DOI: https://dx.doi.org/10.4314/ejpch.v19i2.4

Ethiopian Journal of Pediatrics and Child Health, 2024, 19(2)
Open access articles distributed in terms of Creative Commons Attribution Licence [CC by 4.0]
ISSN 2413-2640 *eISSN* 2519-0334

OPEN ACCESS

Original Article

Assessment of knowledge, practice, and barriers regarding neonatal pain care among pediatrics and pediatric surgical residents at a Tertiary Hospital, Addis Ababa, Ethiopia

Desalegn Mechal [1]*, Asrat Demtse [2]

[1] Department of Pediatrics and Child Health , College of Health Sciences, ArbaMinch University, ArbaMinch , Ethiopia, [2] Department of Pediatrics and Child Health , College of Health Sciences, Addis Ababa
University, Addis Ababa, Ethiopia

*Corresponding author: desalegnmechal@gmail.com

Abstract

Background: *The growing knowledge in medicine has shown newborns can feel pain and that treating pain has benefits for the neonates in the short- and long-term. Despite the presence of expert consensus on neonatal pain scoring methods, neonatal pain remains unnoticed and under treated. Among others, effective pain management requires that the physicians caring for neonates be well informed, keen-eyed and amenable to ensure that neonatal pain care is multi-tiered and multifaceted.*

Objective: *To assess the knowledge, practice and barriers regarding neonatal pain management among pediatric and pediatric surgical residents at Tikur Anbesa Specialized Hospital.*

Methods*: Institution based cross sectional study using a self-administered questionnaire was employed from June 01- July 15, 2020 among all pediatrics and pediatric surgical residents. Data was analyzed using SPSS version 26.0 software. One way ANOVA was used to determine differences in means. Statistical, significance was set at p≤0.05.*

Results: *Response rate was 96 % (104 out of 108 participants). The maximum and minimum score for the knowledge questions were 10 and 4 out of 10 respectively. The mean (SD) knowledge score was 8.5 (±1.4). Only 15.8% of residents reported using neonatal pain assessment tools on daily practice. The frequency of analgesia and non-pharmacologic measures for common neonatal procedures were sub-optimal and varied with the procedure. One-way ANOVA found no significant difference in neonatal pain care by specialty, knowledge status, experience, and residency year (P>0.05). Most residents cited inadequate staff training (88.4%), absence of local neonatal pain guidelines (87.4%), and lack of pain assessment (63.2%) as barriers to optimal neonatal pain care.*

Citation : Mechal D., Demtse A., Assessment of Knowledge, practice, and barriers regarding neonatal pain care among pediatrics and pediatric surgical residents at a Tertiary Hospital, Addis Ababa, Ethiopia. *Ethiop J Pediatr Child Health*. 2024;19 (2):115-131 ***Submission date:*** *14 January 2024* ***Accepted****: 5 November 2024* ***Published****: 31 December 2024*

Conclusion: *Despite the high knowledge score achieved by most of the residents, the use of analgesia and comfort measures for common neonatal procedures were not optimal, indicating a need for supervised practical application.*

Keywords*: neonatal pain care, analgesia, comfort measure*

Introduction

The International Association for the Study of Pain refers to pain as an unpleasant sensory and emotional experience, added to a tissue injury that is real, potential, or spoken regarding such injury(1,2). Prior to the 1980s, it was thought that the neonates could not experience pain because of the incomplete myelination (the process of forming a fatty sheath around axons in the nervous system, which increases the speed at which electrical signals travel between neurons) and the absence of recall for pain indicated the immaturity of the central nervous system(4,5).

Growing knowledge in neurology, practical medicine and perinatal research have showed that the fetus and newborn can feel acute, established, and chronic pain. Treating pain has benefits for the neonates in short- and long-term (1,2).

Pain due to the illnesses and painful procedures are common in neonates, especially in those in the NICU (Neonatal ICU) due to both hospital principles and routines, and the complex work process, which involves surroundings with high glow, temperature, sound, and many handling, exposing them to stress since birth. They respond to such painful events by a sequence of composite biochemical, physiologic, and behavioral alterations(1,2,3).

Self-reporting is the most dependable indicator of the presence and intensity of pain. Despite that ancillary measurements including hormonal, behavioral, physiological measures have been utilized to asses' pain in the neonate due to inability of neonates to voice pain (3,4).

There are varieties of tools available for the assessment of neonatal pain, which rely on gestational age, sleep/wake state, behavioral responses, physiological responses or a combination of this. Neonatal pain assessment is an essential prerequisite for optimal pain management and depends on use of an appropriate, sensitive and accurate clinical pain assessment tool and clinical staff training to ensure health care providers can detect neonatal pain using the selected assessment tool. Despite greater understanding that neonates experience pain ,Analgesic therapy is usually not given (6,3,7).

For neonates to receive adequate pain control, a pain control program should include non-pharmacological and pharmacological therapies and preventive strategies for effective management of neonatal pain(8,9). Non-pharmacologic approaches like kangaroo care, facilitated tucking, non-nutritive sucking, sucrose, and others can be utilized for procedural pain or as an adjuvant therapy. Topical

anesthetics, opioids, NSAIDs, acetaminophen and other sedative and anesthetic agents may be included into NICU protocols for treatment of moderate to severe pain in all neonates (5,6,7).

Despite the advancing knowledge about evaluation and treatment of pain, pain in neonates remains unnoticed and under treated(3). Thus, the entire neonatology staff, especially those who are directly involved in the care of babies should learn how to recognize, asses, and treat the neonatal pain to avoid or decrease the harmful effects of pain in the newborn development ; a quick recovery and overall improvement in the neonatal care. To our knowledge there is no published data describing the status of physician's neonatal pain care in Ethiopia.

Methods

Study setting

The study was conducted in Tikur anbessa specialized Hospital. TASH is located at the heart of the capital city on Churchill Avenue. The hospital is the largest hospital in Ethiopia providing undergraduate as well as postgraduate teaching service in addition to the clinical service. It has around 600 beds and serves nearly 400,000 patients a year. The hospital has about 227 beds for pediatrics in general including the neonatal ward.

TASH NICU has 39 beds with more than 250 inpatient cases/month being managed.

Interns, trained nurses, pediatric and child health residents, and neonatology consultant specialists run the neonatal ICU. Outpatient services are given in one high-risk infant clinic with average 200 patients each month.

Study Design

Institution based cross sectional study design was employed from June 1, 2020 to July 15, 2020 to assess the knowledge, practice and barriers regarding neonatal pain care in TASH among pediatrics and pediatric surgical residents practicing at TASH in Addis Ababa.

Operational definitions

Knowledge status of respondents: was classified using the mean value; respondents who score lower than the mean were categorized as less knowledgeable and those who score more than the mean were categorized as knowledgeable (18).

Neonatal procedural pain: Includes acute and chronic pain induced and experienced because of procedures (14).

Pharmacological interventions: drugs including sedatives, muscle relaxants, anesthetic agents, narcotic analgesics and non-steroidal anti inflammatory agents (8,9).

Non-pharmacological interventions: Behavioral actions to minimize reduce or relieve painful stimuli limited to oral sucrose, swaddling, non-nutritive sucking, breastfeeding and kangaroo mother care (8,9).

Neonatal pain care practice: use of analgesia and comfort measures for common neonatal procedures.it was assessed by 14 questions using five point Likert scale. All individual answers to practice were given scores (one=never to five=always) and computed to obtain total mean score. Those who score

below the mean were classified as having poor practice and those who score above the mean as good practice(14,18).

Inclusion and Exclusion criteria

Inclusion criteria: Those pediatrics and pediatric surgical residents practicing in TASH and who were involved in health care service for neonates and gave informed consent.

Exclusion criteria: Those pediatric and pediatric surgical residents who cannot give informed consent. 1st and 2nd year pediatric surgical residents who are not involved in neonatal care

Sample Size and Sampling Procedure

The sample size was determined using single population proportion formula based on the assumption that Z (standard value for 95% confidence interval) =1.96; CI (confidence interval) =95%; D (marginal error) =0.05; P = 13.3 %(28). Q = 1-P which is equal to 0.867. Having applied a resource correction formula and adding 10% for non-respondents the sample size was set at 86. There are total of 88 pediatric residents from year 1 to year 3 and there are 20 pediatric surgical residents, which are year 3, year 4 and year 5. All pediatrics and pediatric surgical residents who are involved in neonatal care and practicing in TASH during the study period were included in the study. Hence, the sample size was equal to study population. It was not difficult to include all of the residents in the study. Thus, all pediatrics and pediatric surgical residents practicing in TASH during the study period were included in the study. Therefore, the sample size was equal to study population.

Data Collection

Self-administering questionnaire was used to collect data from pediatrics and pediatric surgical residents of TASH. After reviewing existing literature on neonatal pain care, investigators designed a questionnaire tailored to the study's parameters. A pilot study was conducted to test feasibility, and to identify potential issues before the main research. The questionnaire had four parts; the first part contains socio-demographic characteristics of the residents; the second part is about the knowledge of the residents regarding neonatal pain care. The third part is about pediatric residents self-reported neonatal pain care practice and the forth part is about barriers to optimal neonatal pain care. All the questions were in English, distributed to the study subjects, and done on spot. Principal investigator collected the data.

Data quality assurance

The validity and reliability of the questionnaire were discussed with a neonatologist. Investigators before actual data analysis and interpretation checked the completeness of each questionnaire.

Data Analysis

Data was cleaned and entered into SPSS. All analysis was done using SPSS version 26. Continuous data were reported as the mean and standard deviation and categorical data, in percent. Reported frequency of use of analgesia and comfort measures was assessed by 14 questions using five point Likert scale. All individual answers to practice were given

scores (one=never to five=always) and computed to obtain total mean score. Inter-group differences in knowledge status and reported use of analgesia and comfort measures are explored with one-way ANOVA. Data Interpretation is carried out using tables, graphs and charts.

Results

Out of 108 pediatric and pediatric surgical residents whom we approached to be part of the study on Knowledge, practice and barriers regarding neonatal pain care at TASH 104 were willing to participate in the study, which gave the response rate of 96 % Of this 101 Responses were complete and, thus valid for analysis.

Socio-demographic characteristics of respondents

Among 101 respondents 55 (54.5%) were male and 56(55.5) were female. Eighty-five (84.2%) of the respondents were below 30 years. With respect to religion, 64 (63.4%) were orthodox religion followers. Sixty (59.41%) were married. Eighty-four (83.4%) were specializing in pediatric and child health, and 40(39.6%) were year one residents. Sixty-seven (66.3%) of respondents reported for having 1 to5 year experience of working in the neonatal care (Table 1).

Table 1: Socio-demographic characteristics of pediatric and pediatric surgery Resident Physicians in Tikur Anbessa Specialized Hospital, 01/10/12-30/10/12

Description	Category	Frequency(n=101)	Percentage (%)
Sex	Male	55	54.5
	Female	46	45.5
Age	Below 30 years	85	84.2
	above 30 years	16	15.8
Religion	Orthodox	64	63.4
	Muslim	25	24.8
	Protestant	10	9.9
	Other	2	???
Marital status	Single	60	59.4
	Married	41	40.6
Specialty	Pediatric and child health	84	83.2
	Pediatric surgery	17	16.8
Year of Residency	1st year	40	39.6
	2nd year	22	21.8
	3rd year	27	26.7
	4th year	7	
	5th year	5	
Year of experience in Neonatal care	Less than a year	32	31.7
	1-5 year	67	66.3
	5-10 year	2	2.0

Knowledge of respondents about neonatal pain care

Respondents were asked ten item questions to assess their knowledge about neonatal pain care. The highest and lowest score for the knowledge questions were 10 and 4 respectively. The mean for knowledge of neonatal pain care score is 8.5 with standard deviation of 1.4. About 56.4 % of the residents scored above the mean knowledge score (Table 2).

Table 2: Knowledge about neonatal pain care of pediatrics and pediatric surgery Resident Physicians in Tikur Anbessa Specialized Hospital, 01/10/12-30/10/12

Questions	Response category	Frequency (n=101)	Percentage
Both preterm and term neonates are capable of experiencing pain.	Yes	98	97
	No	2	?
	No idea	1	?
Neonates, especially preterm infants, are less sensitive to pain than older children and adults.	Yes	10	
	No	85	84.2
	No idea	6	
Neonatal pain has long-term adverse effects.	Yes	92	91.1
	No	5	
	No idea	4	?
Analgesia is not critical to the care of neonates because they do not remember painful experiences.	Yes	4	?
	No	93	92.1
	No idea	4	?
Pharmacologic or non-pharmacologic interventions are necessary even if many invasive procedures can be done quickly.	Yes	100	99
	No	1	
Breast feeding can be used in neonates experiencing pain for varies reasons	Yes	98	97
	No	2	
Oral sucrose and/glucose can be used in neonates experiencing pain for varies reasons	Yes	84	83.2
	No	3	
	No idea	14	13.9
Oral sucrose and/glucose can be used in neonates experiencing pain for varies reasons	Yes	84	83.2
	No	3	??
	No idea	14	13.9
Non-nutritive suckling can be used in neonates experiencing pain for varies reasons	Yes	85	84.2
	No	6	
	No idea	10	9.9
Facilitated tuckling can be used in neonates experiencing pain for varies reasons	Yes	60	59.4
	No	11	10.9
	No idea	30	29.7
Kangaroo mother care can be used in neonates experiencing pain for varies reasons	Yes	66	65.3
	No	12	11.9
	No idea	33	22.8

Presence or absence of statistically significant difference in knowledge score due to factors like; Specialty, Year of experience, Year of residency was assessed using one way ANOVA. There was no statistically significant difference in knowledge score regarding specialty ((F (1, 99) =3.165, P=0.078) but there was significant difference in knowledge score between residents with different years of experience, and different year of residency.

For year of residency data was split based on specialty, assumption of the test was checked using Leven's test of Homogeneity and revealed non-significant result i.e. (pediatrics: F (2, 81) =0.54, P=0.58 and pediatric surgery F (2, 14) =3.51, P=0.58). There was statistically significant difference in knowledge score between years of residency (pediatrics: F (2, 81) = 10, P = 0.00 and pediatric surgery: F (2, 81) = 13.8, P = 0.00).

Based on the employed multiple comparisons (tukey post-hoc test) the knowledge score of 3rd (M=9.2, SD=0.97, p=0.00) and 2nd (M=8.73, SD=1.31, P=0.017) year pediatric residents were significantly higher than 1st yrs.' (M=7.77, SD=1.44) with 95% confidence interval of the difference between means from 0.64 to 2.26 and 0.14 to 1.76 respectively. There was no statistically significant difference in knowledge score b/n 2nd and 3rd yr. residents (p=0.403). The knowledge score of 5th (M=9.8, SD=0.45, p=0.01) and 4th (M=9.53, SD=0.53, P=0.01) year pediatric surgery residents were significantly higher than 3rd yrs.' (M=7.6, SD=1.14) with 95% confidence interval of the difference between means from 0.97 to 3.43 and 0.83 to 3.11 respectively. There was no statistically significant difference in knowledge score b/n 4th and 5th yr. residents (p=0.86)

For year of experience, assumption of the test was checked using Leven's test of Homogeneity revealed non-significant result i.e. (F (2, 98) =0.91, P=0.41). There was statistically significant difference in knowledge score between years of experience (F (2, 98) = 4.23, P = 0.02) and Based on the employed multiple comparisons (tukey post-hoc test) knowledge score of residents having 1to 5yrs of experience (M=8.71, SD=1.21, p=0.01) was significantly higher than residents with less than 1 yr. of experience (M=7.94, SD=1.60) with 95% confidence interval of the difference between means from 0 .15 to 1.53. There was no statistically significant difference in knowledge score b/n those who had more than 10yrs of experience and those with less than one yr. and 1 to 5yrs of experience (p=0.53 and 0.97).

Practice regarding neonatal pain care among pediatrics and pediatric surgical residents

Among 101 respondents, Majority 75(74.3%) claims that they are aware of neonatal pain assessment tools whereas 26(25.7%) are not aware of neonatal pain assessment tools (Figure 1**).**

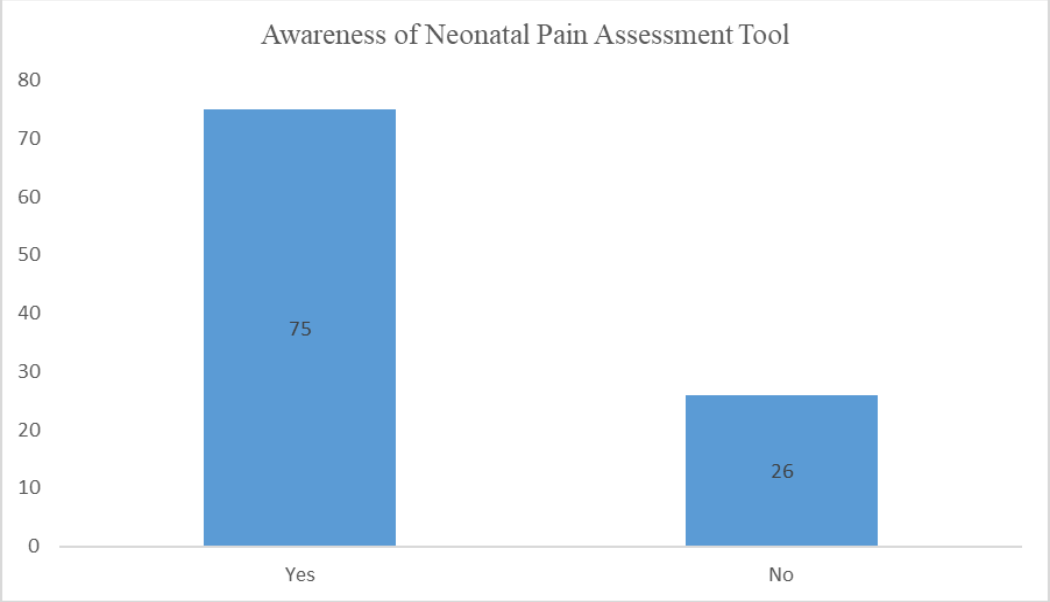

Figure 1: self-reported neonatal pain assessment tool awareness of pediatrics and pediatric surgery Resident Physicians in Tikur Anbessa Specialized Hospital, 01/10/12-30/10/12

Nonetheless, Eighty-five (84.2%) responded for not using neonatal pain assessment tools. Of those, who responded yes for using neonatal pain assessment tools (15.8%),only 10 (9.9%) were able to write down the tool. Question assessing type of anti-pain used for neonate who undergone surgical procedure were forwarded for the participants and 80(79.2%) selected paracetamol for managing the pains, 29(28.7%) selected morphine, while, 64 (63.4%) selected non-pharmacologic pain management and 23(22.4%) of them selected pain management based on pain score.

The residents were asked to report frequency of use and /or recommendation of Analgesia and non-pharmacologic strategies for common neonatal procedures (Heel lancing, Venipuncture, IV line insertion, Nasogastric tube insertion, Lumbar puncture, Umbilical line insertion and circumcision) as (never, rarely, often, usually, and always) during their practice in NICU

Administration of analgesia varied with the procedure done: analgesia was more likely to be given for the more invasive procedures (Lumbar puncture, Umbilical line insertion and circumcision).

Out of the respondents, 56(55.4%) reported never using analgesia for lumbar puncture and 38(37.6%) reported never using analgesia for umbilical line insertion. However, 54(73%) out of 74 respondents reported always using analgesia for circumcision. (Figure 2).

The majority of respondents, 55(54.5%), 42 (41.6%), 40(39.6%), 59(58.4%), 19(18.8%), and 22(21.8%) reported never using recommended comfort measures for Heel lancing, Venipuncture, IV line insertion, Nasogastric tube insertion, Lumbar puncture, and Umbilical line insertion, respectively (Figure 3).

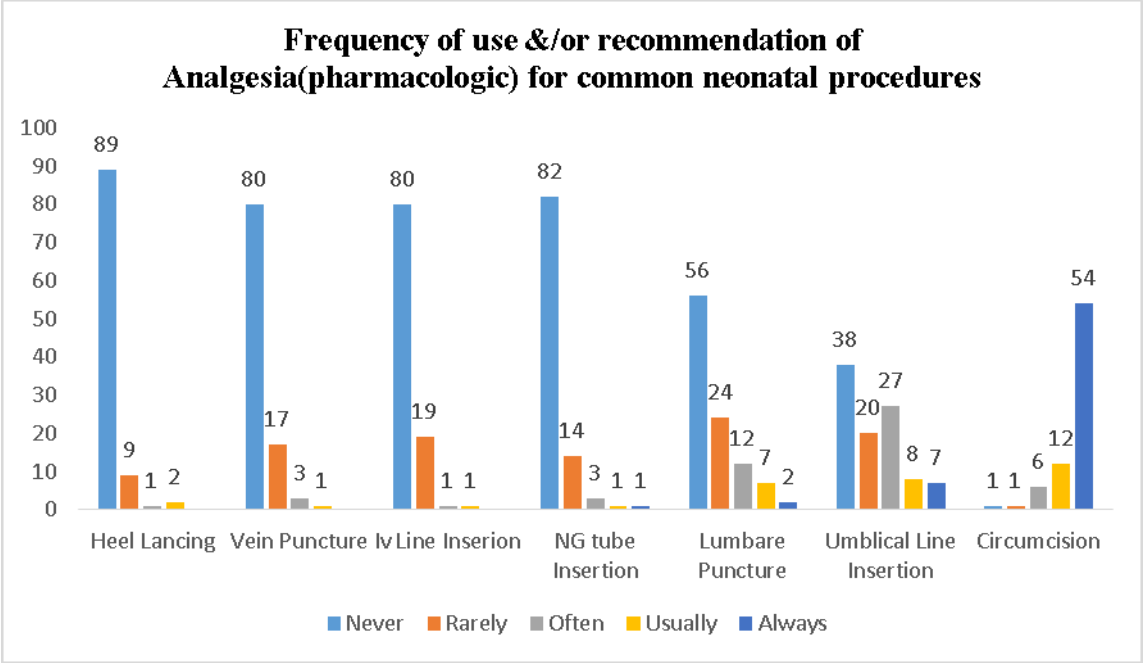

Figure 2: self-reported frequency of use &/recommendation of analgesia for common neonatal procedures among pediatrics and pediatric surgery Resident Physicians in Tikur Anbessa Specialized Hospital, 01/10/12-30/10/12

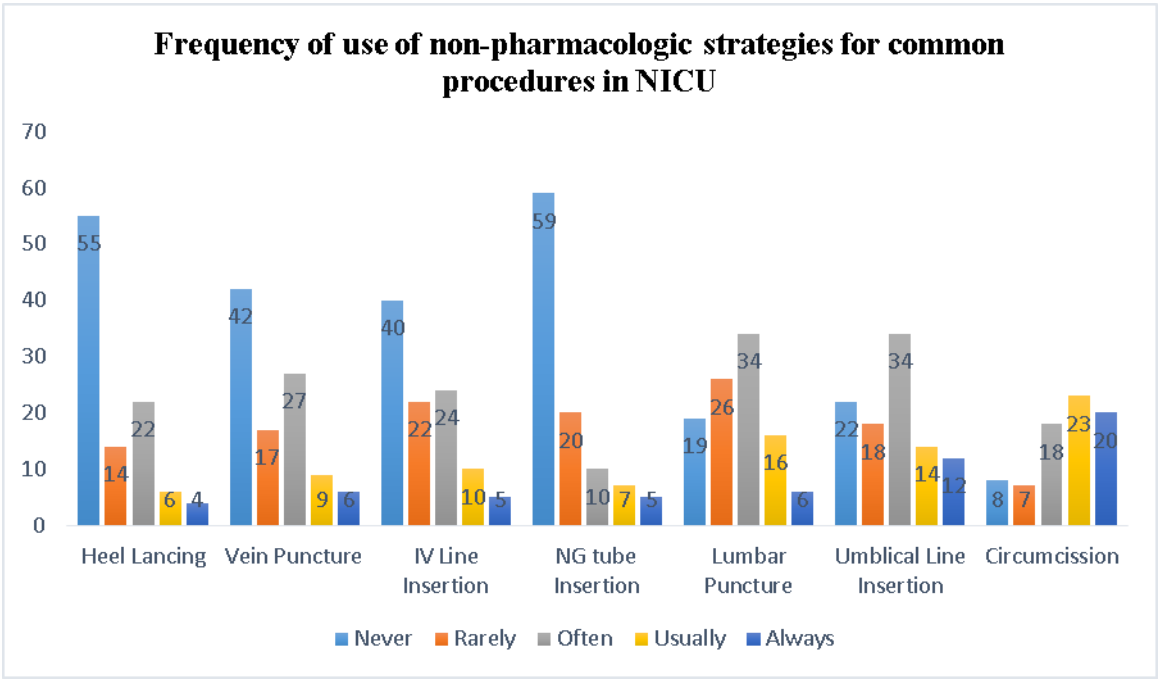

Figure 3: self-reported frequency of use and /or recommendation of comfort measures for common neonatal procedures pediatrics and pediatric surgery Resident Physicians in Tikur Anbessa Specialized Hospital, 01/10/12-30/10/12

All individual answers to practice (five point Likert scale) were computed to obtain total mean score= 28.5 with SD= 9. Practice level was less than the mean for 50% of the respondents and thus had poor practice

Differences in utilization of analgesia and non-pharmacologic measures between groups (Specialty, Year of experience, Year of residency and knowledge status.) was assessed using ANOVA. Assumption of the test is checked using Leven's test of Homogeneity and revealed non-significant result i.e. (P> 0.05). There was no statistically significant difference in reported use of analgesia and Comfort measures (between residents grouped by year of experience, knowledge status and specialty (F (2, 98) =2.835, P=0.064, F (1, 99) = 0.061, P=0.805, F (1, 99) = 2.360, P=0.128). For year of residency, data was split based on specialty. Assumption of the test is checked using Leven's test of Homogeneity and revealed non-significant result i.e. (P of 0.543> 0.05). There was no statistically significant difference in reported use of analgesia and Comfort measures between years of residency (pediatrics F (2, 81) =2.941, P=0.058, pediatric surgery F(2,14)=2.823,P=0.93).

Barriers to optimal neonatal pain care

Almost all of the respondents 95 (94.1%) did not think neonatal pain care in TASH NICU is optimal (Figure 4).

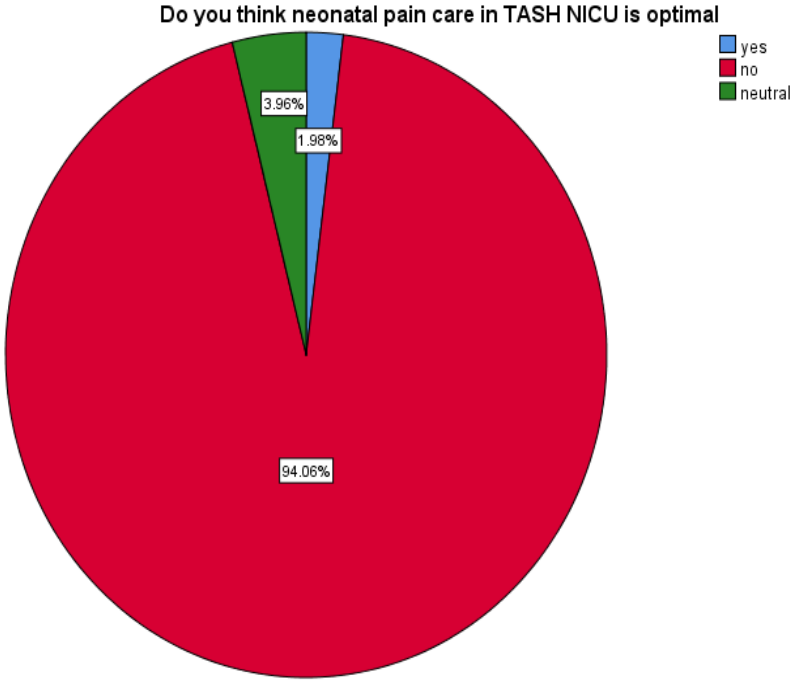

Figure 4: neonatal pain care at TASH NICU pediatrics and pediatric surgery Residents perception in Tikur Anbessa Specialized Hospital, 01/10/12-30/10/12

When they were asked about the barriers that impedes optimal neonatal pain care in TASH NICU 84(88.4%),83(87.4) and 60(63.2%) of the residents stated that Inadequate staff training regarding neonatal pain care, Lack of evidence-based neonatal pain management guideline/protocol in TASH NICU and lack of pain at all respectively (Table 3).

Table 3: Perceived barriers to neonatal pain care of pediatric and pediatric surgery Resident Physicians in Tikur Anbessa Specialized Hospital, 01/10/12-30/10/12

Barriers	Frequency(n=95)	Percentage
Lack of evidence-based neonatal pain management guideline/protocol in TASH NICU	83	87.4
NICU Staff resistance to change practice	24	25.3
Inadequate staff training regarding pain assessment and management	84	88.4
Fear of adverse effects of analgesia	41	43.2
Because pain is not assessed at all	60	63.2
Absence(scarcity) of pain medications	26	27.4
Other (write it here)	1	

Only 36(35.6) of residents reported receiving any form of formal teaching, learning or training session on neonatal pain assessment and management leaving 65(64.4%) of the residents who report that they have no any form of formal teaching, learning or training session on neonatal pain assessment and management (Figure 5).

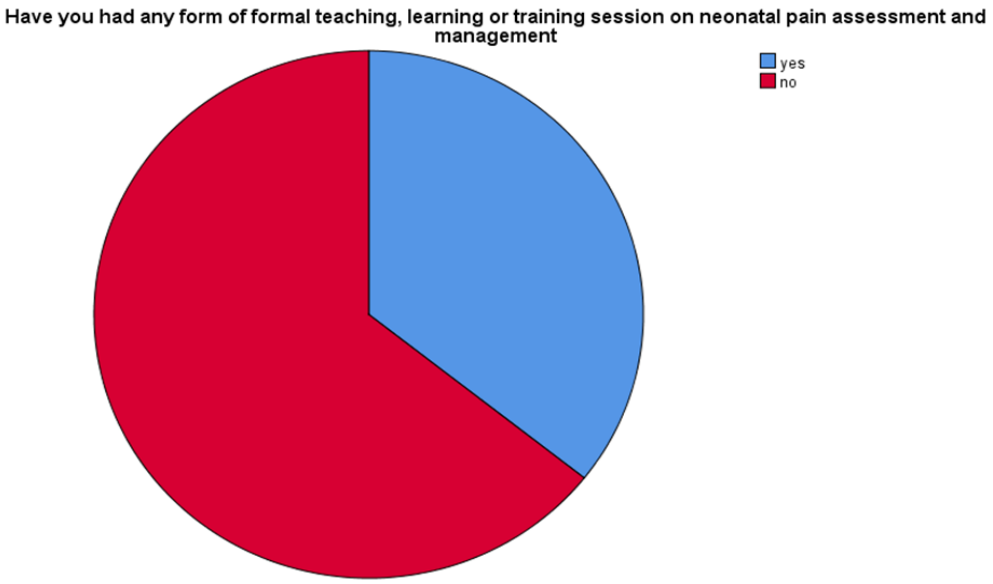

Figure 5: reported formal teaching/training session on neonatal pain care of pediatric and pediatric surgery Resident Physicians in Tikur Anbessa Specialized Hospital, 01/10/12-30/10/12

Discussion

The results of this study shows the existing state of residents' knowledge, and self reported practice and barriers regarding neonatal pain care in TASH, as reported by the residents themselves

Most of the TASH residents achieved high 'knowledge scores' and this is comparable to the finding from Malaysian pediatric physicians (24) who scored good knowledge,. Residents correctly agreed to most of the questions at percentage more than 80%. The consensus was that both preterm and term neonates are capable of experiencing pain (97%), Neonates, especially preterm infants, are more sensitive to pain than older children and adults(84.2%). Neonatal pain has long-term adverse effects (91.1%). Analgesia is critical to the care of neonates because they do remember painful experiences (92%). Pharmacologic/non-pharmacologic interventions are necessary even though many invasive procedures can be completed quickly (99%). The knowledge scores were better than those reported by Iraq study where only (35.6%)of the residents scored above 5(23).

Majority of respondents correctly responded that Breast-feeding (97%, only57.4% correctly agreed in Iraq's study), Oral sucrose and/ glucose (83.2%), and Non-nutritive suckling (84.2%) can be used as comfort measures for a neonate experiencing neonatal pain But 36.9% and 44.5% of the respondents didn't know that facilitated tuckling and Kangaroo mother care as comfort measure for neonatal pain care respectively which is near to 37.6% reported by Iraq study(23). This shows that there is knowledge gap among residents regarding comfort measures, which can be, used for common neonatal procedures

Only about 56.4% of the respondents scored above the mean knowledge score about neonatal pain care. This is below the expectation that all residents need to know about neonatal pain care. One way ANOVA was used to explore difference in knowledge score due to factors like; Specialty, Year of experience, Year of residency and showed 3rd and 2nd yr. pediatric residents scored significantly higher than 1st yr. residents with a mean total score of 9.2 and 8.73 versus 7.77 (P = 0.00 and 0.02) respectively; in the same way 5th and 4th yr. pediatric surgery residents scored higher than 3rd yr. pediatric surgery residents with a mean total score of 9.8 and 9.53 versus 7.6 respectively (P = 0.01) respectively. Residents who had 1-5yr of experience had higher knowledge score than those who had less than one yr. of experience with a mean total score of 8.71 versus 7.94 (P = 0.01). The findings in this study is also supported by the findings of studies done in Malaysia where doctors with greater work experience scored better(24), suggesting the duration of clinical experience plays an important role in magnifying knowledge.

Regarding pain management practice, optimal pain management depends on awareness and use of reliable, validated neonatal pain assessment tools. From the result, 74.3% of

respondents claims that they are aware of neonatal pain assessment tools, However, reported use of pain tools in daily practice by 16/101; 15.8% respondents is lower than 46% and 33% reported by studies in Nigeria and Italy, respectively(28,29). Our findings are higher than 6% and 2.5% reported by Malaysian, Australia and United Kingdom's study (24,30,18). Such under use of validated pain assessment tools to decide the need for analgesia and asses adequacy of treatment can lead to both sub-optimal pain care and over-medication, adventuring avoidable adverse drug reactions.

The utilization of analgesia varied with the procedure done: as in United Kingdom's survey analgesia was more likely to be employed for the more invasive procedures (Lumbar puncture, Umbilical line insertion and circumcision)(18).

Regardless of acknowledging, that all neonates experience pain to a similar or higher degree than adults, study participants reported use of analgesia and comfort measure for common neonatal procedures were unacceptably low. Less than 10% resident physicians always used either analgesia or non-pharmacologic measures for Heel lancing, Venipuncture, IV line insertion and Nasogastric tube insertion in neonates; the findings are supported by a study from Jordan where less than 30% doctors always used either analgesia or comfort measures for heel-prick, venipuncture, lumbar puncture, arterial stab or long line insertion (18). Most 55(54.5%), 42(41.6%), 40(39.6%), 59(58.4%), 19(18.8%), and 22(21.8%) of the respondents never used or recommended comfort measures for Heel lancing, Venipuncture, IV line insertion, Nasogastric tube insertion, Lumbar puncture and Umbilical line insertion respectively.

Moreover, there was no statistically significant difference in revealed frequency of utilization of analgesia and non-pharmacologic measures between resident physicians due to factors like specialty, knowledge status, year of residency and year of experience.

The results of the perceived barriers to pain assessment and management among pediatrics and pediatric surgery residents in TASH revealed that almost all 94.1 %(95) respondents agreed that neonatal pain care in TASH NICU is not optimal. The most common perceived barriers which impedes optimal neonatal pain care at TASH NICU are inadequate staff training regarding neonatal pain care (88.4%), Lack of evidence-based neonatal pain management guideline (87.4%), and lack pain assessment at all (agreed by 88.4%,87.4% and 63.2% of the respondents respectively.

Fear of adverse effects of analgesia(in spite of documentations that most analgesics can be utilized safely in newborns (American Academy of Pediatrics 2000, 2006) ,scarcity of pain medications and staffs resistance to change practice were also mentioned as barrier to optimal neonatal pain care by 43.2%,27.4% and 25.3% of the residents respectively. Similar barriers are reported by the studies done in Malaysia, Brazil and Nigeria; in addition poor communication between heath workers

regarding timing of procedures, obliviousness and taking advantage of the fact that 'babies cannot protest' ,unapproachability of analgesic techniques , misconception that analgesia was not necessary and fear of adding to the cost of care were also mentioned as reasons for not utilizing analgesics(24,31,28).

Furthermore Only 36(35.6%) of respondents reported having formal teaching, learning or training session on neonatal pain care and alarmingly few (15.8% respondents) reported using pain tools in daily practice which can both be barriers to optimal neonatal pain care

Regarding knowledge of residents about neonatal pain care, the results of this study indicated that most of the TASH residents achieved high 'knowledge scores' about neonatal pain care.But there were gaps on awareness about the non-pharmacologic pain management strategies.

Conclusion

Despite the high knowledge, score achieved by most of the resident physicians the reported use of analgesia and comfort measures for common neonatal procedures are not optimal. Hence, inconsistency exists between knowledge and realistic application of neonatal pain care. Most common reported barriers to neonatal pain care at TASH NICU are inadequate staff training, lack of evidence-based neonatal pain management guideline and lack pain assessment at all.

Limitations of the study

This study was limited by its reliance on self-report. This is a small sample done in only one hospital and the results may not be reflective of all physicians in Ethiopia However, the results can be assumed to be the true reflection of the current practice of neonatal pain care given the fact that the survey was carried out at the nation's biggest hospital where both surgical and medical service are given for neonates.

Recommendation

The findings suggest that there is significant room for improving neonatal pain care by supervising staffs regarding their neonatal pain care practice and implementation of neonatal pain care protocols.

Finally, future research should entail on comprehensive evaluation of clinical practice through direct observation, interviews, and/or prospective audits.

Declaration

Acknowledgement

We express our deep sense of gratitude to the resident physicians who participated and spent their time filling the self-administered questioner.

Ethical consideration

Written permission to carry out the study was obtained from the Department Research and Publication Committee, at Addis Ababa University College of Medicine and health science, department of pediatrics and child health. The data collection was inconspicuousness such that names of individual respondents and any other personal identifiers were not included. The participants were told the objective of the research and each respondent

signed a written consent before data collection. The participation was voluntary and investigators kept responses confidential. Data records were kept safe using locked boxes.

Conflict of interest

Both authors declare that they have no conflicts of interest that could have influenced the study

Authors contribution

DM: Designed the study, conducted data analysis, and drafted the initial manuscript. Also played a key role in interpreting the results and revising the manuscript for important intellectual content

AD Provided expert guidance on the study design and methodology. Reviewed the manuscript thoroughly, offering substantial revisions and ensuring the accuracy and integrity of the data presented. Both authors read and approved the final manuscript

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. The authors conducted the study independently.

References

1. Schwaller F, Fitzgerald M. The consequences of pain in early life: Injury-induced plasticity in developing pain pathways. Eur J Neurosci. 2014; 39: 344-352. doi:10.1111/ejn.12414
2. Vinall J, Grunau RE. Impact of repeated procedural pain-related stress in infants born very preterm. Pediatr Res 75, 584–587 (2014). https://doi.org/10.1038/pr.2014.16
3. Carbajal R, Rousset A, Danan C, et al. Epidemiology and treatment of painful procedures in neonates in intensive care units. JAMA. 2008;300(1):60-70. doi:10.1001/jama.300.1.60;
4. Breivik H. International Association for the Study of Pain. J Pain Symptom Manage. 2002;24(2):97-101. doi:10.1016/s0885-3924(02)00465-7
5. International Association for the Study of Pain. IASP Terminology. Iasp. 2017;
6. S.H.P. S, M. VD, K.S. A, D. R, R.A. VL, D. T. Do We Still Hurt Newborn Babies? A Prospective Study of Procedural Pain and Analgesia in Neonates. Arch Pediatr Adolesc Med. 2003;157(11):1058-1064. doi:10.1001/archpedi.157.11.1058
7. Hartley C, Slater R. Neurophysiological measures of nociceptive brain activity in the newborn infant-the next steps. Acta Paediatr Int J Paediatr. 2014;103(3):238-242. doi:10.1111/apa.12490
8. Lim Y, Godambe S. Prevention and management of procedural pain in the neonate: An update, American Academy of Pediatrics, 2016. Archives of Disease in Childhood: Education and Practice Edition. 2017;102(5):254-256. doi:10.1136/archdischild-2016-311066

9. Anand KJS, Eriksson M, Boyle EM, Avila-Alvarez A, Andersen RD, Sarafidis K, et al. Assessment of continuous pain in newborns admitted to NICUs in 18 European countries. Acta Paediatrica (Oslo, Norway : 1992). 2017 Aug;106 (8):1248-1259. DOI: 10.1111/apa.13810.

10. Anand KJS, Hickey PR. Pain and Its Effects in the Human Neonate and Fetus. N Engl J Med. N Engl J Med. 1987;317 (21):1321-1329. doi:10.1056/ NEJM198711193172105

11. Cruz MD, Fernandes AM, Oliveira CR. Epidemiology of painful procedures performed in neonates: A systematic review of observational studies. Eur J Pain. 2016;20(4):489-498. doi:10.1002/ejp.757

12. Abdel Razeq NM. Barriers That Impede the Provision of Pain Care to Neonates by Nurses in Jordan. J Obstet Gynecol Neonatal Nurs. 2016;45(3):371-377. doi:10.1016/j.jogn.2016.01.007

13. Maxwell LG, Malavolta CP, Fraga M V. Assessment of pain in the neonate. Clin Perinatol. 2013;40(3):457-469. doi:10.1016/j.clp.2013.05.001

14. Bogduk HM and N. IASP Terminology [Internet]. IASP Press. 2020. p. 209–14. Available from: https://www.iasp-pain.org/ Education/Content.aspx? ItemNumber=1698%0Ahttp://www.iasp-pain.org/terminology? navItemNumber=576#Pain%0Ahttp:// www.iasp-pain.org/terminology? navItemNumber=576#Peripheralneuropathicpain

15. Ballweg D. Neonatal and pediatric pain management: standards and application. Paediatr Child Health (Oxford). 2008;

16. C.L. L, M.P. H, N. M, B. C, R.W. H, Lowery CL, et al. Neurodevelopmental changes of fetal pain. Semin Perinatol. 2007; 31:275-282 doi:10.1053

17. Hall RW, Anand KJ. Pain management in newborns. Clin Perinatol. 2014;41(4):895-924. doi:10.1016/j.clp.2014.08.010.

18. A.O. A, S. J. Pain management in neonates: A survey of nurses and doctors. J Adv Nurs. 2012;68(6):1288-1301. doi:10.1111/j.1365-2648.2011.05837.x

19. Akuma AO, Jordan S. Pain management in neonates: A survey of nurses and doctors. J Adv Nurs. 2012;68(6):1288-1301. doi:10.1111/j.1365-2648.2011.05837.x

20. Martins SW, Dias FS, Enuno SRF, Paula KMP de. Pain assessment and control by nurses of a neonatal intensive care unit. Rev Dor. 2013;14(1):21-6

21. Pölkki T, Korhonen A, Laukkala H, Saarela T, Vehviläinen-Julkunen K, Pietilä AM. Nurses' attitudes and perceptions of pain assessment in neonatal intensive care. Scand J Caring Sci. 2010;24(1):49-55. doi:10.1111/j.1471-6712.2008.00683.x

22. Abdel Razeq NM, Akuma AO, Jordan S. Status of Neonatal Pain Assessment and Management in Jordan. Pain Manag Nurs. 2016;17(4):239-248. doi:10.1016/j.pmn.2016.02.050

23. Hameed NN, Sweedan BH. Assessment of Knowledge of Pediatric Resident Doctors About Neonatal Pain. 2012;11(4).

24. Ishak S, Nfe F, Zakaria SZ S, Adli A, Jaafar R. Neonatal pain: Knowledge and perception among pediatric doctors in Malaysia. Pediatr Int. 2019;61(1):67-72. doi:10.1111/ped.13724

25. G M, Vatsa M. Knowledge, Attitude and Management of Neonatal Pain among Health Care Professional in Neonatal units. Int J Nurs Educ. 2012; 4(2), p167-171.

26. Byrd PJ, Gonzales I, Parsons V. Exploring Barriers to Pain Management in Newborn Intensive Care Units. Adv Neonatal Care. 2009;9(6):299-306. doi:10.1097/ANC.0b013e3181c1ff9c

27. Gradin M, Eriksson M. Neonatal pain assessment in Sweden - A fifteen-year follow up. Acta Paediatr. 2011;100(2):204-208. doi:10.1111/j.1651-2227.2010.01996.x

28. Suleiman Z, Kolawole I, Adegboye K, Adeboye M, Onuchukwu C, Bello S, et al. Analgesia for procedural pain: Current practice among Nigerian paediatricians. Port Harcourt Med J 2019;13:13-8

29. Codipietro L, Bailo E, Nangeroni M, Ponzone A, Grazia G. Analgesic Techniques in Minor Painful Procedures in Neonatal Units: A Survey in Northern Italy.Pain Practice : the Official Journal of World Institute of Pain. 2011 Mar-Apr;11 (2):154-159. DOI: 10.1111/j.1533-2500.2010.00406.x.

30. Harrison D, Loughnan P, Johnston L. Pain assessment and procedural pain management practices in neonatal units in Australia. J Paediatr Child Health. 2006 Jan-Feb; 42(1-2):6-9. doi: 10.1111/j.1440-1754.2006.00781.x. PMID: 16487381

31. Christoffel MM, Querido DL, Silveira ALD da, Magesti BN, Gomes ALM, Silva ACCS da. Health professionals' barriers in the management, evaluation, and treatment of neonatal pain. P vol.2 no.1 São Paulo Jan./Mar. 2019https://doi.org/10.5935/2595-0118.20190007