

St. Paul's Hospital Millennium Medical College School of Nursing
Department of Emergency and Critical Care



**Knowledge of Cervical Collar and Associated Factor among Emergency
Medical Service Providers at prehospital Settings in Addis Ababa Ethiopia
2021/22**

By

Mehari Alemayehu

February 2022

Addis Ababa Ethiopia

**St. Paul's Hospital Millennium Medical College School of Nursing
Department of Emergency and Critical Care Paramedic program**



**Knowledge of Cervical Collar and Associated Factor among Emergency
Medical Service Providers at prehospital Settings in Addis Ababa Ethiopia
2021/22**

By

Mehari Alemayehu

Advisors

Eriste Nigusse (PHD Fellow)

Rodas Merid (MSc, EMCCN)

**A Research thesis to be Submitted to St. Paul Hospital Millennium Medical College;
Nursing Education Directorate, Department of Emergency and Critical Care Nursing in
Partial Fulfillment of the Requirements for the Degree of Master in Paramedics Science.**

February 2022

Addis Ababa Ethiopia

St. Paul's Hospital Millennium Medical College

Department of Paramedics

Postgraduate Program

Research Project Submission Template

Name of investigator	Mehari Alemayehu(BSc, MSc Candidate)
Full title of the research project	Knowledge of cervical collars and associated factors among emergency medical service Providers at Pre hospital Settings in Addis Ababa Ethiopia 2022
Duration of the research	From October 2021- February 2022
Study Area	Addis Ababa fire and emergency Prevention and Rescue Commission, Ethiopian Red cross Society Addis Ababa Branch and Tebita ambulance
Total Cost of the project	27205 Ethiopian Birr
Source of Funding	Saint Paul's Hospital Millennium Medical College.
Address of investigator	Cell phone: +251947474357
	Email: meharialemayehu29@gmail.com
Name of Advisors	Eriste Nigussa (PHD Fellow) Rodas Merid (MSc EMCCN)

Abstract

Background

Cervical spine is the most vulnerable portion of the spine to injury, due to its mobility and exposure. Collars were introduced to protect the spinal cord from further injury by immobilizing a potentially unstable spine. Cervical Collars have effectively become a hallmark of high-quality trauma care, and in many Emergency medical service (EMS) systems. Despite the importance of providers understanding on different parameters of C-collar, to the level of this search no published study was found regarding the knowledge of pre-hospital EMS', in the study area.

Objective:

Assessment of Knowledge about cervical collars and associated factors among emergency medical service Providers at Pre hospital Settings in Addis Ababa Ethiopia 2021/22

Study Methods:

Institutional based Descriptive cross-sectional study design was conducted at Addis Ababa Fire and Emergency Prevention and Rescue Commission, Ethiopian Red Cross Society Addis Ababa Branch, and Tebita ambulance. Since the total number of participants in those areas were very limited in number the study assumed it to be all inclusive. Bivariate and multivariate logistic regression analysis was utilized to assess the relationship between dependent and independent

Result: A total of 191 prehospital health car professions were included in the study. Overall response rate was 189 (98.9%). Of them more than half 118(62.4%) were female. According to this study the overall cervical collar knowledge were found 108 (57.14%) poor knowledge and only 81(42.86%) have good knowledge. Prehospital professionals received training and Available of Guideline about cervical collar were significantly associated with knowledge of cervical collar.

Conclusion: this study observes that most of prehospital professionals' knowledge of cervical collar was poor. The findings of this study revealed that a great emphasis has to be given in boosting the Knowledge of the professionals providing on job training and Guideline.

Key Word: Knowledge, cervical collar and pre hospital

Acknowledgement

First and for most I would like to forward my deepest gratitude to my advisor Sr Eriste Nigussa and Sr Rodas Merid for their contribution as scientific advisors and constructive comments they provided to me.

Finally, I would like to express my gratitude to St Paul's Hospital Millennium Medical College for sponsoring my enrollment in this MSC program.

Table of Contents

Abstract	I
Acknowledgement	II
List of table	V
List of figure.....	VI
Acronym.....	VII
1. Introduction	1
1.1 Background	1
1.2 Statement of the problem	3
1.3 Significance of the study	4
2. Literature Review.....	5
2.1 Health care provider's knowledge about C-collar	5
2.2 Factors affecting provider's knowledge on Cervical Collar	6
2.3 Conceptual Frame Work	7
3. Objective	8
3.1 General objective	8
3.2 Specific objectives	8
4. Methods and Materials.....	9
4.1 Study area.....	9
4.2 Study design and period	9
4.3 Population	10
4.3.1 Source population	10
All health care providers working in prehospital health care settings in Addis Ababa.....	10
4.3.2 Study population.....	10
4.3.3 Eligibility Criteria.....	10
4.4 Sample size Determination	10
4.5 Sampling Procedure	10
4.6 Study Variables	10
4.6.1 Dependent Variable	10

4.62 Independent Variables	11
4.6 Data Collection Tools	11
4.7 Data Collection Procedure	11
4.8 Operational Definition	11
4.9 Data Quality assurances	11
4.10 Data Management and Analysis	12
4.11 Ethical Consideration	12
4.12 Dissemination of the Result	13
5. RESULT.....	14
5.1 Socio Demographic Characteristics.....	14
5.2 Knowledge level of participants about cervical collar	15
5.2. Knowledge of prehospital health care providers towards c-collar in prehospital settings.....	19
5.3 Factors associated with Knowledge of cervical collar	20
6. Discussion	23
6.1. Strength and limitation	24
7. Conclusion	25
8. Recommendation	25
9. References	26
10. Annex	30
Consent and information sheet.....	30

List of table

Table 1: Socio-demographic characteristics among participants Addis Ababa Ethiopia 2021/22 (n =189).....	14
Table 2 Knowledge of cervical collar of the respondents; Addis Ababa Ethiopia 2021/2022 (n=189).....	15
Table 3Bivariate analysis with knowledge of cervical collar among respondent; Addis Ababa Ethiopia, n=189.....	20
Table 4 Multivariate analysis with knowledge of cervical collar among respondent; Addis Ababa Ethiopia n=189.....	21

List of figure

Figure 1: Conceptual framework for the study Knowledge about cervical collars and associated factors among emergency medical service Providers at pre hospital Setting Addis Ababa Ethiopia (20),(24)and (26)	7
Figure 2 Knowledge of cervical collar of the respondents about type and complication; Addis Ababa Ethiopia 2021/2022 (n=189)	18
Figure 3 Knowledge level of cervical collar among participants, Addis Ababa Ethiopia 2021/2022 (n=189)	19

Acronym

ATLS _Advanced Trauma Life Support

C-Collar _ Cervical collar

CCR_ Canadian Cervical Spine Rule

ED_ Emergency Department

EMS _ Emergency Medical Service

EMT_ Emergency medical Technician

ICP_ Intra Cranial Presser

NEXUS_ National Emergency X-radiography Utilization Study

PHCP_ Pre hospital health care provider

SCI _Spinal cord Injury

TBI_ Traumatic Brain Injury

1. Introduction

1.1 Background

Cervical spine is the most vulnerable portion of the spine to injury, due to its mobility and exposure.(1) Cervical stabilization is considered to be standard prehospital practice to help prevent neurologic deficits associated with unstable neck injuries in trauma victims. (2)

The role of a cervical collar was most commonly cited for prevention of instability followed by fracture immobilization and comfort.(3)

Collars have effectively become a hallmark of high-quality trauma care, and in many Emergency medical service (EMS) systems, protocolized paramedics never transfer patients to the emergency department without a collar.(4)

Collars were introduced to protect the spinal cord from further injury by immobilizing a potentially unstable spine.(5) However, evidences show that use of c-collar has complication with improper application and if not applied with precautions. For instance, applying c-collar with unstable craniosacral joints possibly induces dural sac compression and possible damage to spinal cord.(6)

application of c-collars in the presence of neck trauma may hide underlying injuries, complicate the assessment of tracheal deviation, increase the risk of hematoma development, increase intubation difficulty, and put the patient at risk of prolonged hypoxia.(7). And also, if c-collar is applied without proper identification of traumatic brain injury, it leads to an increase intra cranial pressure (ICP). (8)

the importance of proper screening of patients before applying c-collar is evidenced with a study conducted in Norway study was recommended to stop usage of c-collars at pre-hospital settings, with the fear of possible harms related to using C-collars among patients National Emergency X-Radiography Utilization Study (NEXUS)-negative patients, as X-ray screening is not performed at pre-hospitals (9) In other way, careful assessment and proper use of c-collars in traumatic patients, at a pre-hospital settings, was suggested as a necessity in improving better outcome of the c-collar use(10). Where, EMS personnel's knowledge about when to use and when to avoid c-collar use is one of the very important parameters in the success. For this fact scholars suggest that working availing necessary tools and training materials on c-collar; as well as working towards boosting of providers knowledge regarding c-collars.(11) working towards transforming

the EMS providers' understanding and knowledge about spinal immobilization suggests that EMS education and protocols should be revised, particularly with regard to the use of spinal immobilization in the management of trauma(12)

1.2 Statement of the problem

Global SCI incidence is estimated to be 40 to 80 new cases per million inhabitants per year. This indicates that between 250 000 and 500 000 persons are harmed in their spinal cords every year.(13) Study conducted in, Maryland show that SCI is estimated that 3–25% of cervical spine injuries are secondary, occurring during pre-hospital or early health center care, and are the result of ineffective management and treatment.(10)

According to a UK cohort study, 2.3 percent of all major trauma patients had fractures/dislocations at the cervical level, and 0.8 percent had cord injuries; 76.7 percent of cervical spine trauma was fractures/dislocations exclusively, and 23.3 percent was cord injuries with or without fractures/dislocations.(14)

Pre-hospital care of patients with potential spinal cord injury requires great care to minimize secondary SCI and potential morbidity related to spinal immobilization.(15) Thus, the promotion of knowledge of this segment of the health care system facilitates the provision of emergency care with optimal quality of care and reduction in mortality and morbidity(16) In deciding whether or not to immobilize the spine, the parameters knowledge necessitates considerations of the accident mechanism, an assessment of the patient's condition, and a spinal examination.(17) Despite the importance of providers understanding on different parameters of C-collar, to the level of this search no published study was found regarding the knowledge of pre-hospital EMS', in the study area.

1.3 Significance of the study

At the end the findings of this study was give an over view about the knowledge status of pre hospital health care providers to their institution. It helps the institution to set an action plan and strategies to overcome and fill the identified gap.

Also the finding of this study was used as evidence base for improving knowledge of pre hospital health professionals, policy makers, health officials, non-governmental organizations and other concerned body's to enhance health states and quality care of cervical Spain injury patients. As this study is the first in its type it will be used as a base line reference for those who want to study more on this research area and will be published in peer reviewed journals.

2. Literature Review

2.1 Health care provider's knowledge about C-collar

According to a study conducted in Iran, pre-hospital emergency personnel have a median to poor level of understanding. The majority of study participants, 71 (69.6%), had moderate knowledge (score between 33.3% and 66.6%), 27 (26.47%) had low knowledge (score less than 33.3 percent), and only 4 (3.9%) had sufficient knowledge (score more than 66.6%) about the use of cervical collar.(16)

Study conducted in Australia show 10.7% cases, inter-observer reliability was tested with good agreement in terms of indication of c-collar use (weighted kappa 0.65). (18)

The results of a descriptive and analytical investigation demonstrate The majority of participants (81.1%) had an average level of knowledge about trauma, while 17.4% had a good level of knowledge, showing that the majority of pre hospital health care employees do not have a good understanding of trauma and the concepts of providing prehospital treatment for trauma patients.(19) According to a study conducted in Indonesia, ambulance nurses had a knowledge of pre hospital care score $(36.5/52=70.1\%)$.(20)

Across-sectional study found that more than 70% of participants had a moderate to poor understanding of how to utilize a neck collar, Factors predicting the rate of damage to the neck and spinal cord (98.8%), the seriousness of injury (95.0 and incorrect measurements were the most common areas (91.3 %).(21)

Another study was conducted Iran with the goal of evaluating EMT Knowledge shows that 87.7% of advanced knowledge of the pre-hospital treatment intensity index of spinal cord trauma, whereas 15.3% had intermediate knowledge.(22)

A study was conducted in India hospital consultants, resident doctors and private practitioners with regard to pre-hospital and emergency care 52% is a score that indicates less than adequate knowledge.(23)

A cross-sectional survey, on Knowledge and Clinical Competence of Medical Emergencies Students in Facing Trauma was 6.5% of participants had low knowledge of trauma, 82.6% had fair knowledge, and 10.9 % had good knowledge.(24)

2.2 Factors affecting provider's knowledge on Cervical Collar

The study conducted in Iran show that relationship between EMS staff age and their knowledge level of prehospital care intensity index of spinal cord trauma indicated a significant direct relationship between their knowledge levels ($P < 0.05$)(25)

Study conducted in Berlin, Germany in terms of the correct positioning of a cervical collar those who took training answered all the questions that assess proper placement of c-collar while others with no training didn't get a satisfactory result. A further analysis showed that uncertainty in terms of the correct positioning of a cervical collar decreases as a result of training on this measure (training: 2.9 ± 1.7 ; without training: 2.0 ± 1.2 ; $p < 0.001$).(17)

Study conducted in Maryland show that Prehospital training increases participant confidence in using a cervical collar, according to the study, with 84% of participants feeling extremely confident in using a cervical collar in a prehospital situation.(10)

according to emergency medical care providers, Implementation of CCR on immobilizing with hard collar confirming ordering x-ray decreased by 25%, ($p = 0.0187$).(18) Despite the educational value, due to a lack of protocol, 15% of spinal injuries were not immobilized.(26)

According to a cross-sectional study conducted in Iran, there was a significant association between knowledge competence level and work experience in pre hospital trauma care

($P < 0.001$). (24)

Study conducted in Indonesia Ambulance Nurses on pre hospital care, study show that training and experience had significant influence on the knowledge ($p < 0.022$). (20)

2.3 Conceptual Frame Work

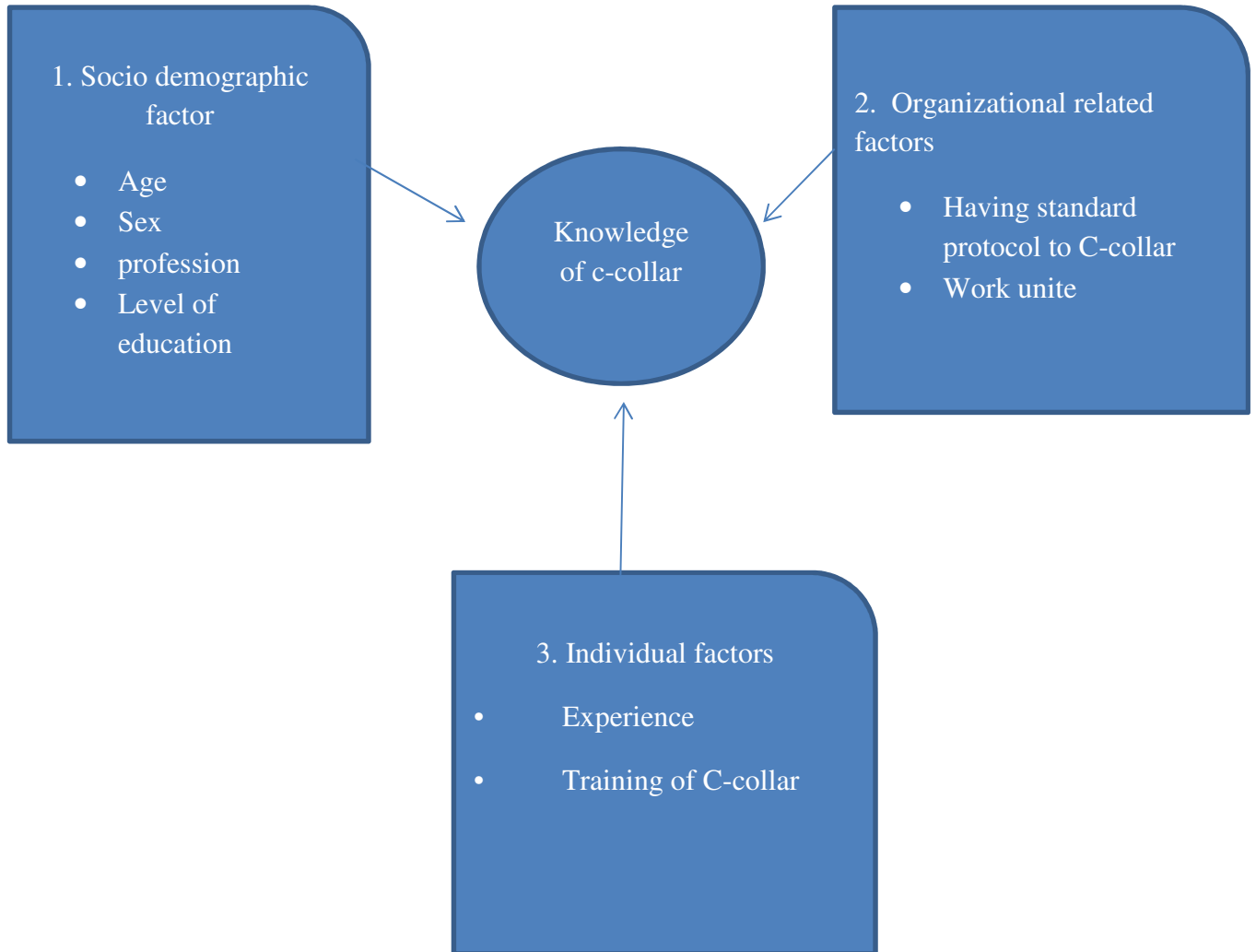


Figure 1: Conceptual framework for the study Knowledge about cervical collars and associated factors among emergency medical service Providers at pre hospital Setting Addis Ababa Ethiopia (20),(24)and (26)

3. Objective

3.1 General objective

To Assess Knowledge of cervical collars and associated factors among emergency medical service Providers at Pre hospital Settings in Addis Ababa Ethiopia 2021/22

3.2 Specific objectives

- ❖ To Determine Knowledge of cervical collar among emergency medical service providers at pre hospital settings in Addis Ababa Ethiopia 2021/22.
- ❖ To identify factors associated with cervical collar Knowledge in emergency medical service providers at pre hospital settings in Addis Ababa Ethiopia 2021/22.

4. Methods and Materials

4.1 Study area

This study was undertaken in Addis Ababa, which is the capital city of Ethiopia and has an area of 530 square kilometers. The population density is estimated to be near 5,165 individuals per square kilometer available. In Addis Ababa there are three pre hospital health care provider institutions. Data was collected from those three pre hospital health care institutions, namely Addis Ababa fire and emergency Prevention and Rescue Commission, Ethiopian Red cross Society Addis Ababa Branch and Tebita ambulance.

Ethiopian Red Cross society Addis Ababa Branch was founded in 1981GC it gives service to communities affected by natural and manmade disasters through the provision of emergency response, ambulance and first aid. Health care providers in this institution are 9 employer and other volunteers workers are giving service in the Red Cross society.

Tebita ambulance pre hospital emergency medical Service was established in 2008 GC and the first private pre hospital emergency medical service providing company in Ethiopia.in these institution 17 prehospotal health care providers are working in there.

Addis Ababa Fire and Emergency Prevention and Rescue Commission were established in 1933GC. Initially, the service was limited to firefighting, but in 2008GC, the commission expanded its services to include pre-hospital health care and prevention. Today, the commission has nine stations and 165 health care workers that provide pre-hospital health care in the communities.

4.2 Study design and period

Institutional based Descriptive cross-sectional study design was employed from October 2021to February 2022 in order to assess of Knowledge about cervical collars and associated factors among emergency medical service Providers at Pre hospital health care service settings in Addis Ababa Ethiopia 2021/22

4.3 Population

4.3.1 Source population

All health care providers working in prehospital health care settings in Addis Ababa.

4.3.2 Study population

All prehospital health care providers in Tebita ambulance, Addis Ababa fire and emergency Prevention and Rescue Commission, and Ethiopian Red cross Society Addis Ababa Branch and that fulfill the inclusion criteria.

4.3.3 Eligibility Criteria

4.3.3.1 Inclusion Criteria

- Pre hospital health care providers who are licensed and work in those three pre hospital settings during study period.

4.3.3.2 Exclusion Criteria

- Those pre hospital health care providers who have work experience < 6 month.
- Those who were unwilling to participate in the study

4.4 Sample size Determination

The sample size of this study is 191 which is the exact number of health care providers working in both governmental & private sectors. Since researcher going to use purposive sampling method using all prehospital health care providers as participants.

4.5 Sampling Procedure

In this study, since the number of all health care providers working in prehospital area were very few in number, then the study assumes it to be all inclusive as a result included in the study no special sampling procedure was be employed.

4.6 Study Variables

4.6.1 Dependent Variable

- Knowledge on C-Collar

4.62 Independent Variables

- Age
- Sex
- profession
- Educational level
- Training
- Work unit
- Experience
- Having protocol to C-collar

4.6 Data Collection Tools

Data was collected by using self-administer questionnaire developed by reviewing different literatures relevant for the study objective. The questionnaire was arranged in such a way it can address the socio demographic information and other independent variables as well as the dependent variables.

4.7 Data Collection Procedure

Data was collected by 5 junior BSc nurse data collectors and 1Senior BSc nurse supervisor who were given two day training before the actual data collection.

4.8 Operational Definition

The knowledge assessing questioner has 30 multiple questions which were used for assessing the knowledge of c-collar among participants. Each correct answer was scored 1 and each incorrect answer was coded as 0. According to this scoring those who score less than mean value were considered to have poor c-collar knowledge and those who got score equal or above mean were considered to have good knowledge on c-collar. (16)

4.9 Data Quality assurances

To ensure quality of data, the questioner was adapted after different literature was reviewed based on research objectives (20),(24),(25) and (26) and was examine by senior experts to the area of study for content validity and The reliability of questioner was calculated with Cronbach's alpha the result was 0.95. Pretest was done on 5% of total population at Nordic

hospital's pre hospital care providers. Any error found during expert evaluation and pretest was corrected and modification was made into the final version of the data collection questionnaire. Training was given to data collectors and supervisors for two days before actual data collection task and training guide was prepare to facilitate the training. Data quality was controlled designing proper data collection materials, and through continues supervision during data collection period. All complete data collection forms were examined for completeness and consistency during data management, storage, cleaning and analysis. The data was entered and cleaned by principal investigator before analysis. The principal investigator of the study controlled over all activity.

4.10 Data Management and Analysis

The collected data was cleaned and checked for any missing and inconsistency, and then it was entered into SPSS version 26. Both Descriptive and Analytic statistics was performed to identify the distribution of socio-demographic characteristics, work related factors and knowledge of cervical collar of the study participants. Bivariate and multivariate logistic regression analysis was performed to assess the association between dependent and independent variables. To control confounding affect those variables having $p\text{-value} < 0.25$ in the bivariate logistic regression was included in the multiple logistic regression analysis. Adjusted odd ratio was computed with their corresponding 95% confidence interval. P-value of < 0.05 was used to declare statistical significance of the results.

4.11 Ethical Consideration

Ethical clearance and approval was obtained from the Institutional Review Board (IRB) of the College of St. Paul's Hospital Millennium Medical College. Official letter was obtained from Department of Nursing to the study settings. After explaining the purpose and possible benefit of the study, written informed consent was obtained from each participant before starting the data collection. The confidentiality was maintained in each level of the project work in this study. For the purpose of confidentiality, the names and any personal identifier of the participants were not being recorded but code number was used. The study participants were informed about their rights to refuse his or her participation, ask any question or withdraw at any time during data collection process.

4.12 Dissemination of the Result

The findings of this study will be submitted and presented to St. Paul's Hospital Millennium Medical College School of Nursing. The result also will be disseminated to Addis Ababa fire and emergency Prevention and Rescue Commission, Ethiopian Red cross Society Addis Ababa Branch, Tebita ambulance and SPHMMC. The findings will be possibly published on reputable peer reviewed journal.

5. RESULT

5.1 Socio Demographic Characteristics

This study evaluated 189 Participants (non response rate was = 1.1%) Among the entire participant included in the study. More than two-third of them 118 (62.4%) of the participants were female. The majority of the participants were in the age group 20-29 years, which accounted for about 103 (54.5%). About more than half of them 167 (88.4%) of the participants were nurses, those with a diploma level were 93 (49.2%), their work in ambulance 165(87.3) and When looking at their work experience 75 (39.7%) of the respondents had between 1-3 years of work experience. About 84 (44.4%) of them had Received Training.

Table 1: Socio-demographic characteristics among participants Addis Ababa Ethiopia 2021/22 (n =189)

Variable	Category	Frequency	Percent (%)
Age	20-29 Years old	103	54.5%
	30-39 Years old	69	36.5%
	greater than 40 years	17	9.0%
Sex	Male	71	37.6%
	Female	118	62.4%
level of education	Diploma	93	49.2%
	Degree	87	46.0%
	Masters and above	9	4.6%
Profession	Emergency medical technician	8	4.2%
	Nurse	167	88.4%
	Health officer	14	7.4%
work unit	pre-hospital ambulance service	165	87.3%
	Dispatch	24	12.7%
work experience	less than one year	42	22.2%
	1-3 years	75	39.7%
	3-6 years	39	20.6%

	6-9 years	23	13.2%
	more than 10 years	8	4.2%
Received Training	Yes	84	44.4%
	No	105	55.6%
Available of Guideline	Yes	80	42.3%
	No	109	57.7%

5.2 Knowledge level of participants about cervical collar

The details of the frequency and present of respondents to identify each c-collar Knowledge were described in table and graph below.

Respondents were evaluated on their knowledge of the cervical collar accordingly. Suggestions potential for spinal injury (altered mental status) was the most frequently identified at 114 (60.3%) and the list identified (Thoraco/lumbar tenderness) was 79 (41.8%).

Table 2 Knowledge of cervical collar of the respondents; Addis Ababa Ethiopia 2021/2022 (n=189)

Variable	Category	Frequency	Present
Altered mental status	Yes	114	60.3
	No	75	39.7
Neurological deficit	Yes	92	48.7
	No	97	51.3
Suspected extremity fracture	Yes	82	43.4
	No	107	56.7
Cervical pain	Yes	89	47.1
	No	100	52.9
Cervical tenderness	Yes	91	48.1
	No	98	50.9
Thoraco/ lumbar pain	Yes	87	46.0
	No	102	54.0

Thoraco/lumbar tenderness	Yes	79	41.8
	No	110	58.2

Participants who responded to the purpose of the C-collar as (cervical collar may protect the neck and prevent further harm) were 107 (56.6%) and the list identified was (cervical collar used for bleeding control) 67 (35.4%).

Variable	Category	Frequency	Present
A cervical collar may protect the neck and prevent future harm.	Yes	107	56.6
	No	82	43.4
A cervical collar may cause temporary relief from pain	Yes	94	49.7
	No	95	50.3
Does cervical collar may help to take some strain off neck muscles?	Yes	88	46.6
	No	101	53.4
Did Cervical collars are occasionally used to reduce pressure on the nerves in the neck.	Yes	84	44.4
	No	105	55.6
Did cervical collar used for bleeding control	Yes	122	64.6
	No	67	35.4

From Indication of C-Collar option participants who identified (immobilize the neck) were 130 (68.8) and the list identified were (After spinal cord surgery) 85(45.0%). See below table

Variable	Category	Frequency	Present
to immobilize the neck	Yes	130	68.8
	No	59	31.2
Spinal injury to the cervical region	Yes	97	51.3
	No	92	48.7
After spinal cord surgery	Yes	85	45.0
	No	104	55.0

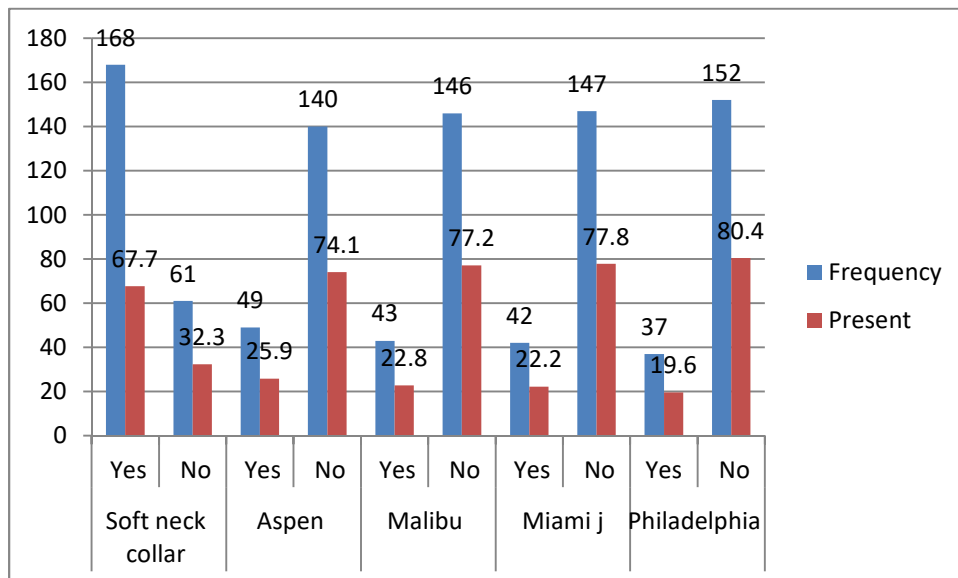
Contraindication and Precaution of applying cervical collar

Respondents knew about contraindications applying to c-collars, mostly identified as (Cervical dislocation with fixed angulation) 104 (55.0), and the list identified was (unsecured airway) 81(42.9).

Variable	Category	Frequency	Present
Cervical dislocation with fixed angulation	Yes	104	55.0
	No	85	45.0
Impaled foreign object in the neck	Yes	82	43.4
	No	107	56.6
Massive soft tissue swelling in the neck	Yes	86	44.5
	No	103	54.5
Un secured airway	Yes	81	42.9
	No	108	57.1
Surgical air way	Yes	89	47.1
	No	100	52.9

Type of neck collars

Respondents who knew about the type of neck collar mostly were (soft neck collar) 165 (67.7%) and the list identified about type of collar was Philadelphia 37 (19.6%).



Complication while applying of cervical

Respondents knew about collar complications mostly identified (Breathing restriction (106, 56.1%) and the list identified was (increased intracranial pressure 90(47.6%).

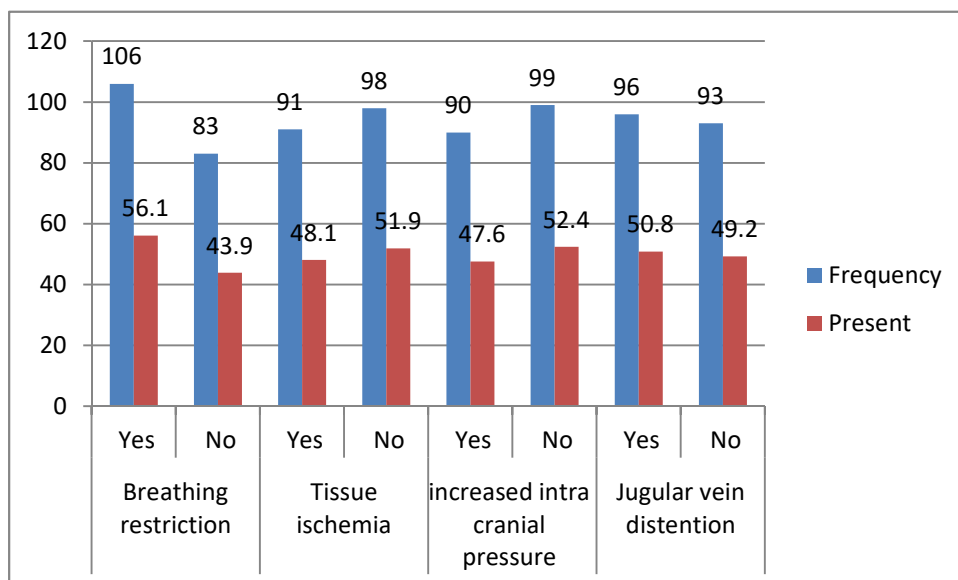


Figure 2 Knowledge of cervical collar of the respondents about type and complication; Addis Ababa Ethiopia 2021/2022 (n=189)

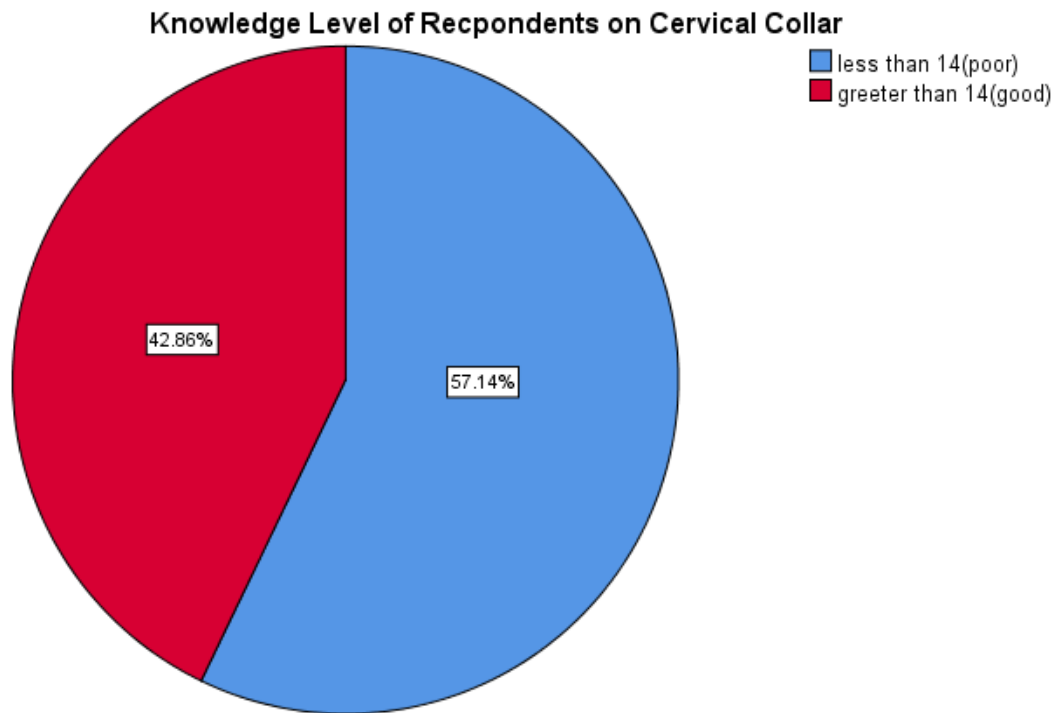


Figure 3 Knowledge level of cervical collar among participants, Addis Ababa Ethiopia 2021/2022 (n=189)

5.2. Knowledge of prehospital health care providers towards c-collar in prehospital settings

As indicated in figure 3, more than half of the participants 108(57.14%) had poor knowledge regarding c-collar with the mean score of 14.0(which is from the total 30 scores), standard deviation of 9.1 out of c-collar knowledge levels.

5.3 Factors associated with Knowledge of cervical collar

Bivariate logistic regression was done to identify significant independent predictors. Age, sex, educational level, profession, training, work experience, work unit, and guidelines were found to have an association with the outcome of knowledge of the cervical collar at a p value less or equal to 0.25 as shown (table 3). Variables that had $p < 0.25$ at bivariate analysis were further entered into a multivariate model to identify the independent factors of outcome knowledge of cervical collar. Multiple logistic regressions were carried out in which these factors were modeled against a dependent variable of the outcome knowledge of the cervical collar.

See Table 3

Table 3 Bivariate analysis with knowledge of cervical collar among respondent; Addis Ababa Ethiopia, n=189

Variables	Category	N=189 (100%)	COR (95% CI)	P- value
Age	20-29	103(54.5)	1.00	<0.001**
	30-39	69(36.5)	0.037(0.016-0.084)	
	>40	17(9.0)	0.31(0.008-0.123)	
Sex	Male	71(37.6)	1.00	0.506
	Female	118(62.4)	1.223(0.676-2.213)	
Educational level	Diploma	93(49.2)	1.00	0.001
	Degree	87(46.0)	0.811 (0.188-3.507)	
	Masters	9(4.6)	0.450(0.076-2.669)	
Profession	EMT	8(4.2)	1.00	0.545
	Nurse	167(88.4)	0.811(0.188-3.507)	
	HO	14(7.4)	0.450(0.076-2.669)	
Work unit	pre-hospital ambulance service	165(87.3)	1.00	0.534
	Dispatch	24(12.70)	1.322(0.548-3.194)	
		41 (14)	0.364(0.104-1.271)	
Work experience	<1 years	42(22.2)	1.00	0.001
	1-3years	75(39.7)	0.541 (0.181-1.611)	

	3-6 years	39(920.6)	0.015(0.004-0.062)	
	6-9 years	23(13.2)	0.026(0.006-0.106)	
	≥10 years	8(4.2)	0.045(0.0007-0.287)	
Received Training	Yes	84(44.4)	156.750(72.183-470.854)	0.001**
	No	105(55.6)	1.00	
Available of Guideline	Yes	80(42.3)	1.00	0.001**
	No	109(57.7)	0.005(0.001-0.015)	

In Multivariate analysis prehospital health care professionals having Training 17 times increase their knowledge as compare to encounters AOR 17.413, 95% CI (3.843-78.897), (p < 0.001) .

Those who have no guideline were 97.5% less likely had good knowledge on cervical collar than who have guideline AOR: 0.025, 95% CI (0.004-0.143), (P<0.001). See in table 4

Table 4 Multivariate analysis with knowledge of cervical collar among respondent; Addis Ababa Ethiopia n=189.

Variables	Catagory	N=189 (100%)	COR(95%	AOR (95% CI)	P – value
Age	20-29 Years	103(54.5)	1.00	1.00	0.005
	30-39 Years	69(36.5)	0.037(0.016-0.084)	0.079(0.017-0.375)	
	≥ 40 years	17(9.0)	0.31(0.008-0.123)	0.075(0.002-3.330)	
education level of	Diploma	93(49.2)	1.00	1.00	0.865
	Degree	87(46.0)	0.811 (0.188-3.507)	1.307(0.242-7.059)	
	Masters	9(4.6)	0.450(0.076-2.669)	3.188(0.030-338.010)	
Received Training	Yes	84(44.4)	156.750(72.183-470.854)	17.413(3.843-78.897)	<0.001**
	No	105(55.6)	1.00	1.00	
Available of Guideline	Yes	80(42.3)	1.00	1.00	<0.001 **
	No	109(57.7)	0.005(0.001-0.015)	0.025(0.004-0.143)	

NB ACR= Adjusted crud reatio, AOR = Adejested Odd reatio, CI 95% Confidence Interval of 95% and ** Strongly Associated to indepandant variabls.

6. Discussion

Many studies have focused on the assessment of spinal cord injury and its clinical consequence in terms of disability (5). But this study aims to assess the knowledge level of pre hospital profession on c-collar. In this study prehospital health care professionals level of knowledge was poor.

This study assessed the knowledge level of participants and associated factors on cervical collar among prehospital health care professionals. Accordingly, majority of prehospital health care profession are poor knowledge on cervical collar 108(57.14%) In addition to this the finding of this study revealed that knowledge of cervical collar was strongly associated with training and guideline.

In this study, poor knowledge was 108(57.14%) of pre hospital health care professionals. The result of this study was comparable to the study done in India (52%) (23) and the result of this study higher as compared to study in Iran (26.47%)(16) and the result of this study was lower as compared to study in Sweden (81.1%) (19) and Indonesia (70.1%) (21). This deference may be due to study site deference, time deference and qualification deference.

the study done in Iran age was one variable that affects knowledge level of participants ($P < 0.05$) (25) but in this study age was not association to knowledge of cervical collar these may be due to small sample size, geographical deference.

In this study training was one of the variables that determines the knowledge level of prehospital professionals ($P < 0.001$) the result of this study was comparable to study done in Germany ($P < 0.001$)(17). And study done in Indonesia pre hospital health care providers training was ($p < 0.022$) this result are comparable. (20)

Guideline was the others that determine the knowledge level of prehospital professionals ($P < 0.001$) the result of this study was comparable to study done in American ($p = 0.0187$)(26) Despite the educational value.

In this study work experience was not associated with knowledge of cervical collar ACR 0.541,95%CI (0.181-1.611),($p < 0.001$), but in the previous study done in Indonesia work experience was significantly associated with knowledge of c-collar ($p < 0.022$) (20) and study done in Iran work experience strong associated to knowledge of c-collar($P < 0.001$) (24). The discrepancy of this result may be due to study area differences, sample size and cofounding.

In our study level of education were not associated with the knowledge of c-collar at the ($p < 0.865$), this discrepancy may be due to participants educational level is not in pre hospital health care specialty they may be upgrade with hospital based or other public specialty.

6.1. Strength and limitation

This survey highlights an area of governmental and private prehospital health care professional knowledge where there were no literatures in Ethiopia. This was the first time in Addis Ababa that knowledge of cervical collar of pre hospital health care professions was tested.

This study also has some limitations:

- ✚ The limitation of this study is the use of only a knowledge questionnaire which serves as an indicator of purely theoretical knowledge. On the contrary, needs both theoretical knowledge with psychomotor skills.
- ✚ This study was cross-sectional due to this nature of the study the cause and effect relationship was not identified.
- ✚ Data were collected by self-administered questioner which led to answer a question without their knowledge.

7. Conclusion

This study observes that most of pre hospital health professionals' knowledge of cervical collar was poor. These findings point to the urgent need for c-collar training programs to be implemented. Special attention should be given to correct the errors in the indication and complication while applying cervical collar of spinal cord injury patients. The proper use of the c-collar by health care workers will bring enormous benefits to patients affected with spinal injury being prevented for farther injury.

8. Recommendation

- **for prehospital healthcare providers:-**

- To update themselves according to c-collar protocols
- **For Department Of Emergency Medicine:-**
 - To provide continues refreshment training.
 - To prepare protocols on how to preform sound c-collar and provide continues updates to professionals working in ambulance of prehospital settings.
- **For prehospital health care institution:-**
 - To facilitate provision of in-service training
 - To facilitate and create opportunity for in-service educational developments of the Workers.
- **For Ministry Of Health**
 - Since effective prehospital care increase patients' outcome at hospital, ministry health should give more attention to prehospital human power development and strength Prehospital emergency system.

9. References

1. Trauma A, Support L. Advanced Trauma Life Support ®. TENTH EDIT. B. SHK, editor. Chicago,IL 60611-3211: United States of America; American College of Surgeons; 2018.

2. Joyce SM, Moser CS. Evaluation of a New Cervical Immobilization / Extrication Device. 2020;(June 1989):61–4.
3. Buckland AJ, Bressan S, Jowett H, Johnson MB, Teague WJ. Heterogeneity in cervical spine assessment in paediatric trauma: A survey of physicians' knowledge and application at a paediatric major trauma centre. *EMA - Emerg Med Australas*. 2016;28(5):569–74.
4. Sundstrøm T, Asbjørnsen H, Habiba S, Sunde GA, Wester K. Prehospital use of cervical collars in trauma patients: A critical review. *J Neurotrauma*. 2014;31(6):531–40.
5. Sundstrøm T. Prehospital Use of Cervical Collars in Trauma Patients : 2014;540:531–40.
6. Mulligan RP, Mahabir RC. The prevalence of cervical spine injury, head injury, or both with isolated and multiple craniomaxillofacial fractures. *Plast Reconstr Surg*. 2010;126(5):1647–51.
7. Oteir AO, Ehs MS, Smith K, Grad H, Exec C, Grad BA, et al. The Prehospital Management of Suspected Spinal Cord Injury : An Update. 2014;(August).
8. Núñez-Patiño RA, Rubiano AM, Godoy DA. Impact of Cervical Collars on Intracranial Pressure Values in Traumatic Brain Injury: A Systematic Review and Meta-Analysis of Prospective Studies. *Neurocrit Care* [Internet]. 2020;32(2):469–77. Available from: <https://doi.org/10.1007/s12028-019-00760-1>
9. Baekgaard JS, Christensen RE, Lee JM, Eid AI, Eskesen TG, Steinmetz J, et al. Cervical Spine Clearance in Trauma Patients with an Unreliable Physical Examination. *World J Surg* [Internet]. 2020;44(4):1113–20. Available from: <https://doi.org/10.1007/s00268-019-05307-1>
10. Sundstrøm T, Asbjørnsen H, Habiba S, Sunde GA, Wester K. Prehospital use of cervical collars in trauma patients: a critical review. *J Neurotrauma*. 2014;31(6):531–40.
11. Kornhall DK, Jørgensen JJ, Brommeland T, Hyldmo PK, Asbjørnsen H, Dolven T, et al. The Norwegian guidelines for the prehospital management of adult trauma patients with potential spinal injury. *Scand J Trauma Resusc Emerg Med* [Internet]. 2017;25(1):1–11. Available from: <http://dx.doi.org/10.1186/s13049-016-0345-x>

12. Bouland AJ, Jenkins JL, Levy MJ. Assessing attitudes toward spinal immobilization. *J Emerg Med* [Internet]. 2013;45(4):e117–25. Available from: <http://dx.doi.org/10.1016/j.jemermed.2013.03.046>
13. Bozzo RB. Spinal cord injury. *Rev Chil Anest*. 2021;50(1):126–58.
14. Hasler RM, Exadaktylos AK, Bouamra O, Benneker LM, Clancy M, Sieber R, et al. Epidemiology and predictors of cervical spine injury in adult major trauma patients: A multicenter cohort study. *J Trauma Acute Care Surg*. 2012;72(4):975–81.
15. Ahn H, Singh J, Nathens A, Macdonald RD, Travers A, Tallon J, et al. Pre-Hospital Care Management of a Potential Spinal Cord Injured Patient : A Systematic Review of the Literature and Evidence-Based Guidelines. 2011;1361(August):1341–61.
16. Dehghannezhad J, Rahmani F, Ghafouri R, Hassankhani H, Dadashzadeh A, Damanabad Z. Promotion of knowledge, skill, and performance of emergency medical technicians in prehospital care of traumatic patients: An action-research study. *Arch Trauma Res*. 2020;9(2):81.
17. Kreinest M, Goller S, Grützner BGPA, Häske MKD. Expertise of German paramedics concerning the prehospital treatment of patients with spinal trauma. 2016;
18. Kerr D, Bradshaw L, Kelly AM. Implementation of the Canadian C-spine rule reduces cervical spine x-ray rate for alert patients with potential neck injury. *J Emerg Med*. 2015;28(2):127–31.
19. Shakeri K, Fallahi-Khoshknab M, Khankeh H, Hosseini M, Heidari M. Knowledge, attitude, and clinical skill of emergency medical technicians from Tehran emergency center in trauma exposure. *Int J Crit Illn Inj Sci*. 2018;8(4):188–93.
20. Suryanto, Plummer V, Boyle M. Knowledge, attitude, and practice of ambulance nurses in prehospital care in Malang, Indonesia. *Australas Emerg Care* [Internet]. 2018;21(1):8–12. Available from: <https://doi.org/10.1016/j.auec.2017.12.001>
21. Mahdi S, Ziabari Z, Kasmaei VM, Pourshafiei SH, Saadatmand S. Knowledge and Practice of medical Interns Regarding Use of Neck Collar in Trauma Patients; a Cross-

Sectional Study. رانی اورژانس طب. 2018;5(0):e11–e11.

22. Patel MB, Humble SS, Cullinane DC, Day MA, Jawa RS, Devin CJ, et al. Cervical spine collar clearance in the obtunded adult blunt trauma patient: A systematic review and practice management guideline from the Eastern Association for the Surgery of Trauma. *J Trauma Acute Care Surg.* 2015;78(2):430–41.
23. Kumar S, Agarwal AK, Kumar A, Agrawal GG, Chaudhary S, Dwivedi V. A study of knowledge, attitude and practice of hospital consultants, resident doctors and private practitioners with regard to pre-hospital and emergency care in Lucknow. *Indian J Surg.* 2018;70(1):14–8.
24. Norouzinia R, Ahmadi M, Seidabadi M. Knowledge and Clinical Competence of Medical Emergencies Students in Facing Trauma. *Majallah-I Tibb-I Urzhāns-I Īrān.* 2016;3(2):73–7.
25. Mozafari M, Anboohi SZ, Ghasemi E, Safarpour H, Anvary R, Shiri H. Research Paper: The Knowledge of Emergency Medical Technicians of Prehospital Care Intensity Index of Spinal Cord Trauma in Ilam Province, Iran. 2021;6(3):139–46.
26. Domeier RM, Frederiksen SM, Welch K. Prospective performance assessment of an out-of-hospital protocol for selective spine immobilization using clinical spine clearance criteria. *Ann Emerg Med.* 2015;46(2):123–31.

Assurance of Principal Investigator

I the undersigned agree to accept all responsibilities for the scientific and ethical conduct of the research project. I was providing timely progress report to my advisor and seek the necessary advice and approval from my primary advisors in the course of the research. I was

communicating timely to my advisors all stakeholders involved in the study including any source of funding for this research.

Name of the student: _____

Signature: _____

Date: _____

Approval of the Primary Advisor

Name of the primary advisor: _____

Signature: _____

Date: _____

Approval of the Co-Advisor

Name of the primary Co-Advisor: _____

Signature: _____

Date: _____

Name of Examiner: _____

Signature: _____

Date: _____

10. Annex

Consent and information sheet

ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

Department of Paramedics science

To Assess Knowledge of cervical collars and associated factors among emergency medical service Providers at Pre hospital Settings Addis Ababa Ethiopia 2021/22

Dear Respondent: good morning/good afternoon?

My name is_____ I am currently a member of a data collection team for a study being conducted by a Paramedic. The objective of the study is Knowledge of cervical collars and associated factors among emergency medical service Providers at Pre hospital Settings Addis Ababa Ethiopia. You are included in the study as part of the sample population to complete the questionnaire designed for this purpose. The information obtained in this study was used only for research purposes. No identifier such as respondents' name was used rather codes was given instead. Thus, any other person can't know any information obtained from you. Involvement in this study is optional and in Voluntary basis and you can drop any individual question or the whole questionnaire. But you're Participation and contribution in the study is very important to achieve the intended objectives of the study and thereafter to come up with important findings which may help Cervical collar knowledge of staff profession and safety planners to advise means of avoiding miss understanding of collars.

Thank you for your cooperation!!!

Do you have any opinion regarding this study?

Do you agree to participate in this study? Yes, continue _____No, thank you! _____

Id number of the respondent_____

Name of the data collector _____Sign_____ Date _____

Name of the supervisor _____Sign_____ Date _____

I. Socio-demographic Characteristics.

S.no	Question	Response
------	----------	----------

1	Age	1. 20-29 years 2. 30-39 year 3. ≥ 40 year
2	Sex	1 male 2 female
3	Educational level	1. Diploma 2. Degree 3. Masters and above
4	Profession	1 Emergency medical technician 2 Nurse 3 Health officer 4 Anesthetist 5 Medical doctor
5	Work unit	1 pre-hospital ambulance service 2 Dispatch center
6	Work experience in pre-hospital (In years)?	1 less than one year 2 1-3 years 3 3-6 years 4 6-9 years 5 more than 10 years

II. Knowledge Questioners in cervical collar

S.no		Response
1	Have you ever received training in the Advanced trauma life support and/or cervical collar apply?	1 yes 2 no
2	If your answer for Q 1 is yes, How long ago you trained?	1. less than 6 month ago 2.6- 12 month ago
3	Did cervical collar apply guidelines available at your work Environment?	1. yes 2 .no
4	If yes question 3 Where is the guidelines kept?	1. In Station 2. In Ambulance 2. In Department Store

II. Knowledge Questioners in cervical collar

Suggestive of potential for spin injury

S.no	Question	Response
1	Altered mental states	1 yes 2 no
2	Neurological deficit	1 yes 2 no
3	Suspected extremity fracture	1 yes 2 no

4	cervical pain	1 yes 2 no
5	Cervical tenderness	1 yes 2 no
6	Thoraco/lumbar pain	1 yes 2 no
7	Thoraco/lumbar tenderness	1 yes 2 no

II. Knowledge Questioners in cervical collar use

Purpose of C-Collar

S.no	Question	Response
1	A cervical collar may protect the neck and prevent future harm.	1 yes 2 no
2	A cervical collar may cause temporary relief from pain	1 yes 2 no
3	Does cervical collar may help to take some strain off neck muscles?	1 yes 2 no
4	Did Cervical collars are occasionally used to reduce pressure on the nerves in the neck.	1 yes 2 no
5	Did cervical collar used for bleeding control	1 yes 2 no

II. Knowledge Questioners in cervical collar

Types of C-Collar

S.no	Question		Response
1	Soft neck collar		1 yes 2 no
	Hard neck collar	1 Aspen	1 yes 2 no
		2 Malibu	1 yes 2 no
		3 Miami J	1 yes 2 no
		4 Philadelphia collars	1 yes 2 no

II. Knowledge Questioners in cervical collar

Indication of C-Collar

S.no	Question	Response
1	to immobilize the neck	1 yes 2 no
2	Spinal injury to the cervical region	1 yes 2 no
3	with active bleeding to the neck	1 yes 2 no
4	After spinal cord surgery	1 yes 2 no

II. Knowledge Questioners in cervical collar

Complication while applying

S.no	Question	Response
1	Breathing restriction	1 yes 2 no
2	Tissue ischemia	1 yes 2 no
3	increased intra cranial pressure	1 yes 2 no
4	Jugular vein distention	1 yes 2 no

II. Knowledge Questioners in cervical collar

Contraindication and Precaution of applying cervical collar

S.no	Question	Response
1	Cervical dislocation with fixed angulation	1 yes 2 no
2	Impaled foreign object in the neck	1 yes 2 no
3	Massive soft tissue swelling in the neck	1 yes 2 no
4	Unsecured airway	1 yes 2 no
5	Surgical air way	1 yes

		2 no
6	Vomiting	1 yes 2 no
7	Mandibular or soft tissue injury with potential for air way compromising	1 yes 2 no