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Original Article

A Quality Improvement Initiative to Shorten the Duration of Hospital stay of Preterm / Low Birth Weight Babies with Special Focus on Infant and Family Centered Developmental care

Sajal Twanabasu[1], Bhusan Kumar Subedi[2], Sushan Homagain[3], Sujina Maskey[4], Anjana Shrestha[5], Kriti Shrestha[6]

[1] Consultant Paediatrician, Dhading Hospital, Nilkantha Municipality, Dhading, Nepal
[2] Internist, Dhading Hospital, Nilkantha Municipality, Dhading, Nepal
[3] Medical Officer, Dhading Hospital, Nilkantha Municipality, Dhading, Nepal
[4] Medical Officer, Patan Academy of Health Sciences, Lagankhel, Lalitpur, Nepal
[5] Dhading Hospital, Nilkantha Municipality, Dhading, Nepal
[6] Staff Nurse, Dhading Hospital, Nilkantha Municipality, Dhading, Nepal

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Correspondence

Sajal Twanabasu,
Consultant Paediatrician,
Dhading Hospital,
Nilkantha Municipality,
Dhading,
Nepal.
Email: sajal.twanabasu@gmail.com

Abstract

Introduction: Infant and family-centered developmental care (IFCDC) incorporates neurodevelopment, parental involvement, parent-infant bonding, and enabling sensory environment. The focus is on minimizing the separation between child and parents and ensuring parental involvement in the care of babies right after birth. This not only helps in optimal neurodevelopmental outcomes but also early discharge of preterm babies as parents will be confident in taking care of their preterm and low birth weight (LBW) babies. IFCDC is not adopted by most neonatal units in Nepal. To reduce the duration of hospital stay of preterm / LBW babies from 10.5 days to 8 days (20% reduction) after introduction of infant and family-centered developmental care at special newborn care unit.

Methods: This is a hospital-based quality improvement project conducted at a 50-bed Governmental district hospital located at a rural setup outside Kathmandu valley in Bagmati province of Nepal. Baseline data on infant length of stay (LOS) was evaluated using the hospital records. Problems were identified using a fishbone diagram. Process and outcome indicators were formulated and analyzed. Multiple Plan-Do-Study-Act (PDSA) cycles were conducted to achieve the desired target.

Results: The average duration of the hospital stay was reduced from the pre-intervention period of 10.5 days to 8 days after incorporating IFCDC which persisted during the post-intervention of four weeks.

Conclusions: Our study has shown that the duration of hospital stay of preterm babies is reduced when IFCDC is adopted. IFCDC is a win-win approach and needs to be adopted in all the neonatal units across the country.

Introduction

Across the globe, significant achievements have been made in reducing the neonatal mortality rate (NMR).[1] Between 1990 and 2021, NMR across the globe decreased by approximately 51%, from 37 deaths per 1000 live births to 18.[1] Nepal has followed a similar trajectory.[2] Previously, the primary focus was only on reducing mortality. Neonatal morbidities associated with prematurity and LBW include neuro-developmental and cognitive impairment in around 21.4% of these infants.[3] Hence,

we should consider providing an optimum environment where babies can thrive and reach their full potential besides only saving them.

Newborns admitted to the neonatal care unit are exposed to various stressful experiences including painful procedures and disruptive environments. These negative experiences in early life are associated with adverse neurodevelopmental and behavioral outcomes. Parent and infant bonding stimulate neurobiological and behavioral processes that support parent and infant well being.[4] Infant and family-centered developmental care (IFCDC) is the integration of two paradigms: family-centered care and developmental care. It is hence based on neurodevelopment, parent-infant interaction, parental involvement, breastfeeding promotion, and environmental adaptation. IFCDC aims to develop a partnership between the family and the healthcare team in delivering care for a neonate. Emphasis is laid on protecting the infant's developing brain, promoting optimal long-term neurodevelopmental and behavioral outcomes by creating an enabling sensory environment.[5,6] There are eight core principles of IFCDC.[7] It includes free 24-hour parental access with no limitations, psychological support for parents, pain management for optimal brain development, a supportive sensory environment, a postural environment to reduce stress, skin-to-skin contact, breastfeeding and lactation support, and sleep protection.

There is a growing evidence that favorable health benefits can be achieved by involving parents in planning, decision-making, and caregiving for their newborns in newborn care units.[8,9] Family-centered care results in increased breastfeeding frequency and a faster weight gain. Implementation of IFCDC also results in a decrease in hospital stays, enhanced parent-infant bonding, sharing of responsibilities, and better neurodevelopmental outcomes.[10] IFCDC results in the earlier readiness of parents for parenthood. They become emotionally comfortable, and self-confident and learn technical skills in taking care of their babies. When the safety of babies can be ensured in a home environment, preterm babies can be discharged resulting in a lesser length of hospital stay (LOS).

Health care providers in Nepal are not aware of the concept of IFCDC. Thus, IFCDC is not a daily norm. Most of the studies on IFCDC are from high-income countries and there are not many studies from middle and low-income countries. This quality improvement project (QI project) is planned to adopt the principles of IFCDC in reducing the duration of hospital stay of preterm / low birth weight (LBW) babies at Dhading Hospital, Dhading, Nepal.

Methods

This hospital-based quality improvement project QI project was conducted at Dhading Hospital, Dhading, Nepal. This is a 50-bedded Governmental district hospital located at a rural setup outside Kathmandu valley in Bagmati province of Nepal with a level II special newborn care unit (SNCU). The Hospital has around 900 deliveries annually and around 350 SNCU admissions. The study was conducted in the SNCU and postnatal ward of Dhading Hospital for three months from 2024 Mar 01 to 2024 May 31, with a post-implementation study done for 1.5 months until the 2024 Jul 15. Pre-intervention data was collected from hospital records for three months from the 2023 Dec 01 to 2024 Feb 29. IFCDC was not practiced at the unit before the project. Only the father and mother were allowed to visit the unit once daily at a pre-fixed schedule. Routine care was provided by the nurses and parents had no role in taking care of babies admitted at SNCU. Moreover, there were no proper settings for the initiation of KMC inside SNCU and KMC was initiated only after the baby was discharged from SNCU. Babies weighing less than 2000 gm, small for gestational age especially whose weight is less than 3rd centile for the corresponding gestational age, those requiring positive pressure ventilation, experiencing respiratory distress and having other medical conditions requiring specialized care were admitted at SNCU. Babies were discharged from SNCU when the medical conditions for which babies were admitted had been resolved. Preterm / LBW babies were discharged only when KMC was well established. For babies whose birth weight was less than 1800 gm, discharge was done only after baby reaching 1800 gm despite well established KMC and consistent adequate weight gain. This resulted in the longer hospital stay of preterm babies which is around 10.5 days (Table 1). The study was commenced after taking ethical approval from the Nepal Health Research Council (NHRC) (Ref No: 1373-2024). The QI team was formulated consisting of a paediatrician as a supervisor / leader, an internist, a medical generalist, medical officers, and nurses designated into different roles as administrators, counselors, recorders, and communicators. Problems were identified using a fishbone diagram in terms of people, place, policy, and process (Figure 1).

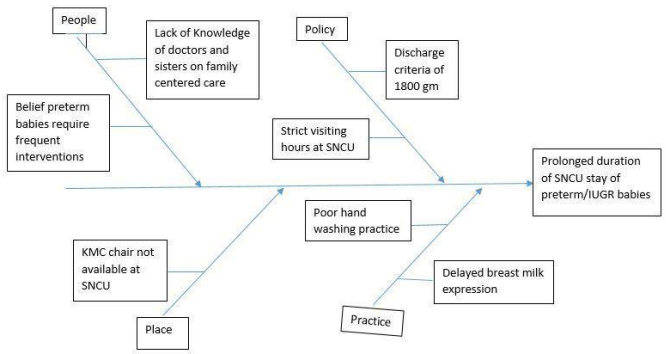

Figure 1: Fish bone diagram

The aim statement of the project was reduce the duration of hospital stay of preterm / LBW babies from 10.5 days to 8 days

(20% reduction) after introduction of infant and family-centered developmental care at special newborn care unit (SNCU). All preterm / LBW babies i.e. babies that were delivered before 37 completed weeks and / or whose weight was less than 2500 gm admitted or referred to Dhading Hospital were included in the study. Babies who were referred out to other hospitals and those with gross congenital anomalies not compatible with life along with parents who wouldn't provide consent for the study were excluded. The average duration of SNCU stay is an outcome indicator that was calculated by summing the total duration of hospital stay of preterm / LBW babies during a fixed period and dividing it by the total number of preterm / LBW babies admitted or referred to Dhading Hospital during the same period. As a process indicator, we also looked at the proportion of hemodynamically stable premature babies on whom KMC was initiated within 48 hours. The IFCDC approach was introduced at the postnatal ward and SNCU. The process was monitored by a QI team and the outcome was measured monthly for four months. We performed four Plan-Do-Study-Act (PDSA) cycles to test a change idea; details of which are shown in Table 1.

PDSA cycle 1

This cycle focused on bridging the gap of health care providers regarding knowledge of IFCDC. The interaction session was conducted with health care providers working at maternity and SNCU to discuss the benefits of involving parents in the care of their babies; challenges faced and possible solutions. Powerpoint presentations, sharing of articles, success stories, and informative videos were used for capacity building.

PDSA cycle 2

This cycle focused on involving parents in taking care of the baby, which included diaper change, daily routine care, and OG / cup feeding under supervision if required. Before the initiation of the project parents weren't included in taking care of babies and major responsibilities of morning care including other routine care laid on nurses. Before involving, parents were educated on how the responsibilities would be shared and oriented on the principles of IFCDC.

PDSA cycle 3

This cycle primarily focused on initiating early kangaroo mother care (KMC) which is one of the components of IFCDC. With a belief that early KMC helps in early weight gain thus facilitating early discharge of preterm / LBW babies, a bed / KMC chair was placed inside the SNCU and at the post-natal and post-operative ward. Before the project, only warmers were present inside SNCU and there were no separate bed / KMC chairs for mothers.

PDSA cycle 4

This cycle focused on changing the current policy, which did not support the current principle of family-centered care. Some of such practices include strict visiting hours at SNCU, allowing only either father or mother to visit SNCU, and discharge criteria of more than 1800 gm. The standard operating procedure of SNCU was updated to encourage everyone to further adopt IFCDC norms. The revised protocol included permitting guardians to stay inside SNCU all the time and discharging babies once parents or guardians are confident in taking care of babies born prematurely.

The post-intervention phase of the QI project

This is the phase during which no active intervention was carried out. The observation was continued in this phase, which lasted for 1.5 months; from the 2024 Jun 01 to 2024 Jul 15.

Data collection and analysis

Data on LOS of preterm babies, weight during admission, and whether KMC was initiated within 48 hours were collected on proforma and entered in Excel datasheet and statistically analyzed. Continuous variables were expressed as mean or median. Percentage was used to show the proportion of a group or set. Complete data of all the babies enrolled in the study were available.

Results

Data from 16 babies were recorded during the pre-intervention period and 39 babies were included in the study. Of these, 25 babies were included during the intervention phase and 14 during the post-intervention phase. Details of each phase are shown in Table 2. Data from the mean birth weight of the babies during the intervention and post-intervention phases were comparable. The proportion of premature babies who received KMC within 48 hours of birth improved. Before the implementation of IFCDC principles, it was four out of 16 babies (25%) and finally reached 10 out of 10 babies (100%) after the 4th PDSA cycle. It was sustained to 100% in the post-implementation phase which is shown in Table 2.

Discussion

The findings of our QI initiative showed that adopting IFCDC norms could reduce the duration of hospital stay of premature babies. We also learned that continuous interactive sessions can develop a positive attitude of the health care providers and when they are motivated, even new concepts can be introduced into the unit. IFCDC is considered a highly innovative and effective method that empowers families to better care for babies. In this approach, families are no longer treated like visitors, but they are members of the caregiving team; partners of health care providers. The partnership is based on the core principles of dignity, respect, information sharing, participation, and collaboration.[11]

Placing KMC chairs and allowing parents to stay inside SNCU all the time has resulted in the early initiation of KMC

and increased frequency of breastfeeding. This has multiple benefits like improved rates of successful lactation, reduction of infant mortality and early weight gain along with a positive impact on newborn brain development by stabilizing heart rate, oxygenation, and improving sleep. This also helps in early discharge.[12,13]

A study done by Tiryaki O et al showed that the time of first breast milk intake (2.15 ± 1.97 vs 4.18 ± 1.75 days), time of first breastfeeding was earlier (12.76 ± 9.37 vs 18.47 ± 13.61 days) when families were integrated into care compared to when families were not involved in care.[14] Similarly, average weight gain at discharge was higher in babies with family-centered care. Our findings are consistent with the study done by Melynk et al which showed that the duration of hospital stay of premature babies is reduced by 3.9 days by creating opportunities for parent empowerment compared to the time when parent empowerment was not done.[15] Similarly, a study done by ZA Bhutta et al showed that early discharge is possible by motivating and involving mothers in the care of premature babies reducing the duration of hospital stay.[16] Studies done by Hei M et al across 11 NICUs across China showed LOS was reduced by 19% when families were integrated into the care resulting in reduced medical expenditure.[17] Moreover, the breastfeeding rate at discharge was increased by 56% and there was a faster weight gain, lower infection, and antibiotic use rate.

We also felt IFCDC was a win-win approach as this also supported health care providers. When parents were taking care of babies, nurses had now more time to focus on other specialized medical tasks. Parents were also oriented regarding the danger signs like fast breathing, decreased activity, and infant cues. This was done by SNCU nurses using pamphlets and displaying videos on a TV placed in the postnatal ward. Parents would inform nurses when the monitor showed parameters below the normal reference values. This allowed nurses from SNCU to help other nurses at maternity during busy hours. This approach is hence very fruitful in delivering care in a resource-limited setting like ours, where wards usually are understaffed and where nurses to patient ratio is more than 1:8 as set by the Government of Nepal.[18] Their assigned task is somehow lessened which reduced their stress. A study done by Verma A et al stated that imparting training to guardians helps in strengthening the delivery of care to sick neonates in resource-limited settings like SNCUs.[19]

There is a paucity of studies conducted in Nepal to make a comparison. As per our knowledge, this is the first study done on IFCDC from Nepal. Nevertheless, IFCDC is an innovative approach that is not only adopted by Western countries but has also been successfully implemented in neonatal care units in India. Both healthcare providers and parents in India have positively accepted this approach.[20]

Limitations of the study include the small sample size and the study conducted for a short duration at a Governmental Hospital in a rural setting. A multicenter study with a large sample size needs to be conducted to generalize the findings. Our SNCU is small and has limited space to accommodate parents and their newborns into SNCU. Overcrowding in SNCU was a significant barrier to integrating families in newborn care. A study done by Wanduru P et al also highlighted a similar challenge.[21] Though overcrowding and sepsis outbreaks were the initial concerns while incorporating family-centered care; studying the sepsis outbreak during the period was out of the scope of this project.

Table 1: Plan-Do-Study-Act cycles undertaken during QI initiatives

PDSA Cycle	Duration	Plan	Do	Study	Act
PDSA 1	1st of March to 15th of March 2024	Capacity building of health care providers to implement norms of IFCDC	• PowerPoint presentations • Sharing success stories, review articles • Displaying informative videos and a flex board with information on IFCDC in Nepali language at postnatal ward.	Development of a positive attitude to implement IFCDC. Initiation of KMC within 48 hours increased.	Adopt PDSA cycle and continue with it
PDSA 2	15th of March 2024 to 30th of March 2024	Involving parents in care giving of babies	• Handling and feeding (even OG / cup feeding) under supervision • Teaching parents about proper hand washing technique • Recognizing and responding to babies cues • Identifying danger signs	Average duration of hospital stay of preterm / LBW babies dropped to 10 days	Adopt PDSA cycle and continue with it
PDSA 3	1st of April 2024 to 30th of April 2024	Early initiation of KMC	• Initiation of KMC at SNCU instead of KMC room • Bed / KMC chair placed inside SNCU	Average duration of hospital stay of preterm / LBW babies dropped to 9.5 days	Adopt PDSA cycle and continue with it
PDSA 4	1st of May 2024 to 30th of May 2024	Update of SNCU protocol	• Allowing guardians to stay inside SNCU all the time • Discharge of hemodynamically stable premature babies once guardians are confident of taking care babies	Average duration of hospital stay of preterm/LBW babies dropped to 8 days	Adopt PDSA cycle and continue with it

Table 2: Details during each phase

	December to February Pre intervention	March (PDSA 1 & 2)	April PDSA 3	May PDSA 4	1st of June to 30th of July Post intervention
Babies enrolled in the study	16	7	8	10	14
Birth weight in gm (Mean ± SD)	2079.36 ± 357.69	2088.57 ± 389.26	2048.57 ± 381.68	2133 ± 245.78	2138.57 ± 458.88
KMC initiated within 48 hours	4 (25%)	4 (57.14%)	7 (87.5%)	10 (100%)	14 (100%)
Average duration of hospital stay (days)	10.5	10	9.5	8	8

All babies discharged from SNCU were followed after one week and then four weekly as per immunization schedule of Nepal. None of the participants were readmitted at hospital.

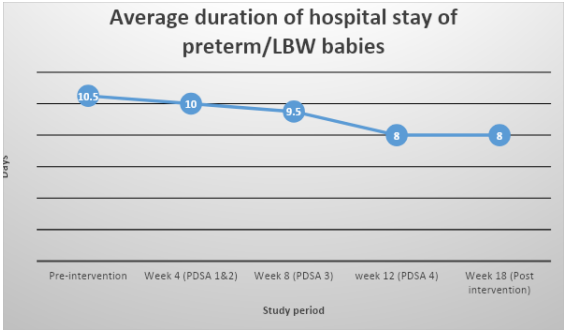

Figure 2: Time series chart

Conclusions

Our study showed that the QI project is an effective tool to improve the quality of service delivered by healthcare providers. Moreover, in our study duration of hospital stay preterm was reduced when IFCDC was adopted. Hence, family-centered care increases the confidence of guardians in taking care of preterm babies decreasing their hospital stay and reducing the workload of health professions. IFCDC is a win-win approach and a real need in every neonatal unit.

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