

Original Research Article

Nursing Care Practice in Neonatal Care Units of Tertiary Hospitals of Nepal: An Exploratory Qualitative Study

Tumla Shrestha^{1*}, Archana Pandey Bista¹, Madhusudan Subedi²

¹TUIOM, Maharajgunj Nursing Campus

Email: tumlashrestha@gmail.com

ORCID: <https://orcid.org/0000-0001-5867-1286>

² Patan Academy of Health Science

*Corresponding Author

Abstract

Preterm infants (PTIs) require special care in neonatal care units (NCUs) for their survival, growth, and development. Nurses are in a pivotal position to provide quality care to those infants in NCUs. Available literature indicates that care practice needs to be improved in developing countries. This study aimed to explore the nursing care practice for PTIs in NCUs. An exploratory qualitative study was conducted in NCUs of three public tertiary care hospitals in Kathmandu, Nepal, from November 2019 to February 2020. Data were collected through six focus group discussions among 40 nurses working in NCUs. The thematic analysis of qualitative data revealed standardized and inadequate care practices for PTIs in NCUs. Standard practices regarding thermal care, oxygen administration, nutritional care, and infection prevention were found. Inadequate care was identified regarding sleep protection, proper positioning, supportive sensory environment, and pain management. The study reported the standard care practice areas and areas for improvement to enhance nursing care in NCUs, such as pain management, sleep promotion, breastfeeding support, kangaroo mother care, and a supportive sensory environment. The findings have important implications for enhancing care practices for PTIs in NCUs, which is important for promoting the short- and long-term outcomes among PTIs.

Keywords: Care practice, neonatal care units, nurses, preterm infant, qualitative exploration

Introduction

Preterm birth is a crucial issue in child mortality and improving the quality of maternal and newborn care. The Global Lancet 2019 estimated worldwide 14.8 million (10.6%) preterm birth. About 12 million (81.1%) births occurred in South Asia and Sub-Saharan Africa (Chawanpaiboon et al., 2019). The annual preterm birth rate in Nepal is 9.3-14.0% of live births (Every PREEMIE Scale, 2019; Gurung et al., 2020). Evidence indicates that the preterm birth rate is increasing in the global and Nepali context (Chawanpaiboon et al., 2019; Xu et al., 2015). Hospital-based studies showed higher prevalence (18.4% - 20.0%) and a higher mortality risk among PTIs in NCUs (Adhikari et al., 2017; KC et al., 2015). It is the primary cause of neonatal, infant, and under-five child mortality (UN Inter-Agency Group for Child Mortality Estimation, 2017).

The survival rate of PTIs is improving with the increased availability of neonatal intensive care, advanced interventions, and life-saving equipment in health facilities (Xu et al., 2015). Nonetheless, the risk for developmental impairments (such as cerebral palsy, learning disabilities, and physical disabilities) has been increased (Chattopadhyay & Mitra, 2015; Sutton & Darmstadt, 2013). Therefore, PTIs, especially very preterm (infant born less than 32 weeks gestation) and very LBW (birthweight less than 2000 grams), require special neuro-protective (developmental supportive) care, in addition to physiological care for their survival with developmental potential (Lavallée et al., 2019; WHO, 2019).

Evidence-based recommended standardized care for PTIs in NCUs are skin-to-skin contact (also known as kangaroo mother care), feeding expressed breast milk (EBM)/breastfeeding, promoting adequate sleep, providing a supportive sensory environment, proper positioning and handling, skin care, proper pain management, and minimizing infant-parent separation (Altimier & Phillips, 2016; Griffiths et al., 2019; WHO, 2019). Although PTI care practice in NCU is a collaborative and multidisciplinary team effort, nurses have the critical role of providing quality care (Moxon et al., 2015; WHO, 2019). Evidence has reported inadequate care practice in NCUs across developing countries, including South Asia and Africa (Jebessa et al., 2021; Moxon et al., 2015; Pradhan et al., 2021). A few research studies conducted in Nepal indicated a lack in some aspects of PTI care, such as kangaroo mother care (KMC), proper positioning, sleep protection, pain management, etc., in NCU (New et al., 2019; Salim et al., 2021). However, limited qualitative studies identify the nurses' perspectives on care practice in PTIs. This study aimed to explore the PTI care practice situation of nurses in Nepal. This study aimed to identify the gap in existing nursing care practice and design interventions to improve the care practice in NCUs in Nepal.

Methods and Materials

Design, Settings and Participants

The exploratory qualitative study was part of the more extensive experimental sequential mixed method study. The findings of the first qualitative phase are presented here. Instruments were developed based on the qualitative findings. In the second phase, a quantitative survey was conducted using developed and validated instruments. This study was conducted in NCUs of three purposively selected tertiary care and not-for-profit hospitals (Tribhuvan University Teaching Hospital, Paropakar Maternity and Women's Hospital and Kanti Children Hospital) in Kathmandu, Nepal, from November 2019 to February 2020. Preterm and sick newborns were referred to these hospitals from different hospitals in different parts of the country. The maternity hospital was the public maternity center, having around 70 to 90 births/day. University Hospital had 19 neonatal beds: 9 beds in the neonatal intensive care unit (NICU) and ten beds in the sick newborn care unit (SNCU). The maternity hospital had 40 neonatal beds: 10 NICU, 26 SNCU, and four kangaroo mother care (KMC) beds. The Children's Hospital had 16 beds (12 functioning) in the NICU and 15 beds in the SNCU (neonatal intermediate care unit).

Two focus group discussions (FGDs) were conducted in each hospital, with participants ranging from 6-9 in each FGD. The inclusion criteria of study participants were registered nurses working in NCUs of respective hospitals for more than six months. A total of 40 nurses participated in the study.

Ethical Approval

The study was approved by the Nepal Health Research Council (Ref. 2804/2019). Administrative approval for the study was obtained from each study site, and written informed consent was obtained from each participant before FGDs. The participants' privacy and confidentiality of the collected data have been maintained throughout the study.

Data Collection Methods and Instrument

FGDs were conducted using the FGD guidelines. The guidelines included initial grand questions (such as "Would you like to share your experience of providing PTI care in NCU?") followed by intermediate questions (such as "What are your care practices for sleep promotion for the PTIs?" "..... pain management practice for PTIs?"). Further probing was done based on the participant's response to the prior questions and the practice areas identified for further exploration. FGDs were conducted in a quiet room near the NCUs of each study setting. Discussions were recorded using a digital voice recorder. Each FGD session was conducted for 60 - 90 minutes. To enhance the trustworthiness of the research instrument, consultation was done with subject matter experts and a qualitative research expert.

Trustworthiness

Lincoln and Guba's (1985) four criteria: credibility, dependability, transferability and confirmability were used to maintain the quality and rigor of this study. Credibility was maintained by expert consultation and purposively recruiting experienced participants willing to share their experiences. Multiple FGDs were conducted. Verbal and non-verbal expressions were observed, noted in field notes, and correlated during data analysis. Peer debriefing was done by seeking support from the other authors for scholarly guidance and feedback to improve the quality of the study findings. Specific descriptions, themes, or significant findings were discussed with participants to assess the accuracy of their expression (member checking).

The thick description of data was collected from the participants selected by purposive sampling, and the research process was described thoroughly. The findings were described using direct quotes. Dependability was maintained using the same instrument in each FGD, preparing transcripts within 1-2 weeks of data collection before the second FGD. For confirmability, the second author reviewed the data analysis process. The research process and the findings were thoroughly presented in the report.

Data Analysis

The first author listened to audiotapes carefully and transcribed them. Transcriptions were read several times, and the audio records were listened to several times to verify the accuracy of the data and to get the whole meaning. The data obtained from FGDs in each setting (group data) was considered the analysis unit (Doody et al., 2013; Morrison-Beedy et al., 2001). All the identifiers were removed from the transcribed data. The data were analyzed using six steps of the thematic analysis procedure by Braun and Clark (2006). The important concepts related to the study were coded. Sub-themes and themes were developed based on codes and categories. Initial codes, sub-themes, and themes were read, discussed, and finalized among the researchers. The findings were described in textual form with supporting quotes.

Results

The findings of the study include demographic and professional information of the participants and thematic findings.

Table 1*Demographic and Professional Characteristics of the Participants (n = 40)*

Characteristics	Number
Age in years	
≤ 30	20
31-40	13
≥ 41	7
Education Qualification	
Proficiency Certificate Level Nursing	7
Bachelor in Nursing	31
Masters in Nursing	2
Experience in NCUs in years (n=40)	
≤ 3	19
4 - 6	9
7-10	9
> 11	3
Designation	
Unit in-charges	4
Senior staff-nurses	8
Staff nurses	28
Training Received in Neonatal Care (n=22)	

Half of the participants were below 30 years old, and most had completed a bachelor's level of education. More than half (22) participants had received neonatal care-related training for two days to two weeks, and 11 had received training on breastfeeding, KMC, and helping babies breathe for two to three days (Table 1).

The exploration of PTI care practices derived two themes: standardized survival care and inadequate developmental supportive care (Table 2).

Table 2*Themes and Sub-themes of Nursing Care Practice for Preterm Infant Care in Neonatal Care Units*

Themes	Sub-themes
<i>Standardized care practice</i>	Standard thermal care and different models of KMC
	Need-based respiratory care and safe oxygen administration
	Standard nutritional care for low-birthweight PTIs
	Practice of essential infection prevention measures
<i>Inadequate care practice</i>	Lacking in the practice of developmentally supportive care components
	Inadequate pain management practice

Standardized Care

Most survival care practices corresponded to the recommended practice, with a few practice variations in different settings.

Standard Thermal Care and Different Models of KMC

The thermal care practice was focused on the care of the PTIs having unstable temperatures and facilitating parents for skin-to-skin contact/KMC to stable PTIs. Participants were mindful of hypothermia risk among PTIs and universally practiced thermal care like maintaining room temperature and using warming devices. Intermittent KMC was practiced in all settings. Whereas the practice of continued KMC was adopted in only one setting, and early intermittent KMC involving both parents was adopted in another setting: *"In Sick Newborn Care Unit (SNCU), we guide mothers for KMC and feeding to stable PTIs for a few days. When mothers are enabled for those care, babies are shifted to the KMC unit for continued KMC until adequate weight gain for discharge."* (FGDs, Setting 2)

The KMC practice was influenced by available infrastructure, equipment (KMC beds) and human resources: *"We practice KMC to stable PTIs (no apnea, no need of oxygen) after the decision in the doctors' round. We call mothers and show their technique for the first time. Then they do it themselves for 2-3 hours daily sitting on the sofa or chair in the feeding room."* (FGDs, Setting 3)

Need-Based Respiratory Care and Safe Oxygen Administration

It included monitoring to identify the need for respiratory care and providing general and respiratory care to PTIs in special respiratory therapies like mechanical ventilator, Continue Positive Airway Pressure (CPAP), and surfactant therapy (the therapeutic administration of exogenous surfactant). Different devices were used to administer oxygen saturation to maintain oxygen saturation across settings. They were aware of the consequence of high-flow oxygen therapy (i.e., retinopathy of prematurity [ROP]): *"We administer low flow oxygen such as less than two-liter by nasal cannula as they have a risk of ROP."* (FGDs, Setting 2)). However, some participants were less aware of the actual flow rate in different devices. PTIs were facilitated for ROP screening before discharge or on follow-up visits with providers.

Standard Nutritional Care for Low Birth Weight PTIs.

Nutritional care practices included monitoring of the hemodynamic condition, including blood sugar level and administration of initial parenteral fluid combined with trophic feeding (small amount of enteral feeding of EBM), progressive EBM feeding, and adding prescribed nutrition supplements such as calcium, iron, and folic acid with feeding. There was a specific feeding pattern after some days of trophic feeding based on the gestational age (GA) and condition of the PTIs. However, the variation in timing was found for starting the trophic feeding:

"To maintain the glucose level, we administer 10% dextrose intravenously. Nowadays, we start oro-gastric (OG) tube feeding earlier (even after 12 hours to stable PTIs) along with parental fluids to prevent intestinal atrophy." (FGDs, Setting 1).

"Hypoglycemic PTIs are given 10% dextrose intravenously for two days with holding the enteral feeding. The EBM feeding started after stable condition. It also depends on gestational age." (FGDs, Setting 3).

The emphasis was there on exclusive EBM feeding. However, it depended on mothers' breast milk secretion as banked breast milk was not provided. Thus, using a standard formula as an alternative was sometimes necessary. Though participants were used to looking after, supporting, and guiding mothers for EBM expression and feeding, the maternal support was influenced by factors like a unit rule, infrastructure, workload, competence, and the felt need for support. A participant shared: *"Mothers express breast milk themselves. It is necessary to guide them, especially for primi mothers.*

Nevertheless, we cannot manage time to observe and guide them. We manage time to observe mothers having problems." (FGDs, Setting 3)

The PTI feeding practices like non-nutritive sucking (NNS) and EBM oral stimulation were emerging: *"Whatever the GA, we do EBM oral stimulation to preterm babies even if in NPO. After tolerating 75% feeding, we encourage mothers to make their baby suck their expressed breast for a short time (2-3 minutes)." (FGDs, Setting 1).*

Adequate Infection Prevention Practice

There were strict infection prevention (IP) rules like hand hygiene, separate gowns, slippers, and visitor control. *"We have a strict rule for hand hygiene before handling babies. There are separate thermometers, stethoscopes, and sanitizers for each baby. Only parents are allowed in the unit following IP rules strictly." (FGDs, Setting 1).* There was practice related to incubator use and invasive procedure: *"We change baby cloth, bedsheet, and the humidifier water daily. The umbilical venous catheter is kept for less than one week." (FGDs, Setting 2).* Environmental cleanliness measures, like scrubbing, high washing, and mopping floors, were implemented regularly.

However, available human and materialistic resources influenced their infection prevention measures. A participant from the government hospital expressed, *"We wear separate gowns and shoes in the unit. The clean gown is available once a week." (FGDs, Setting 3).* *"Two staff need to do everything fast." (FGDs, Setting 3).*

Inadequate Care Practice

Nurses made some effort to provide developmental supportive care (DSC), like KMC, exclusive breast milk feeding, and skincare. However, the lack of appropriate DSC and practice inconsistencies were found in some areas, such as proper positioning, sleep promotion, a supportive sensory environment (SSE), and pain management. Some DSC components (such as sleep protection, supportive sensory environment, and pain management) were new for nurses, and some kinds of DSC were not used in practice for other reasons, like a lack of adequate resources in NCUs to provide DSC.

Lacking in Practice of Developmental Supportive Care Components

The DSC components like proper positioning with nesting and sleep promotion were practiced in one setting: *"We avoid the 'W' position and try to maintain their body in a straight line with flexed limbs like the fetal position. We have kept 2-meters long cotton wrappers to make nesting for positioning them" (FGDs, Setting 1).* However, there was an inadequate and

inconsistent practice in other settings: *"They are kept in the lateral position to prevent aspiration or in a comfortable position. We sometimes use nesting by folding wrapper to give the feeling like being in the womb, especially to restless PTIs"* (FGDs, Setting 2).

Minimum handling with clustered routine care was a relatively common practice for sleep promotion: *"For minimum handling, routine care like morning care and feeding are done by an assigned nurse at a scheduled time. Sleeping babies with stable vital signs are provided orogastric tube feeding only."* (FGDs, Setting 1).

However, sleep promotion was compromised, especially where an inadequate nurse-infant ratio with the functional method of care management: *"Here, one nurse has to care for 4-5 babies. We practice two-hourly feedings, three-hourly diaper changes, and vital signs monitoring. Besides that, we do not disturb them if babies are well."* (FGDs, Setting 3).

Lacking and inconsistency in light and sound minimization practices for SSE were evident: *"We do nothing special for light precautions. Sunlight enters the unit from the large windows in NICU. SNCU is relatively dim lighted. We use eye cover for the babies in phototherapy"* (FGDs, Setting 3). *"We need to use common light if any emergency procedures at night"* (FGDs, Setting 3).

"The ventilator sound is the noisiest, which we cannot minimize. The unit is very noisy when many ventilators are in use. We use cotton earplugs sometimes for their sound sleep" (N7, Setting 3). *"Sometimes the noise in the unit is due to the term baby's cry, especially during nighttime."* (FGDs, Setting 3).

Nevertheless, the recently developed unit had soundproof walls and dark-colored window glass. Minimizing light during nighttime was a universal practice in different study sites. There was good practice of light and sound precautions in one setting: *"We have covered the window glass to control extra outside light. We cover the incubator top to avoid direct bright light inside the incubator and minimize light levels at night"* (FGDs, Setting 1). Furthermore, *"We keep the monitors' volume at a minimum level and try to stop the alarm ring immediately. We know that preterm babies are at risk of hearing problems. So we speak in a low voice and minimize mobile sound"* (FGDs, Setting 1).

Furthermore, variation was found for encouraging parental contact and interaction during the initial phase: *"We have parental visit time once a day in NICU. During the visit, they can see their baby for a few minutes without touch and interaction"* (FGDs, Setting 3). *"Even if the baby is on a ventilator, we encourage parental visits and encourage to touch and massage the baby's hands and feet and for interaction"* (FGDs, Setting 1). Maternal contact is used to increase and be consistent after starting breast milk feeding (EBM/oral feeding) and the PTIs. Maternal contact and engagement with PTIs enhanced significantly after shifting the PTIs to SNCU.

Lacking in Pain Management Practice

There was a lack of procedural pain assessment and variation and inconsistency in using pain management measures: *"We have nothing special about pain management. We use cetamol*

if the baby has a painful procedure. If PTI has excessive cry after the procedure, we use feeding, cuddling, and providing thumb sucking to manage our time" (FGDs, Setting 2).

Though there was practice of some pain management measures, those were inconsistent due to lack of resources.

"Usually, we keep the baby well-fed before any procedure. We sometimes feed EBM for excessive crying, hold and cuddle them, and check for possible painful areas like the IV site. Sometimes, we provide thumb sucking but do not use the pacifier. We have no practice guidelines for regular practice." (FGDs, Setting 1).

"Previously, we used Emla for the procedural pain. Now it is unavailable, and all parents cannot afford it themselves" (FGDs, Setting 3).

Discussion

The findings of this study highlighted that nurses used to follow some standard care practices in providing care to PTIs in NCU; however, there were inconsistencies regarding the provision of routine care practices among nurses and across settings. The most noteworthy findings are that nurses provided substandard PTI care practices and inadequate developmental supportive care practices in NCUs. The standard of care for PTIs is essential for physiological processes for survival. Thermal care, respiratory care, nutritional care and infection prevention were relatively congruent with recommended care besides a few lacking related resources; however, the practice of DSC components needed to be more harmonious.

There was a universal practice for thermal care of PTIs having unstable temperatures using warming devices for thermal care. Previous studies in Ethiopia and Pakistan (Jebessa et al., 2021; Pradhan et al., 2021) reported inadequate practice regarding the availability of adequate warming devices. There was a universal practice of intermittent KMC and only one facility with resources for KMC (separate rooms and KMC beds) continued KMC practice. A country case study including high, middle and low-income countries, including Nepal, reported less systematic implementation of KMC in medium and low-income countries (New et al., 2019). The present findings are consistent with the findings of Nepal in that study (New et al., 2019). A study in Ethiopia among care providers reported inadequate KMC practice related to a lack of guidelines and resources (Jebessa et al., 2021). Another multi-country hospital-based survey in India, Indonesia and Uganda revealed some KMC practices in all study hospitals. In Indian hospitals, adequate practice was having 24-hour access to the unit and the involvement of parents in KMC and EBM feeding fields (Narayanan, et al., 2019). Although KMC is an evidence-based, effective intervention for PTIs, the effective practice for KMC is influenced by the availability of resources, parental support, and involvement in PTI care.

There was adequate practice of monitoring and maintaining oxygen saturation among nurses to prevent ROP. As suggested in current literature (Fierson et al., 2018), there was a practice of sending vulnerable PTIs for ROP screening that may enhance early identification and appropriate management of at-risk PTIs.

Their nutrition and feeding practices followed the national and WHO guidelines for feeding LBW infants (Ministry of Health and Population, 2016; WHO, 2011) and other evidence-based practice recommendations (Narayanan, et al., 2019; Shah et al., 2018). Though emphasis on exclusive EBM feeding, formula feeding was necessary when mothers could not provide the required amount of breast milk as there was no provision for donor and banked breast milk. Another study also reported using formula as an alternative feeding (Narayanan, et al., 2019). Using a supplement of human milk fortifier was based on the availability and affordability of the parents.

The current study revealed the practice of trophic feeding (10-15 ml/kg/day gavage feeding of EBM) with parental fluid, which is recommended as an effective nutritional practice for extremely preterm and LBW infants (Lubbe, 2018; WHO, 2011). Trophic feeding is more effective when combined with EBM oral stimulation (Greene et al., 2016; Lubbe, 2018). EBM oral stimulation was found in only one setting. NNS on an emptied breast is an effective practice for promoting feeding milestones among PTIs (Foster et al., 2016; Greene et al., 2016; Lubbe, 2018). However, the use of NNS was inconsistent across the study sites.

Providing maternal support is essential for adequate breast milk production and the establishment of exclusive breast milk feeding among PTIs (Hasselberg et al., 2016; Shattnawi, 2015). There was an accommodation facility for mothers and provision of scheduled visits in the unit. Breastfeeding support, especially in the form of instruction and guidance, was varied and influenced by the nurse-infant ratio, unit rule, infrastructure, and the felt need for support. Literature also indicated the establishment of breastfeeding among PTIs in NCU as challenging and the need for an adequate nurse-infant ratio and availability of resources and unit environment for breastfeeding support (Hallowell et al., 2014; Shattnawi, 2017).

Evidence signified prematurity as the most critical risk factor for neonatal infection (Ramasethu, 2017). Hand hygiene is considered the best method for infection prevention in NCU (Ramasethu, 2017; Uwaezuoke & Obu, 2013). The present study findings reported strict hand hygiene practices. Strategies like universal precaution, consideration for equipment use like incubators, and measures related to invasive procedures (Uwaezuoke & Obu, 2013) were in practice. Previous studies in Nigeria reported inadequate practice in those areas (Ezike et al., 2021). Moreover, insufficient nurse-infant ratio, lack of resources like clean gowns, and lack of adequate training and orientation programs were the main challenges for infection prevention practice similar to other studies (Ezike et al., 2021; Uwaezuoke & Obu, 2013).

Developmental supportive care includes interventions and the creation of a stress-free care environment that supports physiologic stability and neurological development and reduces disability (Altimier & Phillips, 2016; WHO, 2019). Some recommended care components comprise KMC, exclusive breast milk feeding, skin care, proper positioning, sleep promotion, SSE and pain management (Lavallée et al., 2019; WHO, 2019). There was the practice of using some recommended DSC components like skincare, KMC, and exclusive breast milk feeding. However, discrepancies and inconsistencies were found in areas like proper positioning, sleep promotion, SSE, and pain management. The practice of proper positioning, such as fetus-like positioning and nesting (maintaining position using available blanket/linen rolls or positioning

devices), (Altimier & Phillips, 2016; Lavallée et al., 2019; WHO, 2019) was there. However, the practice inconsistencies might be due to insufficient resources or inadequate awareness. There were efforts for necessary sleep promotion practice (Altimier & Phillips, 2016; WHO, 2019) using clustered routine care (minimal handling) of the PTIs. However, the practice was influenced by the inadequate nurse-infant ratio. Previous studies in Nepal (New et al., 2019) and South Africa (Rheeder et al., 2017) also reported insufficient practice.

The care practice of recommended SSE (light and sound precaution, positive parental stimulation) (Altimier & Phillips, 2016; Griffiths et al., 2019; Lavallée et al., 2019) was another area for improvement. Though minimizing night light and covering the eyes during phototherapy were universal practices, a lack of standard care practices was found regarding light precaution (i.e., maintaining dim light, avoiding direct light to PTI's face, etc). Similarly, a lack of care was identified for required sound minimization practices (Altimier & Phillips, 2016; Rheeder et al., 2017) like minimizing the proper conversation volume and alarms (including monitors and ventilators). The current study further identified the lack of evidence-based care and practice variation regarding positive parental contact, engagement, interaction, and stimulation. There was less practice of supporting parental visits, stimulation, and bonding during the initial period for PTIs. Maternal access to their PTIs is enhanced only after the initiation of feeding, especially after shifting to SNCU. Previous studies also reported a lack of practice (New et al., 2019; Rheeder et al., 2017).

Evidence signified the vulnerability of PTIs to painful experiences related to various invasive procedures and their long-term consequences (Cong et al., 2017). The American Academy of Pediatrics recommends assessment, prevention, and management of pain among neonates consistently with written guidelines (American Academy of Pediatrics, 2016). However, previous studies (Costa et al., 2017; Tarjoman et al., 2019) and this study reported a lack of neonatal pain assessment and management practice. They inconsistently used evidence-based measures like EBM feeding, dextrose solution, NNS, cuddling, and swaddling. There was no KMC practice for pain management or involving mothers in pain management. The discontinuation of some practices was related to the unavailability of resources like sucrose solution and local anesthetic agent (Emla). Evidence indicated the need for practice guidelines, training, and resources for practice inconsistency (American Academy of Pediatrics, 2016; Cong et al., 2013).

Study Limitation

The study was conducted in NCUs of three tertiary hospitals in the capital city of Nepal. There are chances of missing some actual practice situations as the findings were explored through participants' expressions during FGDs. The researchers tried to explore reality with adequate discussion, member checking, etc.

Conclusion

There is standard and substandard PTI care practice in NCUs. The traditional care practices are thermal care, respiratory care, nutritional care, and infection prevention. Variation and lack are found regarding sleep promotion, proper positioning, providing a supportive sensory

environment, and pain management practice. Practice enhancement is also required in areas like KMC and breastfeeding. Providing orientation and training about special care of PTIs would enhance their care practice. Furthermore, developing the practice guidelines would regulate consistent and uniform practice. Improving nursing care for PTIs in NCUs might promote the overall health, well-being, and development of the PTIs.

This study provided the PTI care practice situation in NCUs in Nepal's tertiary hospitals, which might represent practice situations in other developing countries. The findings explored the strength areas and gaps in nursing care practice. The findings might be worthy for neonatal clinicians, nurses, administrators, policymakers, and researchers to design and implement interventions to enhance the PTI nursing care practice in NCUs. Improved PTI care practice in NCU might improve the overall health, well-being, and development of vulnerable PTIs. Improvement of nursing care practice with the provision of necessary training and essential resources might promote the overall health and developmental potential of the NCU-admitted PTIs and the emotional well-being of the parents.

Acknowledgments

The authors express their gratitude to the University Grants Commission for the Ph.D. Fellowship Grants, study settings for providing permission to conduct the study, and the study participants for sharing their valuable experiences.

Authors' Contribution

TS: Conception, planning, data collection and analysis, literature review, manuscript preparation and review

AP: Guidance and supervision in planning, conduction, analysis, and manuscript review

MS: Guidance in planning, conduction, analysis, and manuscript review

Funding

PhD Fellowship Grants for the study from the University Grants Commission Nepal

Conflict of Interest

No

References

- Adhikari, S., Rao, K. S., B K, G., & Bahadur, N. (2017). Morbidities and outcome of a neonatal intensive care in Western Nepal. *Journal of Nepal Health Research Council*, 15(2), 141–145. <https://doi.org/10.3126/jnhrc.v15i2.18203>
- Altimier, L., & Phillips, R. (2016). The neonatal integrative developmental care model: Advanced clinical applications of the seven core measures for neuroprotective family-centered developmental care. *Newborn and Infant Nursing Reviews*, 16(4), 230–244. <https://doi.org/10.1053/j.nainr.2016.09.030>
- American Academy of Pediatrics. (2016). Prevention and management of procedural pain in the neonate: An Update. *Pediatrics*, 137(2), e20154271. <https://doi.org/10.1542/peds.2015-4271>
- Chattopadhyay, N., & Mitra, K. (2015). Neurodevelopmental outcome of high risk newborns discharged from special care baby units in a rural district in India. *Journal of Public Health Research*, 4(1). <https://doi.org/10.4081/jphr.2015.318>

- Chawanpaiboon, S., Vogel, J. P., Moller, A. B., Lumbiganon, P., Petzold, M., Hogan, D., Landoulsi, S., Jampathong, N., Kongwattanakul, K., Laopaiboon, M., Lewis, C., Rattanakanokchai, S., Teng, D. N., Thinkhamrop, J., Watananirun, K., Zhang, J., Zhou, W., & Gülmezoglu, A. M. (2019). Global, regional, and national estimates of levels of preterm birth in 2014: a systematic review and modelling analysis. *The Lancet Global Health*, 7(1), e37–e46. [https://doi.org/10.1016/S2214-109X\(18\)30451-0](https://doi.org/10.1016/S2214-109X(18)30451-0)
- Cong, X., Delaney, C., & Vazquez, V. (2013). Neonatal nurses' perceptions of pain assessment and management in NICUs: A national survey. *Advances in Neonatal Care*, 13(5), 353–360. <https://doi.org/10.1097/ANC.0b013e31829d62e8>
- Cong, X., Wu, J., Vittner, D., Xu, W., Hussain, N., Galvin, S., Fitzsimons, M., McGrath, J. M., & Henderson, W. A. (2017). The impact of cumulative pain/stress on neurobehavioral development of preterm infants in the NICU. *Early Human Development*, 108, 9–16. <https://doi.org/https://doi.org/10.1016/j.earlhumdev.2017.03.003>
- Costa, T., Rossato, L. M., Bueno, M., Secco, I. L., Sposito, N. P. B., Harrison, D., & de Freitas, J. S. (2017). Nurses' knowledge and practices regarding pain management in newborns. *Revista Da Escola de Enfermagem*, 51, 1–7. <https://doi.org/10.1590/S1980-220X2016034403210>
- Doody, O., Slevin, E., & Taggart, L. (2013). Focus group interviews part 3: Analysis. *British Journal of Nursing (Mark Allen Publishing)*, 22, 266–269. <https://doi.org/10.12968/bjon.2013.22.5.266>
- Every PREEMIE Scale. (2019). *Profile of preterm and low birth weight prevention and care* (Issue May). Retrieved from www.EveryPreemie.org
- Ezike, O. C., Nwaneri, A. C., Odikpo, L. C., & Evert O, O. (2021). Infection control practices among nurses working in neonatal intensive care units (nicu) of two selected tertiary hospitals in enugu, nigeria. *International Journal of Africa Nursing Sciences*, 100344. <https://doi.org/https://doi.org/10.1016/j.ijans.2021.100344>
- Fierson, W. M., American Academy of Pediatrics Section on Ophthalmology, American Academy of Ophthalmology, American Association for Pediatric Ophthalmology and Strabismus, American Association of Certified Orthoptists, Chiang, M. F., Good, W., Phelps, D., Reynolds, J., Robbins, S. L., Karr, D. J., Bradford, G. E., Nischal, K., Roarty, J., Rubin, S. E., Suh, D. W., Lehman, S. S., & Ellis, G. S. Jr. (2018). Screening examination of premature infants for retinopathy of prematurity. *Pediatrics*, 142(6), e20183061. <https://doi.org/10.1542/peds.2018-3061>
- Foster, J. P., Psaila, K., & Patterson, T. (2016). Non-nutritive sucking for increasing physiologic stability and nutrition in preterm infants. *Cochrane Database of Systematic Reviews*, 2016(10). <https://doi.org/10.1002/14651858.CD001071.pub3>
- Greene, Z., Cpf, O. D., & Walshe, M. (2016). *Oral stimulation for promoting oral feeding in preterm infants (Review)*. <https://doi.org/10.1002/14651858.CD009720.pub2>. Copyright
- Griffiths, N., Spence, K., Loughran-Fowlds, A., & Westrup, B. (2019). Individualised developmental care for babies and parents in the NICU: Evidence-based best practice guideline recommendations. *Early Human Development*, 139(August). <https://doi.org/10.1016/j.earlhumdev.2019.104840>
- Gurung, A., Wrammert, J., Sunny, A. K., Gurung, R., Rana, N., Basaula, Y. N., Paudel, P., Pokhrel, A., & KC, A. (2020). Incidence, risk factors and consequences of preterm birth – findings from a multi-centric observational study for 14 months in Nepal. *Archives of Public Health*, 78(1), 64. <https://doi.org/10.1186/s13690-020-00446-7>
- Hallowell, S. G., Spatz, D. L., Hanlon, A. L., Rogowski, J. A., & Lake, E. T. (2014). Characteristics of the NICU work environment associated with breastfeeding support. *Advances in Neonatal Care*, 14(4), 290–300. <https://doi.org/10.1097/ANC.000000000000102>

- Hasselberg, M., Huus, K., & Golsäter, M. (2016). Breastfeeding preterm infants at a neonatal care unit in rural Tanzania. *JOGNN - Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 45(6), 825–835. <https://doi.org/10.1016/j.jogn.2016.07.010>
- Jebessa, S., Litch, J. A., Senturia, K., Hailu, T., Kahsay, A., Kuti, K. A., Wolka, E., Teklu, A. M., & Gezahegn, W. (2021). Qualitative assessment of the quality of care for preterm, low birth weight, and sick newborns in Ethiopia. *Health Services Insights*, 14(Table 1). <https://doi.org/10.1177/11786329211025150>
- KC, A., Wrammert, J., Nelin, V., Ewald, U., Clark, R., & Målqvist, M. (2015). Level of mortality risk for babies born preterm or with a small weight for gestation in a tertiary hospital of Nepal. *BMC Public Health*, 15(1), 877. <https://doi.org/10.1186/s12889-015-2232-1>
- Lavallée, A., De Clifford-Faugère, G., Garcia, C., Fernandez Oviedo, A. N., Héon, M., & Aita, M. (2019). PART 2: Practice and research recommendations for quality developmental care in the NICU. *Journal of Neonatal Nursing*, 25(4), 160–165. <https://doi.org/10.1016/j.jnn.2019.03.008>
- Lubbe, W. (2018). Clinicians guide for cue-based transition to oral feeding in preterm infants: An easy-to-use clinical guide. *Journal of Evaluation in Clinical Practice*, 24(1), 80–88. <https://doi.org/10.1111/jep.12721>
- Ministry of Health and Population, Governemnt of Nepal. (2016). *National Neonatal Clinical Protocol*. Retrieved from <https://fwd.gov.np/wp-content/uploads/2022/02/Neonatal-clinical-protocal-2016-06-26-2.pdf>
- Morrison-Beedy, D., Côté-Arsenault, D., & Feinstein, N. F. (2001). Maximizing results with focus groups: Moderator and analysis issues. *Applied Nursing Research*, 14(1), 48–53. <https://doi.org/10.1053/apnr.2001.21081>
- Moxon, S. G., Lawn, J. E., Dickson, K. E., Simen-Kapeu, A., Gupta, G., Deorari, A., Singhal, N., New, K., Kenner, C., Bhutani, V., Kumar, R., Molyneux, E., & Blencowe, H. (2015). Inpatient care of small and sick newborns: a multi-country analysis of health system bottlenecks and potential solutions. *BMC Pregnancy and Childbirth*, 15(2), S7. <https://doi.org/10.1186/1471-2393-15-S2-S7>
- Narayanan, I., Litch, J., & Robb-McCord, J. (2019). *Safe and effective human milk feeding for small and sick newborns*. <https://doi.org/10.13140/RG.2.2.16795.39204>
- Narayanan, I., Nsungwa-Sabiti, J., Lusyati, S., Rohsiswatmo, R., Thomas, N., Kamalarathnam, C. N., Wembabazi, J. J., Kirabira, V. N., Waiswa, P., Data, S., Kajjo, D., Mubiri, P., Ochola, E., Shrestha, P., Choi, H. Y., & Ramasethu, J. (2019). Facility readiness in low and middle-income countries to address care of high risk/ small and sick newborns. *Maternal Health, Neonatology and Perinatology*, 5(1), 1–14. <https://doi.org/10.1186/s40748-019-0105-9>
- New, K., Durairaj, A., Robb-McCord, J., & Khadka, N. (2019). *Nurturing care for small and sick newborns: evidence review and country case studies*. August. Retrieved from <https://www.everypremie.org/wp-content/uploads/2019/09/Nurturing-Care-Evidence-Review-and-Case-Studies-13Aug2019.pdf>
- Pradhan, N. A., Ali, A., Roujani, S., Ali, S. A., Rizwan, S., Saleem, S., & Siddiqi, S. (2021). Quality of inpatient care of small and sick newborns in Pakistan: perceptions of key stakeholders. *BMC Pediatrics*, 21(1), 396. <https://doi.org/10.1186/s12887-021-02850-6>
- Ramasethu, J. (2017). Prevention and treatment of neonatal nosocomial infections. *Maternal Health, Neonatology and Perinatology*, 3(1), 5. <https://doi.org/10.1186/s40748-017-0043-3>
- Rheeder, A., Lubbe, W., van der Walt, C. S. J., & Pretorius, R. (2017). Compliance with best practice guidelines for neurodevelopmental supportive care in South Africa. *Journal of Perinatal & Neonatal Nursing, Publish Ah(00)*, 1–14. <https://doi.org/10.1097/jpn.0000000000000275>

- Salim, N., Shabani, J., Peven, K., Rahman, Q. S., KC, A., Shamba, D., Ruysen, H., Rahman, A. E., KC, N., Mkopi, N., Zaman, S. Bin, Shirima, K., Ameen, S., Kong, S., Basnet, O., Manji, K., Kabuteni, T. J., Brotherton, H., Moxon, S. G., ... Group, E.-B. S. (2021). Kangaroo mother care: EN-BIRTH multi-country validation study. *BMC Pregnancy and Childbirth*, *21*(1), 231. <https://doi.org/10.1186/s12884-020-03423-8>
- Shah, R. K., Sainju, N. K., & Joshi, S. K. (2018). Knowledge, attitude and practice towards kangaroo mother care. *Journal of Nepal Health Research Council*, *15*(3), 275–281. <https://doi.org/10.3126/jnhrc.v15i3.18855>
- Shattnawi, K. K. (2015). Suspended liminality: breastfeeding and becoming a mother in two NICUs. *International Journal of Advanced Nursing Studies*, *4*(2), 75. <https://doi.org/10.14419/ijans.v4i2.4877>
- Shattnawi, K. K. (2017). Healthcare professionals' attitudes and practices in supporting and promoting the breastfeeding of preterm infants in NICUs. *Advances in Neonatal Care*, *17*(5), 390–399. <https://doi.org/10.1097/ANC.0000000000000421>
- Sutton, P. S., & Darmstadt, G. L. (2013). Preterm birth and neurodevelopment: A review of outcomes and recommendations for early identification and cost-effective interventions. *Journal of Tropical Pediatrics*, *59*(4), 258–265. <https://doi.org/10.1093/tropej/fmt012>
- Tarjoman, A., Vasigh, A., pouy, S., Safari, S., & Borji, M. (2019). Pain management in neonatal intensive care units: A cross sectional study of neonatal nurses in Ilam City. *Journal of Neonatal Nursing*, *25*(3), 136–138. <https://doi.org/10.1016/j.jnn.2018.08.006>
- UN Inter-Agency Group for Child Mortality Estimation. (2017). *Child mortality 2017: Levels and trends*. Retrieved from https://www.unicef.org/media/48871/file/Child_Mortality_Report_2017.pdf
- Uwaezuoke, S. N., & Obu, H. A. (2013). Nosocomial infections in neonatal intensive care units: Cost-effective control strategies in resource-limited countries. *Nigerian Journal of Paediatrics*, *40*(2), 125-132–132.
- WHO. (2011). Guidelines on optimal feeding of low birth-weight infants in low-and middle-income countries. *Geneva: WHO*, 16–45. <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Guidelines+on+Optimal+feeding+of+low+birth-+weight+infants+in+low-and+middle-income+countries#0>
- WHO. (2019). Survive & thrive: Transforming care for every small and sick newborn. In *WHO, UNICEF* (Vol. 29, Issue 8). <https://apps.who.int/iris/bitstream/handle/10665/326495/9789241515887-eng.pdf>
- Xu, H., Dai, Q., Xu, Y., Gong, Z., Dai, G., Ding, M., Duggan, C., Hu, Z., & Hu, F. B. (2015). Time trends and risk factor associated with premature birth and infants deaths due to prematurity in Hubei Province, China from 2001 to 2012. *BMC Pregnancy and Childbirth*, *15*(1), 329. <https://doi.org/10.1186/s12884-015-0767-x>