

Original Research Article

NEONATAL PAIN MANAGEMENT PRACTICES AMONG NURSES WORKING IN NEWBORN UNITS IN NYANZA AND WESTERN KENYA

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Abstract

Background: Newborn babies in the Neonatal Intensive Care Units (NICU) and Newborn Units (NBUs) undergo several procedures that cause a significant amount of pain. Nurses play an essential role in the implementation of pain assessment and management measures in neonates. However, while it remains widely known that nurses play an important role in neonatal pain management, nurses' practices on the management of pain in neonates admitted in Newborn care units have not been widely published within the nursing science.

Objectives: To evaluate neonatal pain management practices among nurses working in newborn units in Nyanza and Western Kenya.

Methods: A descriptive cross-sectional study using qualitative and quantitative approaches was used targeting 89 nurses. The collection of data was done through semi-structured, self-administered questionnaires with both closed and open-ended questions. Qualitative data was collected through in-depth interviews. Data obtained was analyzed using the statistical package for social science (SPSS) version 22.0 software. The study assumed a confidence level of 95% and a (p) value equal to or less than 0.05 was considered significant. Qualitative data was analyzed through logic checks to understand the emerging themes. Descriptive statistical analysis was done using frequencies, percentage and means.

Results: The study established that a small percentage of the nurses practiced pain management in neonates through use of non-pharmacologic (34.8%) and pharmacologic (28.1%) strategies. The commonly used non-pharmacologic strategies include changing of nappies (71.9%) and repositioning (68.5). Pain assessment was however seldom done.

Conclusion: Following the results, the study concluded that nurses practice pain management in neonates by implementing non-pharmacological and pharmacological strategies. The commonly used pain management strategy in neonates is utilization of non-pharmacological strategies such as change of nappies repositioning and kangaroo mother care. However, gaps exist in knowledge and competency on neonatal pain management aspects and practice. The study therefore recommended enhancement of awareness on aspects of neonatal pain among nurses to facilitate improved pain management practices in neonates. Further strengthening of nurses' knowledge and skills on pain management in neonates through attending scheduled short courses, workshops and on job training is recommended.

Keywords: *Neonate, Neonatal pain, Nurses, Knowledge, Perception*

INTRODUCTION

Neonates admitted in neonatal intensive care units (NICU) experience numerous painful stimuli due to various procedures they must undergo (Williams & Lascelles, 2020). However, pain control in neonates undergoing invasive procedures is limited. Untreated neonatal pain represents a huge global source of short-term and potentially long-term clinical morbidity (Wade et al., 2020). Research done over the years (Hatfield, 2014; Walker, 2019; Williams & Lascelles, 2020; Shiff et al., 2021) shows that untreated pain leads to immediate and long-term complications later in life that affect the brain, neuro-development, and pain reactivity into adulthood. Infants who are exposed to a high number of tissue breaking procedures during NICU have been reported to have poor cognitive, motor and neuro-developmental outcomes (Victoria & Murphy, 2017; Walker, 2019).

There is an increased awareness of neonatal pain experiences among nurses working in NBUs and NICUs (Carlsen Mistic et al., 2021). Despite increased knowledge on neonatal pain and its consequences little corresponding improvement has been seen in clinical practice and evidence (Muteteli et al., 2019a) shows that routine procedures among neonates are done without pain relief measures. Nurses play a crucial role in assessing, implementing and evaluating pain management interventions to minimize neonatal pain using available resources such as non-pharmacologic, techniques. Nurses' perceptions play an essential role in the management of pain in neonates. Recent literature (Carlsen Mistic et al., 2021) and (Hanna Popowicz et al., 2021) show that positive perceptions of the nurses, efficient tools, and better practices are vital for the management of neonatal pain.

While it remains widely known that nurses play an important role in neonatal pain management, (Carlsen Mistic et al., 2021), neonatal pain management practices among nurses in most Low and medium income countries in sub-Sahara Africa like Kenya have not been comprehensively assessed. Few studies (Kereri, D., 202; Wade et al., 2020) and (Kyololo et al., 2020) have assessed neonatal pain management in Kenya however none specifically evaluated neonatal pain management practices among nurses.. In addition previous studies show gaps in the neonatal pain management among nurses (Kereri, 2019; Perry et al., 2019). In this regard there is a growing understanding of the need to understand nurses' practices in managing pain in the newborn units.

Objective: The aim of the study was to evaluate pain management practices among nurses working in newborn units in Nyanza and Western Kenya. The study findings are expected to contribute to an expanded knowledge base by highlighting the importance of nurses' practices while managing pain in neonates. This in return will give hindsight to the nurses and other health workers that indeed, neonates need pain control and prevention

METHODS

Study Design

A descriptive study design was used with mixed approach of both qualitative and quantitative data collection methods to assess nurses' practices on neonatal pain management.

Setting

The study was conducted in selected counties in Western Kenya. Eight counties were included four from the former Nyanza province Kisumu, Homa Bay, Migori, Kisii

and four from the former Western province namely; Kakamega, Vihiga, Bungoma, and Busia. There was a total of 8 hospitals in the region which had neonatal units.

Research Subject

Sampling of both study population and study sites was done by census due to the few numbers of public facilities that had established NBUs and nurses working in NBUs across Western Kenya. Hence all the facilities with established NBUs were included in the study. A total of 89 nurses participated in the study.

The study population consisted of all nurses working in new-born units in public hospitals within Western Kenya. Total number of nurses who worked in the newborn units was 89 excluding the head nurses. All the nurses who had worked for more than six months in the selected NBUs and who had consented to participate were included in the study. Non-consenting nurses and those away on leave during the period of study were excluded.

Instruments

The study employed a semi-structured, self-administered questionnaire with both closed and open-ended questions to collect data. The data collection tools were adopted and modified from; Axelin et al., (2010); Priscah & Martina (2018); Nimbalkar et al., (2014) and Daniels & Jackson (2011). Validity of the questionnaire used for data collection was assessed through pretesting in a pilot study. The instrument was further subjected to reliability analysis which yielded a Cronbach's alpha of 0.76.

Data Analysis

Quantitative data from completed questionnaires was cleaned, coded and variables were entered into Statistical Package for the Social Sciences (SPSS) version 22.0

software for analysis. Descriptive and inferential statistics were used to present quantitative data. Qualitative data from the key informant interviews (KIIs) was analyzed manually by coding the data based on the logic checks and emerging themes. Common themes were identified, inferences made from each theme and conclusion drawn. The information was triangulated with quantitative data from the questionnaire then it was reported verbatim.

Ethical Consideration

Ethical approval and permission for the purpose of conducting this research was acquired from the university's Institutional Research and Ethics Committee (IREC) on 20th august 2019. Permission to gather data in the study area was obtained from NACOSTI on 26th December 2019. Participants were informed about the study and they signed a written consent.

RESULTS

Characteristics of the Respondents

Majority (84.3%) were females with diploma being the leading qualification (60.7%). Most (68.5%) of the respondents were in the age bracket of 21 – 39 years. Slightly more than a third (36%) had worked for ten years or more. Majority (18%) were from JOOTRH as per table 1.

Table 1. Characteristics of the Respondents

Characteristic	Categories	n	%
Age group in years	20 and below	1	1.1
	21 – 30	30	33.7
	31 – 40	31	34.8
	41 – 50	21	23.6
	51 – 60	6	6.7
Gender	Male	14	15.7
	Female	75	84.3
Qualifications	Diploma	54	60.7
	Post-graduate diploma	15	16.8

	Degree	17	19.1
	Post graduate degree	3	3.4
Work experience	6 months – 11 months	10	11.2
	1 -2 years	17	19.1
	3 – 5 years	16	18.0
	6 – 9 years	14	15.7
	≥ 10 years	32	36.0

Nurses' perceptions on pain in neonates

When asked if they believe that neonates experience pain, majority (75%) strongly agreed that neonates experience pain. However, less than half strongly agreed that minor procedures are painful (39.3%). Almost half (44.9%) perceived that preterm babies are likely to experience more pain due to high numbers of procedures or such neonates experience more pain as compared to older babies. Regarding respondents' perceptions on neonatal pain assessment, less than a third (32.6%) strongly felt that the pain assessment tool is accurate and effective in pain assessment.

Participants were also asked to rate their perceptions on neonatal pain interventions. Less than half strongly believed that pharmacologic (41.6%) and non-pharmacologic (42.7%) interventions are vital regardless of the duration taken to perform invasive procedures. Data from KIIs displayed conformity with quantitative data. Majority six out seven of those interviewed in in-depth agreed that neonates experience pain. "Nurses are very much aware that neonates feel pain but do little to address it since medication for neonates is limited" (KII number 2).

Nurses' perceptions on their knowledge and competency of pain management in newborn units

Participant's perception on their knowledge and competency on neonatal pain management was assessed. When asked if they felt comfortable with their knowledge and

skills in neonatal pain management, (31.5%) reported to be uncomfortable using both pharmacological and non-pharmacological interventions while less than a quarter (22.5%) felt that neonatal pain management was undertaken well in their newborn units.

Tools used in neonatal pain assessment in newborn units

Figure 1 illustrates participants' responses concerning tools used by nurses to assess pain in NBUs. Out of the 89 respondents, 48.3 % affirmed not to be having the recommended tools. Slightly more than a quarter (28.1%) of the respondents reported use of pain assessment tools while 23.6% relied on baby's crying and on expression of agitation to assess for pain. Those that reported using tools cited Face, Legs, Activity, Cry, and Consolability (FLACC) and Faces pain scale (FPS) as the tools they utilize. These findings slightly contradicted those from KIIs. According to all KIIs there were no established neonatal pain assessment tools in the facilities. "The hospital has no tools for assessing pain in the neonates. Concentration is on older pediatrics and adults" (KII NO3). Another KII reported lack of protocols to guide pain management in neonates.

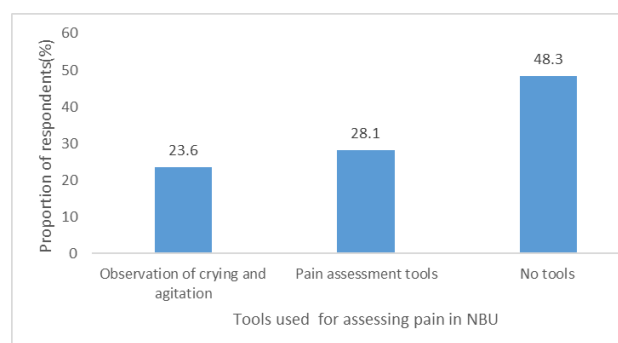


Figure 1. Tools used in pain assessment in neonates in NBUs

Frequency and type of strategy used in neonatal pain management in NBUs

Figure 2 is an illustration of the frequency and type of strategy nurses used in managing pain in neonates. The four leading

approaches used by nurses are changing nappies (71.9%), repositioning (68.5%), using Kangaroo care approach (60.7%) and tactile soothing (55.1%). More than twice as many nurses often use non-pharmacologic interventions compared to those who use pharmacologic (20.2%) interventions. On the other hand, 34.8% and 20.2% have never used pharmacologic or non-pharmacologic interventions, respectively. Data from Key informant interviews (KIIs) indicated that pain management in neonates was objective since all facilities lacked laid down protocols on how to manage pain in neonates. *“There are no laid down measures that I have ever known. The NBU has no protocols and procedures for managing pain in neonates we manage the pain as per what we think” (KII No4).*

Neonatal pain management practices among Nurses

The responses are presented in Likert Scale. From the results, 28.1% and 34.8% strongly agreed (SA) that they use pharmacologic or non-pharmacologic interventions for neonatal pain management, respectively. Minority (5.6%) reported regular

use of pain assessment tools or complete pain assessment scores (3.4%). Whereas nearly forty percent (39.3%) strongly agreed (SA) that they use physiological and behavioral factors to assess pain in neonates, 30.3% use massage in pain management. Less than one-in-five consult other clinicians on actions to undertake after they have the scores (16.9%), conduct pain assessment frequently among the neonates as per the protocols (11.2%), record all the scores and actions during pain assessment and management (11.2%), read guidelines and protocols of pain assessment and management (19.1%) or use non-nutritive suckling in pain management (10.1%) as illustrated in table 2.

Data from KIIs indicated use of selected drugs such as brufen and morphine to manage neonatal pain. For example, one participant reported use of brufen and another one reported use of morphine for managing pain in neonates. *“Syrup brufen is given to a few newborns upon prescription by the doctor” KII NO1. “Syrup morphine is used many times and to distract a neonate feeling pain they are made to suck a gauze soaked 50% dextrose” KII NO3.*

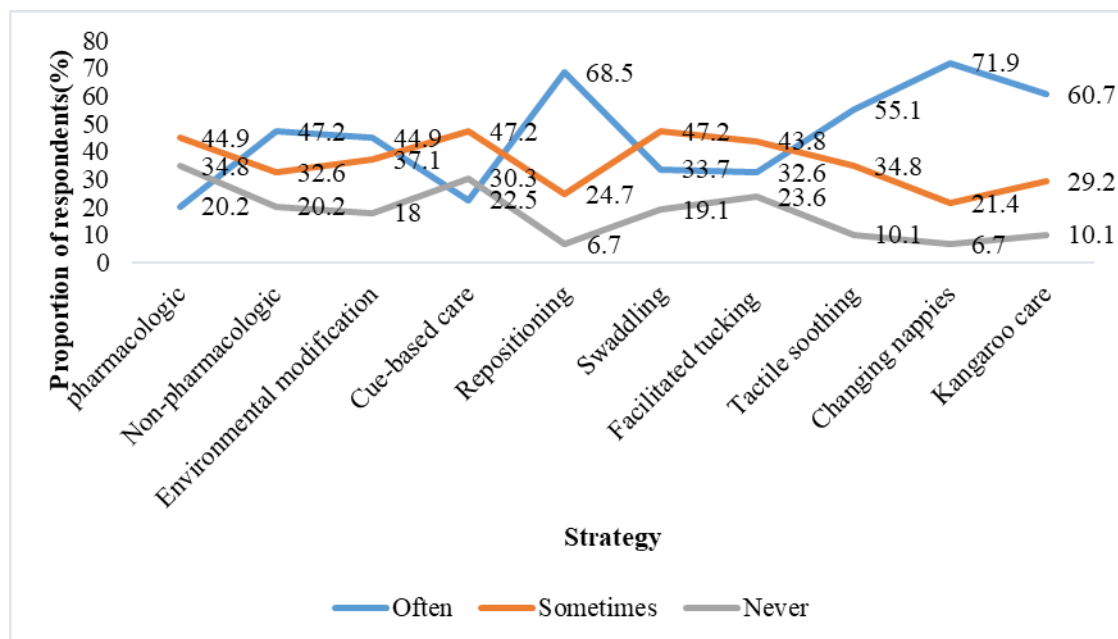


Figure 2. Frequency and type of strategy nurses use in neonatal pain management in NBU

Table 2. Neonatal pain management practices among Nurses

Type of practice	Strongly agree (SA) (%)	Agree (A) (%)	Disagree (D) (%)	Strongly Disagree (SD) (%)
I use pharmacologic interventions for neonatal pain management	25 (28.1)	33 (37.1)	20 (22.5)	11 (12.4)
I use non-pharmacologic interventions for neonatal pain management	31 (34.8)	40 (44.9)	12 (13.5)	6 (6.7)
I use pain assessment tools regularly	5 (5.6)	17 (19.1)	29 (32.6)	38 (42.7)
I use physiological and behavioral factors to assess pain in neonates	35 (39.3)	26 (29.2)	20 (22.5)	8 (9.0)
I always complete pain assessment scores	3 (3.4)	13 (14.6)	41 (46.1)	32 (33.0)
I consult other clinicians on actions to undertake after I have the scores	15 (16.9)	20 (22.5)	27 (30.4)	27 (30.4)
I conduct pain assessment frequently among the neonates as per the protocols	10 (1.2)	22 (24.7)	32 (36.0)	25 (28.1)
I record all the scores and actions during pain assessment and management	10 (11.2)	18 (20.2)	29 (32.6)	32 (36.0)
I read guidelines and protocols of pain assessment and management	17 (19.1)	21 (23.6)	22 (24.7)	29 (32.6)
I use non-nutritive sucking in pain management	9 (10.1)	32 (36.0)	25 (28.1)	23 (25.8)
I use massage in pain management	27 (30.3)	34 (38.2)	17 (19.1)	11 (12.4)

DISCUSSION

Participants Socio-demographic Factors

Various socio-demographic factors among nurses' influence pain prevention and management among neonates. Though correlation studies between demographics and nurses' practices were not done in the current study, findings show that majority of the nurses working in NBU were females with a mean age of 35 years. Other studies (Costa *et al.*, 2017; Muteteli *et al.*, 2019a; Suleiman *et al.*, 2019) reported similar findings. Level of education and gender has been found to be significantly associated with the nature of neonates' pain prevention and management (Popowicz *et al.*, 2021). Findings from the current study show that majority of the participants had attained diploma level of education however, correlational studies to establish the relationship between education level and neonatal pain management practices. A cross-sectional study done in Ethiopia (Wari, 2021) reported contrary findings. In

this study most (81%) of the nurses working in NBU had a bachelors of nursing degree. About half of these nurses had been trained on neonatal pain management. Of importance is that this group depicted good knowledge on neonatal pain management however, similar to the current study, neonatal pain management practices were low.

Nurses' perceptions on neonatal pain

Various aspects on perception of pain in neonates were assessed in the present study. Findings show that most nurses (66.75 %) believe that neonates experience pain. In corroboration are reports from the KII where six out of seven of those interviewed reported that though they don't address it, nurses acknowledge that neonates usually experience pain.

In the past it was thought that neonatal nervous systems were immature hence they could not feel pain (Bishop & Bishop, 2020). This notion was so widely believed that even

major operations, including open-heart surgery, were carried out without the use of analgesics or anesthetics. Evidence from recent literature (Gursul *et al.*, 2019; Williams & Lascelles, 2020) however shows that neonates are capable of experiencing pain just as adults do, or even at a greater level.

Findings from the current study agree with existing literature (Ishak *et al.*, 2019; Muteteli *et al.*, 2019a) that nurses believe neonates experience pain. Same as current study the studies by Ishak and Muteteli done in Malaysia and Rwanda respectively used a cross-sectional design with a self-administered questionnaire as the data collection instrument a possible explanation of the similarities in the data findings. Other studies done earlier (Costa *et al.*, 2017; Avila-Alvarez *et al.*, 2016) indicate similar reports in that most of the nurses agreed that neonates experience pain. Similar to the current study, the study by Costa *et al.*, 2017 was done among nurses in six public hospitals with NICUs using a descriptive cross-sectional design.

Majority of the nurses in the present study believed that both term and pre-term neonates experience pain. In agreement is evidence from randomized control studies (Shiff *et al.*, 2021; Gursul *et al.*, 2019) which proved that preterm neonates experience pain even more than the term neonate. This was proven through measuring of brain activity in neonates through invasive methods such as Electroencephalography (EEG) (Gursul *et al.*, 2019) and Magnetic Resonance Imaging (MRI) (Brummelte *et al.*, 2012).

Contrary findings were noted elsewhere. A descriptive study (Popowicz, 2021) done in Poland among nurses and midwives reported that a large number of the participants did not believe that neonates especially preterm experienced as much pain as older children and adults. A believe they attributed to the immature immune system in the neonates. Different from the current study

the Poland study engaged a larger sample size of 43 hospitals and 558 respondents with more than a quarter being older than 50 years of age.

Nurses perceived knowledge and competency on neonatal pain management

Participants in the current study reported to be uncomfortable with their knowledge and skills in neonatal pain management using pharmacological interventions. Less than half (42%) were aware of both the pharmacologic and non-pharmacologic methods used in pain management among neonates. This could possibly be attributed to lack of targeted trainings on neonatal pain management and continued professional training post basic college education. The findings agree with those of other global studies (Muteteli *et al.*, 2019; Costa *et al.*, 2017; Popowicz *et al.*, 2021). In these studies, nurses were found to have knowledge deficit on selected aspects of neonatal pain management such as knowledge on newborn physiology and pain management and use of pain assessment tools. The study by Muteteli done in Rwanda reported a large percentage 74.2 % of nurses having inadequate knowledge on neonatal pain management. The findings from Muteteli and the current study could be similar as both countries are low income countries in Africa and the study population was less than 100 in both. The hospitals too were government facilities. Findings from the current study differ from those of (Popowicz *et al.*, 2021) where majority of the participants were reported to have sufficient knowledge on neonatal pain. The study by Popowicz even though done on the same population of nurses working in NICU as the current study was done in a more developed country in Europe. Further differences could be attributed to the education level and experience among the respondents. Unlike the respondents in the current study more than half of the respondents in the Polish study had either a bachelors or master's degree in neonatal nursing and over 75% had more

than 10 years' experience working in NICU. Higher education and experience are both associated with increased knowledge (Wari, 2021).

Tools used in neonatal pain assessment

The gold standard measurement of pain is through self-report. However due to developmental reasons, neonates cannot self-report. Different approaches have been applied in assessing neonatal pain in different settings. To perform pain assessment in neonates, nurses are required to use specific instruments that can allow them obtain assessment scores and plan for appropriate treatment. The American Academy of Pediatrics (AAP) recommends use of reliable assessment tools for accurate evaluation and management of neonatal pain. However, despite the recommendations, evidence in literature from studies (Muteteli *et al.*, 2019; Rocha *et al.*, 2021) report few or lack of neonatal pain assessment tools in study sites hence a confirmation that neonatal pain assessment is insufficiently done.

Results from the current study corroborate with above findings. In this study, almost half of the respondents (48.3 % n=89) confirmed absence of neonatal pain assessment tools. In addition, none of the recommended tools, including PIPP, N-PASS, NIPS, NFCS, CRIES, or BPSN were found to be in use in the study area. A few members claimed to be using the FACES and FLACC tool. In agreement is data from KIIs. According to all KIIs there were no established neonatal pain assessment tools in the facility. The lack of assessments tools could be related to lack of protocols and policies on neonatal pain management in the study sites. Further report from KIIs in the present study indicates total lack of protocols. All the in charges interviewed said there were no protocols in place to guide assessment and management of neonatal pain. In agreement are findings from other studies.

These findings disagree with those from studies done in other countries. Studies by (Popowicz *et al.*, 2021) and (Suleiman *et al.*, 2019) had different findings. In both studies though not sufficient, neonatal pain assessment and management protocols were present at the study sites. In addition, the nurses found the protocols clear and easy to understand. The findings from the Polish study were done in Poland a developed country where awareness and adherence to neonatal pain management protocols could be higher. The study by (Suleiman *et al.*, 2019) though done in Nigeria a developing country like Kenya was done among a population of doctors. Of importance to note is even study where the pain assessment tools were available, their usage was very minimal. For example, a primary observational and prospective clinical study by Rocha in Brazil among 12 nurse and 26 nursing technicians reported use of only NIPS scale for the first three days of admission into the pediatric unit or intensive care unit (Rocha *et al.*, 2021).

Neonates cannot self-report pain. In this regard AAP recommends use of multidimensional pain assessment tools such that measurement includes both physiologic and behavioral indicators of pain. Behavioral indicators of pain include changes in facial expressions, body movements, and crying. Positive findings in line with above recommendations were found in the present study. The study findings indicate compliance by slightly above a quarter 28.3 % of the respondents who reported to be relying on the baby's crying and agitation as a way of assessing neonatal pain. The respondents did not however have protocols for reference.

Strategies used by nurses in neonatal pain management in NBUs

Pain relief and prevention are key elements in health care. Pain relieve in neonates is an important task among health caregivers since exposure to repeated experiences of pain during the neonatal period

is known to have short (AAP, 2017) and long term (Walker, 2019) adverse effects which include alterations in pain sensitivity among others. A number of strategies have been shown to be beneficial in the management of mild to moderate pain in the neonate. However, despite increased awareness that neonates experience pain, studies (Muteteli *et al.*, 2019;Wari, 2021) report underuse of effective pain relief for routine procedures.

In agreement with previous studies are findings from the current study. In the current study a good number of respondents had never used pharmacologic (34.8%) or even non-pharmacologic (20.2%) interventions in managing neonatal pain. For those who used non-pharmacologic interventions, majority applied physiological and behavioral attributes such as use of non-nutritive sucking; change of nappies, repositioning using Kangaroo care approach and tactile soothing. Corroborative findings were reported in several other studies done elsewhere (Muteteli *et al.*, 2019a ;Costa *et al.*, 2017;Wari, 2021;Popowicz *et al.*,2021). In all these studies a high percentage use of non-pharmacological pain management practices was reported. The most cited non-pharmacological interventions were non-nutritive sucking and repositioning. This finding supports earlier findings(Hall, W Richard, 2015) who in their respective researches indicated that the increase in endogenous endorphins and pacifying effect of non-nutritive sucking reduced neonatal pain during invasive procedures. It is also worth noting from the study result that a reasonable percentage 30.3 % of the nurses used massaging to manage neonatal pain in their newborn units. This result notably supports recent findings(Liu *et al.*, 2022) which recommended massage for pain control in neonates since it was found to play a positive role in relief of painful procedures.

Data from clinical trials (Krowchuk, 2018;Hoarau *et al.*, 2021) shows that sucrose has been proven to have significant reductions in episodes of crying, facial grimacing, and

motor activity reduction following oral administration of sucrose prior to performance of minor but painful procedures. Despite such existing evidence, findings from the current study revealed total non-use of glucose in neonatal pain management. The commonly reported used pharmacological interventions were use of brufen and paracetamol as a form of analgesia as reported in IDI. These findings are in line with those of other studies done across the globe. A retrospective study (Rocha *et al.*, 2021) done in Brazil found no records of analgesia sedative use in almost 80% of the analyzed files. Another study (Muteteli *et al.*, 2019a) done in Rwanda reported positive attitudes towards the practice of pain management among neonates. However, despite the positive attitudes, the study subjects did not display good will towards actualizing the practice since they believed that pharmacological analgesics should not be used in neonates and if it has to be used then it should be rarely done. The similar findings can be attributed to similarities in study set ups in that both are middle income countries and the studies were done among nurses. Contrasting findings were reported in a systematic review done in Kenya (Wade *et al.*, 2020). In this review expressed breast milk and oral sugar were the second line recommended mode of analgesia among neonates undergoing routine procedures in non-tertiary health care units in Kenya. Further contrary findings(Krowchuk, 2018) show that oral administration of oral sucrose as a pain management measure in neonates does not prevent development of long-term effects of pain on infants such as remote hyperalgesia. This therefore indicates a gap hence necessity for developing protocols to guide management of pain in neonates.

Nurses' practices in management of pain in neonates

Nurses' practices play a crucial role in determination of patient outcomes. Neonatal pain management practices assessed in the

current study include; use of either pharmacologic or non-pharmacologic strategies, pain assessment, documentation, consultation from clinicians and reading guidelines on assessment and management of pain in neonates. The findings indicate low utilization of the neonatal pain management strategies. Corroborating findings are noted globally (Roga *et al.*, 2023; Popowicz, 2021; Carlsen Misic *et al.*, 2021). Nursing studies addressing pain management in neonates recommend use of non-pharmacological pain interventions to alleviate procedural associated pain in neonates (Mangat *et al.*, 2018; Rocha, 2021). In conformity with this recommendation, slightly more than 1/3 of nurses in the current study used non-pharmacologic strategies such as non-nutritive sucking and massage to manage pain in neonates in the current study. Corroborating findings were noted in the study by Costa *et al.*, 2017 where 58.8% of the study participants reported use of non-nutritive sucking. Similar to the current study the study by Costa used a descriptive cross-sectional approach to collect data, assessed pain management practices among nurses working in NICUs in public hospitals and used a self-administered questionnaire. However, compared to the current study the sample size in the Costa study slightly was smaller where they interviewed 51 nurses.

Pain assessment provides a pathway for pain management. To assess pain in neonates, use of a validated pain assessment tool is recommended (Pediatric Association Of Anesthesiologists, 2012). When asked about neonatal pain assessment actions, slightly more than a third of the respondents in the current study reported use of physiologic and behavioral factors to assess pain while a very small proportion (less than 10%) reported use of pain assessment tools or even completion of pain assessment scores. These findings relate largely with existing literature (Costa *et al.*, 2017; Muteteli *et al.*, 2019a). Findings from the two previous studies Costa and Muteteli

indicate good knowledge among study participants on the use of pain assessment scales however, despite the perceived good knowledge, use of the pain assessment scales in the study sites was minimal. Contrary to the current study, the study by Costa and Muteteli reported presence of pain assessment tools in the study sites.

In summary findings from the study show that nurses practiced pain management in neonates through utilization of pharmacologic and non-pharmacologic interventions such as non-nutritive sucking and massage. Other pain management actions included physiologic assessment of pain and consultations from colleagues.

CONCLUSION

Following the results, the study concluded that nurses practice pain management in neonates by implementing non-pharmacological and pharmacological strategies. The commonly used pain management strategy in neonates is utilization of non-pharmacological strategies such as change of nappies repositioning and kangaroo mother care.

However, even though nurses implement pain management in neonates, gaps exist in knowledge and competency on neonatal pain management aspects and practice since most nurses had perceptions of not being equipped with adequate knowledge and competency to administer interventions necessary in relieving neonates from painful experiences. Further, the study revealed lack of recommended pain assessment tools in the study area. An indication that pain in neonates is not assessed using validated assessment tools.

SUGGESTIONS

There is need for management in individual health care facilities to improve nurse's practices on neonatal pain management by enhancing awareness on aspects of neonatal pain. Nurses need to strengthen their knowledge and skills on pain

management in neonates through attending scheduled short courses, workshops and on job trainings.

There's need for county management to provide neonatal pain assessment tools to health care facilities with NBUs and NICUs; and enhance their use through policies and guidelines for neonatal pain management. Further research should be done to explore nurses' competency on strategies used to manage neonatal pain in the NBUs.

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DECLARATION OF CONFLICTING INTEREST

There is no conflict of interest.

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AUTHOR CONTRIBUTION

Teresa Kerubo Okiri: Conceptualization/ design of the study, literature review, data collection and interpretation; and writing of the manuscript.

Mary Kipmerewo: Review of the concept and study design, examination of data analysis and interpretation and review of manuscript writing.

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