



ADDIS ABABA UNIVERSITY
College of Health
Sciences

**ASSESSMENT KNOWLEDGE, ATTITUDE AND PRACTICE OF NURSES TOWARDS
NEONATAL PAIN MANAGEMENT AND DETERMINANT FACTORS AT PUBLIC
HOSPITALS IN ADDIS ABABA ETHIOPIA, 2021**

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This thesis by Dr Solomon Maregn is accepted in its present form by the Board of Examiners as Satisfying thesis requirements for specialty certificate in pediatrics and child health.

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List of Abbreviations and acronyms

AAU--- Addis Ababa University

BSc---- Bachelor of Scienc

CSA--- Central statistical agency

ETB-----Ethiopian Birr

GMH--- Gandhi Memorial Hospital

IASP----International association study of pain

MSc--- Masters of science

NFCS ---Neonatal facial coding system

NGO---- Non-governmental organization

NICU----Neonatal intensive care unit

PIPP ----Premature Infant Pain Profile

NIPS ---Neonatal Infant Pain Scale

N-PASS--Neonatal pain, agitation, and sedation scale

SPHMMC--- St. Paul's hospital millennium medical college

SPSS---- Statistical package for social sciences

TASH---- TikurAnbessa Specialized Hospital

Abstract

Background: Pain is a significant global problem in the field of health. Recent advances in neurobiology, clinical medicine and neonatal research have established that the fetus and newborn may experience acute, established, and chronic pain and that controlling pain has short- and long-term benefits for all newborns (1)(2). Despite the growing knowledge about pain assessment and intervention, the neonatal pain remains unrecognized and undertreated (3). Appropriate management of neonatal pain prevents unnecessary hospital stay and suffering them from pain. In clinical settings, nurses play a vital role in pain assessment and management and must be knowledgeable regarding how to best assess and manage the pain.

Objective: The aim of the study was to assess the neonatal ICU nurses' knowledge and practice and factors associated regarding neonatal pain management at public hospital of Addis Ababa, Ethiopia, 2020.

Method: -Institutional based cross-sectional study design will be used to collect data from four selected public hospitals in Addis Ababa, from 21 July-22 August 2021. Simple random sampling will be used to recruit study participants using structured, self-administered questionnaire. Data will be cleaned and entered using SPSS version 26.0 software and data will analysis.

Result: Majority (98(87.5.0%)) and (87(77.7%)) of the nurse had good overall knowledge and attitude. However, one third (42(37.5%)) of the respondents have good practice.

Conclusion: Most nurses had poor practice in managing neonatal pain but majority of nurses had adequate knowledge concerning neonatal pain management. There was gap between their knowledge and practice.

Key words: - Knowledge, attitude, practice, nurses, pain, NICU

1. Introduction

1.1. Background

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(4)(5). It is a subjective feeling and an individual response to the cause. The application of the word pain is learned by each individual through experience associated to sickness early in life(10). However, this definition has been confronted for the reason that newborns can't verbalize their pain; bearing in mind that nonexistence of verbal announcement does not avert one from feeling pain and requiring treatment. Hence, the measurement of neonatal pain is highly dependent on the observer's judgment, and the indicators in the indicating system must be subjectively observed and determined by others (11).

Pain is a cardinal symptom of inflammation and is valuable in the diagnosis of many disorders and conditions. It may be mild or severe, chronic or acute, lancinating , burning, dull or sharp, precisely or poorly localized, or referred.

Before the 1980s, it was believed that the newborns (NB) did not feel pain because of the insufficiency of the myelination (substance responsible for the conduction of the nerve impulses) in the brain and the lack of memory for pain showed the immaturity of the central nervous system. Recent advances in neurobiology, clinical medicine and neonatal research have established that the fetus and newborn may experience acute, established, and chronic pain and that controlling pain has short- and long-term benefits for all newborns(1)(2). Pain due to the illnesses and painful procedures are common in neonates, especially in those in the NICU due to both institutional standards and routines, and the intricate work process, which involves environments with high Luminosity, artificial temperature, noise, and many handlings, putting their bodies through stress since birth. They respond to such noxious stimuli by a series of complex biochemical, physiologic, and behavioral alterations.

While self-reporting is the single most reliable indicator of the existence and intensity of acute pain, indirect measurements including hormonal, behavioral, physiological measures have been used to validate pain in the neonate due to inability of neonates to verbalize pain.

The cornerstone of pain management is its assessment and measurement especially in case of neonates who cannot report their pain and the assessment ought to comprise physiological (e.g. pulse rate, saturation of oxygen) and behavioral factors (e.g. cry, facial expression, body movement) and validated pain scale measurement usage is recommended (14, 15).

There are also multiple validated pain scales utilized by NICUs to assess pain like neonatal infant pain scale (NIPS); neonatal facial coding system (NFCS); neonatal pain, agitation, and sedation scale (NPASS); CRIES (cry, required oxygen, increased vital signs, expression, sleeplessness scale); COMFORT Scale; for term neonates and the premature infant pain Profile (PIPP) is a validated pain scoring system for preterm neonates (15, 16).

Based on the assessment done the management and intervention needed should be given to the neonate. In neonatal pain management, professional nurses that care for newborns have various roles like assessing the comfort needs of the neonate, observation of neonatal response to clinical procedures and evaluation of how these influence neonatal comfort and rest. Study reminds us of the susceptibility of newborns who cannot verbalize and advocate for themselves when they are in pain (15).

Despite greater understanding that neonates experience pain, Analgesic therapy is often not given, (6)(3)(7). To ensure that neonates 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).

As it is argued by American Academy of Pediatrics, all health care professionals who work with neonates to make pain management as number one goal not only because it's ethical but also because of consequences that come with pain (6). The use of pain assessment scales provides consistency between nurses and other clinicians, and provides an accurate measure for the presence of pain, stress, or discomfort and it can provide an accurate description of the effect of non-pharmacological and pharmacological management interventions on a neonate's pain (18). Pharmacological modalities used to treat pain in neonates includes: topical anesthetics lidocaine 2.5%, tetracaine 2.5%, and liposomal lidocaine 4%, acetaminophen, local anesthetics like lidocaine injection, sedative medication like morphine, fentanyl, and ketamine are available (15, 18).

Combination of pharmacological and non-pharmacological or combination of nonpharmacologicaltherapies provides synergistic effects. Non-pharmacological pain managementincludes oral sucrose, breast feeding, kangaroo care, swaddling or facilitated tucking, nonnutritivesucking, and positioning (15, 18).

Factors to pediatric pain management may include organization, professional, andpatient barriers. Organization obstacles are related to the regulatory barriers to access toanalgesics, supply limitations, and prioritization of infectious diseases (20).

In case of professionalbarriers it consists of believing that narcotics are more dangerous in the pediatric patient; that theinfant's immature nervous system does not allow them to feel pain, that pain builds character, thetolerance of pain in children is better in adult, and that the memory of pain is absent inchildren(21).

As it have shown in some studies, patient contextual factors such as infant age,previous pain experiences, gender and health status play an important role in pain responses,especially due to their lower threshold , premature newborns are more sensitive to pain and must be considered in the measurement of pain(14, 13).

Even if pain is reflected to have protective functions, however, suggestion exists to confirm thatuntreated or ineffectively treated pain has both short and long term negative effects on the healthof the neonate. Midst these are the development of complications such as intracranialhemorrhage, decreased immune response, delayed weight gain, prolonged hospitalization,impaired neonate-parent bonding and the development of psychosomatic conditions suchhyperalgesia and allodynia (11).

Hence, nurses forming the majority of healthcare providers may be required to use appropriate strategies to assess and manage neonatal pain.

1.2. Statement of the problem

World Health Organization and International Association for the Study of Pain explained as pain is a significant global problem in the field of health. However, regardless of huge investment and research efforts in relation to the issue of pain, the clinical practice is far from therecommended one. Pain is under-notified, poorly documented in medical charts and undertreatedin both industrialized and unindustrialized countries (11, 22).

American Academy of Pediatrics (2016) states there is a great prevalence of knowledge divergences in health care professionals' capability to properly assess and manage pain in neonates (23). There are many studies reporting that deficiencies be present in knowledge andpractice of assessing and treating pain in neonates. Study conducted in Iran showed that 65% ofneonatal nurses didn't use any pain assessment tools and majority of nurses didn't felt as painwas being well managed in their neonatal intensive care unit(24).

Neonates who are treated in a neonatal intensive care unit (NICU) are exposed to several of stressful procedures and to environmental stress. And study showed that, for example, on average 14 ± 4 stressful procedures throughout the first two weeks of life within a period of 24hours midst 151 newborns(25).

Recurrent and persistent pain exposure in preterm infants duringa susceptible time for brain development may have adverse consequences (26) . Particularly,they may contribute to altered development of the pain system, behavior and cognition duringlater infantile and adolescence (27, 28).

Having no gold standard for managing neonatal pain remains to be a challenge to neonatal careproviders and so far pain is taken as the fifth vital sign(29). Neonatal pain is nearly difficult toinvestigate because of having nothing to base on saying the neonate is in pain. Underutilizationsof pharmacological and non-pharmacological pain interventions have a big gap among painknowledge, evidence, and clinical practice worldwide (17, 30). Nurses and physicians indeveloping countries lack knowledge about assessing the extent of pain and using effective nonpharmacologic and pharmacologic analgesia in neonates (31).

Pain is experienced by hospitalized newborns from painful procedures and pain related to theirphysiological conditions (15). Pain in neonate is inevitable and nurses that give care for them mustplay a vital role in pain assessment and management and must be knowledgeable concerning how to assess and manage neonatal pain. However, in some circumstances, nurses do

not take into attention the pain that neonates may be undergoing during treatment procedures. Others performed several painful procedures at a time on different body areas without giving attention the neonate's pain. Such delivery of nursing care results in increased pain in neonates. Study also indicated that the knowledge, practice and beliefs of nurses have a significant influence on the effectiveness of pain management (32). Knowledge deficits may cause nurses to hold resilient beliefs towards neonatal pain management. As study conducted in South Africa showed, a knowledge deficit on neonatal pain management associated with the absence of practical guideline with neonatal pain management. This knowledge deficit is then associated with a lack of pain management in neonatal wards. The study is inspired from 10 year of clinical practice observing neonatal pain appeared to be the last priority, receiving little or no attention by neonatal staff (33).

It is hard to get relevant study that shows the prevalence of pain and its management among hospitalized neonates in Ethiopia. In spite of various factors surrounding pain management have been explored, little is known about the burden of unrecognized and undertreated pain in neonates in Ethiopia and in Addis Ababa. To my knowledge and searching process there are limited studies existing that examine nursing staff of knowledge and practice towards neonatal pain management and associated factors in neonatal units currently at public hospitals of Addis Ababa. As a result, it is valuable to address this gap. This will establish baseline information about nursing staff current knowledge and practice regarding neonatal pain management.

Consequently, it is a significant step in the process of improving pain management in neonatal units. This in turn will positively reflect on improving the quality of life of newborns and hopefully decrease hospital stay which in turn lead to decrease in medical costs.

Therefore this study aimed to identify nurses' knowledge and practice and factors associated with neonatal pain management in selected public hospitals in Addis Ababa and address this issue through researches.

1.3. Significance of the study

This research is based on the fact that the neonates experience acute, established, and chronic pain and controlling pain has short- and long-term benefits for all newborns(1)(2). Neonates do not have the conventional verbal means to report pain and depend on neonatal staff to assess, recognize, diagnose and manage their pain. In order to do so, neonatal staff need to have the knowledge and understanding of neonatal physiological and behavioral responses to pain and relevant interventions to relieve pain(34).

Thus, to improve this aspect of care, it is desirable to assess the knowledge, practice and perceived barriers regarding neonatal pain care among nurses working in the NICU.

This will help in devising appropriate strategies to improve the knowledge and practices of healthcare professionals (nurses) regarding neonatal pain care and to deal with the barriers that impede optimal neonatal pain care.

Several studies from worldwide specially in developing countries indicates as pain management is not given priority and also unrecognized and undertreated by any health care professionals. However, properly managing neonatal pain is the only option that can prevent neonates from suffering due to pain and unnecessary hospital stay.

Little is known about burden of unrecognized and undertreated pain to newborns in Ethiopia as well as Addis Ababa city. Evaluating the knowledge and practice of nurses towards neonatal pain management will specifically help to identify the result and continue to deal with accordingly

2. Literature Review

Based on the neuroanatomy and neurophysiology of neonates, Ballweg (35) concluded that unavailability of descending inhibitory neurotransmitters to modulate pain meant that neonatal patients experienced pain more intensely than adults or pediatric patients. 'If a procedure is painful in adults, it should be considered painful to neonates'; the expression of pain may differ from that of an adult, however.

2.1. Knowledge on Neonatal Pain Management

Study conducted in Brazil in 2017 indicated that only 63.3% of nurses' use pain assessment scale while majority (86.0%) of nurses know as neonates feel pain and the recorded pain management was 84.3%. The researcher concluded as nurses considered neonatal pain is a relevant however they don't perform pain assessment or treatment of newborns in systematized way(36).

In other study conducted in Iran showed that lower than half (45.5%) of nurses working in neonatal intensive care unit were at good level for complications and pain intensity awareness and on tool for measuring pain 54.6% of them were poor and it was concluded awareness about neonatal pain assessment was relatively low and identified as less knowledge of nurse is the most effective barrier to pain care of the patient(37).

Another study in Brazilian showed that 69.8% of the healthcare professionals knew of certain non-pharmacological management effective for relief of acute pain(38) . Similar study in Rwanda indicated that 74.2% nurses demonstrated a low level of knowledge of neonatal pain management. Based the five level of knowledge the finding reported was 3.03%, 22.73% and 74.24% of them had high, moderate and low knowledge level respectively .The mean knowledge scored was 61.74%. On the sign and symptom knowledge questionnaires of newborns pain the majority answered with crying (83.3%), vital signs change (56.15%), and agitation (53%). And it was concluded as there was knowledge deficit among nurses(39).

A descriptive study was conducted in Antalya, Turkey in 2018 indicated that 68.6% of the nurses supposed that the child/mother had mentioned the pain and 22.5% reported that the reason of the pain was constantly an illness. Nurses from this study indicated that 56.9% of them didn't received education about pain and 51% of nurses stated as they had insufficient knowledge about the evaluation of pain and the author of this study concluded as it was very helpful to make in-service training platforms for pain which is deliberated as a vital finding. The investigator

also suggested that nurses maximize their level of knowledge to adverse false perception/practices about pain (40).

A study conducted in Ethiopia in 2018 on knowledge, attitude, practice and factors associated with pain management for hospitalized children among Nurses showed that as nurses had inadequate knowledge (52.2%) on pediatric pain management. The investigator concluded with nurses had poor performance towards pain management and also recommended as the hospital administrative bodies should provide convenient training program regarding pain and its management to nursing staff (41).

2.2. Nurses' Pain Assessment and Management Practice

Pain has been unacknowledged and undertreated in the history of neonatal care because of healthcare provider's misunderstandings that newborn infants have a diminished or absent ability to feel pain due to immaturity of their nervous system (42). An effective pain prevention program should be implemented in every health care facility caring for neonates, which includes strategies for regularly assessing pain, reducing the number of stressful procedures done, and using of pharmacologic and non-pharmacologic therapies effectively for the inhibition of pain related with repetitive minor procedures and reducing pain related with surgery and other major procedures (43).

A study in Turkey on Non-pharmacological strategies used to reduce procedural pain in infants by nurses showed that that 65.3% nurses used non-pharmacologic methods during vaccinations, 63.3% used physical contact/massage techniques, 26.5% used cold compress, and 27.9% used breastfeeding and 33.3% of nurses used positioning methods during invasive procedures, whereas 31.3% used no particular method. It was also determined with respect to heel lance procedures, 57.8% nurses employed non-pharmacologic methods, 50.3% were knowledgeable about skin contact, 38.8% were aware of massage/vibration, and 38.1% were knowledgeable about positioning, and they actually used them in practice. Furthermore, as education levels of nurses increased, their tendency to use non-pharmacologic methods during painful procedures increased accordingly; a significant correlation was determined ($p < 0.05$) (44). Other study in Rwanda showed that nurses do not use pharmacological interventions (analgesia) during painful procedures for a heel prick, IM injection, peripheral catheter insertion, NG tube insertion, or adhesive tape removal procedures. However, they reported as analgesia was used for a lumbar puncture, ET intubation; long line insertion and chest drain procedures. They

also didn't use no-pharmacological involvements (comfort measures) during painful procedures for all the procedures. The mean level of nurses' practical neonatal pain management was 52.08%. About use of sucrose to manage neonatal pain indicated that 59.1% of respondents never use sucrose during procedures, 22.7% rarely do, 10.6% often use it, 3.0% usually do, and 4.5% always do. The main pharmacological used was Paracetamol (84.8%) and morphine (10.6%) & Diclofenac (1.5%). Regarding practice of no-pharmacologic intervention used breastfeeding (31.8%), positioning 24.2%, non-nutritive sucking 12.1%, none 13.6%, use of sugar 3.0%, Kangaroo Mother Care 1.5%, swaddling 1.5%. No pain assessment tool (84.85%), no neonatal pain management guideline (93.94%). Regarding their level of neonatal pain management, high (4.55), moderate (10.6%) and lower level (84.85%) (39).

A study done on neonatal nurses working in the Neonatal Intensive Care Units (NICUs) in Ardebil, Iran reported that 65% of nurses didn't use pain assessment tool and less than half (44.2%) of them use pain assessment accurately. And the author concluded with nurses' awareness of well-managed pain had a significantly associated with adequate training, use of suitable and correct pain tools, clear and evidence-based protocols, and family intervention (45).

2.3. Factors for Pain Management In Neonates

Neonatal pain management is affected by different barriers as it was shown in several researches. A research done on California NICU nurses to explore barriers that NICU nurses face when attempting to optimally manage newborn pain showed that a knowledge-practice gap still exists within newborn pain management. In this study, less than half of the nurses felt that newborn pain is well managed within the NICUs where they are employed. Barriers identified related to physicians' pain management practices, lack of evidence-based pain management protocols, nurses' and physicians' resistance to change practice, infant pain assessment tools, and inadequate staff training regarding pain assessment and management (46).

According to a study in Kenya reported, the absence of evidence based written guideline, pain assessment scale tool, continuing professional development and the health workers years of experience were among the factors that affects positively or negatively concerning the management of neonatal pain (47).

Similar study conducted in Iran indicated numerous factors that related with the application of managing pain in newborn by classifying individual and organizational factors. The individual issue contained of the classifications knowledge of the persons and faithfulness of the personnel. Whereas the Organizational classes comprised pain control policy, work environment situation and management matters. And the researcher concluded with absence of teaching courses, nonexistence of an infant pain management policy and management subjects were the major hindrances in the way of carrying out of infant pain management by health care providers identified(48).

2.3. Conceptual framework

This conceptual frame work is developed by primary investigator by revising and assessing several literatures and reformed according to fit this study (14, 20, 13, 39, 47, 48, 49).As it is shown below, the relation of the health care provider factors, patient related factors (sociodemographic factors) and organizational factors influence the management of neonatal pain.

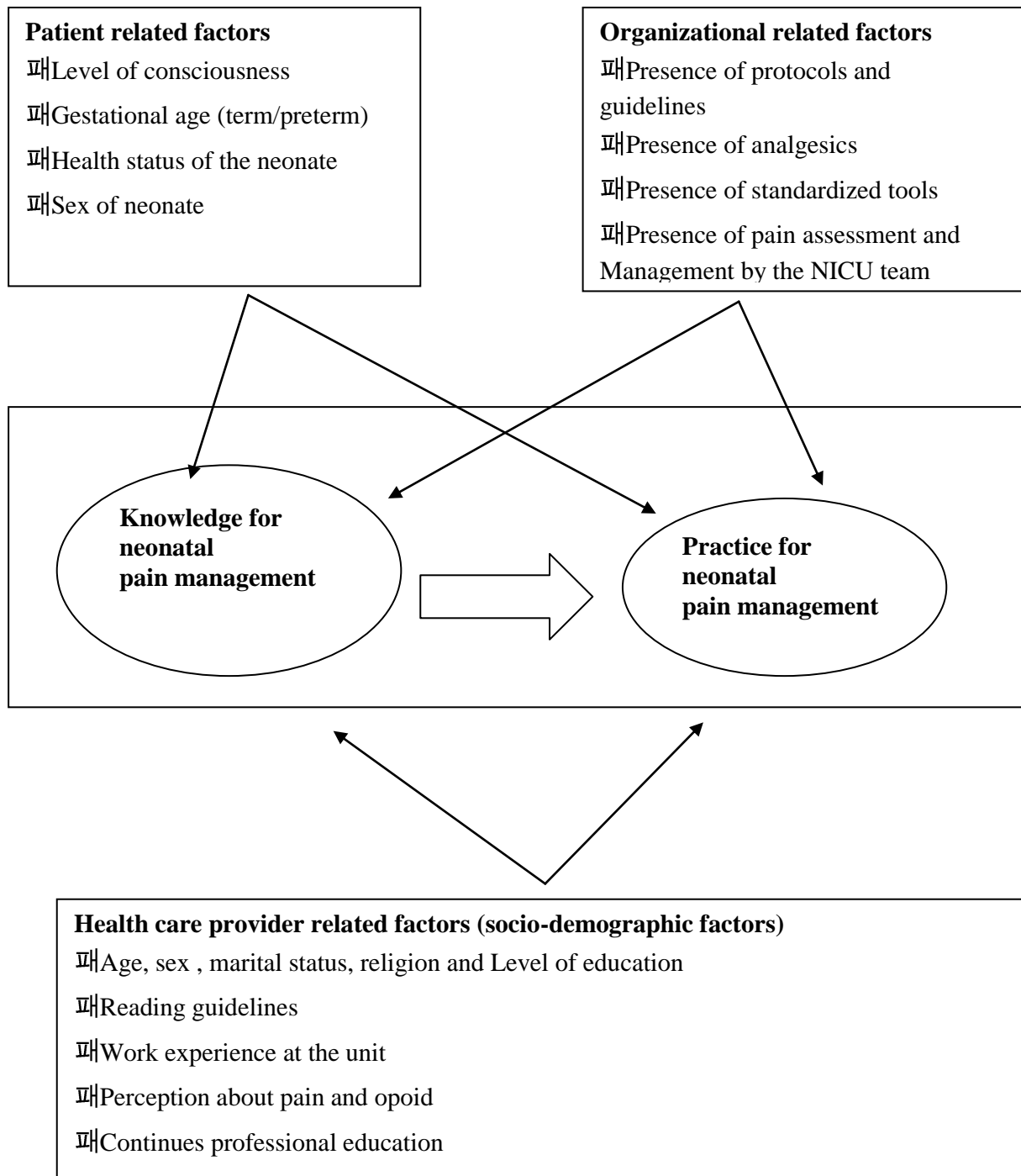


Figure 1: Conceptual framework; reflects relationship among Knowledge, practice and associated factors concerning neonatal pain management among nurses developed by reviewing several literatures.

The above conceptual framework indicates that the independent variables like patient related factors, organizational related factors and health care provider related factors affects the dependent variables knowledge directly and practice of nurses' directly or indirectly towards neonatal pain management. The patient related factor (neonatal related) like level of consciousness, gestational age (term/preterm), health status of the neonate, sex of neonate affects the knowledge and practice of nurses' towards neonatal pain management (11, 13). The organizational related factors like presence of pain management protocol and guideline, availability of analgesics, presence of standardized neonatal pain assessment tool, presence of pain assessment and management by neonatal ICU nursing staff team affect the directly the knowledge and practice of nurses regarding to neonatal pain management (20, 47). The health care provider related factor and socio-demographic factors like age, sex, marital status, religion, level of education, work experience at the unit, reading guidelines, perception about pain and opioid, and continues professional education also affect the knowledge and practice of nurses' towards neonatal pain management (39, 48, 49).

3. Objective

3.1. General objective

➤ To assess the NICU nurses' knowledge, practice and factors associated regarding neonatal pain management in public hospitals in Addis Ababa, Ethiopia 2020.

3.2. Specific Objectives

- To determine the NICU nurses' knowledge on management of neonatal pain.
- To identify the NICU nurse' knowledge related associated factors on management of neonatal pain.
- To identify the NICU nurse' practice on management of neonatal pain.
- To determine the NICU nurse' practical related associated factors on management of neonatal pain.

4. Methodology

4.1. Study Area

This study was conducted in Addis Ababa, the Capital City of Ethiopia and the city was selected purposely due to having more hospitals with neonatal intensive care unit. The city has ten subcities.

With regard to health institutions the city has 13 government hospitals (five are owned by Ethiopian federal ministry of health, six by the Addis Ababa city Administration Health Bureau, one by the Ethiopian Federal Police, and One by Ethiopian armed force). The hospitals are built in all the 10 sub-cities. Nine of the hospitals have neonatal intensive care unit set up. Four of the hospitals with NICU were randomly selected using lottery method to be included in this study.

The selected hospitals were; TikurAnbessa Specialized Hospital, St. Pauls' Hospital Millennium Medical College, Yekatit 12 Hospital and Gandy Memorial Hospitals are selected for the study and currently the total NICU nursing staffs working in selected four public hospitals are 150.

1. **TikurAnbessa Specialized Hospital** was established in 1966 and located in Lideta Sub City. Formerly it was called Princess Mekonnen for memory of Harar, but in 1975 it is named as TikurAnbessa Hospital. Now it is called TikurAnbessa Specialized Hospital (TASH). It is the largest referral hospital in country. TASH provides several tertiary level health care services, such as medical, gynecological and obstetrics, surgical, pediatrics and emergency healthcare services at outpatient and inpatient level. These services are organized under specialty units such as chest, renal, neurology, cardiology, dermatology, gastro intestine, infectious disease, orthopedics, general surgery, gynecologic and obstetrics, diabetic, hematology, and intensive care units (ICU)(50). Currently 33 nurses are working in the NICU of TASH.

2. **St. Paul's Hospital Millennium Medical College:** was built in 1969 and located in Gullele Sub-city. Previously it was named St Paul General Specialized Hospital until 2008 and currently it is called Saint Paul's Hospital Millennium Medical College. It is

the second largest referral hospital in Ethiopia. The hospital has the following departments under which the specialty services are provided. These are;-Forensic medicine and toxicology, internal medicine neurology, general surgery, ENT, psychiatry, ophthalmology, dentistry (maxillofacial surgery), radiology, dermatology, gynecology& obstetrics, pediatrics, biomedicine, emergency medicine and neurosurgery. And also has neonatal intensive care unit which has been functional over 8 years(51). Currently the numbers of nursing staffs in this NICU are 60.

3. Gandy Memorial Hospital GMH: was established in 1951E.c and found in Kirkos sub city. This hospital is governed under Addis Ababa city administration health bureau and provides maternal and neonatal service(50). The number of nursing staff working in neonatal intensive care unit is 23 currently.

4. Yekatit 12 hospital medical college: was established in 1945 E.C. The currently services given by this hospital is, Maternal Health service, Child Health services, and adolescent reproductive health. Yekatit 12 hospital is the only hospital under the city Administrative Health Bureau of Addis Ababa with high number of neonatal and pediatric(52). It also has neonatal intensive care unit and 34 nurses are working in this neonatal care unit now as information obtained from the hospital.

4.2. Study Design and Period

Institutional based Crosse-sectional study was done in public hospitals in Addis Ababa from 22April to 22May 2020.

4.3. Population

4.3.1. Source population

- The nursing staff working in NICU in public hospitals in Addis Ababa, Ethiopia 2020.

4.3.2. Study population

- The nursing staff who had been working in the neonatal intensive care unit of selectedpublic hospitals in Addis Ababa.

4.3.3. Sampling population

- The sampling populations were the nursing staff working in the neonatal intensive care unit and randomly selected by simple random sampling of selected four public hospitals in Addis Ababa.

4.3.4. Sampled Population

- Each nursing staff working in neonatal unit of selected four public hospitals who was selected by simple random sampling.

4.4. Inclusion and Exclusion criteria

4.4.1. Inclusion criteria

- All nurses who had at least six months of work experiences in the selected NICUs, and willing to take part in the study.

4.4.2. Exclusion criteria

- Nurses who were on annual, sick or maternity leave at the time of data collection were excluded.

4.5. Sampling Methods

4.5.1. Sample size determination

The sample size of this study was determined by using the formula for calculating a

single population mean, $ni = \frac{(z_{\alpha/2})^2 p(1-p)}{d^2}$

Where ni = initial estimated sample size

Z = Normal standard

P = proportion/prevalence of knowledge and practice of nurses on neonatal pain management

d = margin of error

The following assumption was used to determine the sample size:

The proportion mean of nurses' knowledge and practice towards neonatal pain management taken from a previous related study conducted in Uganda since there is no related previous study in Ethiopia and it was 61.74% and 52.08% respectively (29). And a 95% confidence level with 0.05 margin of error assumed.

$$ni(1) = \frac{(1.92)^2 \times 0.52(1 - 0.52)}{(0.05)^2} = 383.545 \approx 384$$

$$ni(2) = \frac{(1.96)^2 \times 0.6174(1 - 0.6174)}{(0.05)^2} = 362.98 \approx 363$$

Therefore, the proportion mean of nurses' practice towards neonatal pain management (p =52.08%) was given large sample size (384) and was used to calculate the final samples for this study.

Since the total population (nurses working in the neonatal intensive care unit of selected public hospitals) were 150 nurses, which was less than 10,000, the adjustment formula was used:

$$nf = \frac{ni}{1 + \frac{ni}{N}}$$

Where nf= final sample size

ni=initial sample size

N = total population

$$nf = \frac{384}{1 + \frac{384}{150}}$$

After considering a 10% non-response rate, the final sample size was 119 nurses.

4.5.2. Sampling procedure

The number of study units to be sampled from each hospital was determined using proportional to site allocation formula from the selected four hospitals: $\frac{nf \times ni}{N}$

Where: ni =number of nurses in each of the selected NICU.

nf = the final sample size

N= the total number of nurses working in the selected NICU.

TikurAnbessa Specialized Hospital = $119 \times 33 / 150 = 26.18 \approx 26$

Saint Paul's Millennium Medical College = $119 \times 60 / 150 = 47.6 \approx 48$

Yekatit 12 Medical College Hospital = $119 \times 34 / 150 = 26.9733 \approx 27$

Gandy Memorial Hospital = $119 \times 23 / 150 = 18.2466 \approx 18$

Simple random sampling technique had been used to select sampled nurses from each hospital. Each study unit in the population who were present during data collection had been represented by a slip of paper, these were put in a box and had been mixed, and a sample of the required size had been drawn from the box. This was done after obtaining the lists of nurses' from mentor of nurses' by their alphabetical name and giving serial number according to their alphabetical order.

4.6. Operational definition

Pain: Pain is unpleasant sensory and emotional experience associated with actual or potential tissue damage.

Pain management: Pain management is the relieve of pain or reduction in pain to a level that is acceptable to the client.

Knowledge: - A familiarity, awareness or understanding of nurses regarding pain management methods gained through experience or study.

Good knowledge: - Those nurses who answered above the mean of the knowledge questions

Poor knowledge: - Those nurses who answered below mean of the knowledge questions.

Attitude: - Pattern of nurses' mental views towards pain management methods.

Positive attitude: - Those nurses who answered above mean of the attitude questions

Negative attitude: - Those nurses who answered below mean of the attitude questions

Practice: - Nurses' activities or behavioral experience in relation to pain management.

Good practice: - Those nurses who able to answer above mean of the practice questions.

Poor practice: Those nurses who able to answer below mean of the practice questions

4.7. Variables

4.7.1. The independent variables

- Socio demographic factors (age, sex, religion, level of education, work experience)
- Environment (presence of assessment tool, presence of guideline, presence of analgesics and provision of training).
- Organizational factors; presence of protocol and guideline, presence of analgesics, presence of standardized tool for neonatal pain assessment.

4.7.2. Dependent (Outcome) variable

- Knowledge related to neonatal pain management
- Practice related to neonatal pain management

4.8. Data Collection tools and procedures

4.8.1. Data Collection Instrument

A self-administered structured questioner will be used to collect the data. It is adapted from a valid and reliable instrument used in previous research done on similar topic (49, 53). As the questionnaire tested against validity and reliability in Brazil and Uganda, It suit with the objectives of this study and also congruent with the system in Ethiopia. The questionnaire consisted of four parts.

The first part containing information regarding nurse's profile such as: age, sex, religion, training, years of experience and professional qualification

The second part is regarding nurses' knowledge composed of affirmative sentences by using the Likert Scale

The third part was regarding nurses' practice

The fourth part was regarding about institutional factors

4.8.2. Data collection procedure

Data will be collected from June 1-20, 2021, after permission obtained from the selected hospitals. The Data collectors will be four trained nurses who will be assigned at each hospital and will be supervised by principal investigator. The principal investigator will be making the overall supervision daily. The purpose of the training is the objective and methodology of the research, data collection approach.

4.8.3. Data quality control

Pre- test: will be carried out on 5% from actual sample size nurses who are fulfilled the criteria Prior to the actual data collection. This initial study will be conduct to test the content applicability, clarity and arrangement of the items needed for each questionnaire. After pre -test unclear question will be change or correct.

4.9. Data processing and analysis

Data will be checked, cleaned and entered in to SPSS version 25.0 software for analysis. Incomplete and inconsistent data will be replaced by other questioner for analysis. The result of the descriptive statistics will be expressed as percentage and frequency. Associations between independent variables and dependent variables will be analyzed first using bivariate analysis to identify factors which are significantly associated with the outcome variable. The magnitude of the association between the different independent variables in relation to dependent will be measured and 95%confidence interval (CI) and P values below 0.05 will be considered statistically significant

4.10. Ethical Consideration

An ethical clearance and official letter will be obtained from the Research and Ethics Committee of School of pediatric and child health of AAU. After getting permission from the hospitals to participate in the study, verbal and written consent will be obtained they will be informed that there is not any incentive or harm for their participation in this study. Finally, participants' identity will be unnamed during data collection and analysis.

4.11. Dissemination and Utilization of Findings

The findings of the study will be shared with the staff, authorities and officials in pediatric and child health department at TASH in order to enhance appropriate intervention

It will be presented on the annual research conference of the department. Finally, the result of the study will be attempted to be published in reputable journal .

5: Result

5.1 Socio-demographic characteristic of Participant

A total of one hundred twelve (112) nurses in four hospitals (TikurAnbessa Specialized Hospital, St. Paul's Hospital Millennium Medical College, Gandy Memorial Hospital GMH, Yekatit 12 hospital medical college) participated making a response rate of 94.1%. Among the total participant 44 (39.3%) were male, and 68 (60.7 %) were female resulting in a female-to-male ratio of 1:1.54. The mean reported age (\pm SD) of the participant was found to be 28.3 (\pm 3.5). More than three fourth 91(81.3%) of the participant were in the age group of \leq 30 years. Regarding educational status, more than half 58(51.8%) of participant were BSc Nurse. About 58(51.8%) of the participants were single. The majority, 75(67.0%) of the participants had a less than 5-year work experience as nurse and 105(93.8%) had a less than 5-year work experience as NICU nurse. The socio-demographic characteristic of the study population is shown in table -1

Table 1: Socio-demographic characteristics nurse's workers in four government hospital

Variables		Frequency	Percent %
Sex	Female	68	60.7 %
	Male	44	39.3 %
Age	\leq 30 yrs.	91	81.3 %
	>30 yrs.	21	18.8 %
Educational status	BSc Nurse	58	51.8 %
	Neonatal BSc	45	40.2 %
	MSc	7	6.3 %
	NR	2	1.8 %
Marital Status	Married	37	33 %
	Single	58	51.8 %
	Divorced	11	9.8 %
	Widowed	3	2.7 %
	NR	3	2.7 %
Working experience as nurse	\leq 5 yrs.	75	67 %
	>5 yrs.	37	33 %

Working experience as nurse in NICU	≤5 yrs.	105	93.8 %
	>5 yrs.	7	6.3 %

5.2. knowledge, attitude, and practice of the respondents

The Average score of knowledge, Attitude and practice were 12.9 (± 2.9), 6.6 (± 2.8) and 45.7 (± 14.9) respectively. Majority (98(87.5.0%)) and (87(77.7%)) of the nurse had good overall knowledge and attitude. However, one third (42(37.5%)) of the respondents have good practice. The details of the responses to each question are indicated in table 2,3 and 4.

5.3. Knowledge of the respondents

Among 112 nurses, 98(87 %) had good knowledge and 14(12.5%) had poor knowledge about neonatal pain management table 2.

Table 2: Distribution of nurse's knowledge towards neonatal pain management

Variables		Frequency	Percent %
Neonates, especially preterm, do not experience pain.	Yes	18	16.1%
	No	94	83.9%
Pain response is congenital.	Yes	64	57.1%
	No	48	42.9%
Neonates experience pain less than adults.	Yes	36	32.1%
	No	76	67.9%
Pain management is not essential to neonate as they do not remember painful experiences.	Yes	27	24.1%
	No	85	75.9%
Physiologic stress related to pain can be more dangerous than analgesia side effects	Yes	72	64.3%
	No	40	35.7%
Analgesia is too dangerous to use in neonates.	Yes	60	53.6%
	No	52	46.4%
Neonate's pain decreases quicker than adults.	Yes	73	65.2%
	No	39	34.8%
Neonates need less analgesia than adults (per kg).	Yes	78	69.6%
	No	34	30.4%

Neonates at 26 weeks have all physiological requirements to perceive pain.	Yes	76	67.9%
	No	36	32.1%
Neonates <28 weeks perceive pain.	Yes	89	79.5%
	No	23	20.5%
Neonates 28-36 weeks perceive pain.	Yes	101	90.2%
	No	11	9.8%
Neonates 37 weeks to term perceive pain.	Yes	102	91.1%
	No	10	8.9%
Neonates birth to 28 days of perceives pain.	Yes	94	83.9%
	No	18	16.1%
Breast feeding	Yes	98	87.5%
	No	14	12.5%
Oral sucrose	Yes	99	88.4%
	No	13	11.6%
Nonnutritive suckling	Yes	91	81.3%
	No	21	18.8%
Facilitated suckling	Yes	88	78.6%
	No	24	21.4%
Kangaroo mother care	Yes	95	84.8%
	No	17	15.2%

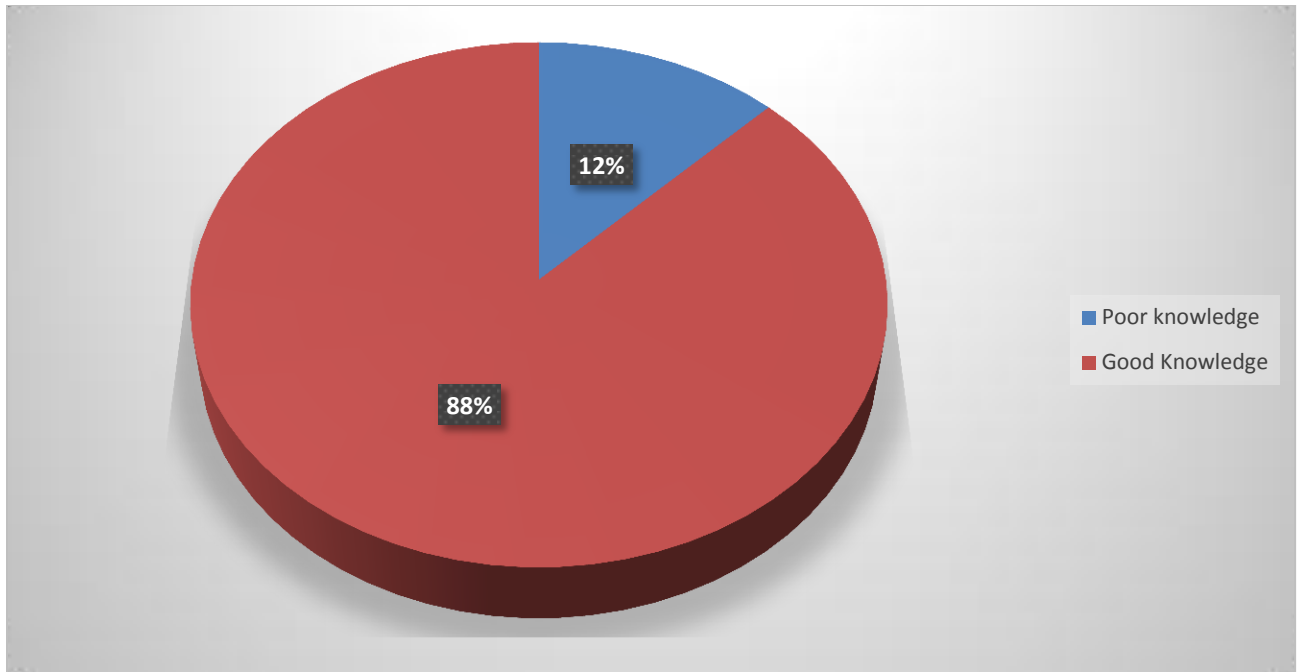


Figure 2:knowledge level of nurse's towards pain, in four Governmet hospital, 2021

5.4. Attitude of the respondents

Among 112 nurses, 87(77.7 %) had good attitude and 25(22.3%) had poor attitude about neonatal pain management table 3.

Table 3:Nurses' Perception towards Painful Procedures

Variables		Frequency	Percent %
Heel prick	No pain	3	2.7 %
	Some pain	35	31.3 %
	Moderate pain	43	38.4 %
	Very painful	31	27.7 %
IM injection	No pain	0	0 %
	Some pain	17	15.2 %
	Moderate pain	44	39.3 %
	Very painful	51	45.5 %
Catheter insertion	No pain	5	4.5 %
	Some pain	20	17.9 %

	Moderate pain	49	43.8 %
	Very painful	38	33.9 %
Lumbar puncture	No pain	0	0 %
	Some pain	3	2.7 %
	Moderate pain	24	21.4 %
	Very painful	85	75.9 %
NGT insertion	No pain	17	15.2 %
	Some pain	47	42.0 %
	Moderate pain	39	34.8 %
	Very painful	9	8.0 %
Suctioning	No pain	11	9.8 %
	Some pain	42	37.5 %
	Moderate pain	41	36.6 %
	Very painful	18	16.1 %
Adhesive Tape removal	No pain	5	4.5 %
	Some pain	48	42.9 %
	Moderate pain	32	28.6 %
	Very painful	27	24.1 %

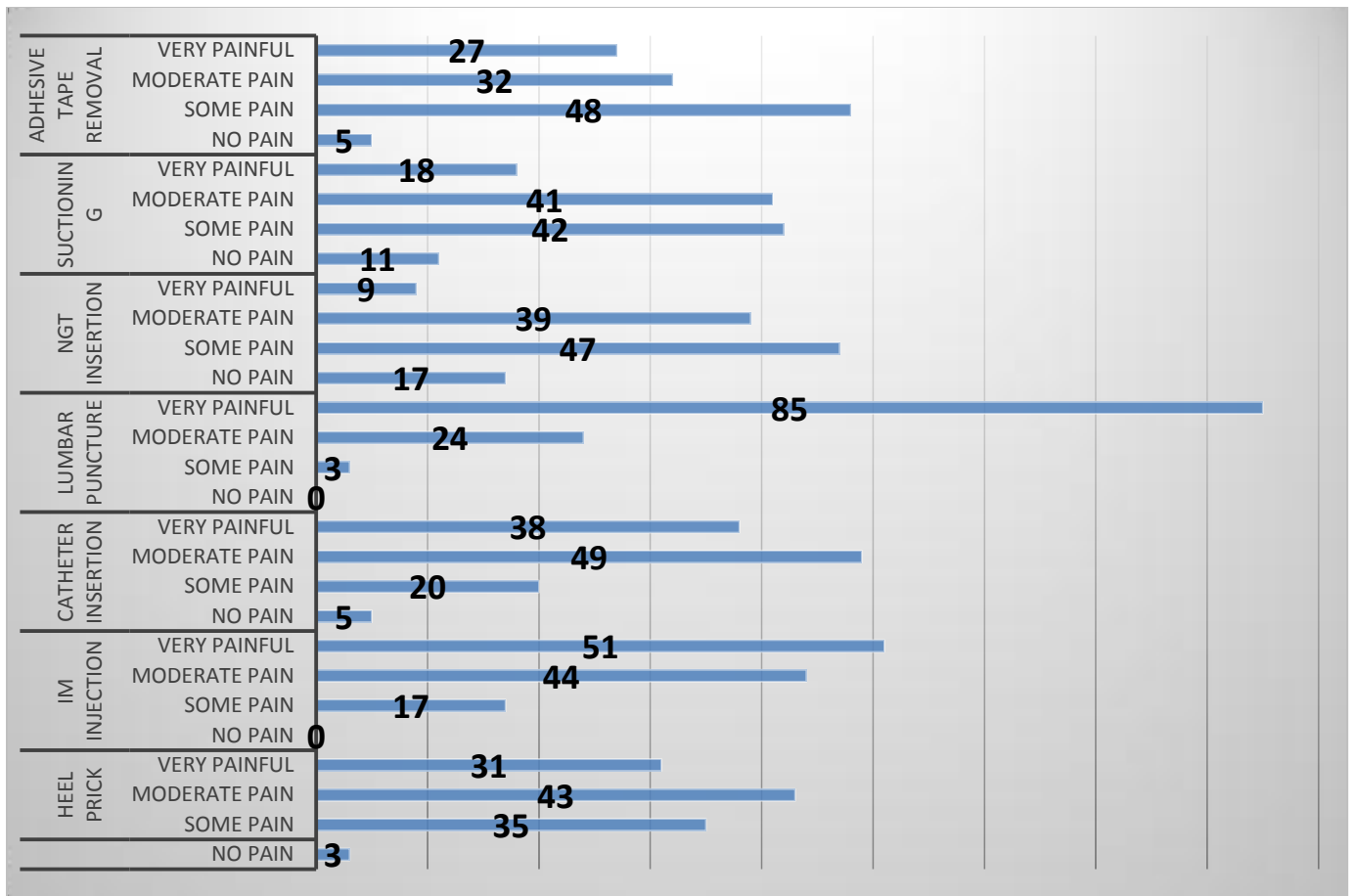


Figure 3: Distribution of nurse's attitude towards neonatal pain management

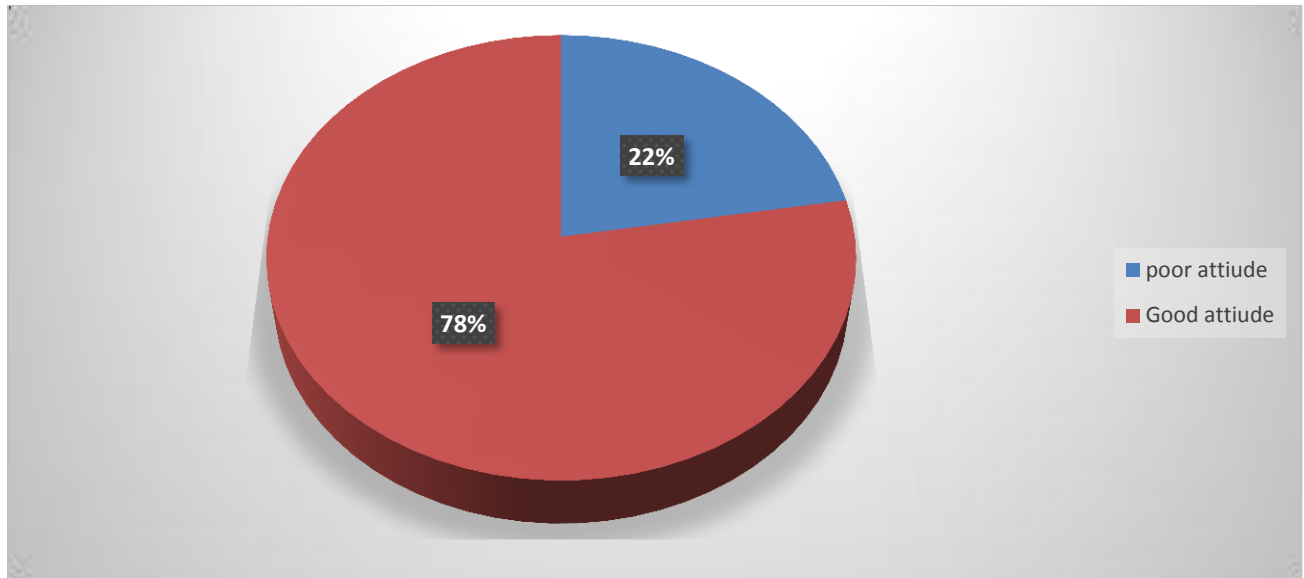


Figure 4:Attitude level of nurse's towards pain, in four Governmet hospital, 2021

5.5. Practice of the respondents

Among 112 nurses, 96(85.7) was aware about neonatal pain assessment the rest 16(14.3) were not aware. About 65(58.0%) use neonatal pain assessment tool whereas 47(42.0%) did not use. Of who use most of the nurse respond crying, vital sign and pain assessment score were the main responses. Most 71(63.4) of the respondents prefer paracetamol followed by 24(21.4%) morphine and 17(15.2%) non-pharmacologic pain management.

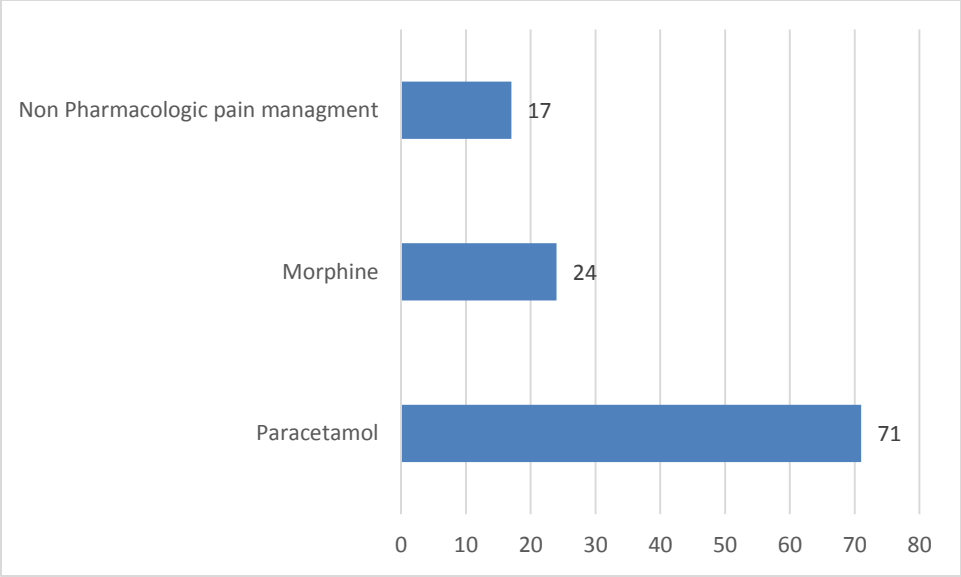


Figure 5:anti pain preferenceof nurse's, in four Government hospital, 2021

Table 4:Figure 6:Nurses' practice on non-pharmacologic strategies

Variables		Frequency	Percent %
IV line insertion	Never	18	16.1 %
	Rarely	14	12.5 %
	Often	30	26.8 %
	Usually,	40	35.7 %
	Always	10	8.9 %
Heel prick	Never	27	24.1 %
	Rarely	17	15.2 %
	Often	35	31.3 %
	Usually	21	18.8 %
	Always	12	10.7 %
IM injection	Never	26	23.2 %
	Rarely	20	17.9 %
	Often	29	25.9 %
	Usually	24	21.4 %
	Always	13	11.6 %
Catheter insertion	Never	26	23.2 %
	Rarely	22	19.6 %
	Often	31	27.7 %
	Usually	19	17.0 %
	Always	14	12.5 %
NGT insertion	Never	32	28.6 %
	Rarely	16	14.3 %
	Often	30	26.8 %
	Usually	18	16.1 %
	Always	16	14.3 %
Suctioning	Never	1	0.9 %
	Rarely	16	14.3 %

	Often	46	41.1 %
	Usually	13	11.6 %
	Always	36	32.1 %
Adhesive Tape removal	Never	34	30.4 %
	Rarely	15	13.4 %
	Often	25	22.3 %
	Usually	34	30.4 %
	Always	4	3.6 %

Table 5:Nurses' practice to wards pain assessment

Variables		Frequency	Percent %
I assess newborn's pain through crying.	Never	14	12.5 %
	Rarely	13	11.6 %
	Often	13	11.6 %
	Usually	43	38.4 %
	Always	29	25.9 %
I assess newborn's pain through facial expressions	Never	11	9.8 %
	Rarely	1	0.9 %
	Often	43	38.4 %
	Usually	38	33.9 %
	Always	19	17.0 %
I assess newborn's pain through body Movement and agitation	Never	10	8.9 %
	Rarely	16	14.3 %
	Often	23	20.5 %
	Usually	35	31.3 %
	Always	28	25.0 %
I assess newborn's pain through the Vital sign.	Never	13	11.6 %
	Rarely	19	17.0 %
	Often	13	11.6 %

	Usually	33	29.5 %
	Always	34	30.4 %
I use scales to assess pain in newborns.	Never	27	24.1 %
	Rarely	23	20.5 %
	Often	22	19.6 %
	Usually	24	21.4 %
	Always	16	14.3 %
I record newborns' pain scores on their medical chart.	Never	32	28.6 %
	Rarely	25	22.3 %
	Often	16	14.3 %
	Usually	21	18.8 %
	Always	18	16.1 %
I use non-nutritive suckling to relieve pain in newborns.	Never	15	13.4 %
	Rarely	23	20.5 %
	Often	17	15.2 %
	Usually	39	34.8 %
	Always	18	16.1 %
I encourage breastfeeding to relieve the pain in newborns.	Never	7	6.3 %
	Rarely	14	12.5 %
	Often	30	26.8 %
	Usually	30	26.8 %
	Always	31	27.7 %
I encourage skin-to-skin contact to relieve the pain in newborns.	Never	9	8.0 %
	Rarely	14	12.5 %
	Often	24	21.4 %
	Usually	36	32.1 %
	Always	29	25.9 %
I offer oral glucose or sucrose to relieve newborn pain during painful procedures.	Never	10	8.9 %
	Rarely	17	15.2 %
	Often	19	17.0 %

	Usually	44	39.3 %
	Always	22	19.6 %
I position the newborn to relieve their pain	Never	6	5.4 %
	Rarely	19	17.0 %
	Often	22	19.6 %
	Usually	38	33.9 %
	Always	27	24.1 %
I perform facilitated tucking in newborns during painful procedures.	Never	17	15.2 %
	Rarely	23	20.5 %
	Often	31	27.7 %
	Usually	29	25.9 %
	Always	12	10.7 %
I use more than one non pharmacological measurement to relieve the pain of newborns.	Never	8	7.1 %
	Rarely	22	19.6 %
	Often	33	29.5 %
	Usually	34	30.4 %
	Always	15	13.4 %
I use pharmacological and non pharmacological combined to relieve pain in newborns.	Never	12	10.7 %
	Rarely	18	16.1 %
	Often	28	25.0 %
	Usually	35	31.3 %
	Always	19	17.0 %

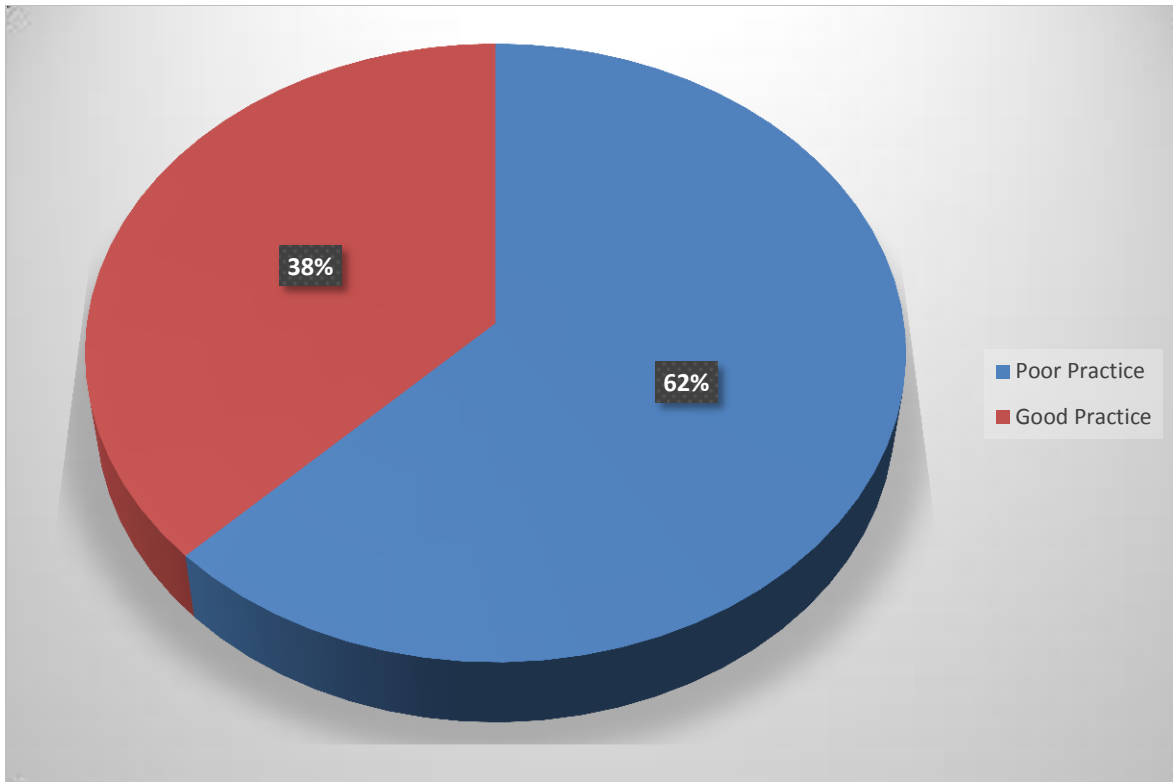


Figure 6:Practice level of nurse's towards pain, in four Governmet hospital, 2021

5.6. Factors associated with neonatal pain management

In this study, explanatory variables such as: - age, sex, educational status, work experience, training knowledge and attitude were analyzed first by bivariable analysis. Based on the p-value, sex of the respondent were significantly with Knowledge level and candidate for multivariable analysis. whereas non variables were identified as candidate variables for the multivariable analysis in case of attitude level. In case of practice level four variables were identified for the multivariable analysis these are: - sex, educational status, work experience as a nurse, training and knowledge level .(Table 6,7,8)

The result of the multivariable analysis revealed that work experience as nurse were the independent determinant of practice

The odds of good knowledge were 63 % lower in nurses with work experience > 5 years as compared to ≤5 year [AOR= 0.37; 95% CI: 0.15 – 0.95]

Table 6: Bivariable and Multivariable Logistic Regression analysis results of factors associated with Knowledge in four government hospital, 2021

Explanatory Variable		Knowledge		Bivariate analysis (COR)	Multivariate analysis (AOR)	P-value
		Poor	Good			
Sex	Male	3(6.8%)	41(93.2%)	1	1	0.25
	Female	11(16.2%)	57(83.8%)	2.63(0.69-10.0)	2.3(0.53-10.17)	
Age	≤ 30 yrs.	12(13.2%)	79(86.8%)	1	1	0.86
	>30 yrs.	2(9.5%)	19(90.5%)	1.44(0.29-6.99)	1.2(0.13-11.0)	
Educational status	Diploma nurse(B.Sc.)	9(15.5%)	49(84.5%)	1	1	0.82
	Neonatal B.Sc.					
	MSc	5(11.1 %)	40(88.9 %)	1.46(0.45-4.73)	1.15(0.32-4.10)	
Work experience as	≤5 yrs.	10(13.3%)	65(86.7%)	1	1	0.92
	>5 yrs.	4(10.8%)	33(89.2%)	1.26(0.37-4.35)	1.0(0.19-6.02)	

nurse						
Work experience as NICU nurse	≤5 yrs.	13(12.4%)	92(87.6%)	1	1	
	>5 yrs.	1(14.3%)	6(85.7%)	0.84(0.09-7.6)	0.77(0.06-9.17)	0.84
Training	Yes	7(10.4%)	60(89.6%)	1.57(0.51-4.8)	1.6(0.52-5.24)	
	No	7(15.6%)	38(84.4%)	1	1	

Table 7: Bivariable and Multivariable Logistic Regression analysis results of factors associated with Attitude in four government hospital, 2021

Explanatory Variable		Attitude		Bivariate analysis (COR)	Multivariate analysis (AOR)	P-value
		Poor	Good			
Sex	Male	8(18.2%)	36(81.8 %)	1.5(0.5-3.8)	1.57(0.51-4.82)	0.43
	Female	17(25.0 %)	51(75 %)	1	1	
Age	≤ 30 yrs.	22(24.2 %)	69(75.8 %)	1	1	
	>30 yrs.	3 (14.3 %)	18(85.7 %)	1.9(0.5-7.11)	3.73(0.53-26.2)	0.18
Educational status	Diploma nurse(B.Sc.) Neonatal B.Sc	14(24.1 %)	44(75.9%)	1	1	
	MSc	8(17.8 %)	37(82.2%)	1.47(0.55-3.8)	1.25(0.44-3.54)	0.67
Work experience as nurse	≤5 yrs.	16(21.3 %)	59(78.7 %)	1	1	
	>5 yrs.	9(24.3 %)	28(75.7%)	0.84(0.33-2.14)	0.66(0.17-2.6)	0.55
Work experience as NICU nurse	≤5 yrs.	23(21.9 %)	82(78.1 %)	1	1	
	>5 yrs.	2(28.6 %)	5(71.4 %)	0.71(0.12-3.85)	1.17(0.1-13.07)	0.89
Training	Yes	18(26.9 %)	49(73.1%)	0.50(0.19-1.32)	0.45(0.15-1.31)	0.14

	No	7(15.6 %)	38(84.4%)	1	1	
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Table 8: Bivariable and Multivariable Logistic Regression analysis results of factors associated with Practice in four government hospital, 2021

Explanatory Variable		Practice		Bivariate analysis (COR)	Multivariate analysis (AOR)	P-value
		Poor	Good			
Sex	Male	22(50.0%)	22(50.0%)	2.4(1.09-5.27)	2.19(0.95-5.04)	0.64
	Female	48(70.6%)	20(29.4%)	1	1	
Age	≤ 30 yrs.	55(60.4%)	36(39.6%)	0.61(0.21-1.72)	-	
	>30 yrs.	15(71.4%)	6(28.6%)	1	1	
Educational status	Diploma nurse(B.Sc.)	36(62.1%)	22(37.9%)	1	1	
	Neonatal B.Sc					
	MSc	26(85.7%)	19(14.3%)	1.196(0.54-2.64)	-	
Work experience as nurse	≤5 yrs.	42(56.0%)	33(44.0%)	1	1	
	>5 yrs.	28(75.7%)	9(24.3%)	0.4(0.17-0.98)	0.37(0.15-0.95)	0.04*
Work experience as NICU nurse	≤5 yrs.	63(60.0%)	42(40.0%)	1	1	
	>5 yrs.	7(100.0%)	0(0.0%)	®.	®	
Training	Yes	39(58.2%)	28(41.8%)	1.59(0.71-3.52)	1.91(0.8-4.53)	0.14
	No	31(68.9%)	14(31.1%)	1	1	
Knowledge Level	Poor	12(85.7%)	2(14.3%)	1	1	
	Good	58(59.2%)	40(40.8%)	4.13(0.87-19.5)	3.85(0.77-19.04)	0.99
Attitude Level	Poor	17(68.0%)	8(32.0%)	1	1	

	Good	53(60.9%)	34(39.1%)	1.36(0.53-3.5)		
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5.7. Facility related factors

Regarding to training, most 67(59.6%) of the nurses have had formal training on neonatal pain assessment the rest 45(40.2%) hadn't take training.

Among the total 112 nurses 53(47.3%) believe that neonatal pain management in NICU was optimal whereas, 8(7.1 %) neutral, and 51(45.5%) believe that neonatal pain management in NICU is not optimal. Of those who said not optimal the barrier identified were lack of evidence based neonatal pain management 15(13.4%), NICU staff resistance to change practice (15(13.4%), Inadequate staff training21(18.8),fear of adverse effects of analgesia 9(8%), Because pain is not assessed at all 22(19.6%), andabsence of some pain medications in the unit10(8.9%)

6. Discussion

The current study found that about 87.5% of respondents had good knowledge and only 37.5% of them have good practice

This finding is consistent with the study done in six hospitals in **Curitiba** and its **Metropolitan Region** (Conclusion: Nurses considered neonatal pain a real event; however, they do not perform pain assessment or treatment of newborns in a systematized way).

It is also similar with a study done in the neonatal wards of two academic hospitals in central Gauteng (**Conclusion:** Clinicians were knowledgeable about neonatal pain, but gaps between knowledge and practice remain).

The result of this study doesn't go in line with study done in the neonatal units and NICU in Bandar Abbas educational hospitals. A total of 50 nurses and nurse assistants working in the neonatal units participated in the study. Results: only 48.2% of the participants had good knowledge. This could be due to:-

- The difference in the sample size
- This difference might be also due to different tool used or the sampling technique.

It also doesn't go in line with study done in nurses and midwives providing neonatal pain management at two hospitals in Kigali. The majority (74.2%) demonstrated a low level of knowledge of neonatal pain and its management. Over half (51.5%) had a positive attitude toward neonatal pain management, though over three quarters (84.8%) reported a low level of integrating pain management into practice.

7. Conclusion

This study identified the knowledge, practice and associated factors concerning neonatal pain management.

Nurses working in selected public hospitals in Neonatal intensive Care unit in Addis Ababa were included.

Most nurses had poor practice in managing neonatal pain but majority of nurses had adequate knowledge concerning neonatal pain management.

There was gap between their knowledge and practice.

There was significant positive association between work experience as a nurse and practice level(>5yrs ,75.5% poor practice),it might be due to negligence

8. Strength and limitation of the study

8.1. Strength of the study

Sample size was high (approximately close with total number of nurses)

The response rate was 94.6%.

8.2. Limitation of the study

The cross-sectional study design makes determining causality impossible.

Qualitative data collection method was not used.

Private hospitals were not included and the result couldn't represent them.

9. Recommendation

- Based on the finding of this study the following recommendations are forwarded to the respective responsible bodies.
- Nurses need to further improve their knowledge and practice on neonatal pain management.
- Those of nurses who had adequate knowledge and good practice on neonatal pain management should also teach their respective colleagues who had deficit on pain management in neonates.
- In-service training program to enhance nurses competence on neonatal pain management

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ANNEXS

Annex. I. Information sheet for the Participation in the Research Study

Dear Madam, Miss, Sir,

My name is Dr Solomon Marelign. Currently I am a candidate in Pediatrics And Child Health graduate at AAU, College of Health Science, Department of Pediatrics And Child Health. And kindly I request for your participation in this study titled “Knowledge, And Practice of

Nurses' And Associated Factors in Managing Neonatal Pain in Public Hospitals in Addis Ababa, Ethiopia with the aim of assessing the NICU nurses' knowledge, practice and factors associated regarding neonatal pain management.

Participants: Randomly selected nurses having equal or greater than six months work experience in neonatal intensive care unit in public hospitals of Addis Ababa.

Potential Risks: There is no foreseen risk by being participating in this study.

Benefits: No financial benefit will be related with this study.

If you would take a few minutes out of your busy schedule and fill out this attached questionnaire it would be of a great help to me. There are no right or wrong answers, just choose the response which you feel reflects your insights.

The total confidentiality of your voluntary participation in this study is guaranteed and the information you provide will be kept unnamed. Your participation in this study is highly appreciated and is for invaluable contribution in the improvement of the quality of care in regard to neonatal pain management. These questionnaires will be used only by myself for my research and will be destroyed following tabulation. No attempt will be made to link you with the answers. You can also choose not to participate in this study if you become uncomfortable during this study, you will be allowed to leave the study at any time.

Will you willing to participate in the study? Yes/ No (Circle their response).

Yes = continue and thank you very much for taking part in this study. If no, stop and thank the Nurse

Annex II. Consent form

In signing this document, I am giving my consent to participate in the study entitled Knowledge, and Practice of Nurses' And Associated Factors in Managing Neonatal Pain in Public Hospitals in Addis Ababa, Ethiopia with the aim of assessing the NICU nurses' knowledge, practice and factors associated regarding neonatal pain management. I have been informed that the purpose of this research project and I understand that I am selected to participate in this study randomly. I have been informed that my participation in this study is willing full and voluntary even I have right to refuse or interrupt the filling of questionnaire and my name will not be mentioned on the questionnaire. I, undersigned, have understood the purpose of the study & fully agree to participate in the study.

Signature of the participant----- Date -----

Thank you and has a nice day!

Name of investigator- Dr Solomon Mareign

Address of investigator: phone no- +251918304351, Email: sol21mareign@gmail.com

Annex III. Questionnaire

Pain management for hospitalized newborns

Date..... Hospital code.....

Instruction: Read each question carefully and tick [] against the option that the best suits your response.

Part I: Demographic Data

101. Age (in years) -----

101. Nurse's gender: - 1/Female [] 2/Male []

103. Nurse's Marital status: - 1/ Married [], 2/Single [], 3/ Divorced [], 4/Widowed [].

104. Nurses level of education? 1/Diploma nurse [] 2/BSc Nurse [] 3/Neonatal BSc N [] 4/MSc []

105. How many years have you been working as a nurse?

106. How many years have you been working in neonatal intensive care unit?

1/ 6 months-to 1year[] 2 / 1-2 year[] 3/ 2-5years[] 4/ >5years[]

PART II: knowledge assessment and attitude questions

Read each question carefully and tick [√] against the option that the best suits your response.

Questions	Yes	No
1. Neonates, especially preterm, do not experience pain.		
2. Pain response is congenital.		
3. Neonates experience pain less than adults.		
4. Pain management is not essential to neonate as they do not remember painful experiences.		
5. Physiologic stress related to pain can be more dangerous than analgesia side effects		
6. Analgesia is too dangerous to use in neonates.		
7. Neonates pain decreases quicker than adults.		
8. Neonates need less analgesia than adults (per kg).		
9. Neonates at 26 weeks have all physiological requirements to perceive pain.		
10. Neonates <28 weeks perceive pain.		
11. Neonates 28-36 weeks perceive pain.		
12. Neonates 37 weeks to term perceive pain.		
13. Neonates birth to 28 days of perceives pain.		
14. Which non pharmacologic pain	A. Breast feeding	

management strategy can be used in neonates experiencing pain for various reasons	B. Oral sucrose		
	C. Nonnutritive suckling		
	D. Facilitated tuckling		
	E. Kangaroo mother care		

Nurses' Perception of Painful Procedures for Neonates

Neonatal Procedures	No Pain	Some Pain	Moderate Pain	Very Painful
Heel prick				
IM injection				
Catheter insertion				
Lumbar puncture				
NGT insertion				
Suctioning				
Adhesive Tape removal				

Part III: Self-reported Practical related questions regarding pain management among nurses

1. Are you aware of neonatal pain assessment tools?

A. Yes B. No

2. Do you use neonatal pain assessment tool?

A. Yes

B. No

3. If you say yes to above (Q2) which assessment tool do you use?

A.write it here

B. I don't remember it

4. Which anti pain do u prefer to give for a neonate who had surgical procedure(more than one choice possible)

A. Paracetamol

B. Morphine/fentanyl

C. Non pharmacologic pain management

D. Other (write it here.....)

5. Frequency of Administration of non-pharmacologic strategies for Painful Procedures

Procedures	Frequency of use of non-pharmacologic strategies				
	Never	Rarely	Often	Usually	Always
IV-line insertion					
Heel prick					
IM injection					
Catheter					

insertion*					
NGT insertion					
Suctioning+					
Tape removal^					

*Peripheral; +Upper airway; ^Adhesive

Questions	Never	Rarely	Often	Usually	Always
01. I assess newborn's pain through crying.					
02. I assess newborn's pain through facial expressions					
03. I assess newborn's pain through body Movement and agitation					
04. I assess newborn's pain through the Vital sign.					
05. I use scales to assess pain in newborns.					
06. I record newborns' pain scores on their medical chart.					
07. I use non-nutritive suckling to relieve pain in newborns.					

08. I encourage breastfeeding to relieve the pain in newborns.					
09. I encourage skin-to-skin contact to relieve the pain in newborns.					
10. I offer oral glucose or sucrose to relieve newborn pain during painful procedures.					
11. I position the newborn to relieve their pain.					
12. I perform facilitated tucking in newborns during painful procedures.					
13. I use more than one nonpharmacological measurement to relieve the pain of newborns.					
14. I use pharmacological and nonpharmacological combined to relieve pain in newborns.					

Part IV. Factors associated with neonatal pain management

1. Have you had any form of formal teaching, learning or training session on neonatal pain assessment and management

A. Yes

B. No

2. Do you think neonatal pain care in your NICU is optimal?

C. Yes

D. No

E. Neutral

3. If your answer to question number 1 is **no** what barrier do, you think impedes optimal neonatal pain care in TASH NICU(*more than one can be selected*)

A. Lack of evidence-based neonatal pain management guideline/protocol in TASH NICU

B. NICU Staff resistance to change practice

C. Inadequate staff training regarding pain assessment and management

D. Fear of adverse effects of analgesia

E. Because pain is not assessed at all

F. Inadequate staff training regarding pain assessment and management

G. Absence of some Pain medications in the unit

H. Nurse to patient ratio / work overload is present

I. Other (write it here)