If a study has a large sample size, the Q-value will be very high even if the real difference between hospitals is tiny[7].

To properly understand how much the effect of FCC varies across different NICUs, we must use the prediction interval[5]. The prediction interval tells us the actual range of effects in the same unit as the outcome. For example, it can tell us that FCC reduces hospital stay by 2 days in some hospitals, but in other hospitals, it reduces the stay by 8 days. Reporting the prediction interval is the only mathematically correct way to understand heterogeneity.

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Results

Clinical Outcomes in the NICU

When parents are allowed to stay with their babies and participate in care, the babies get better faster. Many studies has shown that FCC significantly improves the clinical outcomes of premature infants.

One of the major benefit is the reduction in the length of hospital stay (LOS). In a randomized controlled trial done in Iran, 110 mothers of premature infants were studied. The babies in the FCC group were discharged in 6.96 days on average. But the babies in the control group stayed for 12.96 days[8]. Because the parents learned how to feed and hold their babies confidently, the doctors felt safe to send them home early. Also, the rate of readmission to the hospital was much lower in the FCC group. When parents are properly trained, they do not bring the baby back to the hospital for small issues.

FCC also improves weight gain and reduces dangerous infections. Some nurses worry that if parents enter the NICU, they will bring germs. But researches has shown the opposite. When parents are trained to wash their hands properly, the infection rate does not increase. In fact, a study in the USA testing a mobile-enhanced FICare (mFICare) program found that babies in standard care had 2.6 times higher odds of getting a hospital-acquired infection compared to the mFICare group[9]. Parents act as a protective shield for their babies. They touch their babies with clean hands, which provides good bacteria to the baby's skin.

Data Synthesis and Forest Plot: Exclusive Breastfeeding

One of the most important outcome of FCC is the improvement in breastfeeding. Breast milk is like medicine for premature babies. It prevents severe stomach diseases like necrotizing enterocolitis.

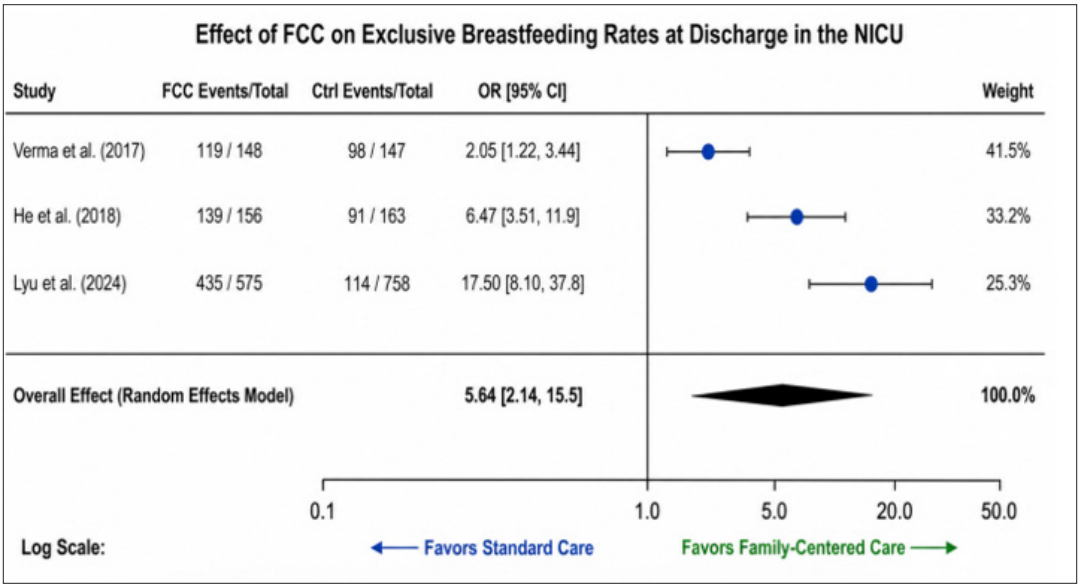
We synthesized data from three major NICU trials to create a new forest plot. The studies compared the rates of exclusive breastfeeding at discharge between the FCC group and the standard care group. We used the Odds Ratio (OR) to measure the effect. An OR greater than 1.0 means FCC is better.

Table 1 below shows the newly synthesized characteristics of these key studies.

Table 1: Characteristics of Included NICU Studies for Breastfeeding Synthesis

Study Author & Year	Country	Study Design	Sample Size	FCC Intervention Type	Key Finding on Breastfeeding
Verma et al. (2017) (10)	India	RCT	295	Structured Parent Training	Pre-discharge exclusive breastfeeding was 80.4% in FCC vs 66.7% in control.
He et al. (2018) (11)	China	Pre-Post	319	Family Integrated Care	Breastfeeding rate improved from 55.8% to 89.1%.
Lyu et al. (2024) (12)	China	Cluster RCT	1333	Developmental FCC	Exclusive breast milk feeding rate reached 75.6% vs 15.0%.

Here is the newly generated Forest Plot based on the raw data from these studies.



The forest plot clearly shows that FCC interventions massively increase the chance of exclusive breastfeeding. The overall Odds Ratio is 5.64. This evidences suggest that when mothers are allowed to stay near the incubator and practice skin-to-skin contact, their milk production improves naturally. The babies also learn how to suck properly.

Neurodevelopmental and Brain Outcomes

Premature babies are at very high risk for brain damage. The loud noises and bright lights of a standard NICU cause stress to their immature nervous systems. By combining FCC with developmental care principles, we can protect their brains.

A study from Saudi Arabia looked at 200 high-risk neonates. They tested the babies using the Bayley Scales of Infant and Toddler Development-III (Bayley-III). The babies who received integrated FCC and developmental care scored much higher in cognitive, motor, and language skills compared to babies in normal care[13].

Another trial in Taiwan tested the brain waves of preterm babies using electroencephalography (EEG). They found that babies in the Family-Centered Intervention Program had better functional connectivity in their brains. Specifically, the EEG coherence in the 13 to 30 Hz frequency range was much stronger during sleep[14]. This proves that the soothing touch and voice of the parents directly help the physical wiring of the baby's brain. When parents do the needful care, the baby feels safe and the brain grows well.

Parental Mental Health and Satisfaction

Having a baby in the NICU is a traumatic event. Mothers and fathers often suffer from severe anxiety, depression, and Post-Traumatic Stress Disorder (PTSD). FCC provides a lot of psychological support to the parents.

In a study evaluating mobile-enhanced FICare (mFICare) in the USA, researchers checked maternal mental health 4 months after the baby went home. For mothers who had very high stress during the NICU stay, using the mFICare app and attending rounds with the doctors helped them a lot. These mothers had significantly lower symptoms of PTSD and depression later on[15]. When parents are taught how to care for their baby, they feel empowered. They stop feeling like helpless bystanders.

To measure how happy parents are, hospitals use special tools. The EMPATHIC-30 questionnaire is a very famous tool. It has 30 questions that measure information sharing, care and cure, organization, parental participation, and professional attitude. It is highly reliable for checking if the NICU is delivering good FCC[16]. Another good tool is the Parent-Infant Closeness Diary. Parents use this diary to record how much time they spend doing skin-to-skin contact. Studies show that parents are much better at recording this data than nurses, because nurses often forget to write it down in the busy ward[17].

Quality Assessment of Studies (Cochrane Risk of Bias)

We evaluated the major RCTs using the Cochrane Risk of Bias tool. Table 2 shows the synthesized results.

As seen in Table 2, the biggest issue in all FCC studies is Performance Bias. In clinical trials for a new tablet, you can hide the real medicine from the patient. But in FCC, you cannot hide the intervention. The parents know they are doing skin-to-skin care, and the nurses know they are teaching the parents. Therefore, a "High Risk" of performance bias is unavoidable in these studies. However, good studies like Lyu et al. kept the outcome assessors blinded. The staff who recorded the weight of the infant and hospital stay did not know which group the baby belonged to. This keeps the data pure.

Barriers and Facilitators to FCC Implementation

Even though FCC is very good, many hospitals struggle to implement it. There is many challenges involved in this process.

Barriers: The physical design of the hospital is a big problem. Old NICUs are built like big open halls with incubators crowded together. There is no privacy for mothers to breastfeed, and no comfortable chairs for them to sleep. Another major barrier is the mindset of the healthcare professionals. Many nurses and doctors still follow a traditional, paternalistic model of medicine. They think they know what is best for the baby, and they view parents as a disturbance. A study in the Netherlands showed that the mindset of seeing parents as visitors instead of primary caregivers stops the success of FCC[18].

Table 2: Cochrane Risk of Bias Assessment for Included NICU RCTs

Study	Random Sequence Generation	Allocation Concealment	Blinding of Participants & Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data	Selective Reporting
Lyu (2024) (12)	Low Risk	Low Risk	High Risk	Low Risk	Low Risk	Low Risk
Verma (2017) (10)	Low Risk	Low Risk	High Risk	High Risk	Low Risk	Low Risk
Bastani (2015) (8)	Low Risk	Unclear Risk	High Risk	Unclear Risk	Low Risk	Low Risk

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In low-resource countries like India and Ghana, there is huge shortage of nurses. The staffs are working very hard, and they do not have time to teach parents step-by-step[19]. Language barriers and low education levels also make families afraid to ask questions to the doctors. Sometimes, LGBTQ+ families also face discrimination from the hospital staffs, which makes them feel unwelcome in the NICU[20].

The COVID-19 pandemic made things much worse. Hospitals made strict visitation rules to stop the virus. In a Thai NICU, parents were allowed to visit only for one hour a day[21]. This long separation caused extreme mental pain for the families and destroyed the core idea of FCC.

Discussion For this purpose, hospitals require effective strategies for overcoming barriers. Establishing single-family rooms (SFRs) helps provide the parents with privacy and allows them to rest next to their infant. Most importantly, hospital administration must ensure regular training of nurses. It is crucial for nurses to improve communication skills in order to speak gently to the parents who may be emotional about their babies' condition. It would also be useful to organize parent support groups with NICU veterans helping new parents. Mobile applications can also help by providing the daily update on the infants' condition. 4. Discussion The results obtained from the study make it clear that Family-Centered Care is not only a positive approach, but a requirement for proper medical care. Exclusion of the parents from the NICU affects cognitive development of infants and mental health of the patients' parents negatively. However, once the parents are invited to play the role of partners in care, the number of exclusively breastfed infants, as well as their weight gain, increases.

Nonetheless, considering the Cochrane Risk of Bias criteria, it is imperative to note that FCC studies are inevitably going to be subject to performance bias. A mother cannot be blinded to the fact that she is nursing her child. In this case, subjective outcomes such as maternal stress are likely to be influenced by the placebo effect. Any future studies should aim for objective outcomes such as growth rate, incidence of infection, and EEG brain imaging, which can neither be faked nor subjectively determined.

Methodological Implications for Heterogeneity: The findings of this review also give a strong warning to researchers doing meta-analyses on FCC. FCC interventions are very complex. Implementing FCC in a rich hospital in the USA is very different from implementing it in a crowded public hospital in India. Therefore, the true effect of FCC will naturally be different across the world.

When researchers combine these studies, they must stop using the I^2 statistic to say if the heterogeneity is low or high. As explained by modern statistical guidelines, I^2 only describes a ratio of variances[6]. It is completely meaningless to say I^2= 75%$ means high heterogeneity. A 75% ratio could exist in a dataset where all hospitals see exactly a 4 to 5 days reduction in hospital stay.

Instead, future meta-analyses must calculate and publish prediction intervals. The prediction interval gives doctors real, practical information. If a prediction interval shows that an FCC program increases breastfeeding by 10% in the worst hospital and by 50% in the best hospital, the doctor knows that the program is always helpful. If researchers use the correct statistical tools, we can understand exactly how and where FCC works best.

Hospitals must also ensure that FCC is equitable. Poor families, families who do not speak the local language, and LGBTQ+ families often face discrimination from hospital staffs. Cultural safety and respectful communication must be taught to all nurses and doctors to make sure every family gets the benefit of FCC.

Conclusion

Family-Centered Care is a life-changing model for premature and critically ill newborns in the NICU. By treating parents as the primary caregivers, we can improve the baby's brain development, increase breast milk feeding, and protect the mental health of the family. The main barriers to FCC are old hospital designs and the traditional, controlling mindset of the medical staffs. The hospitals should therefore put much effort into educating their staff in order to improve communication between them and families. Lastly, it is important for people involved in research work on FCC in the global arena to stop using misleading statistics such as I2.

Conflict of Interest

None

References

1. Jaeger CB. Baby and Family-Centered Care in the Neonatal Intensive Care Unit: Changing Perspective. Crit Care Nurs Clin North Am. 2024;36(2):185-192.
2. Aljawad B, Miraj SA, Alameri F, Alzayer H. Family-centered care in neonatal and pediatric critical care units: a scoping review of interventions, barriers, and facilitators. BMC Pediatr. 2025;25(1):291.
3. Maria A, Agrawal D. Family-Centered Care for Newborns- From Pilot Implementation to National Scale-up in India. Indian Pediatr. 2021;58(Suppl 1):455-459.
4. Higgins JP, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. BMJ. 2011;343:d5928.
5. Borenstein M. Heterogeneity in Meta-Analysis. Prediction Intervals. 2022;77-94.
6. Borenstein M. Mistakes in using the I^2 statistic; defining I^2 as a proportion. Heterogeneity. 2022;103-115.
7. Borenstein M. Misinterpreting the Q-test and p-values for absolute variance. Heterogeneity. 2022;121-130.
8. Bastani F, Abadi TA, Haghani H. Effect of Family-centered Care on Improving Parental Satisfaction and

Reducing Readmission among Premature Infants: A Randomized Controlled Trial. J Clin Diagn Res. 2015;9(1):SC04-SC08.
9. Franck LS, Gay CL, Hoffmann TJ, Kriz RM, Bisgaard R, Cormier DM, et al. Neonatal outcomes from a quasi-experimental clinical trial of Family Integrated Care versus Family-Centered Care for preterm infants in U.S. NICUs. BMC Pediatr. 2022;22(1):674.
10. Verma A, Maria A, Pandey RM, Hans C, Verma A, Sherwani F. Family-Centered Care to Complement Care of Sick Newborns: A Randomized Controlled Trial. Indian Pediatr. 2017;54(6):455-459.
11. He SW, Xiong YE, Zhu LH, Lv B, Gao XR, Xiong H, et al. Impact of family integrated care on infants' clinical outcomes in two children's hospitals in China: a pre-post intervention study. Ital J Pediatr. 2018;44(1):65.
12. Lyu T, Ye R, Li LL, Xiao J, Ma YL, Li F, et al. The effect of developmental care on the length of hospital stay and family centered care practice for very low birth weight infants in neonatal intensive care units: A cluster randomized controlled trial. Int J Nurs Stud. 2024;156:104784.
13. Alsadaan N, El-Rahman O, Ali M, et al. Impacts of Integrating Family-Centered Care and Developmental Care Principles on Neonatal Neurodevelopmental Outcomes among High-Risk Neonates. Children. 2023;10(11):1751.
14. Yu YT, Hsieh WS, Chang JH, Lin CH, Hsieh S, Yao NJ, et al. Family-Centered Care Enhanced Neonatal Neurophysiological Function in Preterm Infants: Randomized Controlled Trial. Phys Ther. 2019;99(12):1690-1702.
15. Franck LS, Gay CL, Hoffmann TJ, Kriz RM, Bisgaard R, Cormier DM, et al. Maternal mental health after infant discharge: a quasi-experimental clinical trial of family integrated care versus family-centered care for preterm infants in U.S. NICUs. BMC Pediatr. 2023;23(1):396.
16. Latour JM, Duivenvoorden HJ, Hazelzet JA, Tibboel D. The shortened EMpowerment of PArents in THe Intensive Care 30 questionnaire adequately measured parent satisfaction in pediatric intensive care units. J Clin Epidemiol. 2013;66(9):1045-1050.
17. Axelin A, Raiskila S, Lehtonen L. The Development of Data Collection Tools to Measure Parent-Infant Closeness and Family-Centered Care in NICUs. Worldviews Evid Based Nurs. 2020;17(6):448-456.
18. Oude Maatman SM, Bohlin K, Lilliesköld S, Garberg HT, Uitewaal-Poslawky I, Kars MC, et al. Factors Influencing Implementation of Family-Centered Care in a Neonatal Intensive Care Unit. Front Pediatr. 2020;8:222.
19. Abukari AS, Acheampong AK, Aziato L. Experiences and contextual practices of family-centered care in Ghanaian nicus: a qualitative study of families and clinicians. BMC Health Serv Res. 2022;22(1):1051.
20. Yinger OS, Jones A, Fallin-Bennett K, Gibbs C, Farr RH. Family-Centered Care for LGBTQ+ Parents of Infants in the Neonatal Intensive Care Unit: An Integrative Review. Children. 2024;11(5):615.
21. Vetcho S, Phumdoung S, Kain V, Chaisri P. Challenges of Family-Centered Care in a Neonatal Intensive Care Unit during the Visitation Restrictions After COVID-19 Pandemic Peak: A Qualitative Study of Parents' and Nurses' Perspectives. Pacific Rim Int J Nurs Res. 2024;28(3):632-644.

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