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DEPARTMENT OF EMERGRNCY MEDICINE

KNOWLEDGE, PRACTICE AND ASSOCIATED FACTORS OF PAIN ASSESSMENT IN CRITICALLY ILL PATIENTS AMONG NURSES WORKING AT ADULT INTENSIVE CARE UNITS OF FEDERALLY ADMINISTERED PUBLIC HOSPITALS IN ADDIS ABABA, ETHIOPIA.

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KNOWLEDGE, PRACTICE AND ASSOCIATED FACTORS OF PAINASSESSMENT IN CRITICALLY ILL PATIENTS AMONG NURSES WORKING AT ADULT INTESIVE CARE UNITS OF FEDERALLY ADMINISTERED PUBLIC HOSPITALS IN ADDIS ABABA, ETHIOPIA, 2019.

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Approved by the Examining Board

As member of examining board of the final master's defence, we certify that we have read and evaluate the thesis prepared by Temesgen Ayenew. We recommended that it will be accepted as fulfilling the thesis requirement for master science degree in Emergency Medicine and Critical Care Nursing.

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ACRONYMS AND ABBREVIATIONS

BPS Behavioral Pain Scale

BPS-NI Behavioral Pain Scale for Non Intubated patients

CIAP Critically Ill Adult Patient

CPOT Critical care Pain Observation Tool

ICU Intensive Care Unit

PTSD Posttraumatic Stress Disorder

VRS Verbal Rating Scale

VAS Visual Analogue Scale

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Background:-Pain can be defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. The patients in intensive care units often suffer from undertreated and unrecognized pain. More than 50% have significant pain during procedures or routine care. However, pain is not assessed properly for critically ill adult patients, although they may suffer from quite severe pain, mainly because they cannot verbally express their pain.

Objective: To assess knowledge, practice and associated factors of pain assessment in critically ill patients among nurses working at adult intensive care units of federally administered hospitals in Addis Ababa, Ethiopia, from April 5 – 25, 2019.

Methods: Institutional based cross-sectional study with a pre tested semi-structured questionnaire was conducted among 111 participants. All nurses working in intensive care units of federally administered public hospitals were included in the study. Bivariate and multivariate logistic regressions was computed to identify associated factors of knowledge and practice of pain assessment in critically ill adult patients and variables with a p-value < 0.05 were considered statistically significant.

Result: More than half (60.4%) of nurses had adequate knowledge about pain assessment in critically ill adult patients. The proportion of nurses who had good pain assessment practice for critically ill adult patients was 55.9%. Working experience of >5 years [OR= 0.194, CI= (0.41, 0.910)], nursing workload [OR =7 .766, CI = (2.450, 24.617)], sedation interfering with pain assessment [OR = 7.628, CI = (2.348, 24.778)] and knowledge of pain assessment [OR = 5.219, CI= (1.673, 16.280)] were factors significantly associated with pain assessment practice of nurses.

Conclusion and recommendation: The result of this study revealed adequate knowledge of pain assessment with poor pain assessment practice. Nursing work load, knowledge, year of working experience and sedation interfering with pain assessment were factors significantly associated with pain assessment practice. Intensive care units should have adequate nurses to minimize nursing workload and ongoing training should be provided. There should be protocols and guidelines for pain assessment in ICUs.

Key Words: Knowledge, Practice, Pain Assessment, Nurses, ICU, Associated factors

1. INTRODUCTION

1.1. Background

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage(1). It can also be a distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive, and social components.

Patients in intensive care units (ICU) may frequently be able to feel pain and yet be unable to speak to those caring for them and the inability to communicate verbally does not disprove the possibility that an individual is suffering pain and is in need of appropriate pain-relieving treatment(2,3). This may be realised in patients with an endotracheal tube or a tracheostomy in situ, for example. Such patients will need very different pain assessments to those who are able to verbally self-report their pain.

Pain is always subjective and many people report pain in the absence of tissue damage or any likely pathophysiological cause; usually this happens for psychological reasons. There is usually no way to differentiate their experience from that due to tissue damage if we take the subjective report. If they concern their experience as pain and report it in the same ways as pain caused by tissue damage, it should be recognised as pain(1). This definition avoids tying pain to the stimulus.

Patients in ICU often suffer from unrecognized and undertreated pain, with potentially serious physical and psychological effects. Pain management is an important component of quality care delivery for the critically ill patient. It is therefore important for clinicians to identify a patient's pain profile and sensible choice of pain medication should be based upon individual needs and desired effect of analgesic. Effective pain management is a moral imperative and professional responsibility for nurses(4).

Assessment of pain is as important as any assessment of the other body systems. The patient is assessed at regular intervals to determine the presence of pain or breakthrough pain, the effectiveness of therapy, the presence of side effects, the need for dose adjustment, or the need for supplemental doses to offset procedural pain. In critical care, assessment and treatment of the patient's pain may be hindered by the acuity of the patient's condition, altered levels of consciousness, and an inability to communicate pain, restricted or limited movement, and endotracheal intubation. To perform an effective pain assessment, the critical

care nurse first attempts to elicit a self-report from the patient. Behavioral observation and changes in physiological parameters are considered along with the patient's self-report.(5)

The basic goal of pain management is to recognise the pain score and manifestations correctly, and to provide the proper pain relief with minimal side effects as quickly as possible as one of the priorities for nurses to provide appropriate care(6).

In terms of nursing practice, pain assessment tools should be combined into daily practice as it is recommended in the most recent guidelines and quality improvement initiatives(7). Additionally, clinical and theoretical training on pain assessment should be comprised in nursing and medical school curricula, as well as in continuous education in order to help clinicians to better understand the importance of prompt identification and management of pain (8).

Pain scales for patients able to communicate includes Visual Analogue scale (VAS), Numerical Rating Scale (NRS) and Verbal Rating Scale (VRS)(9). Assessing pain in critically ill patients, mainly in nonverbal patients, is a great challenge. Critical care pain observation tool (CPOT) and Behavioral pain scale (BPS) are valid and reliable tool to study pain in patients hospitalized in intensive care units(10).

Expected nursing practice includes assess and document pain in all critically ill adult patients using appropriate and validated tools, assess and document pain for critically ill adults who are unable to self-report, using a validated behavioral pain scale, avoid referring primarily to vital signs for pain assessment of critically ill adult patients(i.e. Use changes in vital signs as cues that the patient might be having pain and assess using validated pain tools, consider significant changes in vital signs as possible adverse events of severe pain) and consider asking someone who knows the patient well to identify behaviors that may indicate pain (11,12).

1.2. Statement of the problem

Pain is among the most common experiences and stressors in critically ill patients. Symptoms of critical illnesses as well as many interventions and procedures in the critical care unit increase pain(13). Even though pain management has become a national priority in recent years, pain continues to be misunderstood, poorly assessed, and undertreated in critical care units and many other healthcare settings(9).

Pain assessment and management can be a particular problem for patients in intensive care units (ICUs)(14). Studies have suggested that more than 70% of ICU patients have unrecognised pain(3). Furthermore, more than 50% have significant pain during procedures or routine care(11). This is challenging because uncontrolled pain triggers physical and emotional stress responses, inhibits healing, increases the risk for other complications, and increases the length of stay in the critical care unit(5,9). Moreover, severe pain interferes with cardiovascular and respiratory physiology, and can therefore impair a patient's recovery and discharge. Pain can also contribute to adverse psychological outcomes in ICU patients, including anxiety, depression, and posttraumatic stress disorder (PTSD)(15).

Pain is not assessed properly for adult ICU patients, although they may suffer from quite severe pain, mainly because they cannot verbally express their pain(16,17). If pain in adult ICU patients can be assessed more accurately based on patient characteristics and treated by multi-disciplinary cares, their pain and stress response can be controlled successfully (17).

Nurses play a critical role in managing and easing acute pain among critically ill adult patients (CIAP). Since pain management should be based on individuals pain level, nurses are expected to be equipped with the necessary knowledge and skills of pain assessment for critically ill adult patients (18). However, studies show that nurses lack knowledge and had poor practices regarding pain assessment in critically ill adult patients(19–21).

Clinician-related barriers, including knowledge deficits regarding pain assessment and management principles, failure to use pain assessment tools to acknowledge the existence of pain, and communication difficulties between the patient and the health-care team, contribute considerably to suboptimal pain assessment among critically ill patients(22).

Application of an objective pain rating scale for the assessment of pain in nonverbal, critically ill patients can improve patients' ratings of their pain experience, improve the documentation of pain assessments by nurses, and increase nurses' confidence(23).

Using tools to assess behavioral indicators of pain (such as BPS, CPOT) promotes pain assessment in challenging situations(24,25). Educational efforts about pain physiology, pain symptoms, and pain assessment probably have been beneficial and providing ICU nurses with ongoing pain assessment courses, and instillation of responsibility for pain assessment early in the education of nurses is very crucial (14,26,27).

While nurses' pain assessment knowledge and practice in critically ill adult patients are such vital(18), no researches are done in Ethiopia as per my knowledge. Therefore this study will address these issues and will be a basis for further research.

1.3. Significance of the Study

Pain assessment presents a major challenge to the health care service providers working in the critical care setup because most patients admitted in the critical care unit have a compromised level of consciousness or are sedated thus are unable to verbally report their level of pain.

Nurses spend more time with patients than any other health care team member. It is the nurse who performs many interventions for pain relief or further individualizes for the patient those interventions prescribed or performed by others. The nurse also, in most occasions, is in a position to evaluate the effectiveness of pain management, plan and initiates the necessary changes. The nurse should therefore practice a knowledge based pain assessment, management and evaluation procedures in order to enhance correct determination of the patient's level of pain and when appropriate, provide pain relieving measures.

Currently, as per my knowledge, there is no study of this kind that has been done in Ethiopia thus the information obtained from this study will form a valuable guide to nursing practice, policy formulation and curriculum development on pain assessment for the critically ill patients. It will also help provoke more research in pain assessment in critically ill patients.

2. LITERATURE REVIEW

2.1. Knowledge of nurses about pain assessment in critically ill adults

Nurses need a wide base of knowledge about pain, its assessment and management principles, and consequences of inadequately managed pain among other concepts about pain. However, studies show that nurses lack adequate knowledge about pain and underestimate pain(20,22,28,29).

A descriptive cross-sectional study carried out about nurses' knowledge and practices related to pain assessment in critically ill patients in a selected private hospital in Bangladesh showed that more than four-fifths (84%) of the respondents currently had adequate knowledge about pain assessment(28).

Findings from a study of critical care nurses' knowledge and practices regarding pain assessment and management at Cairo University Hospitals revealed that the majority of the studied sample (93.3%) had an unsatisfactory knowledge(20).

In the a study done on nurses' knowledge and practices towards pain assessment in critically ill patients at CHUK (a teaching university hospital in Kigali), the majority of respondent (67.2%) do not have adequate current knowledge on pain assessment(29).

In a study on nurses' knowledge of the principles of acute pain assessment in critically ill adult patients who are able to self-report at Uganda's national hospital, the mean knowledge score of nurses was 71% indicating adequate knowledge levels(18).

In a cross sectional study of practices of nurses in management of pain among critically ill non-verbal adult patients in the critical care unit, Kenyatta national hospital nurses working in the critical care unit also revealed that nurses had inadequate knowledge on pain assessment and management with an overall knowledge score of 8.26 (SD±2.23)(30).

2.2. Nurses' practice of pain assessment

A descriptive cross-sectional study carried out about Nurses' knowledge and practices related to pain assessment in critically ill patients in a selected private hospital in Bangladesh showed that most of the respondents (61.5%) were using a pain assessment tool for patients sometimes, followed by routinely (23%), often (11%) and seldom (4.5%). About 71% of the respondents used to read any guidelines for pain assessment and management for critically ill patients. About 61% of the respondents always agreed with patients statements about their

pain and 73.5% of the respondents were documenting the findings after pain assessment for patients able to communicate(28).

Findings from a study of critical care nurses' knowledge and practices regarding pain assessment and management at Cairo University Hospitals revealed that the majority of the studied sample (95%) had an unsatisfactory practices level(20).

In the a study done on nurses' knowledge and practices towards pain assessment in critically ill patients at CHUK (a teaching university hospital in Kigali), the majority of respondents 78% have the low practices scores(29).

In a descriptive cross-sectional study of Nurses' pain assessment practices with critically ill adult patients in Ugandan hospital, overall, most of the nurses had poor (scores <7) pain assessment practices (76.5%). The average score on the scale for pain assessment practices for the sample was 4.86 (SD = 2.46), which indicates poor practices. The majority of participants (77.6%) reported that they do not use any tool during pain assessment(21).

2.3. **Factors associated with pain assessment**

In a survey conducted in Canada routine use of a behavioral pain tool was associated with awareness of published guidelines (odds ratio, 2.5; 95% CI, 1.7-3.7) and clinical availability of the tool (odds ratio, 2.6; 95% CI, 1.6-4.3)(16).

Findings from a study of critical care nurses' knowledge and practices regarding pain assessment and management at Cairo University Hospitals revealed, more than half of the studied sample (75%, 63.3% & 58.3%) reported that the factors that may affect their abilities to assess pain were lack of education, nursing workload and patient instability respectively(20).

In a study of Nurses' knowledge related to pain assessment for critically ill patients at a public sector hospital in Johannesburg, most frequently occurring barriers were unavailable pain assessment tools, lack of designated area for charting pain and hemodynamic instability(31).

In a descriptive cross-sectional study of nurses' pain assessment practices with critically ill adult patients in Ugandan hospital, the main perceived barriers to acute pain assessment practices were workload (84.1%), lack of education about assessment tools (82.4%), lack of familiarity with assessment tools (78.2%), poor documentation of pain assessment and management (77.6%), poor communication of pain assessment priorities at the unit (74.7%),

lack of availability of assessment tools (74.1%) and lack of protocols and guidelines (74.1%). The other barriers were giving a low priority to pain management by the unit (61.8%), sedation of patients (65.9%), lack of designated area for charting pain (58.2%), prescription of insufficient analgesia (58.2%) and patient instability (56.5%)(21).

In the a study done on nurses' knowledge and practices towards pain assessment in critically ill patients at CHUK (a teaching university hospital in Kigali), majority of the participants reported the following as barriers to pain assessment ; nursing workload (85.2%), lack of availability of assessment tools (62.3%), lack of education on assessment tools (67.2%) , lack of familiarity with tools (55.7%) , lack of protocols and guidelines on pain assessment and management (54.1%), poor documentation of pain assessment and management (50.8%) and poor communication of pain assessment priorities at the unit (59.0%), low priority of pain management by unity team (57.4%)(29)

In a cross sectional study of practices of nurses in management of pain among critically ill non-verbal adult patients in the critical care unit, Kenyatta national hospital, lack of pain assessment tool to guide nurses and lack of well laid out regulations for frequent pain assessments, significantly (P= 0.014) prevented nurses from rating the patient's level of pain(30).

2.4. Conceptual framework

The research adapted the conceptual frame work developed by Irene Kizza and modified by reviewing different literatures which concerned with nursing knowledge and practices about assessment of pain for critically ill patients(16,21,29–32)

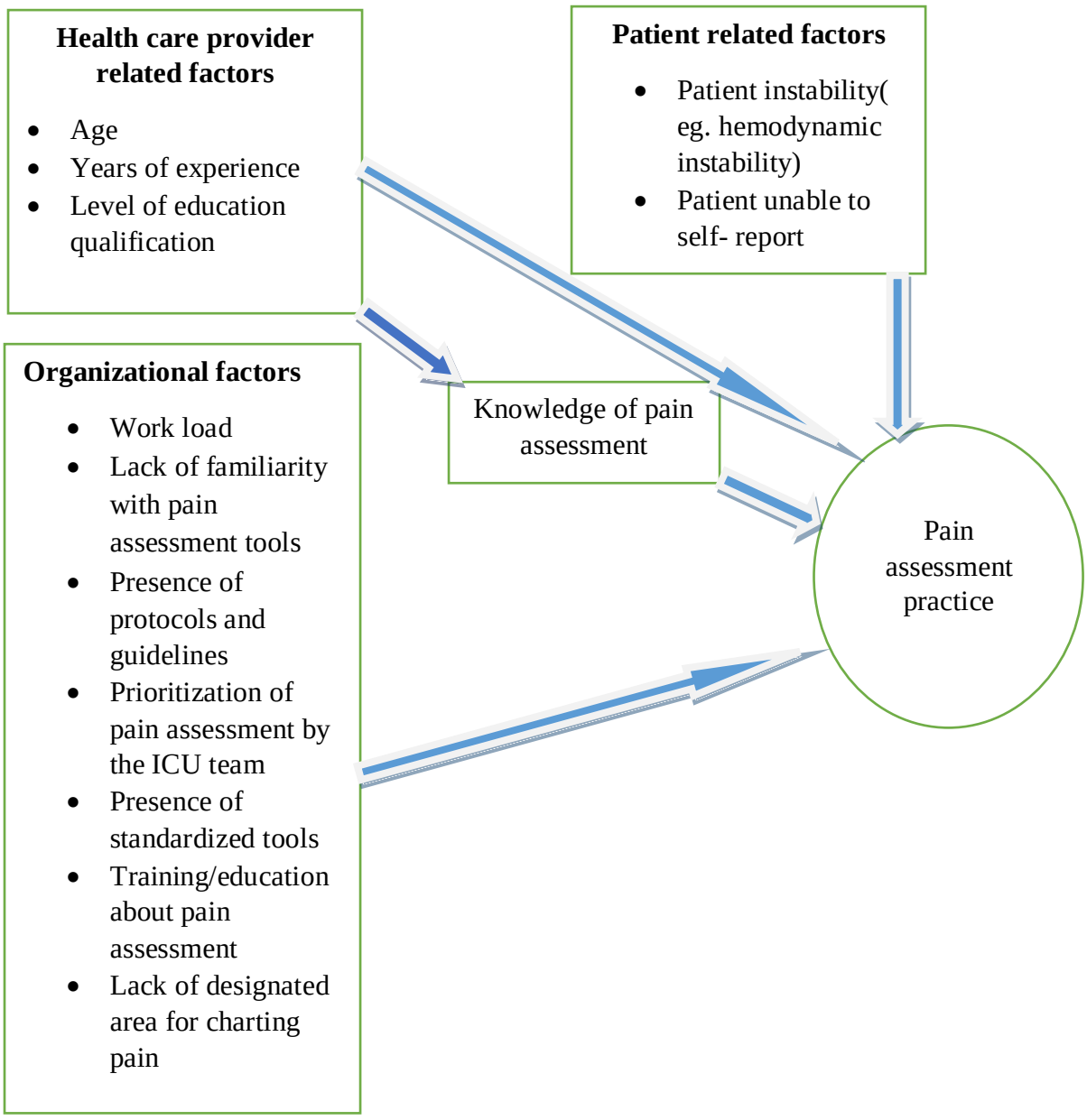

Figure 1: Shows conceptual framework for Nurses' Knowledge and Practices towards Pain assessment in Critically Ill Adult Patients and Associated Factors in Federally Administered Public Hospitals of Addis Ababa, Ethiopia**,** 2019**.**

3. OBJECTIVES

3.1. General objective

- To assess knowledge, practice and associated factors of pain assessment in critically ill patients among nurses working at adult intensive care units of federally administered hospitals in Addis Ababa, Ethiopia, 2019.

3.2. Specific objectives

- To determine intensive care unit nurses' knowledge towards pain assessment in critically ill adult patients.
- To determine intensive care unit nurses' practice towards pain assessment in critically ill adult patients.
- To identify factors affecting pain assessment in critically ill adult patients by nurses

4. METHODS

4.1. Study area and Period

A cross sectional study design was conducted at federally administered hospitals in Addis Ababa, which is capital city of Ethiopia, from April 5 - 25, 2019. Saint Petors, AaBET, ALERT and Tikur Anbesa Specialized Hospital was included on the study

Black Lion Hospital (Tikur Anbesa in Amharic): is Ethiopia's largest general public hospital in the country which was given to Addis Ababa University (AAU) by the Ministry of Health (MOH) for the faculty as a main teaching hospital 1998. The intensive care unit is comprised of subunits organized based on the specialty of care provided. There are a total of 41 nurses working in adult ICU. (Tikur Anbesa Specialized Hospital, ICU annual report).

ALERT is a medical facility on the edge of Addis Ababa, specializing in Hansen's disease, also known as "leprosy". It was originally the All Africa Leprosy Rehabilitation and Training Center (hence the acronym), but the official name is now expanded to include tuberculosis. There is currently a 240-bed teaching hospital, which includes dermatology, ophthalmology, and surgery departments, also an orthopaedic workshop, and a rehabilitation program. It has 27 nurses working in ICU.

AaBET Hospital: is a newly established 250-bed and 12 ICU-bed teaching and public referral hospital in Addis Ababa, Ethiopia, affiliated with St. Paul's Hospital Millennium Medical College (SPHMMC). It has 36 nurses working in adult ICU.

St. Petros: There are a total of 24 nurses who are currently working in adult ICU.

4.2. Population

4.2.1. Source population

The source population of the study were all nurses who were working at federally administered public Hospitals in Addis Ababa city.

4.2.2. Study population

The study population were intensive care unit nurses who were working in ICU at federally administered public hospitals in Addis Ababa city during the study period.

4.2.3. Study unit

The study unit was individual nurses who fulfilled the inclusion criteria.

4.3. Sample size determination

All nurses (128) in federally administered public hospitals of Addis Ababa (AaBET=36, TASH=41, ALERT=27, and St. Petro =24) were included in the study.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

- ✓ All Nurses who were working in the ICU of selected hospitals.

4.4.2. Exclusion criteria

- Nurses who were in annual leave and managerial area

4.5. Variables

4.5.1. Dependent variable:

- ❖ Knowledge
- ❖ Practice

4.5.2. Independent variables:

Health care provider related factors

- Socio-demographic factors
- Years of experience
- Level of education qualification

Organizational factors

- Work load
- Lack of familiarity with pain assessment tools
- Presence of protocols and guidelines
- Prioritization of pain assessment by the ICU team
- Presence of standardized tools
- Training/education about pain assessment
- Lack of designated area for charting pain

Patient related factors

- Patient instability(eg. hemodynamic instability)
- Patient unable to self- report

4.6. Operational definitions

Pre-emptive analgesia –Administration of an analgesic prior to an acute pain stimulus such as a procedure performed among critically ill patients that is known to be painful.

Critically ill patient: Patients who required more intensive and careful nursing care. This is a patient who is able or unable to self-report.

Adequate knowledge: Nurses who correctly answered above or equal to 70% of knowledge questions considered as having adequate knowledge on pain assessment in critically ill patients and those who correctly answered below 70% of knowledge questions considered as having inadequate knowledge(18).

Good practice: Nurses who correctly answered above or equal to 70% of practice questions considered as having adequate practice on pain assessment in critically ill patients but in the contrary, those who correctly answered below 70% considered as having poor practice(21).

4.7. Data collection procedure

4.7.1. Study instrument

A pre-tested self-administered semi structured questionnaire was used to collect data. The questionnaire was adapted from reviewed literatures(19,27). It was an instrument developed, piloted in five adult ICUs and re-evaluated by ten experts in pain, critical care and research methodology in Canada. The expert's rated the instrument's clarity, content validity and comprehensiveness. The researcher sought and received permission from the original author to use and modify the tool. The modification made includes changing the responses for the close-ended items about pain assessment practices from a Likert style to dichotomous format ('yes' and 'no'). The modification was to facilitate easy quantification of the variable (knowledge and practices) and generation of reliable responses from participants. The modified tool was pre-tested to ensure clarity and logical sequencing of the questions. The internal consistency reliability and content validity of the modified tool was also established.

4.7.2. Data quality control

One day training was provided to four data collectors and supervisors on the study instrument and data collection producers prior to the beginning of the study. Pretesting of the questionnaire was conducted by 5% of the samples two weeks prior to data collection in selected ICU Nurses at Debremarkos Referral Hospital to check the clarity, sequence, consistency and time required to fill the entire questionnaire. Day to day supervision was conducted for each data collectors by supervisor and principal investigator to see how the

data collection tools are used and filled questionnaires was checked for completeness, legibility and consistency.

4.7.3. **Data analysis and presentation**

The data was checked for completeness and unclear responses then coded and entered into the Epi Data version 4.2. It was exported and analysed using SPSS version 21 software. Descriptive statistics was used to summarize quantitative data. Then the results was presented in terms of tables and graphs and in percentages. Univariate analysis, bivariate and multivariate logistic regression was applied to identify associated factors of knowledge and practice of pain assessment in critically ill adult patients and variables with a p-value < 0.05 was considered statistically significant.

4.8. **Ethical consideration**

Ethical clearance to carry out the research was sought from the Addis Ababa University College of health science research standards and ethics committee. The research purpose, its benefits and the procedures were explained for each potential respondents. The respondents then were signed an informed consent and any respondent seeking further clarification was assisted. Any person unwilling to participate was not be forced to do so and any person wishing to withdraw at any time during the study will free to do so. Confidentiality and privacy was strictly maintained. Only the principal investigator and the research assistants were accessed the data.

5. RESULT

5.1. Sociodemographic Characteristics of Study Participants

There were a total of 111 respondents and 56(50.1%) were males. There were 7 nurses on annual leave during the study period and overall response rate was 91.73%. The mean age of respondents was 26.80 (SD ± 4.20) and median professional work experience was 2 years with interquartile range between 1 and 4. Majority of the respondents have educational level of bachelor's degree (82%).

Table 1: Sociodemographic characteristics of nurses in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

Sex		**Frequency**	**Percent**
	Male	55	49.5
	Female	56	50.5
	Total	111	100.0
Age			
	21-30	98	88.3
	31-40	13	11.7
	Total	111	100.0
Level of education			
	diploma nurse	11	9.9
	BSc nurse	91	82.0
	masters nurse	9	8.1
	Total	111	100.0
Marital status			
	Single	81	73.0
	Married	30	27.0
	Total	111	100.0
Religion			
	Orthodox	64	57.7
	Muslim	17	15.3
	Protestant	26	23.4
	Others	4	3.6
	Total	111	100.0

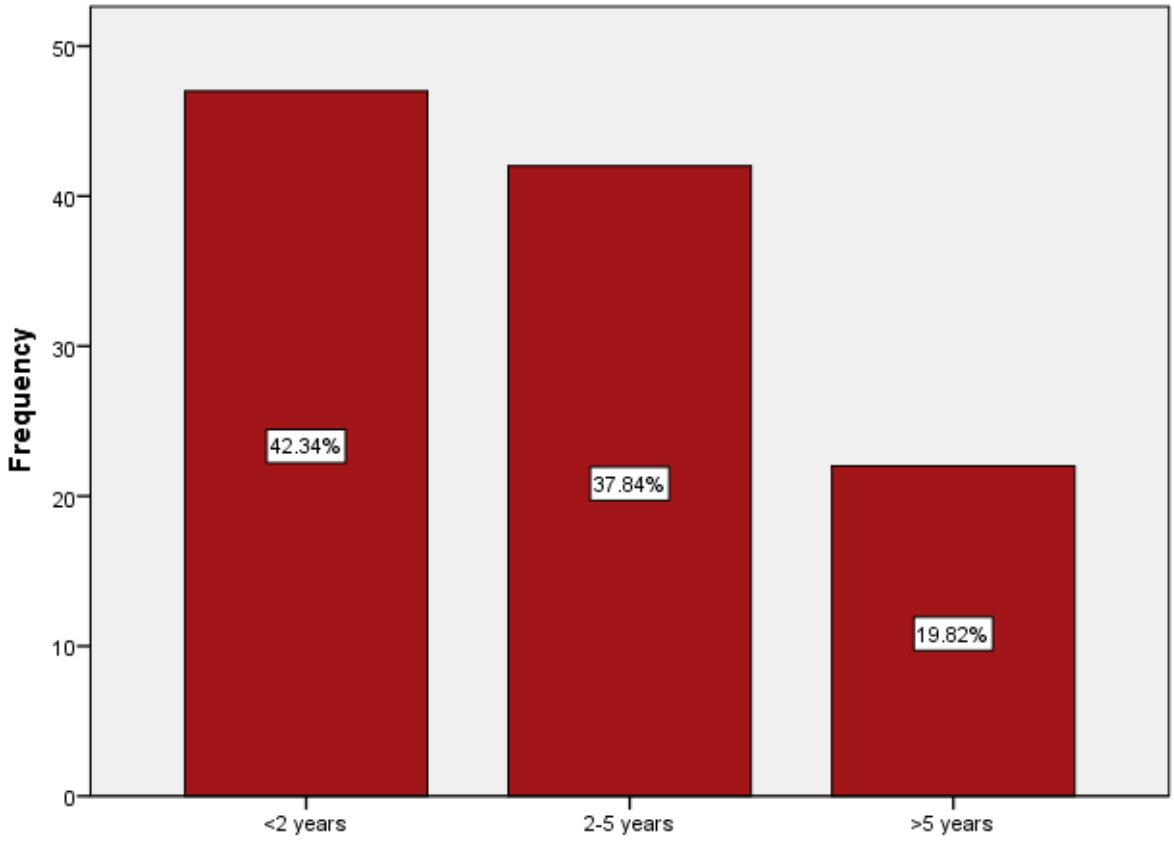

Figure 2: Year of professional working experience of nurses in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

5.2. Knowledge of nurses about key pain assessment principles

Among 111 respondents 38.7%, 17.1%, and 44.1% reported that accurate rating of pain intensity is by patients, doctors and nurses respectively.

Majority of nurses knew that pain assessment is necessary for postoperative patients (92.8%), medical (nun-surgical) patients (84.2%), patients with GCS<8 (70.3%), trauma patients (91%), burn patients (90.1%), end of life patients (65.8%), and patients receiving sedatives (64%).

Majority of nurses had adequate knowledge about the need of pre-empitive analgesia before pain inducing procedures like wound care (74.8%), invasive line placement (67.6%), and drain removal (54.1%). However, sizable number of nurses did not knew the need for pre-empitive analgesia before other pain inducing procedures like patient repositioning (50.5%), endotracheal suctioning (50.5%), and spontaneous breathing trial (64%).

Regarding behavioural indicators of pain for non-verbal patients, significant number of nurses knew that restlessness (92.8%), fighting/activation of ventilator alarms (86.5%), pulling of endotracheal tube (82.9%), and retraction of upper limbs (82%) are indicators of pain for non-verbal CIAPs.

Over-all mean knowledge score was 21.44±4.63 (71.46%). This indicates that nurses had adequate knowledge towards pain assessment for CIAPs which is >70%.

Table 2: Nurses' knowledge of pain assessment in CIAPs in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

Variables	Yes		No	
	Frequency	Percentage	Frequency	Percentage
For which of the following classifications of critically ill patients is pain assessment necessary?				
Post-operative patient	103	92.8%	8	7.2%
medical(non-surgical) patients	94	84.7%	17	15.3%
patients with GCS less than 8	78	70.3%	33	29.7%
trauma patients	101	91.0%	10	9.0%
burn patients	100	90.1%	11	9.9%
end of life patients	73	65.8%	38	34.2%
patients receiving sedatives	71	64.0%	40	36.0%
The need for pre-empitive analgesia is necessary prior to the following procedures				
patient repositioning	55	49.5%	56	50.5%
endotracheal suctioning	55	49.5%	56	50.5%
wound care	83	74.8%	28	25.2%
drain removal	60	54.1%	51	45.9%
invasive line placement	75	67.6%	36	32.4%
spontaneous breathing (weaning) trial	40	36.0%	71	64.0%
Which of the following behaviors are indicators of pain for critically ill nonverbal patients				
closing eyes	78	70.3%	33	29.7%
Rigidity	83	74.8%	28	25.2%
Vocalization	73	65.8%	38	34.2%
fighting/activation of ventilator alarms	96	86.5%	15	13.5%
Splinting	85	76.6%	26	23.4%
slow cautious movement	79	71.2%	32	28.8%
retraction of upper limbs	91	82.0%	20	18.0%
trying to climb out of bed	84	75.7%	27	24.3%
repetitive touching of area	87	78.4%	24	21.6%
pulling of ET tube	92	82.9%	19	17.1%
striking staff	80	72.1%	31	27.9%
resistance to passive movements	86	77.5%	25	22.5%
not following commands	69	62.2%	42	37.8%
Withdrawing	80	72.1%	31	27.9%
Guarding	79	71.2%	32	28.8%
Restlessness	103	92.8%	8	7.2%

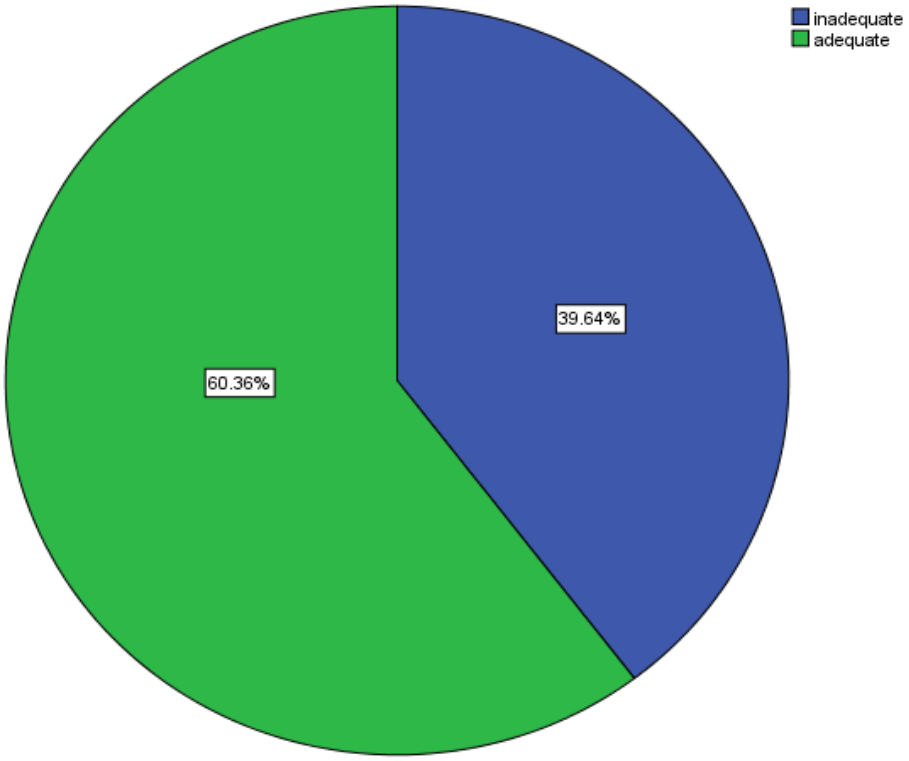

Figure 3: Pie chart showing percentage of nurses' knowledge about pain assessment in critically ill adult patients in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

5.3. Nurses' Practice of pain assessment for critically ill adult patients

Nurses who had ever used pain assessment tools for CIAPs who are able to self-report were 55.9% and 48.6%, 67.6% and 53.2% of, used pain assessment tools for CIAPs who are unable to self-report, discussed pain assessment and management during nurse-nurse reports and discussed pain scores during nurse-nurse reports respectively.

Table 3: Nurses' pain assessment practice in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

Variables	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Do you use pain assessment tool for patients able to communicate?	62	55.9%	49	44.1%
Do you use pain assessment tool for patients unable to communicate	54	48.6%	57	51.4%
Do you discuses pain assessment and management during nurse-nurse report?	75	67.6%	36	32.4%
Are pain scores discussed during nurse-nurse report?	59	53.2%	52	46.8%

Among nurses who use pain assessment tools for critically ill adult patients able to self-report (55.9%), half of them uses it sometimes and only 17.74 % of them were using pain assessment tools routinely. From those nurses who were using pain assessment tools for CIAPs who are unable to self-report, three-fourth (75.9%) of them were using it sometimes and only 9.3% were using it routinely.

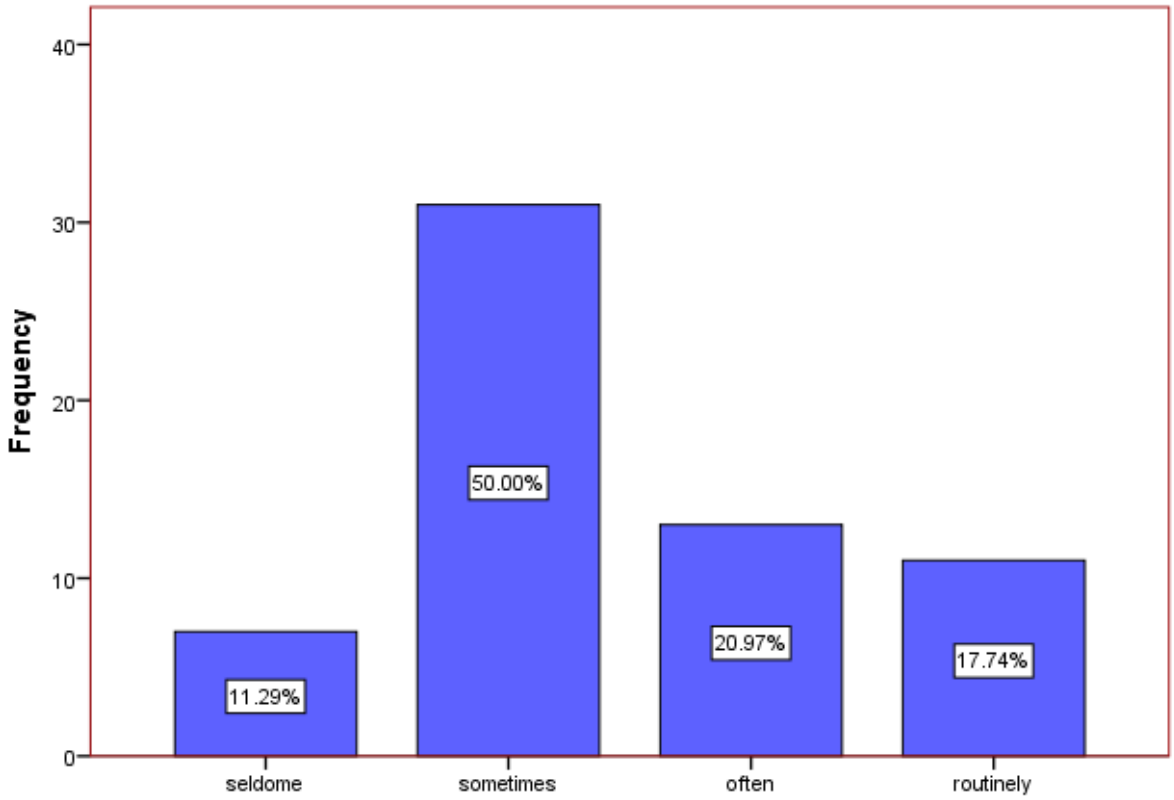

Figure 4: Frequency of using pain assessment tool by nurses for patients able to self-report in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

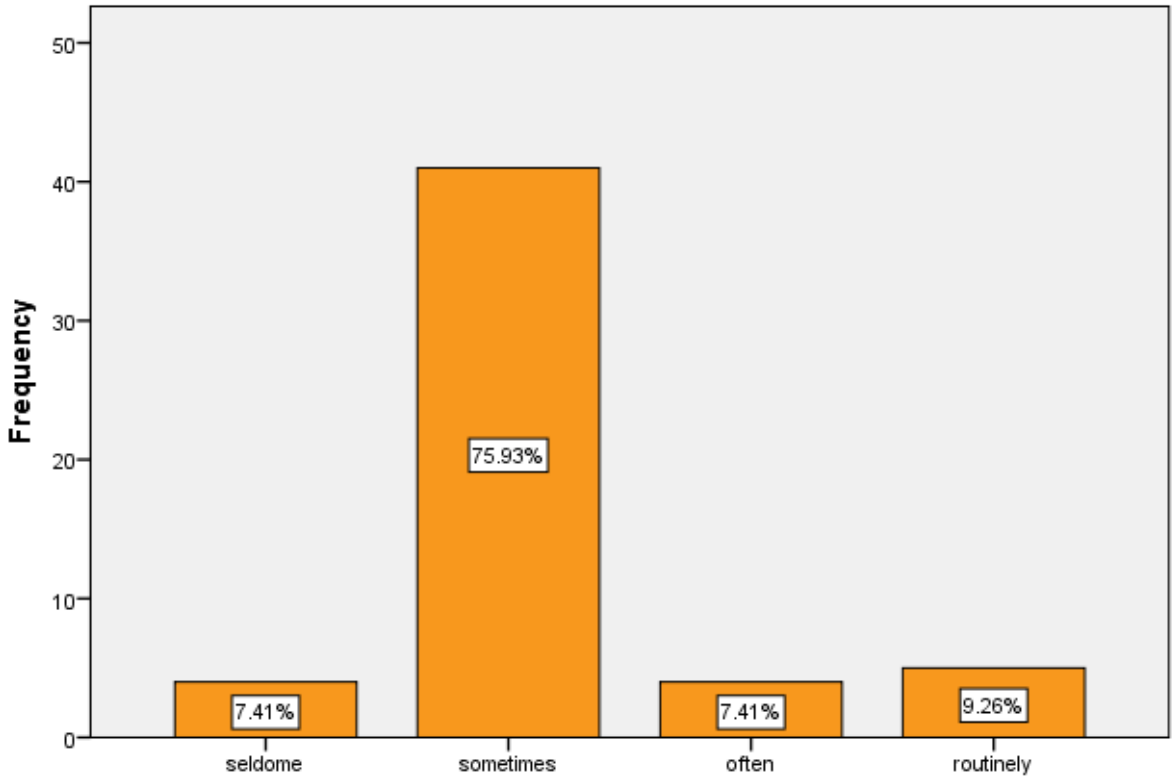

Figure 5: Frequency of using pain assessment tool by nurses for patients unable to self-report in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

From those nurses who were using pain assessment tools for patients able to self-report (55.9%), the tools used were 37%, 30.6% and 32.25% 0-10 numeric rating scale (NRS), Visual Analogue Scale (VAS) and Verbal Rating Scale (VAS) respectively. Nurses who were using pain assessment tools for CIAPs who are unable to self-report (48.6%) 83.33% and 16.67% used CPOT and BPS respectively.

Table 4: Types of pain assessment tools ever used by nurses in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

Which tools do you use for patients able to self-report	**Yes**	
	Frequency	**Percentage(N=62)**
0-10 NRS	23	37.00%
VAS	19	30.60%
VRS	20	32.25%
Total	62	100%
Which tools do you use for patients unable to self-report	**Frequency**	**Percentage(N=54)**
BPS	9	16.67%
CPOT	45	83.33%
Total	54	100%

Responses for open ended practice question about method of assessing pain for critically ill adult patients other than using pain assessment tools include:

- Looking for vital signs
- Looking patients facial expression
- Considering severity of cases/advanced procedures
- Fighting with machine
- Restlessness
- Gesture and verbalization
- Physiological changes
- Looking actions of the patients
- Behavioural changes
- Seeing patients response to touché

The over-all mean practice score were 2.25 ± 1.60 (56.25%). This indicates that nurses had poor practice towards pain assessment for CIAPs which is <70%.

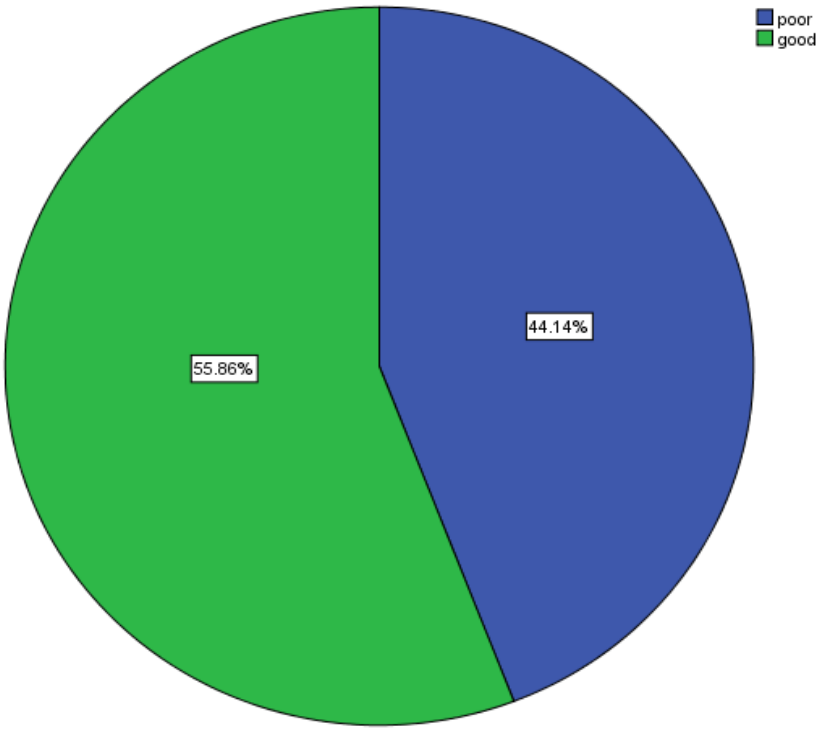

Figure 6: Pie chart showing percentage of nurses' practice of pain assessment for critically ill adult patients in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

Table 5: Perceived barriers to pain assessment and pain management by nurses in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

Variables	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Nursing Workload	57	51.4%	54	48.6%
Lack of availability of pain assessment tools	57	51.4%	54	48.6%
Lack of familiarity with assessment	56	50.5%	55	49.5%
Lack of training about pain assessment	57	51.4%	54	48.6%
Patient instability e.g. unstable hemodynamically	54	48.6%	57	51.4%
Patient inability to communicate	58	52.3%	53	47.7%
Lack of protocols/guidelines for pain	58	52.3%	53	47.7%
Low priority of pain of pain assessment by ICU team	60	54.1%	51	45.9%
No designated area of charting pain	62	55.9%	49	44.1%
Sedation interfering with pain assessment	55	49.5%	56	50.5%
Poor documentation of pain assessment	50	45.0%	61	55.0%

5.4. Factors affecting nurses' knowledge of pain assessment

In binary logistic regression analysis no significant association was observed between knowledge of nurses and sociodemographic characteristics like age, years of work experience and educational level.

Table 6: Predictors of nurses' pain assessment knowledge in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

		Knowledge			
		Adequate	***inadequate***	***COR***	***p value***
Age	21-30	60	38	1	
	31-40	7	6	0.739(0.231,2.366)	0.61
year of work experience	<2	27	20	1	
	2_5	25	17	1.089(0.468,2.536)	0.843
	>5	15	7	1.587(0.546,4.615)	0.396
Educational level	Diploma	7	4	1	
	BSc	55	36	0.873(0.238, 3.198)	0.838
	Masters	5	4	0.714(0.118(4.319)	0.714

5.5. Factors affecting nurses practice of pain assessment in critically ill patients

First bivariate binary logistic regression analysis was done to see the association between nurses' practice and sociodemographic characteristics as well as nurses' perceived barriers of pain assessment. Then variables with p value of ≤0.2 (year of work experience >5, nursing work load, patient instability, lack of protocols/guidelines, no designated area for charting pain, sedation interfering with pain assessment, poor documentation of pain assessment and knowledge of nurses) were entered to multivariable binary logistic regression.

Finally multivariable regression analysis showed that work experience >5 years, nursing workload, sedation interfering with pain assessment and nurses' knowledge were significantly associated with nurses' practice of pain assessment in critically ill adult patients.

The study revealed that nurses with working experience of >5 years were 80.6% less likely [OR= 0.194, CI= (0.41, 0.910)] to have good pain assessment practice in CIAPs, in the absence of nursing workload pain assessment practice will be improved by more than seven times [OR =7 .766, CI = (2.450, 24.617)], nurses practice pain assessment about seven times more [OR = 7.628, CI = (2.348, 24.778)] in non-sedated patients than sedated patients, nurses with adequate knowledge of pain assessment in CIAPs were about five times [OR = 5.219, CI= (1.673, 16.280)] good in practice than those with inadequate knowledge.

Table 7: Bivariate and Multivariate analysis on sociodemographic associated factors of nurses' pain assessment practices in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

Variables		***Practice***		***COR***	***AOR***	***p value***
		Good	***Poor***			
Age	21-30	56	42	1	1	
	31-40	6	7	0.643(0.201,2.054)		
year of work experience	<2	29	18	1	1	
	2-5	25	17	0.913(0.389,2.139)	1.294(0.388,4.319)	0.68
	>5	8	14	0.355(0.124,1.103)	0.194(0.41,0.910)**	0.038**
Educational level	Diploma	7	4	1	1	
	BSc	50	41	0.697(0.191,2.547)		
	Masters	5	4	0.714(0.118,4.319)		
Knowledge	Adequate	44	23	2.763(1.261,6.055)*	5.219(1.673,16.280)**	0.004**
	Inadequate	18	26	1	1	

Table 8: Bivariate and Multivariate analysis on perceived barriers of nurses' pain assessment practices in intensive care units of federally administered public hospitals, Addis Ababa, 2019.

Variables		Practice		COR	AOR	P value
		Poor	Good			
Nursing work load	Yes	38	19	7.818(3.304,18.500)*	7.766(2.450,24.617)**	0.001**
	No	11	43	1	1	
lack of availability of pain assessment tools	Yes	27	30	1.309(0.617,2.776)		
	No	22	32	1	1	
Lack of familiarity with assessment tools	Yes	26	30	1.206(0.569,2.553)		
	No	23	32	1	1	
Lack of training about pain assessment	Yes	28	29	1.517(0.714,3.226)		
	No	21	33	1	1	
Patient instability	Yes	32	22	3.422(1.561,7.506)*	2.117(0.678,6.606)	0.2
	No	17	40	1	1	
patient inability to communicate	Yes	25	33	0.915(0.432,1.938)		
	No	24	29	1	1	
Lack of protocols/guidelines	Yes	33	25	3.052(1.394,.683)*	1.984(0.576,6.833)	0.28
	No	16	37	1	1	
Low priority of pain assessment	Yes	24	36	0.693(0.326,1.437)		
	No	25	26	1	1	
no designated area of charting pain	Yes	36	26	3.834(1.705,8.662)*	1.166(0.305,4.452)	0.82
	No	13	36	1	1	
sedation interfering with pain assessment	Yes	33	22	3.750(1.699,8.279)*	7.628(2.348,24.778)**	0.001**
	No	16	40	1	1	
poor documentation of pain assessment	Yes	31	19	3.898(1.764,8.614)*	2.928(0.963, 8.902)	0.06
	No	18	43	1	1	

*significant at COR **significant at AOR

6. DISCUSSION

In this study the proportion of nurses who had adequate knowledge about pain assessment in CIAPs was found to be 60.4%. This finding indicate that more than half of nurses who are working in ICUs had adequate knowledge of pain assessment in CIAPs, a result in line with a study done in Uganda(18) (58.2%), and it is better than studies done in Cairo university hospital (93.3% had unsatisfactory knowledge), CHUK (a teaching university hospital in Kigali) which revealed 67.2% had no adequate knowledge(20,29), but lower than s study done in Bangladesh(84%)(28).

The above difference might be due to sample size and sociodemographic variations. For example in a study in Cairo university hospital majority of the respondents had educational level of diploma. However, in this study no significant associations were found between knowledge and educational level.

On this study the proportion of nurses who had good pain assessment practice for CIAPs was 55.9%. This result is higher than studies done in Cairo university hospital which indicated 95% of nurses had unsatisfactory practice, CHUK (a teaching university hospital in Kigali) which revealed 78% had low practice scores and in Ugandan hospital which indicated 76.5% had poor pain assessment practice(20,21,29).

The above discrepancies might be due to the reason that even though nurses in this study reported that they used pain assessment tools for patients able to self-report and unable to self-report (among questions scored for the calculation of overall practice), only 17.74% and 9.3% were using pain assessment tools routinely respectively.

Guidelines recommend that monitoring pain in all ICU patients be a routine part of practice through use of subjective (self-report) or objective (behaviour observation) pain assessment scales validated for ICU use(7,11). However, in this study, only about half of the respondents ever used pain assessment tool for patients able to self-report (55.9%) in line with Bangladesh study (58.5%)(28), contrary with Ugandan study(21) which showed 77.6% didn't use pain assessment tools. The result of this study is less than study done in Canada (89%)(16). This differences might be attributed to differences in ongoing professional education received, staffing, and presence of guidelines.

In this study only 48.6% of nurses ever used pain assessment tools for patients unable to self-report. Among the respondents who ever used pain assessment tools for patients unable to self-report, majority of them (75.9%) were using it sometimes (less than 50% of the time)

which is similar with a study done in Bangladesh (61.5%)(28). This might be due to lack of time, lack of training or skill gaps.

The most frequent pain assessment practice in this study was discussing pain assessment and management during nurse to nurse report (67.6%) which is similar with a study done in Ugandan hospital (76%) and Bangladesh (74.5%)(21,28). Least frequent pain assessment practice was using pain assessment tools for CIAPs unable to self-report. This might be due to lack of familiarity with tools and lack of training about pain assessment.

Majority of nurses who ever used pain assessment tools for patients able to self-report were using 0-10 numeric rating scale (37%) similar to that of Ugandan study which showed 12.4% out of 22.4% used numeric rating scales and Canadian study (98%)(16,21). This might be attributed to non-complexity and easiness of the tool.

This study revealed that nurses with working experience of >5 years were 80.6% less likely to have good pain assessment practice. This might be due to lack of interest/dissatisfaction with profession as year of work experience increases.

Knowledge about pain assessment principles was also another factor significantly associated with pain assessment practice. This might be due to the fact as knowledge increases application in to practice will be high.

Furthermore, nursing workload, similar with a study at Ugandan hospital, Cairo university hospital and CHUK (21,22,29), and sedation interfering with pain assessment practice similar with Ugandan hospital(22), were significantly associated with pain assessment practice of nurses in CIAPs. This might be due to the fact that workload interference with time needed for pain assessment and subjective nature of pain in which sedated patients couldn’t report their feeling of pain, hence difficult to obtain information about their pain.

7. LIMITATIONS OF THE STUDY

This is a cross-sectional study and might not show cause and effect relationship. Since this study was conducted by self-administered questions it wouldn't adequately explore practice of nurses due to the possibility of social desirability bias and could lead to over/under estimation. Attitude was not included in this study and might have an effect in poor practice of pain assessment.

8. CONCLUSION

Assessment of pain is as important as any assessment of the other body systems and many guidelines recommend that in terms of nursing practice, pain assessment tools should be combined into daily practice. The result of this study demonstrated that nearly above half of nurses had adequate knowledge of pain assessment. Even though this result is re-assuring, it is not adequate on top of the reason that pain is considered as the fifth vital sign. The overall pain assessment practice score of nurses was poor and nurses were not using pain assessment tools routinely. Nursing work load, knowledge of principles, year of working experience and sedation interfering with pain assessment were factors significantly associated with pain assessment practice.

9. RECOMMENDATION

- **For nurses:**
  - Nurses should put their knowledge in to practice
- **For hospital administrators**
  - Intensive care units should have to minimize nursing workload through adequate staffing
  - Ongoing training about pain assessment should be provided for ICU nurses
  - There should be protocols and guidelines for pain assessment in ICUS
- **For Department of emergency medicine**
  - The department should provide ongoing training and support for nurses about pain assessment in critically ill patients in collaboration with hospitals.
- **For Federal Ministry of Health**
  - FMOH is expected to emphasise the need for routine pain assessment and should have a system for monitoring and evaluation of pain assessment and management in ICU patients.
- **For researchers:**
  - It is better to conduct observational studies to explore practice of pain assessment adequately
  - It will be better if attitude is studied

10.REFERENCES

1. Williams AC de C, Craig KD. Updating the definition of pain. Pain. 2016;157(11):2420–3.
2. Treede R-D. The International Association for the Study of Pain definition of pain. PAIN Reports. 2018;3(2):e643.
3. Alderson SM, Mckechnie SR. Unrecognised , undertreated , pain in ICU : Causes , effects , and how to do better. 2013;2013(March):108–13.
4. Adam VN. Pain management in - critically ill patients. 2015;117(2):225–30.
5. Morton PG, Fontaine DK. Essentials of critical care nursing: A holistic approach. Essentials of Critical Care Nursing: A Holistic Approach. 2012. 1–509 p.
6. Rasmi Issa M, Awaje H AM, Khraisat FS. Knowledge and Attitude about Pain and Pain Management among Critical Care Nurses in a Tertiary Hospital. J Intensive Crit Care. 2017;03(01):1–6.
7. Puntillo K. Pain Assessment and Mnagement for Intensive Care Unit Patients. 2016;16(4).
8. Georgiou E, Hadjibalassi M, Lambrinou E, Andreou P, Papathanassoglou EDE. The Impact of Pain Assessment on Critically Ill Patients ' Outcomes : A Systematic Review. 2015;2015.
9. Edra F, Mpharm JJ. Analgesia in intensive care : part 1. 2016;16(June 2015):72–8.
10. Zeggwagh AA, Abidi K, Abouqal R. Validation of a Behavioral Pain Scale in Critically Ill, Sedated, and Mechanically Ventilated Patients Youne`s. 2005;(11):1470–6.
11. Gélinas C. AACN Practice Alert Assessing Pain in Critically Ill Adults. 2018;38(6):13–6.
12. Arbour C, Choinière M, Topolovec-vranic J, Loiselle CG, Gélinas C. Can Fluctuations in Vital Signs Be Used for Pain Assessment in Critically Ill Patients with a Traumatic Brain Injury ? 2014;2014.
13. Puntillo KA, Max A, Timsit JF, Vignoud L, Chanques G, Robleda G, et al. Determinants of procedural pain intensity in the intensive care unit: The Europain®

study. Am J Respir Crit Care Med. 2014;189(1):39–47.

14. Batiha A-M. Pain Management Barriers in Critical Care Units : A Qualitative study Pain management barriers in critical care units : A qualitative study. 2014;(December).

15. Carrillo-torres O, Ramirez-torres MA, Mendiola-roa MA. Update on the assessment and treatment of pain in. Rev Médica del Hosp Gen México. 2016;79(3):165–73.

16. Hons B, Cncc C, Burry L, Mcgillion M. Critical Care Nurses' Pain Assessment and Management Practices: A Survey in Canada. 2012;21(4):251–9.

17. Park J, Ph D, Kim JH. Assessment and Treatment of Pain in Adult Intensive Care Unit Patients. 2014;29(3):147–59.

18. Betty I, Kanaabi J, Kohi TW, Chalo R. Nurses' knowledge of the principles of acute pain assessment in critically ill adult patients who are able to self-report Irene. Int J Africa Nurs Sci. 2016;4(March):20–7.

19. Rose L, Smith O. Critical Care Nurses' Pain Assessment and Management Practices: A Survey in Canada. 2012;(January 2015).

20. Youssef W, Samy R. Critical Care Nurses ' Knowledge and Practice Regarding Administration of Selected Positive Inotropics at Cairo University Hospitals. J Nat Sci Res. 2014;4(2):90–100.

21. Kizza B, Muliira K. Nurses ' pain assessment practices with critically ill adult patients. 2015;(Sessler 2009):573–82.

22. Kizza IB, Sciences A. Nurses ' Knowledge and practices related to pain Assessment in Critically Ill Patients at Mugalo Hosptal , Uganda. 2012;(November).

23. Pollmann-mudryj MA, Mcfarlan AW, Topolovec-vranic J, Pollmann-mudryj MA. Patient Satisfaction and Documentation of Pain Assessments and Management After Implementing the Adult Nonverbal Pain Scale. 2010;19(4).

24. Ain SELFEP. Behavioral Pain Assessment Tool For Critically Ill Adults Unable To Self-Report Pain. 2013;22(3):246–54.

25. Patient A, Page C. Pain Assessment In Nonverbal Patients. AJCC Patient Care Page. 2013;22(3):255–6.

26. McCaffery M. Nurses ' Knowledge of Pain Assessment and Management : How Much

Progress Have We Made ? 1997;14(3):175–88.

27. Kizza NIB, Muliira JK. Acute pain assessment among critically ill adult patients : Nurses ' knowledge , practices , and perceived barriers. 2016;5339.

28. Chowdhury ABMA, Mondol S, Muhammad F, Chowdhury ABMA, Mondol S, Muhammad F. Nurses ' knowledge and practices related to pain assessment in critically ill patients in a selected private hospital in Bangladesh. Int J Community Med Public Heal Mondol S al Int J Community Med Public Heal. 2018;5(10):4219–24.

29. Louise TM. Assessment Of Nurses' Knowledge And Practices Towards Pain Assessment In Critically Ill Patients At Chuk. 2017;

30. Hellen KW. Practices of Nurses in Management of Pain among Critically Ill Non-Verbal Adult Patients in the Critical. 2012;

31. Onwong ' IGM. Nurses' Knowledge Related To Pain Assessment for Critically Ill Patients at a Public Sector Hospital in Johannesburg. 2014.

11.ANNEX

Annex I. Consent form: -

This questionnaire is prepared to assess the knowledge, practice and associated factors of pain assessment in critically ill adult patients among ICU nurses in federally administered hospitals of Addis Ababa city, Ethiopia, 2019. The assessment is made for the partial fulfilment of Master's Degree in Emergency Medicine and Critical Care Nursing. The results of the study will be used as base line information to design appropriate intervention strategies to increase health workers capacity of pain assessment ICUs hospitals. The questionnaire contains closed ended questions and will be provided in self-administered form. You are therefore kindly requested to provide genuine answers to the questions. The information you provide is confidential and is used only for the purpose of this study. If you have any question, don't hesitate to ask the data collector. Your cooperation and participation until the completion of the questionnaire is very necessary for the successful completion of the assessment. We therefore ask your genuine willingness. However, you have the right to turn down if you are not voluntary to participate fill -No" in the box below.

If you are voluntary Yes No

Thank you in advance for your cooperation

Data collectors Name_____ sign: _____

Investigators address: Tel-+251-918650653

Email address- teme31722@gmail.com

Annex II. Questionnaire

Addis Ababa University, College of Health Sciences, School of Medicine, Graduate Studies.

Questionnaire ID No_____

Date_____

I. Demographic data

Code	Questions	Category	Remark
101	Sex	1. Male 2. Female	
102	Age	___years	
103	Marital status	1. Single 2. Married 3. Divorced 4. Widowed	
104	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Other (specify)……	
105	Level of education qualification	1. Diploma nurse 2. BSc nurse 3. Masters nurse 4. Others(specify)____	
106	Professional working experience	_____years	
107	Name of hospital you are working now	_____	

II. Knowledge of nurses about pain assessment for critically ill adult patients

Code	Question	Category	Remark
201	Who provides the most accurate rating of pain intensity? (Please select only one response)	1. Patients 2. Doctor 3. Nurses 4. Relatives	
Assessment of pain is necessary for the following classifications of critically ill patient?			
202	Post-operative patient	1. Yes 2. No	
203	Medical (nonsurgical) patients	1. Yes 2. No	

204	Patients with a Glasgow Coma Scale less than 8	1. Yes 2. No	
205	Trauma patients	1. Yes 2. No	
206	Burns patients	1. Yes 2. No	
207	End-of-life patients	1. Yes 2. No	
208	Patients receiving sedatives	1. Yes 2. No	
Assessment of the need for pre-emptive analgesia is necessary prior to following Procedures?			
209	Patient repositioning	1. Yes 2. No	
210	Endotracheal suctioning	1. Yes 2. No	
211	Wound care	1. Yes 2. No	
212	Drain removal	1. Yes 2. No	
213	Invasive line placement	1. Yes 2. No	
214	Spontaneous breathing (weaning trial)	1. Yes 2. No	
Which of the following behaviors are indicators of pain in critically ill non-verbal patients?			
215	Closing eyes	1. Yes 2. No	
216	Rigidity	1. Yes 2. No	
217	Vocalization	1. Yes 2. No	
218	Fighting ventilator/activation of Alarms	1. Yes 2. No	
219	Splinting	1. Yes 2. No	
220	Slow cautious movements	1. Yes 2. No	
221	Retraction of upper limbs	1. Yes 2. No	
222	Trying to climb out of bed	1. Yes 2. No	
223	Repetitive touching of area	1. Yes 2. No	
224	Pulling of ET tube	1. Yes 2. No	
225	Striking staff	1. Yes	

		2. No	
226	Resistance to passive movements	1. Yes 2. No	
227	Not following commands	1. Yes 2. no	
228	Withdrawing	1. Yes 2. No	
229	Guarding	1. Yes 2. No	
230	Restlessness	1. Yes 2. No	

III. The following questions relate to pain assessment practices for ALL critically-ill patients

Code	**Questions**	**Category**	**Remark**
301	Do you use pain assessment tool for patients able to communicate?	1. Yes 2. No	**If no go to Q 305**
302	If **yes** to **Q302**, How frequently do you use pain assessment tools for patients able to self-report	1. Seldom (1-25%) 2. Sometimes (26-50%) 3. Often (51-75%) 4. Routinely (>75%)	
303	If YES to **Q 302** please identify the tool(s) you currently use (**indicate all that apply**)	1. 0-10 Numerical rating scale (NRS) 2. Visual Analogue Scale (VAS) 3. Verbal Rating Scale (VRS) 4. others(specify)__ _____ _____	
304	Do you use pain assessment tool for patients unable to communicate?	1. Yes 2. No	**If no go to Q 307**
305	If y**es** to **Q 305,** How frequently do you use pain assessment tools for patients able to self-report	1. Seldom (1-25%) 2. Sometimes (26-50%) 3. Often (51-75%) 4. Routinely (>75%)	
306	If **YES Q 305**, please identify the tool(s) you currently use (**indicate all that apply**)	1. Behavioral Pain Scale (BPS) 2. Critical-Care Pain Observation Tool (CPOT) 3. Others(specify)__ _____ _____	

307	If you do not use pain assessment tool, please describe your method of assessing pain for critically ill adult patients?	....	
308	Do you discuses pain assessment and management during nurse-nurse report?	1. Yes 2. No	
309	Are pain scores discussed during nurse-nurse report?	1. Yes 2. No	

IV. Factors affecting pain assessment in critically ill adult patients

Code	Questions	Category	Remark
401	Nursing Workload	1. YES 2. NO	
402	Lack of availability of pain assessment tools	1. YES 2. NO	
403	Lack of familiarity with assessment tools	1. YES 2. NO	
404	Lack of training about pain assessment	1. Yes 2. No	
405	Patient instability e.g. unstable hemodynamically	1. YES 2. NO	
406	Patient inability to communicate	1. YES 2. NO	
407	Lack of protocols/guidelines for pain assessment	1. YES 2. NO	
408	Low priority of pain of pain assessment by ICU team	1. YES 2. NO	
409	No designated area of charting pain	1. YES 2. NO	
410	Sedation interfering with pain assessment	1. YES 2. NO	
411	Poor documentation of pain assessment	1. YES 2. NO	

Thanks for your cooperation!!!