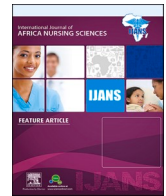




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# Preparing for implementation of family-integrated neonatal care by healthcare providers in a district hospital of Limpopo Province

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## ABSTRACT

**Background:** Parents of babies admitted to the neonatal unit experience considerable stress related to the neonatal environment and condition of the neonate. During admission, care is provided by healthcare providers and parents only visit their neonates during scheduled times. In family-integrated neonatal care parents are primary caregivers in neonatal health.

**Aim:** The aim of the study was to develop and implement strategies of family integrated neonatal care in a district hospital of Limpopo.

**Design:** Action research, Piggot Irvine Problem Resolving Action Research model was utilized in the study.

**Methods:** A quantitative tool was utilized to collect data on the well-being of the neonates. Two focus groups were held to explore the experiences of health care providers on provision of neonatal care in Limpopo Province.

**Data analysis:** Descriptive statistics was used to analyse quantitative data and the Tesch eight steps of data analysis was used to analyse qualitative data.

**Results:** Six sub themes emerged during the focus groups, namely, 1) HIV-positive mothers' unwillingness to breastfeed; 2) failure of the HIV-positive mothers to disclose their status to partners 3) failure of the mother to sustain kangaroo mother care after discharge; 4) incorrect Apgar scoring by midwives and medications by doctors in the labour ward; 5) shortage of resources in the neonatal unit; and 6) roles of family members in the neonatal unit. On assessment of the neonates' well-being, it was found that most lost weight, while some neonates had a prolonged stay in the neonatal unit.

Strategies of implementation of family integrated neonatal Care were developed by a steering committee.

**Conclusion:** The conducted situational analysis highlighted the need for implementation of family integrated neonatal care, in which parents would become primary caregivers for their own neonates. Further research is required to explore the experiences of mothers during the implementation of family integrated neonatal care.

## 1. Introduction

Family integrated neonatal care is defined as a planned and structured approach of neonatal care that empowers parents to become primary caregivers of their own neonates during admission in the neonatal intensive care unit (Waddington, van Veenendaal, O'Brien, & Patel, 2021). This model of care also encourages parents to continue caring for their infants after discharge from the hospital. Parents are involved in daily care activities in a planned and structured manner, which enable them to become part of the neonatal healthcare team that cares for neonates in the neonatal unit (O'Brien et al., 2013, 2018; Macdonell, I. K., Christie, K., Robson, K., Pytlik, K., Lee, S.K. & O'Brien, K., 2013).

Family integrated neonatal care was developed in Canada as a derivative of the Estonian Tallinn approach of neonatal care. In the latter approach, mothers take care of their new-born and preterm babies for 24 h, with minimal use of technology and handling by the nursing staff (Levin, 1994).

According to O'Brien et al. (2013) the outcomes of family integrated neonatal care for neonates include a decrease in retinopathy of prematurity, necrotising enterocolitis, medication errors, and length of stay of neonates in the neonatal unit. Mortality rates and costs for the hospitals are also reduced. Mothers in this model of care tend to gain confidence, comfort and hope. Moreover, bonding between the mother and the infant is improved, while healthcare providers' workload is reduced. The

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relationship between the family and the healthcare providers is improved (Macdonnell, I.K., Christie, K., Robson, K., Pytlik, K., Lee, S.K. & O'Brien, K., 2013).

According to Hariati, Mckenna, Sutumo, Lusmilasari, and Febriani (2022) conventional neonatal care overwhelmed the mothers as they experienced stress, fear of losing their infant, distress and trauma as well as mixed feelings due to the condition of the neonate. Wang, Meng, Ma, and Zhou (2021) added that the neonatal intensive care unit environment and the condition of the neonate resulted in shock and lack of attachment to the neonate. Mothers also had a sense of loss of motherhood as nurses were providing most of the care giving skills to the neonates. Horwood, Haskins, Luthuli, and McKerrow (2019) indicated that mothers at times felt disrespected as they were often shouted at and their neonates' confidentiality and privacy were also breached by discussing the condition of their neonates openly. According to Namusoke, Sekikubo, Namiiro, and Nakigudde (2021) nurses failed to answer the questions that the mother had regarding their neonates and were as such seen as insensitive and lacked proper communication by the mothers. Horner (2019) indicated that separation, lack of bonding and attachment in the mother and neonate dyad relationship may result in long term effects such as attachment disorders manifested by emotional withdrawal and disinhibited social disorder in the infant. Wang et al. (2021) acknowledged that mothers should be included in the provision of care to their own neonates in order to cope better with the negative experiences they might encounter in the neonatal intensive care unit.

In spite of the benefits, there was a paucity regarding the implementation of family integrated neonatal care in Sub-Saharan African countries, and conventional neonatal care was provided in the setting of the study. The setting was a low-resource public district hospital in a rural area of the Limpopo Province, South Africa, serving a mainly low socio-economic population group. Neonates admitted in the neonatal unit included neonates in need of close monitoring and some form of support, and at times neonates in need of intensive care. As far as possible, very ill neonates would be referred for specialised treatment at a tertiary hospital.

In the conventional provision of neonatal care by healthcare providers, mothers could visit their infants only at scheduled times. When an ill or premature neonate was admitted to the neonatal unit, parents were mostly excluded in the infant's care. Mothers were allowed to participate in some activities of care, such as breastfeeding and scheduled visits to the neonate.

The overall aim of the study was therefore to develop and implement strategies of family integrated neonatal care in a district hospital of Limpopo, of which the first objective was to describe the baseline data prior to the implementation of family integrated care. The purpose of this manuscript was to report on the preparation for implementation of the strategies, which included a description of the mothers and neonates being admitted in the district hospital of Limpopo Province, the experiences of the healthcare providers of neonatal care at that time (prior to implementation of family integrated care), and the development of the strategies by a steering committee.

## 2. Methods

### 2.1. Design

The Piggot-Irvine Problem Resolving Action Research (PRAR) model was utilised as the design of the overall study to implement family integrated neonatal care in the district hospital. This article reports on Cycle I to describe the existing situation (situational analysis) and Cycle II (development of strategies). The evaluation after implementation (Cycle III) will be reported in a separate manuscript.

As illustrated in Fig. 1, the PRAR model allows for different cycles. Each cycle consists of four steps, namely: planning, acting, observing and reflecting. The process is iterative in nature and allows systematic reflection and collaboration with the people committed to change

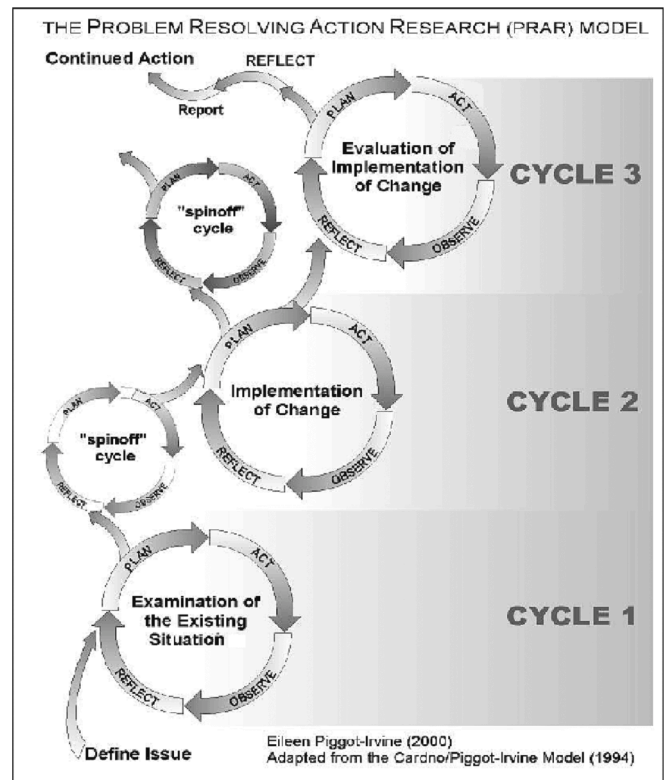


Fig. 1. Piggot-Irvine problem resolving action research.

(Piggot-Irvine, 2009). The application of the model in this study included three cycles, namely: situational analysis, implementing change, and evaluating the implemented change, of which the first two cycles are reported in this manuscript.

### 2.2. Sample selection and recruitment

The first objective was to describe the baseline data of neonates and mothers prior to implementation of family integrated care. A quantitative tool was used to collect retrospective data from the neonatal records. The neonatal data included weight gain, neonatal mortality, length of stay and their respective health problems. As data was extracted from the neonatal records, maternal data available was limited to maternal age and parity.

Neonatal records were used from January to December 2015 to provide a situation analysis prior to implementation of family integrated care, as 2016 was used to prepare and initiate family integrated care in the neonatal unit. The sample size was determined using Yamane's formula (Yamane 1967), which was  $n = 229$  files per annum, from a total population of  $N = 500$  admissions per year. The following describes Yamane's formula that was used to obtain the sample:

$$n = \frac{N}{1 + N(e)^2}$$

where,  $n$  = the sample size,  $N$  = population size (500 neonates per annum),  $e$  = the error of 5 percentage points and 95% confidence level and  $p = 0.05$  are assumed. Substituting all these values in the equation gave a sample size of 222 neonatal files per annum. However, 229 files were sampled using systemic random sampling in order to get an equal distribution of files per month.

To describe the experiences of the healthcare providers prior to implementation of family integrated care, all the healthcare providers ( $N = 32$ ) who provided neonatal care at the district hospital in Limpopo Province at the time of the study, were invited to participate in focus

groups during neonatal unit meetings. They were invited based on their knowledge and experience of neonatal care in the particular setting, and they were included if they signed voluntary consent to participate. Nine ( $n = 9$ ) participants participated voluntarily in the focus groups, who included registered nurses, enrolled nurses and enrolled nursing auxiliaries, while no other disciplines participated.

The steering committee was responsible for the second cycle of the study to develop and implement strategies for family integrated care, and consisted of the assistant manager of the maternity ward, the acting operational manager of the postnatal and neonatal ward, and the medical doctor in charge of the neonatal unit. These members were purposefully selected for their roles in the operational management of the neonatal unit and they then participated voluntarily.

### 2.3. Data collection

The researcher used both quantitative and qualitative data collection techniques in the study. For the first objective to describe the neonatal outcomes prior to implementation of family integrated care, a quantitative data capturing tool was used to collect retrospective demographic data of the neonates' gestational age, weight gain, health related problems, length of stay of the neonates, and neonatal mortality, as well as the mothers' age and parity. The data was collected by the researcher from the patient records from February to April 2017, once ethical approval has been obtained by the respective ethical committees in January 2017. As the proposal indicated that 2015 records would be used, the researcher continued as such.

Qualitative data was collected in September to October 2017 for the second objective by means of two focus groups with nurses to describe their experiences concerning care provision to neonates in the neonatal unit. The first focus group was composed of four participants which were all registered nurses ( $n = 4$ ), while the second was conducted with five participants which were enrolled auxiliary nurses ( $n = 3$ ) and enrolled nurses ( $n = 2$ ). Healthcare providers from other disciplines indicated that they were not able to join the focus groups. The researcher, who was a trained facilitator, conducted the focus groups at a time suited to most who were willing to participate, without interruption of services. The groups were held in a side room of the neonatal unit, which was private and accessible to all. The central question focused on their experiences regarding the neonatal care provided in the neonatal unit, and their views concerning the nature and level of involvement by parents in the care of their neonates. The first focus group took 60 min and the second focus group was 55 min. The focus groups were audio recorded and field notes were taken on observations and nonverbal cues. The results are discussed later in this manuscript.

The above was considered as the first cycle to obtain baseline data prior to implementation of family integrated care. Cycle two then to develop and implement the strategies was done by the steering committee and included the results of the previous steps, an in-depth literature review on family integrated care, and minutes of meetings held with staff and management of the specific district hospital.

### 2.4. Data analysis

A statistician analysed the retrospective data by means of descriptive statistics using graphs, percentages and frequencies to describe the neonatal outcomes prior to implementation of family integrated care, as described by Polit and Beck (2017). The rationale thereof was to obtain baseline data which could be used to compare with outcomes after implementation of family integrated care.

The qualitative data obtained from the focus group interviews, and was analysed by the researcher using Tesch's eight steps of data analysis as described by Creswell (2014). The focus group interviews were transcribed verbatim, the researcher read and re-read each transcript, and wrote down ideas from each transcript as the ideas emerged. Similar topics and ideas derived from the transcripts were clustered in relation

to the study objectives and codes were allocated to the clusters. These codes were written next to the appropriate segments of the transcribed interviews. The most descriptive words were chosen for the topics, and these were converted into categories. A final decision was made on the most appropriate code for each category and the ordering thereof.

In order to develop and implement the strategies for family integrated care in the neonatal unit, the steering committee reviewed relevant literature, the results of the previous two objectives and the minutes of the meetings held in the neonatal unit. Inductive and deductive reasoning and in-depth discussions were used to reach consensus amongst the steering committee with the formulation of the strategies. The strategies then were presented and discussed with the neonatal staff and input were considered to finalise formulation. Once agreement was obtained from all role players, the strategies were implemented.

### 2.5. Ethical considerations

Ethical approval was obtained from the University of Pretoria's Faculty of Health Science Research Ethics Committee, and the Limpopo Department of Health. Institutional permission was granted by the Chief Executive Officer of the district hospital.

Ethical principles (beneficence, respect for human dignity and justice) were adhered to as stipulated by the Belmont Report (Department of Health. 2015, 2015). The principle of beneficence was adhered to ensure that the participants had the right to freedom from harm and discomfort, and were not subjected to unnecessary risks of harm or discomfort. Respect for human dignity was observed as participants had the right to be in the study voluntarily, uncoerced, and independently. The nature and purpose of the study was explained to the participants for purposes of informed consent, as well as their right to refuse any involvement in the study without any reprisals or penalty meted against them. The researcher also explained there were no risks and the benefits of the study might be improved outcomes for the neonates on the long term, but the participants would not receive any specific benefits. Justice was addressed by treating all participants fairly and just. All personal information of the participants was kept confidential by assigning numbers to the participants and not publishing any information that might expose them.

### 2.6. Rigour

Strategies to enhance the rigour of the study were related to the use of well-established research design and research techniques, the researcher's prolonged engagement with the context, training as a facilitator, and involvement of participants who were knowledgeable about the context. The researcher was responsible for data collection, which reduced the risk for inter-researcher interpretation. The steering committee members contributed to the rigour of the study by keeping a clear audit trail of the processes followed and providing thick description.

## 3. Results

### 3.1. Baseline data of mothers and neonates

#### 3.1.1. Demographic data of mothers ( $n = 229$ )

- Age

The results indicated that 16 (7%) of mothers were less than 18 years of age, while 191 (83%) were within the childbearing age of 18 to 36 years; and 22 (10%) were older than 36 years of age, which is an advanced maternal age.

Mothers younger than 18 years of age were at risk of morbidity and mortality due to unsafe abortion, hypertension and nutritional anaemia in pregnancy, cephalopelvic disproportion, and prolonged labour. Their

babies also tend to be at higher risk for morbidity and mortality due to preterm labour, low birth weight babies, and a higher risk for birth defects (Adeniyi, Oyinloye, Awoyinka, Adeyemo, & Ayankunle, 2021). Mothers above the age of 36 years of age were at risk of diabetes, hypertensive disorders in pregnancy, increased maternal mortality as well as poor neonatal outcomes (Pinheiro, Areia, Pinto, & Donato, 2019). Claramonte Nieto, Meler Barrabes, and Garcia Martínez (2019) added that mothers older than 36 years were at risk of diabetes, placenta praevia and caesarian births.

• Parity (n = 229)

The mothers' parity is indicated in Fig. 2.

Mothers who are primigravida (G1P0) tend to be at risk of high mortality due to maternal complications such as hypertension, cephalopelvic disproportion, postpartum hemorrhage and prolonged labour. Mothers of high parity (G6P5 and above) are also at risk of antepartum haemorrhage, postpartum haemorrhage, and ruptured uterus due to malpresentation and prolonged labour (Cronje & Grobler, 2021).

3.1.2. Baseline data of the neonates

• Gender and gestational age of neonates

Of the 229 neonates included in the study, 125 (54.59%) were boys, and 104 (45.41%) were girls. Furthermore, 192 (84%) were full-term, while 7 (16%) were preterm. Shakya (2014) indicated that girls required less admission than boy and that more full-term neonates were admitted than preterm neonates, which corresponded with the results of this study.

• Weight gain

Weight gain was considered a relevant indicator of the effect of care on a preterm or sick infant, as poor weight gain is associated with morbidity and mortality (Ndembo, Naburi, & Kisenge, 2021), and could therefore be valuable to determine the difference between conventional and family integrated care in the neonatal unit. The baseline results showed that 113 (49.34%) lost weight, 16 (6.99%) neonates' weight remained the same and 100 (43.67%) neonates gained weight during admission in the neonatal unit.

• Length of stay

Length of stay was also considered to be a valuable indicator of quality of care (Lingsma, Bottle, & Middleton, 2018) and parental competence and confidence as caregiver to their sick or preterm infant (Nieves, 2017). The baseline data of length of stay was calculated according to weight groups as indicated in Table 1.

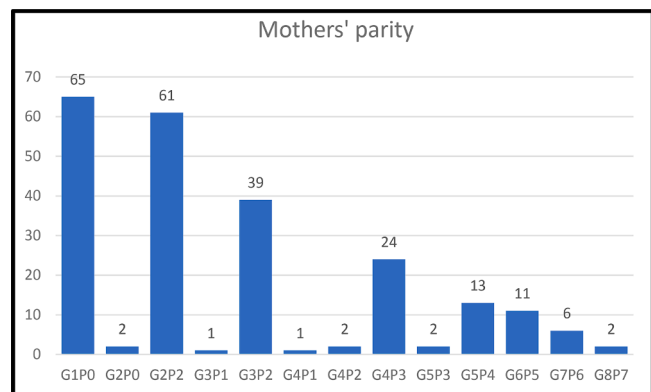


Fig. 2. Mothers' parity (G = Gravity; P = Parity).

Table 1

Length of stay according to weight groups (n = 229).

Length of stay measured in days	<2500 g	2500 g-3500 g	>3500 g	Total
0	1 (0.44%)	0 (0%)	1 (0.44%)	2 (0.88%)
1-5	29 (12.66%)	78 (34%)	70 (30.57%)	177 (77.29%)
6-10	10 (4.37%)	11 (4.8%)	5 (2.19%)	26 (11.35%)
>10	19 (8.3%)	2 (0.87%)	3 (1.31%)	24 (10.48%)
Total	59 (25.76%)	91 (39.74%)	79 (34.5%)	229 (100%)

\*The calculated % is rounded off.

The majority (77.29%) were hospitalised for a period of 1 to 5 days, and 10.48% stayed for longer than 10 days. The implementation of family integrated neonatal care was expected to reduce the length of stay of neonates in the district hospital.

• Neonatal mortality (n = 229)

Baseline data was obtained of the neonatal mortality as a further indicator of quality of care as described by Nieves (2017). The expectation was also that neonatal mortality should decrease with the implementation of family integrated care. The baseline data indicated that 221 (96.50%) of the neonates were discharged alive, while 8 (3.5%) had died. The causes of death for the neonates that died were birth asphyxia 2 (0.87%); respiratory distress 2 (0.87%); herbal intoxication 1 (0.44%); low birth weight 1(0.44%), meconium aspiration 1(0.44%) and neonatal sepsis1(0.44%).

The purpose of the retrospective data was to obtain measurable baseline data which could be used for comparison between outcomes prior and after implementation of family integrated care in the same setting.

3.2. Themes identified during focus group interviews

Two focus groups were conducted with 9 participants who were all female and constituted of registered nurses (n = 4), auxiliary nurses (n = 3) and enrolled nurses (n = 2). Three participants were between the age of 20–25 years, 1 was between 26 and 30 years, 1 between 31 and 35 years, 2 between 36 and 40 years, 0 between 41 and 45 and 46–50 years, 1 between 51 and 55 years and 1 between 56 and 60 years. Five of the participants worked in the neonatal unit for a period of 1–5 years, two had an experience of 6–10 years, 1 participant worked in the neonatal unit for 11–15 years and 1 had an experience of 16–20 years.

The central question of the focus group discussions was the experiences of healthcare providers regarding the care provided in the neonatal unit and parental involvement. The themes that emerged are summarised in Table 2 and then discussed.

The themes, categories and sub-categories are discussed in the following section.

3.2.1. Challenges encountered with mothers and neonates during neonatal care

The challenges are especially related to HIV-positive mothers, reactions of mothers towards neonatal care and experiences of healthcare providers related to the neonates.

3.2.1.1. HIV-positive mothers.

• HIV-positive mothers' unwillingness to breastfeed

According to Hazemba, Ncama, and Sithole (2016), exclusive breastfeeding and intake of prescribed antiretroviral drugs for six



**Table 2**  
Summary of themes.

Theme	Categories	Subcategories
1. Challenges encountered with mothers and neonates during neonatal care	a) HIV-positive mothers	<ul style="list-style-type: none"> <li>• HIV-positive mothers' unwillingness to breastfeed</li> <li>• Failure of HIV-positive mothers to disclose their HIV status</li> </ul>
	b) Reactions of mothers towards neonatal care	<ul style="list-style-type: none"> <li>• Emotional reactions of the mothers towards neonatal care</li> <li>• Failure of the mothers to sustain KMC after discharge</li> </ul>
	c) Experiences of healthcare providers related to the neonates	<ul style="list-style-type: none"> <li>• Challenges and errors related to assessment and treatment of neonates</li> </ul>
2 Equipment and resources	a) Inadequate provision of material and human resources	<ul style="list-style-type: none"> <li>• Lack of equipment and material resources</li> <li>• Shortage of staff</li> <li>• Unconducive working environment</li> </ul>
3 Roles of family in neonatal care	a) Family involvement in neonatal care	<ul style="list-style-type: none"> <li>• Lack of family involvement in neonatal care</li> <li>• Benefits of family involvement in neonatal care</li> </ul>

months during the postnatal period can reduce the risk of transmission of HIV from the mother to the neonate. However, despite the availability of antiretroviral drugs, the HIV-positive mothers were still unwilling to breastfeed. To that effect, one of the participants mentioned:

"We have challenges with the mothers (taking a deep sigh) who are HIV-positive with the babies that are exposed - they don't want to breastfeed their babies. That is our challenge in this unit. So, what we are looking forward to is for the mothers to breastfeed so to understand what is to breastfeed." (Participant 5)

Nyoni, Sweet, Clark, and Ward (2019) proffer that HIV-positive mothers were not assisted in deciding on *how* to feed their babies after birth. Thus, the mothers were left doubtful of the potential for antiretroviral drugs and exclusive breastfeeding to reduce the possibility of mother to child transmission of the virus. These (doubtful) mothers upheld that the baby could still easily be infected. Breastfeeding is an important component of family integrated neonatal care, whose implementation could encourage HIV-positive mothers to breastfeed their neonates and also improve bonding in the process.

- Failure of the mothers to disclose their HIV status

HIV-positive mothers did not disclose their HIV status to family members with whom they were living, or who were helping them with the neonate's care. Such non-disclosure of their HIV status resulted in neonates' defaulting treatment as the families were unaware of the treatment they had to receive for the neonate, subjecting the neonate to the risk of contracting HIV. The latter was emphasised in the following:

"I don't know how to say it, but it is a challenge, the mothers do not tell their parents or partners" [meaning, their HIV status]. (Participant 5)

According to Nyadat and van Rensburg (2017), infants born from HIV-positive mothers are more likely to become HIV-positive due to their mothers' failure to disclose their HIV status. In this regard, family integrated neonatal care could encourage HIV-positive mothers to disclose their HIV status to their partners and family members. Such disclosure could prevent the transmission of HIV to the neonates, as well as health-related problems that could lead to the neonates' readmission.

### 3.2.1.2. Reactions of mothers towards neonatal care.

- Emotional reactions of the mothers towards neonatal care

The results of the study showed that the mothers of preterm neonates feared to handle the neonates as they were afraid that they will fall because they were too small. This was indicated as follows:

"They are afraid of the baby, sometimes they don't want to touch the baby. they don't know how to put the baby on the breast. The baby is too small she is afraid that the baby will fall." (Participant 3)

This finding agrees with that of Wang et al. (2021) who indicated that mothers experience fear and anxiety during admission in the neonatal units. Moreover mothers were also worried about the size of the baby as well as the chance of the neonates' survival.

- Failure of the mothers to sustain kangaroo mother care after discharge

Mothers of preterm neonates failed to continue with the kangaroo mother care practices at home and did not follow the advice given to them on discharge, to the detriment of the neonates. A participant expressed the detrimental effects as follows:

"Sometimes you find that she has got maybe 3 babies *neh*. This three [were not premature] so they told themselves that they once had a baby *mos* so why are they telling me to do this. I was doing this for this two why [can't I]. I can't have a problem with this one because I have done this before. So that is just ignorance so there we have a problem ... It becomes a problem when the mother goes home, she does not have anyone to help and she ends up putting the baby on the bed and continuing with work at home.." (Participant 3)

This finding agrees with that of Sjomar et al. (2023) who indicated that mothers fail to continue with kangaroo mother care at home as they find it hard to do the house chores and also have a problem if they had other children to look after. The mothers end up putting the baby on the bed when sleeping in order to continue household house hold work without difficulty. Therefore, family integrated neonatal care has the potential to equip the mothers with the necessary skills and assistance of providing kangaroo mother care, thereby assisting them to continue the practice at home.

### 3.2.1.3. Experiences of healthcare providers related to the neonates.

- Challenges and errors related to assessment and treatment of neonates

It was found that the neonates were incorrectly assessed and there were also medication errors committed during admission of the neonates in the labour. Furthermore the unit mostly admitted preterm babies that most of the time experienced some respiratory problems such as apnoeic attacks. This was shown as follows:

"My experience in this unit we are having a lot of babies who are preterms who are less than 20 weeks, 30 weeks, some if the weight is more than 850 g some they survive, some they don't survive, from the experience these babies have apnoeic attacks, and sometimes the mothers do not know what to do but we tell them that the preterms because their lungs are not matured they will have these apnoeic attacks. We encourage and educate them to tell us the...anything the abnormalities they see on the baby." (Participant 5)

"My experience sometimes they brought a baby here and the baby changes condition and immediately have some signs of seizures and if you tell the labour nurse that this changed has some seizures she says no it is not some seizures maybe is jitters whereas you could see the baby clenching his fists and the arms are so tight or they brought the baby here being cyanosed central cyanosed saying hah immediately when we get inside here the baby changed condition." (Participant 6)

"Even the treatment that the doctors prescribe if you can't check it properly you can give the wrong dose because you have to check some of

them do not know how to calculate” (Participant 6)

According to [Mulac, Taxis, and Hagesaether \(2021\)](#) 24% of medication errors occur during prescription and while dosage errors were the most leading type of medication error that occurred in hospitals. [Moschino et al. \(2020\)](#) highlighted a rise in premature birth which might lead to long term respiratory complications for the neonates. According to [Moschino et al. \(2020\)](#) apnoea is one of the leading problems that preterm neonates are admitted for that may lead to respiratory failure requiring mechanical ventilation.

### 3.2.2. Equipment and resources

#### 3.2.2.1. Inadequate provision of material and human resources.

- Lack of proper equipment and material resources

It was determined that equipment such as incubators, pulse oximeters and infusion pumps, were not functioning correctly, as amplified by the participants below.

“We don’t have the sats [saturation] monitors, these machines are old I think they have to buy us new machines because they don’t even light we have to go there and press so that you can see the reading there ... Even the infusion pumps are no longer working properly.” (Participant 5)

[Prullage et al. \(2022\)](#) highlighted the challenge of shortage of equipment in the NICU such as infusion pumps, oxygen blenders and CPAP machines. To that effect, participants shared that equipment was either outdated or completely dysfunctional, which negatively affected the quality of care provided in the neonatal units.

The study also revealed shortage of supplies such as baby blankets which exposed the neonates at risk of hypothermia while shortage of nappies affected the relations between the health care provider and the family of the neonate. This was indicated as follows:

“The baby blankets and the baby carriers we are running short of them”. (Participant 4).

“As we used to have nappies, tissues here sometimes you find that we don’t [have them]. It becomes a problem to the mothers because they ask where the nappies are. If you tell the mothers that [they] must buy [their] own nappies neh...some mothers tell their families at home that here at the hospital they tell us to buy the nappies what, what...some families are angry why. They come to ask for the sister who said they must buy and they say I want the nurse told my child this and that.” (Participant 6)

However, family integrated neonatal care could still be successfully implemented in spite of equipment that is not functional, and the involvement of parents might contribute to monitoring of the neonates by being present and involved in the neonatal unit.

- Shortages of staff

The results revealed shortage of nurses that should monitor the neonates during their admission in the neonatal unit. This was shown as follows:

“Shortage of staff is a problem because I will never see all this babies with my eyes you see in front here maybe we are three and the hand of the baby is like or the foot is like this” [meaning swollen] (Participant 5)

[Lala, Lala, and Dangor \(2017\)](#) supported the notion that there is shortage of all categories of nurses in South Africa.

- Unconducive working environment

The health care providers highlighted that the neonatal units they were working in is small and congested which makes it difficult to move around the unit. This was indicated as follows:

“The environment I not conducive to these babies it is very small, if

they are many it will be congested and there will be no movement here” (showing with her hands). (Participant 6)

According to [Awan and Tahir \(2015\)](#) a conducive environment plays an important role in the production results of the institutions. Thus there was a need for the neonatal unit to be accommodative in order for the health care providers to provide quality neonatal care.

- Lack of family involvement in the care of neonate

According to participants, the neonates’ families are not involved in the care of the neonate. To that effect, they averred thus:

“Some are refusing, I remember an incident with the father of another baby. I told the father of the baby to kanga [kangaroo care] the baby, neh. Some found me taking out the baby trying to show the father how to kanga [kangaroo care] the baby and they said: ‘no, no, the father is not supposed to touch the baby, the father is supposed to look at the baby, not touch.’” (Participant 1)

“Mothers were inviting the fathers to come and bond with the baby for an hour or so, but now...some fathers want, but others do not want it at all. Some they want, some they fear to touch the little one, but it was just cancelled. We don’t know what went wrong with the practice. We don’t know.” (Participant 2)

According to [Jerntorp, Sivberg, and Lundqvist \(2021\)](#) agree that contradictions still exist among healthcare providers regarding the role of the father during hospitalisation of the neonate in the neonatal intensive care unit. The mother is still considered the primary caregiver, while the father is only expected to receive information and make decision regarding the care of the neonate. This resulted in fathers having feelings of being excluded, unimportant with lack of clear roles during hospitalisation of their neonate ([Jerntorp et al., 2021](#)).

- Benefits of family involvement in neonatal care

The health care providers believed that inclusion of the family in neonatal care will assist the family in understanding the condition and care of their sick and small neonate better. The work load will be reduced as the neonates will be cared for by their own families. This was said as follows:

“The family of of the premature babies must be involved from day 1 maybe they will understand what this is The grandmothers when they come to visit them, indicate that they [ have never had a low birth weight baby] the kangaroo babies are not everywhere. sometimes I never had a low birth weight baby since I was born so it is a surprise to me when you say my daughter has got a...so I have to learn this I am to help here when she goes home so I had to learn it here at the hospital.” (Participant 1)

“It will minimize the workload to me. It also helps saving time because I will just be recording the observations I will not going to check the baby i will ask the mother if the baby has past urine or stools. what is the temperature and the mother will ask which one sister the skin or incubator or air they can tell us they can read. It will save us time.” (Participant 5)

[O’Brien et al. \(2013\)](#) supported that outcomes of family integrated care on nurses were that they were doing more teaching and less provision of neonatal care and the parents became closer to the nurses thus improving their relationship.

### 3.3. Formulation and implementation of strategies for family integrated care in the neonatal unit

A steering committee was established to formulate and implement strategies for family integrated care in the neonatal unit. Four steering committee members were purposively selected based on the leadership roles that the members were playing in the operational management of the neonatal unit, their support of the concept of family integrated care, and their willingness to take part in the implementation thereof.

The steering committee used the McKinsey 7S Model ([Ravanfar,](#)

2015) to develop the strategies for the implementation of family integrated neonatal care. The seven areas of the model are divided into soft and hard areas, which are all interconnected. The hard areas include strategy, structure and systems, while the soft areas include style, staff and skills (Ravanfar, 2015). The McKinsey 7S Model consists of seven components however the strategy, skills, staff and systems components were used to develop the strategies to implement family integrated neonatal care. The other components such as the structure, shared values and the style were used in the day-to-day management of the unit.

The steering committee members conducted an in-depth literature review related to family integrated care, and discussed the baseline results of the neonates and mothers, as well as the findings of the focus groups. Their conclusions were discussed at staff meetings in the neonatal unit, and all staff could give input on how to implement family integrated care. The decision was that in order to achieve family integrated care, it was also necessary to address additional challenges in the neonatal unit, which implied that there were some strategies formulated that were not directly linked to family integrated care, but were supporting neonatal care in general.

The strategies were as follows:

1. The managers have to ensure that midwives assess the neonates properly by using the Apgar score during the implementation of family integrated neonatal care:
  - In-service education has to be provided to the midwives with regard to the correct Apgar scoring.
  - Fire-drills on Apgar scoring should be conducted to ensure that the midwives are well acquainted with Apgar scoring.
2. The managers need to prevent the occurrence of medico-legal hazards related to medication prescriptions during the implementation of family integrated neonatal care:
  - All doctors should be given in-service education with regard to medication prescriptions for neonates.
  - Medical interns should be allocated to the neonatal unit to be orientated in the management of sick and small neonates in general before they do calls in the neonatal unit.
3. The healthcare providers should support safe breastfeeding practices during the implementation of family integrated neonatal care:
  - Mothers should be encouraged to disclose their HIV status to the immediate members of their family.
  - Couple counselling and testing for HIV should be provided.
  - The family need to attend the counselling sessions with the mothers to promote adherence to treatment.
  - Mothers should be encouraged to breastfeed their neonates exclusively.
4. The healthcare providers have to provide support to mothers during the provision of family integrated neonatal care:
  - The condition of the neonates should be explained to the mothers during admission to allay their stress and anxiety.
  - The mothers should be informed about the progress of the neonates during their stay in the neonatal unit.
  - The mothers should be orientated in the neonatal unit and be informed about the different machines and alarms that might be attached to the neonate.
  - The mothers should be taught about daily care activities, including hand washing, 'top-and-tailing', nappy changing, cord care, checking vital signs, giving oral medication, breast-, tube- or cup feeding, and intermittent skin-to-skin contact.
  - The mother should be allowed to attend the doctors' rounds and give a report about the condition of her own neonate
  - The establishment of mother-to-mother support groups should be facilitated.
  - Social workers should provide social support to the mothers and the family as a whole.
  - Psychologists should provide services to the mothers to cope with emotional and psychological challenges.
5. The healthcare providers need to encourage kangaroo care after discharge and as part of family integrated neonatal care:
  - The healthcare providers should ensure that the mothers continue doing kangaroo care at home through education of the mothers about the advantages and techniques thereof.
  - Assessment should be done to determine whether the mother is eligible for discharge by using the kangaroo care score chart before discharge.
  - Mothers should be encouraged to join support groups of mothers with preterm infants at home.
  - Mothers need to be encouraged to attend the neonatal clinic for assessing the wellbeing of the neonate.
6. The managers have to ensure the availability of durable and functional medical equipment during the implementation of family integrated neonatal care:
  - The managers should perform a needs assessment and purchase the required equipment, such as incubators, pulse oximeters, apnoeic monitors, phototherapy lights and intravenous fluid monitors.
  - All personnel should be trained in the use of new equipment.
  - A maintenance plan should be available for the equipment and they should be maintained according to the plan.
  - Malfunctioning and old equipment should be condemned, and broken ones should be repaired.
  - Sharing of equipment between units should be controlled through inventory and recording to ensure the availability of equipment during the provision of family integrated neonatal care.
7. The managers have to ensure the provision of adequate human and material resources during the implementation of family integrated neonatal care in the neonatal ward:
  - The managers should do a needs assessment to check the category of health professionals required in the neonatal ward.
  - Motivations should be presented to the Provincial Department of Health to fill up the vacant posts.
  - Exit interviews should be conducted with healthcare providers leaving the institution to identify potential challenges in the unit.
  - A human resource plan should be drawn up to address shortages of staff, overtime and remuneration.
  - A retention strategy should be developed to prevent healthcare providers from resigning.
8. The managers have to develop a policy on the involvement of other family members than the parents during the implementation of family integrated neonatal care in the neonatal unit:
  - Managers should create standard operating procedures that describe the role of the father and grandmother during the implementation of family integrated neonatal care in the neonatal unit.

These strategies were implemented from November 2018, and the outcomes were evaluated during Cycle III. The results thereof will be addressed in another manuscripts.

#### 4. Discussion

Family integrated care is a much-needed approach in neonatal care due to its benefits to parents and neonates on the short and long term, such as improved adjustment to parenthood, shorter length of stay in hospital, improved bonding and attachment, and reduced medication errors and incidents during hospitalisation (O'Brien et al., 2018; Hei, Gao, Nong et al. 2016). A lack of family support constitutes a noticeable problem for the mothers' stay during the admission of their ill neonates, delays their adaptation to parenthood and caregiving, and increases their stress levels (De Bernardo, Svelto, Giordano, Sordino, & Riccitelli, 2017).

The implementation of family integrated care needs careful planning appropriate to the setting (Banerjee, Aloysius, Platonos, & Deierl, 2018; Cohen et al., 2014), which can be done by using McKinsey 7S Model (Ravanfar, 2015) to develop strategies. The strategies developed in this

study included the strategies directly related to family integrated care, but were expanded to address other challenges experienced in the specific context as well. The strategies were implemented and the outcomes were evaluated against the baseline data obtained prior to implementation. The outcomes indicated improved weight gain of the neonates and reduced length of stay. Additional outcomes included empowerment of the mothers, positive attitude of mothers and support of each other, and increased involvement of fathers. Challenges were experienced regarding the facilities and equipment, and involvement of other family members such as grandmothers. The process and results of evaluation of family integrated care in the district hospital in Limpopo will be discussed in a separate manuscript.

It is recommended for family integrated care to be implemented in neonatal care, irrespective if it is a high or a low resource setting. The study also underlines the importance of support and education of parents in the care of their sick or preterm infant, but also the importance of teamwork amongst healthcare providers to implement family integrated care. Knowledgeable and committed leaders can play a crucial role in successful implementation.

Provision of conventional neonatal care which excludes parents as caregivers engenders unprecedented levels of stress for the parents, but implementation of family integrated care provides support for the parents. However, such an orientation requires the healthcare providers' mind shift from that of care to engagement with the parents as primary care givers during the implementation of family integrated care. There is a need for a steering committee to develop strategies that will facilitate easy implementation of the family integrated neonatal care model in the identified hospital.

A limitation of the study was that it was contextual with small sample sizes, and therefore cannot be generalised.

## 5. Conclusion

An overview was provided on the situation analysis of the district hospital in Limpopo Province prior to implementation of family integrated care, as well as the formulation of strategies for implementation thereof. The situation analysis was done in order to obtain measurements which could be used as comparison of the differences as a result of implementation of family integrated care. These will be reported on in a follow-up manuscript.

## Author contribution

Dr MA Shokane was the main author and this was the study done for the Ph.D. in Nursing at the University of Pretoria. Prof R. S Mogale was the supervisor and Prof C Maree was the co-supervisor in the study and both contributed towards the development of the article.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Authors will provide any data required if requested.

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