

# The Practice of Nurses and Associated Factors towards Pain Assessment in Critically Ill Adult Patients in Referral Hospitals of Amhara Region, Ethiopia, 2019

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## Abstract

**Background:** Pain is quite a predominant problem in critically ill patients. Failure to assess and relieve pain results in multisystem effects that weaken a patient's recovery and discharge time. Nurses play a crucial role in the assessment, relief and evaluation of pain by realizing subjective responses from the patient.

**Methods:** Institution based quantitative cross-sectional study design was conducted among nurses working in units where adult critical patients get care. Data were collected using self-administered questionnaire and entered in Epi data version 3.1 software, exported to statistical product and service solution version 25 for analysis. Bivariable and multivariable logistic regression analysis were carried out. Variables having p value <0.05 were interpreted as having statistically significant association and the magnitude was displayed by adjusted odds ratio with 95% confidence interval.

**Results:** A total of 422 Nurses participated in this study and, 241(57.1%) (95% CI= (52%-62%)) had inadequate pain assessment practices. Knowledge of behaviors indicative of pain [AOR=2.38; 95% CI= (1.55-3.65)], work experience [AOR=1.67; 95% CI= (1.08-2.60)], lack of familiarity to pain assessment tools [AOR= 1.76; 95% CI= (1.13-2.72)], low priority given to pain assessment [AOR=2.08; 95% CI= (1.27-3.41)] and lack of protocols and guidelines [AOR= 2.18; 95% CI = (1.33-3.55)] were significantly associated with pain assessment practices at p-value <0.05.

**Conclusion:** This study revealed that pain assessment practice was found inadequate in referral hospitals of Amhara region. Inadequate knowledge of behaviors indicative of pain, lack of guidelines and protocols, low prioritization given to pain assessment and lack of familiarity with pain assessment tools were significantly associated with inadequate pain assessment practices in critically ill adult patients

**Keywords:** Practice, Pain, Assessment, Nurses, Critically ill.

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## Introduction

According to International Association for the Study of Pain (IASP), 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 is an unpleasant human experience, often accompanying with underlying medical conditions, and a key reason for individuals to seek medical

advice [2]. Maintaining an optimum level of comfort for critically ill patients is a universal goal for health professionals because pain is one of the major experiences that can minimize patients' comfort [3].

Acute pain is one of the most common stressful experiences among critically ill adult patients due to pre-existing diseases, trauma and routine care procedures [4], pain experienced during repositioning, invasive nursing procedures and endotracheal

suctioning [5] and is usually rated as moderate to severe in intensity. In addition, existence of sources such as inserting and removal of urinary catheter, nasogastric tube, chest tubes, tracheal suctioning, invasive lines (arterial and venous catheter), suture removal, routine nursing care and nursing care procedures such as wound drain removal, bathing, massage of back and pressure points, sheets change and repositioning [6,7] creates and aggravates a patient's experience of pain.

Pain affects most of critically ill patients and results in serious consequences that impact on the patient's quality of life [8]. Reports show that pain is prevalent in more than 75% of critically ill patients [9-11].

Regardless of numerous years of research, pain is quiet a substantial problem for critically ill patients during the course of their stay. Under diagnosed pain has been resulted to a number of adverse consequences including increased infection rate, prolonged mechanical ventilation, hemodynamic instabilities, delirium and compromised immunity [12]. It also produces adverse psychological and physiological response that includes increased heart rate, blood pressure, respiratory rate, neuroendocrine secretion and psychological distress. Failure to assess and relieve pain produces lengthy stress state, which can result in damaging multisystem effects and can therefore weaken a patient's recovery and discharge [11].

Assessment of pain and its severity is required not only to deliver satisfactory pain relief, but also to decrease overtreatment of pain and associated adverse events [13]. Pain may not be recognized and managed if poorly assessed. This result in sympathetic activation due to pain and can have negative effects on the cardiovascular, gastrointestinal, and renal systems, predisposing patients to events such as cardiac ischemia and ileus. Unrelieved pain decreases patient mobility, resulting in complications such as deep vein thrombosis, pulmonary embolus and pneumonia resulting in further stay in health institutions and more cost [14]. It can also result in harmful physiological and psychological effects on the patients. These effects include reduced wound recovery, increased metabolic rate and cardiac output, increased production of cortisol, increased retention of fluids, and the risk of developing chronic pain [15].

While adequate pain control is a basic human right [16], a number of factors hinder the management of pain in the critically ill patient. One of which is inadequate pain assessment; the first step in providing adequate pain relief for critically ill patients. Various disciplines are involved in pain assessment; nonetheless, nurses play a crucial role in the assessment, relief and evaluation of pain by attaining subjective responses from the patient using verbal set of questions, and also objectively observing nonverbal actions like facial expressions of the patients. For this, knowledge on behaviors the patient experience and elements of a variety of different tools and using them is required according to the condition of the patient [17]. However, globally, many nurses in general practice settings had inadequate knowledge about behaviors critical patient in pain experiences and basic pain assessment principles which impede practice of pain assessment [18].

Although pain is obvious in critically ill adult patients and there is a gap in nurses' practice as evidenced by few studies in developing countries, in Ethiopia in the extent of my search, no study was available that shows the exact magnitude about practices of nurses' towards pain assessment among critically ill adult patients. Hence, this study aimed to provide input in drawing the attention of health care professionals, especially nurses, to have good pain assessment practice and using pain assessment tools in day to day patient care.

## Methodology

Institution based quantitative cross-sectional study design was used. It was conducted in public referral hospitals of Amhara region (Debre Markos, Debre Birhan, Dessie, Felege Hiwot and Gonder University) among randomly selected nurses working in units where adult critical patients get care from March 1/2019 to March 30/2019.

### Sample size calculation

The sample size of the study was calculated using both single and double population formula. The largest sample size which was calculated by single population proportion formula (384) was taken. Then, by Adding 10% nonresponse rate, the final sample size (Nf) required for this study was 422 and then it was proportionally allocated to each referral hospital and units.

### Operational definitions

**Critically ill patients-** are defined as those patients who are at high risk for actual or potential life threatening health problems and who requires intense and watchful nursing care [19].

**Patient unable to communicate-** Any critically ill patient who cannot communicate their health needs for example presence and intensity of pain, either due to sedation, mechanical ventilation, altered level of consciousness or cognitive impairment and patients at end of life [20].

**Adequate knowledge-** Nurses who correctly answered above or equal to 70% of knowledge questions on pain indicator behaviors considered as having adequate knowledge.

**Inadequate knowledge-** Nurses who correctly answered below 70% of knowledge questions on pain indicator behaviors considered as having inadequate knowledge [21].

**Adequate practice-** Nurses who correctly answered above or equal to 60% of practice questions considered as having adequate practice on pain assessment in critically ill patients.

**Inadequate practice-** Nurses who correctly answered below 60% considered as having inadequate practice [22].

### Study variables

**Dependent variables:** Nurses' pain assessment practice

**Independent variables:** Socio-demographic related factors: Age, sex, marital status, qualification, years of work experience, working unit, years of unit experience and monthly income (salary).

**Patient related factors:** Patient inability to communicate and

patients' instability (e.g. hemodynamic instability i.e. decreased BP and increased pulse)

**Health Care Provider Related Factors:** previous poor documentation of pain, nursing workload, lack of familiarity with pain assessment tools and knowledge of behaviors indicative of pain in critically ill adult patients.

**Organizational Factors:** Lack of availability of pain assessment tools, lack of guideline/protocols, lack of designated area for charting pain and low prioritization to pain assessment

### Description of study tool

Data was collected using semi structured, pretested questionnaire that was originally developed in Canada to measure nurses' pain assessment practice in critically ill patients [23]. 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 facilitated easy quantification of the variable and generation of reliable responses from participants. The modified tool was pre-tested and ensured the clarity as well as the logical sequence of the questions. The appearance of the tool in terms of feasibility, readability, consistency of style and formatting, the likelihood the target audience would be able to answer the questions, appears to be appropriate to the study purpose and content area and the clarity of the language used was evaluated by five experts in nursing academic, research and clinical area. As a result some modification was done accordingly. The internal consistency reliability of the modified tool was also established. The overall Cronbach's alpha of the modified tool was 0.84. The data were collected by two diploma nurses with one BSc degree nurse supervisor in each study area. Training was given for a day on the objective, relevance of the study, informed consent and confidentiality of information.

### Data collection procedures

The study was reviewed and approved by the Research and Ethics committees of Debre Markos University college of Health Sciences. After obtaining approval to conduct the study, meetings were held with managers/chief clinical officers/quality unit officers/ nurse in-charges of each referral hospital to explain the study purpose and procedures. After getting written and signed permission letter given to conduct the study, the data collectors approached nurses for recruitment into the study. The nurses who participated were given explanations of the study purpose before requesting them to provide consent to participate in the study. The questionnaire was given for nurses who consented to participate in the study. To limit interruption of patient care, the participants were asked to complete the study questionnaire during their break time. The returned questionnaires were immediately checked for completeness and clarifications were sought whenever necessary before the participant left.

### Data quality control

The data collection tool was pretested at Enjibara General Hospital with 21 participants working in the selected units prior to the actual data collection started. The principal investigator

gave one day training for data collectors and supervisors about the data collection tool and procedures in the data collection. Each questionnaire was reviewed and checked for completeness, accuracy and consistency of the collected data and immediate measures was taken accordingly.

### Data processing and analysis

First data on the questionnaires were checked for completeness, coded and entered into Epi Data version 3.1. After finishing data entry, it was exported to SPSS version 25.

The exported data were cleaned, recoded, and computation was performed for knowledge and practice questions. Descriptive analysis was used to summarize the demographic characteristics of the study participants. The results were presented in text, frequency tables and graphs. Before regression analysis, data was checked for multicollinearity problem with variance inflation factor. Goodness of fit was checked with Hosmer and Lemeshow model of fit ( $p=0.80$ ). Bivariable and multivariable analysis was performed. The factors considered were socio demographic characteristics, patient related factors, health care related factors and organizational factors.

Binary logistic regression model was used to see the association between each independent variable and the dependent variable. All variables with a  $p\text{-value}\leq 0.25$  in the bivariable logistic regression analysis were entered into multivariable logistic regression model and backward likely hood ratio variable selection method was used for controlling confounders, further analysis and to identify variables having significant association with the dependent variable. Adjusted odds ratio with 95% confidence interval was used to determine the strength of association between dependent and independent variables both in the case of bivariable and multivariable logistic regression analyses. Variables having a  $p\text{-value}<0.05$  in multivariable logistic regression model were considered as statistically significant.

### Ethical considerations

First, ethical clearance letter was obtained from Debre Markos University Institutional Health Research Ethics Review Committee (IHRERC). Official letters of cooperation were written for each hospital to obtain their cooperation in facilitating the study. Permission letter obtained from the selected hospitals administrative bodies was given to unit coordinators. Information on the study was explained to the participants, including the procedures, rights, potential risks, and benefits of the study. Informed consent was obtained from all respondents prior to the data collection and the privacy and confidentiality of the respondents was ensured by excluding the name on the questionnaire. No other person except the data collection facilitators and the research team members had access to the filled questionnaires.

## Results

### Socio demographic characteristics of participants

Four hundred twenty two nurses were participated in this study.

From the total nurses, 221(52.4 %) were male. The median age of the respondents was 28 (IQR 26-30) (min age of 20 and max age of 52) and nearly two third (64.7%) of them were grouped under the age group of 20-29. On the subject of the participants' marital status, more than half, 240 (56.9%) were married and, 178 (42.2%) were single.

Regarding educational status of nurses, majority of them (75.1%) were BSc nurses and one third (32.9%) of them were working in emergency OPD.

Almost half (49.8%) of the nurses participated in this study had work experience from two to five years working in the health institution as a nurse. Related to experience in a specific working unit (ward), 83.4% of them had a unit work experience less than two years. More than half (52.1%) of nurses get monthly salary in Ethiopian birr ranging from 3969 to 5309 (Table 1).

### Nurses' knowledge of behaviors indicative of pain in critically ill patients

Two third of nurses (65.9%) had inadequate knowledge about the behaviors that critically ill patients experience while in pain. Most of the nurses considered crying (vocalization) (85.3%), restlessness (82.7%) as indicator of pain while the rest considered

**Table 1** Socio demographic characteristics of nurses' working in Referral Hospitals of Amhara Region, Ethiopia, 2019 (N=422).

Variable	Category	Frequency	Percent
Sex	Male	221	52.4
	Female	201	47.6
Age	20-29	273	64.7
	30-39	133	31.5
	>39	16	3.8
Marital status	Single	178	42.2
	Married	240	56.9
	Divorced	3	0.7
	Widowed	1	0.2
Qualification	Diploma	56	13.3
	Bsc degree	317	75.1
	Degree in ECCN	29	6.9
	Degree in SNS	12	2.8
	Master and above	8	1.9
Ward (Working Unit)	Medical ward	106	25.1
	Surgical ward	121	28.7
	Adult ICU	56	13.3
	Emergency OPD	139	32.9
Work experience as a nurse	<2 years	52	12.3
	2-5 years	210	49.8
	>5 years	160	37.9
Unit experience	<2 years	352	83.4
	2-5 years	60	14.2
	>5 years	10	2.4
Salary	2628-3968 ETB	76	18
	3969-5309 ETB	220	52.1
	5310-6650 ETB	83	19.7
	6651-7991 ETB	24	5.7
	7992-9332 ETB	19	4.5

guarding of body (70.9%) and grimacing (65.6%) as behaviors experienced by critically ill patients as indicative of pain (Table 2).

### Nurses' pain assessment practices in critically ill adult patients

All nurses participated in this study reported each of the activities they did while caring for critically ill adult patients. Overall, 241(57.1%) (95% CI= (52%-62%)) of the respondents had inadequate pain assessment practice in critically ill adult patients.

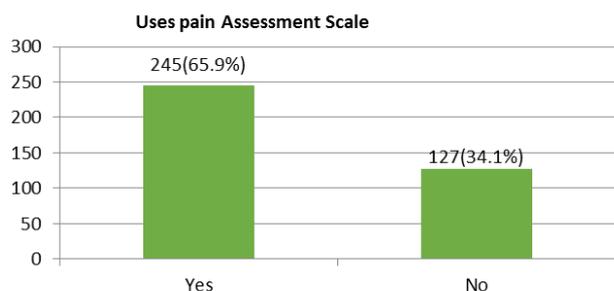
### Pain assessment practices related to use of pain assessment tools for critically ill patients who are able to communicate

Of the 422 nurses, most of them (88.2%) reported that they did assessment for pain among critically ill adult patients who are able to report pain. From those who assessed for pain, almost two third of them (65.9%) used pain assessment tools. Responses to an open-ended question on the methods they used if they do not use pain assessment scales revealed that they assess by asking intensity of pain, patient observation of behavioral changes, based on the medical diagnosis of the patient, examining for tenderness, patient complain and using physiological indicators such as increase in vital sign measurement (Figure 1).

From nurses who used pain assessment tools, 161(65.7%) of

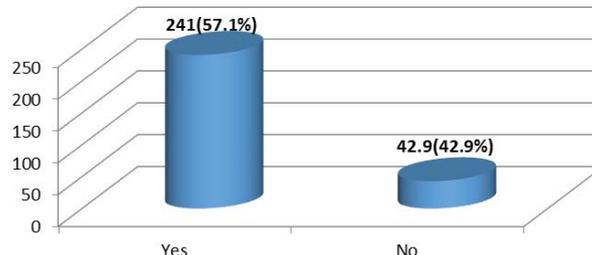
**Table 2** Nurses' response for behaviors suggestive of pain in critically ill adult patients in Referral Hospitals of Amhara Region, Ethiopia, 2019(N=422).

Variables/Behaviors suggestive of pain	Response	Frequency (%)
Vocalization/crying	Yes	360 (85.3%)
	No	62 (14.7%)
Brow lowering/Frowning	Yes	186 (44.1%)
	No	236 (55.9%)
Grimacing	Yes	277 (65.6%)
	No	145 (34.4%)
Clenching fists/teeth	Yes	229 (54.3%)
	No	193 (45.7%)
Trying to climb out of bed	Yes	204 (48.3%)
	No	218 (51.7%)
Retraction of upper limbs	Yes	192 (45.5%)
	No	230 (54.5%)
Repetitive touching of area of body	Yes	230 (54.5%)
	No	192 (45.5%)
Seeking attention through movements	Yes	209 (49.5%)
	No	213 (50.5%)
Attempting to sit up	Yes	179 (42.4%)
	No	243 (57.6%)
Resistance to passive movements	Yes	209 (49.5%)
	No	213 (50.5%)
Not following commands	Yes	191 (45.3%)
	No	231 (54.7%)
Guarding of body	Yes	299 (70.9%)
	No	123 (29.1%)
Restlessness	Yes	349 (82.7%)
	No	73 (17.3%)

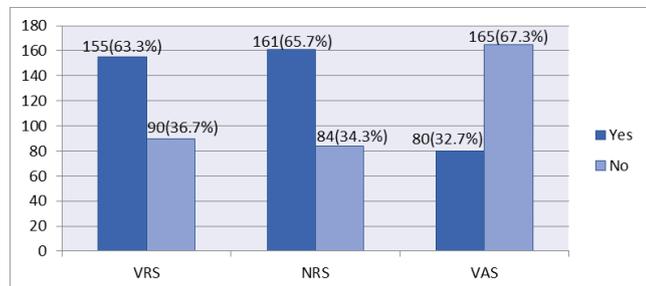


**Figure 1** Frequency distribution of nurses by whether they use tools during pain assessment or not in critically ill patients who are able to communicate in Referral Hospitals of Amhara Region, Ethiopia, 2019.

Assess pain in patients unable to communicate



**Figure 3** Frequency distribution of nurses' weather they assess pain or not in critically ill patients who are unable to communicate in Referral Hospitals of Amhara Region, Ethiopia, 2019.



**Figure 2** Frequency distribution of nurses by type of pain assessment tools they used in critically ill adult patients who are able to communicate; in Referral Hospitals of Amhara Region, Ethiopia, 2019.

them use numerical rating scale (NRS). Near half, 114 (46.5%) of them used it sometimes and few of them, 45 (18.4%) used routinely (**Figure 2**).

### Pain assessment practices related to use of pain assessment tools for critically ill patients who are unable to communicate

From the total 422 nurses, 241(57.1%) reported that they assessed for pain among adult patients who are unable to report pain. From nurses who assessed for pain, 111(46.0%) used pain assessment tools. Replies to an open-ended question on the methods they used to assess pain in patients unable to communicate if they do not use pain assessment scales shown that they assess pain by asking attendants, observations of behavioral changes like crying, facial expression, grimacing and restlessness; using vital sign derangements and instabilities; and based on the medical diagnosis of the patient (**Figure 3**).

Among the respondents who report as they used pain assessment scales, 78(70.3%) of them use behavioral pain scale while the remaining 33(29.7%) used critical care pain observation tool. The participants who used assessment tools were not regularly utilizing them during patient care and 40.5% of them used sometimes.

### Pain assessment practices in all critically ill patients

An acute pain assessment practice that was mostly performed by

nurses in patients who are able to and unable to communicate was assessing analgesics need before wound care (73.7%).

Assessing analgesics need before patient repositioning (36.3%) was among the practice that was less performed (**Table 3**).

### Factors associated with pain assessment practices in critically ill adult patients

Sex, qualification, working unit, work experience and salary were socio demographic factors that were associated with pain assessment practice in critically ill adult patients in bivariable logistic regression analyses. Other associated factors include knowledge of nurses regarding behaviors indicative of pain, lack of familiarity to pain assessment tools, lack of protocols and guidelines and low prioritization to pain assessment by the unit.

In multivariable logistic regression analysis, nurses work experience, knowledge of behaviors indicative of pain in critically ill adult patients, lack of protocols and guidelines, lack of familiarity to pain assessment tools and low priority given to pain assessment found to be statistically significant variables.

Accordingly, Nurses who had a work experience of two to five years were 1.67 times [AOR=1.67; 95% CI= (1.08-2.60)] more likely to experience inadequate pain assessment practices compared to nurses who had a work experience of more than five years.

Nurse professionals who had inadequate knowledge of behaviors that are indicative of pain in critically ill patients were 2.38 times [AOR=2.38; 95% CI=(1.55-3.65)] more likely to practice pain assessment inadequately and those nurses who faced lack of protocols and guidelines regarding pain assessment in critically ill adult patients were 2.18 times [AOR=2.18; 95% CI =(1.33-3.55)] more likely to practice pain assessment inadequately and nurse professionals who were not familiar with pain assessment tools were 1.76 times [AOR=1.76; 95% CI=(1.13-2.72)] more likely to practice pain assessment inadequately.

Those nurses who reported low prioritization given to pain assessment as a factor were 2.08 times [AOR=2.08; 95% CI= (1.27-3.41)] more likely to practice pain assessment inadequately than their counter parts (**Table 4**).

**Table 3** Frequency distribution of Nurses who assessed for pain by their assessment practices in critically ill adult patients in Referral Hospitals of Amhara Region, Ethiopia, 2019 (N=422).

Variables	Response	Frequency	Percentage
Assess analgesics need before wound care	Yes	311	73.7%
	No	111	26.3%
Discuss pain assessment scores during nurse-to-nurse report	Yes	244	57.9%
	No	178	42.1%
Assess analgesics need before drain removal	Yes	216	51.2%
	No	206	48.8%
Assess analgesics need before endotracheal suctioning	Yes	211	50.0%
	No	211	50.0%
Record pain and its score as a fifth vital sign on vital sign sheet	Yes	182	43.1%
	No	240	56.9%
Assess analgesics need before invasive line placement	Yes	180	42.6%
	No	242	57.4%
Assess the need for preventive analgesia prior to patient repositioning	Yes	153	36.3%
	No	269	63.7%

**Table 4** Multivariate analysis of factors associated with Nurses' pain assessment practices in critically ill adult patients in Referral Hospitals of Amhara Region, Ethiopia, 2019.

Variables	Category	Practice		OR, 95% CI & P value		
		Inadequate	Adequate	COR (95% CI)	P Value	AOR(95% CI)
Sex	Female	121	80	1.27(0.864-1.87)	0.22	1.31(0.87-1.98)
	Male	120	101	1		
Qualification	Diploma	37	19	1.55(0.857-2.79)	0.15	1.46(0.75-2.82)
	Degree & above	204	162	1		
Working unit	Medical	64	42	1.03(0.61-1.72)	0.92	1.29(0.74-2.28)
	Surgical	68	53	0.87(0.53-1.42)	0.57	0.93(0.54-1.60)
	ICU	26	30	0.58(0.31-1.09)	0.092	0.62(0.32-1.22)
	Emergency	83	56	1		1
Work experience as a nurse	<2 years	26	26	1.00(0.54-1.87)	1	0.97(0.50-1.86)
	2-5 years	135	75	1.80(1.18-2.74)	0.006	1.67(1.08-2.60)*
	>5 years	80	80	1		1
Monthly Salary in ETB	2628-3968	42	34	2.12(0.75-5.97)	0.16	1.20(0.34-4.26)
	3969-5309	130	90	2.48(0.94-6.53)	0.067	1.49(0.51-4.38)
	5310-6650	50	33	2.59(0.9-7.28)	0.069	2.08(0.68-6.37)
	6651-7991	12	12	1.71(0.50-5.86)	0.39	1.91(0.52-6.95)
	7992-9332	7	12	1		1
Knowledge of pain behaviors	Inadequate	179	99	2.39(1.58-3.61)	0.000	2.38(1.55-3.65)**
	Adequate	62	82	1		1
Lack of familiarity	Yes	159	97	1.68(1.13-2.49)	0.01	1.76(1.13-2.72)*
	No	82	84	1		1
Lack of guideline	Yes	156	135	1.59(1.04-2.45)	0.03	2.18(1.33-3.55)*
	No	85	46	1		1
Low prioritization given to pain assessment	Yes	189	119	1.89(1.23-2.92)	0.004	2.08(1.27-3.41)*
	No	52	62	1		1

\* P value<0.05, \*\* P value <0.001 in multivariable logistic regression analysis

## Discussion

This study examined pain assessment practices of nurses caring for critically ill adult patients in referral hospitals of Amhara Region. Findings of the study revealed that, 57.1% (95% CI; 52%-62%) of nurses` had inadequate pain assessment practices. This is lower compared to research findings done in 2017 in Rwanda

(78%) [24] and in 2015 in Uganda (76.5%) [22]. This difference might be due to the recent attention given to pain assessment and management initiatives and trainings in developing countries including Ethiopia [25]. However, the result of this study is higher than the research finding done in 2012 in Canada (39%). This might be due to the difference in awareness and accessibility of trainings on pain assessment, availability of pain assessment

tools, guidelines and access to best practice, ongoing monitoring of delivery of care and presence of national pain strategy.

In the current study, nurses who had a work experience of two to five years were more likely to experience inadequate pain assessment practices compared to nurses who had a work experience of more than five years. This is due to the fact that when experience increase nurses become familiar with the assessment technique, skill, protocol and also they become confident enough in front of the patient. However, this didn't show statistically significant association in other studies.

In this study, nurse professionals who had inadequate knowledge of behaviors that are indicative of pain in critically ill patients were more likely to practice pain assessment inadequately. This is supported by the study done in Canada. This is due to the fact that adequate knowledge is a means or an input for adequate practice, so nurses who have inadequate knowledge practice inadequately. An inconsistency in knowledge and scoring of these behaviors may bring into question the clinical usefulness and application of pain assessment tools in real world which results in inadequate practice.

In this study, lack of protocols and guidelines for assessing pain were found significantly associated with pain assessment practices in critically ill adult patients. Those nurses who faced lack of protocols and guidelines regarding pain assessment in critically ill adult patients were more likely to practice pain assessment inadequately.

This finding is similar with the finding in studies conducted in Canada, Uganda [22], Rwanda [24] and Kenya [20]. This is due to the fact that nurses appear to be compliant at working protocols because this provides a clear logical structure and therefore added confidence for clinical activities, facilitates translation of best evidence to practice but in absence of these, they have been reported to have a greater reliance on individuals' knowledge and skill. This in turn affects the quality of practice and patients' outcome.

Lack of familiarity to pain assessment tools was the other factor that was significantly associated with inadequate pain assessment practice. Nurse professionals who were not familiar with pain assessment tools were more likely to practice pain assessment inadequately. This could be supported by a study conducted in Uganda and Rwanda [22,24]. This might be attributed to inadequate formal teaching about pain assessment tools as well as their availability at working area. Unfamiliarity to pain assessment tools leads to inadequate use of them in critically ill patients.

In the current study low prioritization given to pain assessment in working unit was statistically significant with inadequate practice of pain assessment. Those nurses who reported low prioritization given to pain assessment as a factor were more likely to practice pain assessment inadequately. This finding is similar with a study conducted in Uganda and Rwanda [22,24]. These could be explained by the reasons such as non-routine pain assessment and evaluation. The low prioritization given and lack of familiarity with pain assessment tools might also be due to absence of the aforementioned protocols and guidelines on how to use them.

## Conclusion

This study revealed that, overall pain assessment practice was found to be inadequate in referral hospitals of Amhara region. Inadequate knowledge of behaviors indicative of pain, lack of guidelines and protocols, low prioritization given to pain assessment and lack of familiarity with pain assessment tools were some of the identified factors that were significantly associated with inadequate pain assessment practices in critically ill adult patients.

## Recommendations

### For clinical nurse leaders

It is better to avail pain assessment tools, protocols and guidelines for proper pain assessment in critically ill patients, provide support supervision by experienced and skilled nurses and presence of a dedicated team to provide leadership on prioritization of pain and its assessment.

### For regional health Bureau and hospital administrators

The authors recommend designing and implementing a continuous professional education program on pain and its assessment with special focus on methods of assessment. There is need of a policy that will foster capacity building for nurses caring for critically ill patients including issues of periodic staff training, translation of research findings into practice and retaining those trained on units where they can perform effectively without rotating them to inappropriate units.

### For researchers

Study employing mixed methods to gain more insight on the practices of nurses related to pain assessment. Methods of data collection like document reviews and observation needs to be used. This will aid analysis of the actual practices. In addition, it is better to study attitude of nurses towards pain assessment in critically ill adult patients.

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## Authors' Contributions

BN and HZ performed the analysis and interpretations. BN wrote the first draft; HZ, BA, DH & BD contributed to the design of the study and substantive revision of the final draft. All authors read and approved the final manuscript.

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## Availability of Data and Materials

All materials and data are available in the main author without any restrictions.

## Competing Interests

No competing interests between the authors.

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