ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

DEPARTIMENT OF EMERGENCY MEDICINE

ASSESSMENT OF KNOWLEDGE AND PRACTICE TOWARDS INFECTION PREVENTION AND ASSOCIATED FACTORS AMONG NURSES WORKING IN ADULT AND PEDIATRIC EMERGENCY IN TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA 2017/18.

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Principal investigator: Negash Abreha (BScN)

June, 2018

Addis Ababa, Ethiopia

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A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES, DEPARTMENT OF EMERGENCY MEDICINE AS PARTIAL FULFILMENT OF THE REQUIREMENTS FOR MASTER'S DEGREE IN EMERGENCY MEDICINE AND CRITICAL CARE NURSING.

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June, 2018

Addis Ababa, Ethiopia

Approval by the board of examiners

This thesis by Negash Abreha is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of Master of Science in Emergency Medicine and Critical Care Nursing.

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June, 2018

Addis Ababa, Ethiopia

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Acronyms and Abbreviation

BSc	Bachelor of Science
CDC	Center for Disease Control
EPA	Environmental Protection Agency
HAI	Hospital Acquired Infection
HBV	Hepatitis B virus
HCW	Health Care Workers
HIV/AIDS	Human Immunodeficiency virus/ Acquired Immune deficiency disease Syndrome
HCV	Hepatitis C virus
IPC	Infection prevention and Control
MRSA	Methicillin Resistant Staphylococcus Aureus
MSc	Master of Science
PPE	Personal Protective Equipment
SSI	Surgical Site Infection
US	United state
WHO	World Health Organization

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Abstract

Background: Infectious diseases are a global concern and the second commonest cause of death in the world. The Centers for Disease Control (CDC) has recommended that standard precautions be used on all patients, regardless of knowledge about their infectious status. Nosocomial infections are infections acquired in the hospital or other health care facilities that were not present or incubating at the time of the client's admission. Compliance with standard precautions measures is therefore essential to prevent and control health care associated infections in both health care workers and patients.

Objective: To assess knowledge and practice towards infection prevention and associated factors among Nurses working in Adult and Pediatric Emergency Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, November 2017 to June 2018.

Methods and Materials: Institution based cross sectional study was conducted from November 2017 to June 2018 at adult and pediatric emergency in Tikur Anbessa Specialized Hospital. Self-administered structured questionnaires were used to collect information. Bivariate and Multivariate Logistic regression was used to identify factors associated with knowledge and practice of nurses towards infection prevention with P-value <0.05.

Result: One hundred two participants with 94.4% response rate were involved in the study. From these (75.5%) were knowledgeable and 72.5% had a safe practice nurses score towards infection prevention. Having training on infection prevention was significantly associated with practice on infection prevention. (AOR=2.669, 95% of CI: 1.66, 7.377).

Conclusion: About three fourth of nurses were knowledgeable and had safe practice on infection prevention. Infection prevention training and presence of infection prevention committee in the health institution are determinant factors to practice. Further study is recommended.

Key words: Infection prevention (IP), Knowledge, and Practices

1. Introduction

1.1. Background

Nosocomial infections are infections acquired in the hospital or other health care facilities that were not present or incubating at the time of the client's admission. It is also referred to as hospital-acquired infections (HAI). HAI is an infection that develops in a limited or vast scope because of pathogenic reactions associated with the infectious agent or its toxins in the hospital that acquired during the 48 to 72 hours after admission or during a specified period of 3 to 10 days after dismissal. According to the WHO, 7.1 million cases of HAI occur every year. One out of every 20 people suffers from hospital infection. This leads to 99,000 cases of death every year and imposes an estimated cost of $ 32 million to society. The WHO has provided a general definition of HAI and has renamed it as health care associated infection. WHO launched its activities in 2005 under the slogan, "clean care is safer care"(1).

The Centers for Disease Control and Prevention (CDC) defines health care-associated infections (HAIs) as infections acquired while in the health care setting (e.g., inpatient hospital admission, hemodialysis unit, or same-day surgery), with a lack of evidence that the infection was present or incubating at the time of entry into the health care setting(2).

Transmission of health care-associated pathogens takes place through direct and indirect contact, droplets, air and a common vehicle. Transmission through contaminated health care workers (HCWs') hands is the most common pattern in most settings(3).Evidence showed that Poor adherence to hand hygiene guideline was reported among HCWs in Bethesda, USA. Another study in Ethiopia reported that good hand hygiene compliance was very low (16.5%) among HCWs(4).Hand hygiene is a general term referring to any action of hand cleansing by using water and detergent and/or the use of alcohol-based hand sanitizers for the removal of transient microorganisms from hands(5).

The Centers for Disease Control (CDC) has recommended that standard precautions be used on all patients, regardless of knowledge about their infectious status. Compliance with

standard precautions measures is therefore essential to prevent and control Health Care associated infections in both health care workers and patients(6).

In practical terms it involves the use of gloves, aprons, goggles, suitable care of needles, sharps and other contaminated instruments, house keeping with appropriate cleaning policies and ensuring strict adherence to standard practices. This requires the sustained provision of protective materials, proper training of health care providers and adherence to sterilization and disinfection protocols(7). Due to this, Infection prevention and control measures aim to ensure the protection of those who might be vulnerable to acquiring an infection both in the general community while receiving care due to health problems in the range of settings(8). Most nosocomial infections are transmitted by health care personnel who fail to practice proper hand washing procedures or change gloves between client contacts(9).

1.2. Statement of problem

The overall incidence of HCAI has increased by 36 percent. The substantial human suffering and financial burden of these infections is staggering. HAI occurs worldwide and affect both developed and developing countries, about 5% -10% patients acquire one or more infections and 15%-40% of patient admitted to critical care thought to be affected. It is also estimated that more than 1.4 million people worldwide are suffering from infections acquired in hospitals(8).

Patient safety studies published in 1991 reveal the most frequent types of adverse events affecting hospitalized patients are adverse drug events, nosocomial infections, and surgical complications (10). The study conducted in Germen, the 1047 patients studied, 117 (11.2%) had a total of 124 nosocomial infections, while 112 (10.7%) had 122 community-acquired infections(11). Study conducted in Africa on HAI revealed that the hospital-wide prevalence of HAI varied between 2.5% and 14.8%; in surgical wards, the cumulative incidence ranged from 5.7% to 45.8%(12).

Increasing concern exists that antimicrobial-resistant microorganisms can be acquired in the community or that they can be introduced into the community from health care facilities. Antimicrobial resistance may also evolve or be acquired in the community and be introduced into a health care facility from the community, where the infection can spread widely(13). Infectious diseases are a global concern and the second commonest cause of death in the world (14). There are controversies regarding published recommendations for important infection

prevention, surveillance and control processes. Despite high infection rates and the need to implement clinically effective processes, there are wide gaps in knowledge illustrating that additional studies are needed(15).The recommendations were elaborated according to that HCAI are common with higher mortality. Little emphasis are given to prevent even people with good knowledge and frequently trained don't practice well. In our set up at TASH, people are staying in crowded condition and little emphasis is given to infection prevention training and lack effective and efficient use of available materials(16).

Nurses are likely to be exposed to microorganisms during their daily practice due to their close and frequent direct contact with patients. This could be one of the main causes of transmitting infection to the patients(17).Health-Care Associated Infections (HCAIs) remain a major challenge to the health care system constituting over 25% of infection rates in the hospital setting and result in significant mortality, morbidity, and economic burden worldwide. One of the major reasons for these high rates of HCAIs is the lack of infection control programs, which have been neglected due to limited resources, competing priorities, and other barriers(18).

Human Immunodeficiency Virus (HIV), Hepatitis B (HBV), Hepatitis C (HCV) infections which are infected through blood and body fluids pose great risks for healthcare workers. Nurses come first among the healthcare workers who are affected most intensely by risky situations caused by working conditions(19).

Both quantitative and qualitative study in Emergency, Tikur Anbessa revealed that anti-septic solution (especially chlorine), some of personal protective devices like mask, goggle and boots were not available in emergency room also functional water sources, written or infection prevention pictures not available in all emergency rooms. Windows were observed in all emergency rooms; most of the windows in different parts of the emergency were absent(20). It is also observed that there is gap on utilization of personal protective equipment, low hand washing practice, overcrowded areas, and scarcity of available materials. Therefore, the aim of this study is to assess the level of knowledge and practice towards infection prevention and associated factors among nurses working in Adult and Pediatric Emergency at Tikur Anbessa Specialized Hospital.

1.3. Rational of the study

Since nurses stay with patient long period of time to provide care based on the patient needs. This study will have a momentous input in identifying and improving the patterns of infection prevention at the health institution in the study area and baseline information for decision makers to put appropriate solution. This study will also help to clarify pictures of problems among infection prevention practice of health care providers in health institution. The study again will be important to create the necessary awareness of health care providers about methods of infection prevention in health institution as well as base line information for further studies.

2. Literature review

Studies conducted in Europe reported hospital- wide prevalence rates of patients affected by HCAI that ranged from 4.6% to 9.3%. An estimated five million HCAI at least occur in acute care hospitals in Europe annually, contributing to 135 000 deaths per year and representing around 25 million extra days of hospital stay and a corresponding economic burden of €13–24 billion(3).

Study in New York in 2015,Residents with acute respiratory infections(ARIs) (index cases) were placed on contact/droplet precautions until 48 hours after symptoms improved or the pathogen's shedding period passed, if the pathogen had been identified. The IP&C coordinator traced each case's contacts by reviewing bed locations, school rooms, and group activities. Asymptomatic contacts were placed on contact/droplet precautions until precautions were discontinued for the index case(21).

2.1. Knowledge on infection prevention

The study conducted in Zabol University, Iran in 2016, revealed that the mean score of the participants on the knowledge of infection prevention was poor (42.5±8). The highest levels of knowledge were related to hand hygiene with a mean of 74.5±24 and precautions to avoid needle stick injuries with a mean of 70±3. In addition, the lowest level of knowledge was related to precautions such as wearing the gown, gloves, mask and glasses during clinical procedures with a mean of 64±2.8. Of the 145 nurse participants in this study, 43% (n=63) had poor knowledge, 35% (n=51) had average knowledge, and 22% (n=31) of the nurses had good knowledge about the prevention of HAIs. Based on the Pearson correlation coefficient, there is no statistically significant relationship between knowledge and practice (r=00.8 p=0.3). However, there is a significant relationship between knowledge and gender (p = 0.02)(1).

Similar study conducted in Nigeria in 2015 indicated that Following pair-wise comparisons using the Mann Whitney test, the median knowledge scores of MLS (85%) was significantly lower than that of the PNO/CNO (95%, p=0.027) and the median knowledge scores of the staff nurse/SNO (90%) were also significantly lower than those of the PNO/CNO (p=0.049). The median percentage knowledge scores were not significantly different on pair-wise comparisons of other professional groups (p>0.05)(22).

Study conducted in Tygerberg Hospital, Cape Town Angela in South Africa in 2016 showed overall knowledge scores were low [57% correct, mean 7.7 (1.7) of 14 questions] but higher in the medical/ allied category and those qualified for 10 years (P<=0.0001, P<=0.008, respectively). Many providers (particularly nurses, P<=0.0001) were unfamiliar with the definition of HAI, but most correctly identified young age and invasive procedures as important HAI risk factors. Knowledge of routes of infection transmission was poor, with most nurses (85%) incorrectly identifying the environment as the predominant source of HAI. Less than half of the participants (48%) believed that alcohol hand-rub was an acceptable alternative to hand-washing with soap and water(23).

In Egypt cancer hospital in 2013, comparison of the studied sample mean knowledge scores in relation to their qualification. It reveals that nurses who had bachelor degree displayed higher mean knowledge scores as compared to the other two groups (diploma & diploma with specialty). This was observed for all assessed items except for that related to sharp devices and needle stick injuries. High significance statistical differences were found between the three groups in relation to infection, sharp devices and needle stick injuries, hand hygiene, personal protective equipment, standard precaution, blood born disease and administration of intravenous solution, antibiotic resistance organism, and methods used to prevent infection and overall scores of knowledge (F=7.422, F=4.826, F=3.179, F=4.678, F=4.639, F=5.246, F=3.970, F=6.083) respectively at $p < 0.05$(17).

Study conducted among health care workers in Addis Ababa, Ethiopia in 2013 showed that overall infection control knowledge among HCWs was good (>90% correct on 11/16 [69%] questions) with knowledge better regarding tuberculosis infection control (>90% correct on 5/6 [83%] questions) versus hand hygiene (>90% correct on 6/10 [60%] questions. There were a few notable infection control topics with poor knowledge. Only 56% of Respondents correctly believed that gloves do not provide complete protection against acquiring or transmitting infection (71% of physicians vs. 41% of nurses, $p < 0.05$). Only 59% knew that an alcohol-based hand sanitizer was as effective as soap and water when the hands were not visibly dirty (51% of physicians vs. 68% of nurses, $p < 0.05$).With regards to TB, the majority of physicians correctly agreed that people who have received BCG vaccine can still develop active TB in contrast to slightly over half of nurses (91% vs. 59%, respectively, P <0.05)(24).

Study conducted in Mizan Aman hospital in south east Ethiopia in 2015, revealed that among 135 HCW's 59 (43.7%) of them disposed sharp materials such as used needles in open pails, 91 (67.4%) in sharp and liquid proof container without removing syringe, 59 (43.7%) in sharp and liquid proof container after separating the needle from syringe, 42 (31.1%) mixed with other wastes/rubbish and 107 (79.2%) in safety box. Ninety five (70.4%) HCW's knows that gloves and gowns were required for any contact with patients(9).

Institutional based cross-sectional quantitative survey conducted in health institution Bahirdar city administration in 2014, revealed, majority of the respondents 299 (84.2 %) were knowledgeable and 55 (15.8%) were not knowledgeable in all health care facilities Majority of the respondent knew diseases transmitted by sharp injury and body fluid: 321(90.7) hepatitis B, 346 (97.7%) HIV, 196(44.6%) hepatitis C, and least percent 61(17.2%) Tuberculosis(8).

Another study in South Wollo Zone in North East Ethiopia in 2016, indicated among the respondent 208(100%) knew about personal protective equipment. 200(96.16%) respondents heard about infection prevention. From the respondents 194(93.3%) knew about healthcare-associated pathogens can be found on normal, intact patient skin, the rest 14(6.7%) do not know about this. Among 208 respondent 190(91.3%) of health care workers knew use of an alcohol based antiseptic for hand hygiene is as effective as soap and water if hands are not visibly dirty. Among respondents 37(17.8%) of them Participated training on infection prevention, and about 203(97.6%) of respondents knew as sharp instruments are source of infection. Among the respondents 208(100%) knew about how to handle sharp instruments and about personal protective equipment does protect being infected. Among 208 respondents 206(95.19%) respondents were knew about highly infectious wastes(18).

Study conducted on Prevention of Surgical Site Infection among Nurses Working in Amara Regional State Referral Hospitals, Northwest Ethiopia in 2015, revealed that male nurses were about 3 times more likely to be knowledgeable about prevention of surgical site infection than female participants (AOR = 3.22, 95% CI: 2.09, 4.95). Those nurses who have served for more than 5 years were about 2 times more likely to be knowledgeable about prevention of surgical site infection than those whose service years are 5 years or less (AOR = 1.81, 95% CI: 1.12, 2.94). Those nurses who have ever taken training on infection prevention methods were about 2 times more likely to be knowledgeable about prevention of surgical site infection than those who have not (AOR = 1.95, 95% CI: 1.27, 2.99)(25).

Cross-sectional study conducted at Wolaitta Sodo teaching and referral hospital, South East Ethiopia in 2017 showed that from the total 282 health care workers (HCWs), 269 (99.3%) of HCWs have good knowledge towards infection prevention and 2 (0.7%) have poor knowledge(26).

2.2. Practice on infection prevention

Study conducted in Iran in 2016, showed out of 145 participants of the study, 24% (n=34) of the nurses had poor practice, 42% (n=61) had average practice, and 34% (n=50) had good practice in the prevention of HAIs. No statistically significant association was observed between knowledge and practice ($p<0.05$)(1) .

Similar study conducted in Nigeria in 2015 indicated the overall median percentage practice score was 50.8%. Across professional groups, the median percentage practice scores of MLS (46.2%), house officers (49.2%), and staff nurses/SNO (49.2%) were lower than those of consultants (53%), resident doctors (56.9%) and PNO/ ACNO (50.7%). These differences were statistically significant ($p<0.0001$ Krukas Willis(22).

Study conducted in Tygerberg Hospital, Cape Town Angela in South Africa revealed that practice questions received 53% desired responses overall [mean 3.2 (1.2) of 6 questions] with higher scores among nurses ($P<0.0001$). Self-reported adherence to IC best practice was high: hand hygiene (88%), use of personal protective equipment (74%) and transmission-based precaution recommendations (80%). For all three measures, nurses reported higher adherence rates ($P<0.0001$). However, providers had poor uptake of annual influenza vaccination (25%) and most (especially doctors, $P<0.0001$) felt obliged to report for work when sick (95% vs 55%). Uptake of N95 respirator fit-testing was poor (28%)(23).

Institutional based cross-sectional quantitative survey conducted in health institution Bahirdar city administration in 2014, 192(54.2%) of respondents had safe practice and 162 (45.8 %) of them had unsafe practice. Majority of the respondents of 310(87.6) had ever wore at least one type of personal protective equipment (PPE) while providing patient care or caring equipment's. Majority of health care workers 292(82.5 %) had hand hygiene practice after completing the procedure they perform and about 180(50.8%) wash their hand before the procedure. The overall hand hygiene practice score was 244(69.0%).Regarding to hand hygiene

material almost all of the respondents 317(98%) use soap and water, whereas only 31(8.8%) used disinfectant solution for hand washing practice(8).

Study conducted on Prevention of Surgical Site Infection among Nurses Working in Amara Regional State Referral Hospitals, North West Ethiopia in 2015, female nurses were about 2 times more likely to practice surgical site infection prevention activities as compared to male nurses (AOR = 2.35, 95% CI: 1.58, 3.50). Those nurses who are 30 years or older were about 2 times more likely to practice surgical site infection prevention activities as compared to those who are less than 30 years old (AOR = 1.79,95% CI: 1.08, 2.97). Nurses who have diploma were about 2 times more likely to practice surgical site infection prevention activities as compared to those who have B.S. degree or higher (AOR = 2.26, 95% CI: 1.08, 4.76)(25).

Cross-sectional study conducted at Wolaitta Sodo teaching and referral hospital, South East Ethiopia in 2017 showed that from the total 282 health care workers (HCWs), 164 (60.5%) of HCWs have good practice towards infection prevention and the remaining 107 (39.5%) of health care workers had poor practice. from this study male health care workers were 62% less likely to practice infection prevention when compared with female health care workers (AOR=0.379 (0.193-0.743)). Health care workers who work in surgical ward were 92% less likely to practice infection prevention when compared with HCWs in medical ward (AOR=0.076 (0.028-0.206)) and HCWs in Obs/gyn were 87% less likely to practice infection prevention (AOR=0.127 (0.054-0.03)) also HCWs in pediatrics ward were 87% less practice infection prevention (AOR=0.17 (0.06-0.48)) and the remaining health care workers from other departments were 92% less likely to practice infection prevention (AOR=0.073 (0.026-0.203)). According to this study health care workers not received training on infection prevention were nearly 10 times more likely to practice infection prevention(26).

3. Objective of the study

3.1. General objective

- To assess knowledge and practice towards infection prevention and associated factors among Nurses working in Adult and Pediatric Emergency Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, from November 2017 to June 2018.

3.2. Specific objectives

- To determine knowledge of nurses towards infection prevention.
- To identify factors associated to knowledge on infection prevention among Nurses
- To describe practice of nurses towards infection prevention.
- To identify factors associated to practice on infection prevention among nurses

4. Methods and Materials

4.1. Study area

The study was conducted in Tikur Anbessa Specialized Teaching Hospital (TASTH), which is located in the capital of Ethiopia, Addis Ababa City, and Kirkos Sub City. It was established in 1973 during the reign of Emperor Haile Selassie as part of the national effort for providing quality health care to the community. The hospital totally holds 12, 3000 m. sq. area of land and the building has settled on 45000 m sq. area. There are 1262 various rooms from the basement to the eighth floor. The hospital is currently functioning as teaching hospitals under AAU and it is the country's biggest specialized referral hospital with 800 beds. This hospital sees approximately 370,000- 400,000 patients per year but the exact number is not known. The hospital was the biggest in Ethiopia during establishment period and was regarded as an exemplary hospital without any other superior one in the continent of Africa. Even at the moment it is renowned and famed as service rendering, training providing and research conducting institution equipped and facilitated with modern medical equipment and highly skilled medical specialists. The hospital has different clinical Departments with specialty and subspecialty training. One of recently established (2010) Department is Emergency Medicine. The Adult Department sees over 20,000 patients per year. It is staffed with 78 nurses and has around 80 beds. The pediatric emergency unit sees 8640 patients per year, staffed with 41 nurses and has around 41 beds (20).

4.2. Study Design

An institution based cross-sectional study was conducted.

4.3. Study period

The study was conducted from November, 2017 to June, 2018.

4.4. Source population

All nurses working at TASH.

4.5. Study Population

All nurses working in adult and pediatric emergency of TASH.

4.6. Inclusion Criteria and Exclusion Criteria

4.6.1. Inclusion Criteria

All nurses working in adult and pediatric emergency unit.

4.6.2. Exclusion Criteria:

Those Nurses who are on leave and those who are working at only night shifts during data collection were not included.

4.7. Sample size determination

All nurses working in adult and pediatric emergency units` were included in the study.

4.8. Sampling Procedure

A convenience sample of all adult and pediatric emergency nurses was invited to participate.

4.9. Variables of the study

4.9.1. Dependent Variable

- ✓ Knowledge of nurses on infection prevention
- ✓ Practice of nurses on infection prevention

4.9.2. Independent variables

- ✓ Socio-demographic characteristics
- ✓ Availability of Infection prevention guideline
- ✓ Previous training on infection prevention
- ✓ Availability of Personal Protective Equipments
- ✓ Presence of infection prevention committee.

4.10. Operational Definitions

Knowledge

Knowledge of individual nurses was classified into two groups (knowledgeable and not knowledgeable). Respondents who score more than mean value of correct answer was classified as knowledgeable. Respondents who score less than mean value of correct answers was classified as not knowledgeable on infection prevention assessment tool.

Practice

Infection prevention practice of nurses was classified into two groups (safe practice and unsafe practice). Respondents who score more than mean of correct answer was classified as safe practiced. Respondents who score less than mean value of correct answers was classified as unsafe practiced on infection prevention assessment tool.

4.11. Data collection tool and procedure

Data was collected by using pretested, structured self-administered questionnaire which consists of socio-demographic information, knowledge, and practice questions on infection prevention. The tool was developed by reviewing related literatures, prepared by English version and it's prepared to assess the knowledge, and practice of healthcare provider on infection prevention in hospital and health center. Eight data collectors (BSc. nurses) and two supervisors (BSc. nurses) were employed, training was given for one day on clarification of some terms and assessment tools, aim of the study, concerning need for strict confidentiality of respondents information, time of data collection, timely collection and reorganization of the collected data and submission on due time. The questionnaire was filled by nurses who are working in adult and pediatric emergency in TASH and data was collected for one month including training and pretest was conducted in emergency nurses working in Paulo's hospital.

4.12. Data quality control

Pre-testing of the questionnaire was done on 5% of the total sample size in Paulo's hospital emergency nurses. But the respondents were not included in the actual study. Modifications were made accordingly.

Supervisors closely monitored data collectors during data collection on daily bases. In addition, the principal investigator together with supervisors was checking the collected data daily.

4.13. Data Processing, analysis and interpretation

Each questionnaire was checked for completeness, missed values and unlikely responses and then manually cleaned up on such indications. The coded data was entered to computer using Epi-info version 3.3 software for its customizing and skip benefit, then after data cleaning, it was exported to SPSS version 21. The data was analyzed descriptively for socio demographic and other study variables. Bivariate and multivariate logistic regression analysis was assessed. Frequency and percentage was used to check the association between variables. 95% Confidence interval was used to determine the strength of association between variables. Those variables which have significant association were selected for further analysis. Results were interpreted as association if $p<0.05$.

4.14. Ethical Consideration

Ethical clearance was obtained from research committee of Department of Emergency Medicine College of Health Sciences, Addis Ababa University. After this, support letter was written by TASH to conduct this research in the hospital. In addition, informed verbal consent was obtained from the respondents before interviewing. Respondents were told about the aim of the study and confidentiality of the information which they were given. In addition, they were told that they have full right to withdraw from the study at any time if they feel that uncomfortable.

4.15. Dissemination of Results

The findings of this study will be presented and submitted to, Department of Emergency Medicine and Critical Care Nursing, College of Health Sciences, Addis Ababa University. In addition, it will be presented on different seminars and attempts will be made to publish.

5. Result

5.1. Socio-demographic Characteristics

From a total of 119 nurses, 108 nurses participated. From these one hundred two (94.4%) responded to the study. Sixty four (62.7%) were females. Almost two third of the study participants were between aged 20-30 years (67.6%). Above two third 70(68.6%) were Orthodox. Among study participants 93(91.2%) had BSc Degree and 7(6.9%) had MSc. Regarding experience of the study participants 54 (52.2%) had below five years and only 6(5.9%) had greater than 10 years' work experience. Among the participants above two third 72 (70.6%) were single. Among study participants 61(59.8%) responded that Emergency Department doesn't have infection prevention committee and around half of the participants 52(51%) responded that didn't have infection prevention guideline. Around half of them 53(52%) had taken training on infection prevention. [Table1].

Table 1: Distribution of Socio-demographic characteristic of nurses working in Adult and Pediatric Emergency in TASH, Addis Ababa, Ethiopia, April 2018(n=102).

Variables	Response	Frequency	Percentage
Age	20-30	69	67.6
	31-40	26	25.5
	>40	7	6.9
Sex	Male	38	37.3
	Female	64	62.7
Religion	Orthodox	70	68.6
	Muslim	9	8.8
	Protestant	23	22.5
Level of education	Diploma	2	2
	BSc degree	93	91.2
	MSc degree	7	6.9
Work experience	<5years	54	52.9
	5-10 years	42	41.2
	>10	6	5.9
Marital status	Married	30	29.4
	Single	72	70.6
Presence of infection prevention committee	Yes	41	40.2
	No	61	59.8
Presence infection prevention guideline	Yes	50	49
	No	52	51
Training on infection prevention	Yes	53	52
	No	49	48

5.2. Knowledge of nurses on infection prevention

The mean score of the knowledge questions was 8.59/13 (SD= 2.483). In this study, 77 (75.5%) of the respondents were found to be knowledgeable about infection prevention (figure 1). Among the study participants 96 (94.1%) heard about infection prevention. Sixty three (61.8%) believed that gloves cannot provide complete protection against acquiring infection. Seventy one (69.6%) of study participants responded that health care- associated pathogens can be found on normally intact patient skin. Eighty six (84.3%) of study participants responded that Washing hands with soap or an alcohol based antiseptic decreases the risk of transmission of hospital acquired pathogens. Concerning the level of safety boxes filling and sealing, fifty nine (57.8%) respondents said it should be filled up to three fourth, twenty one (20.6%) respondents up to one half and twenty two (21.6%) respondents said it should be full before sealing and closing. Regarding the disease transmitted by needle stick injury 95 (93.1%), 80(78.4%), 65(63.7%), and 4(3.9%) of participants believed that HIV, HBV, HCV, and TB are transmitted by needle stick injury, respectively [table 2].

Table 2: Distribution of knowledge of nurses on Infection Prevention in Adult and Pediatric Emergency in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia April 2018 (n=102).

Variable	Response	Frequency	Percentage
Heard about infection prevention	Yes	96	94.1
	No	6	5.9
Gloves cannot provide complete protection against acquiring infection	Yes	63	61.8
	No	39	38.2
Health care- associated pathogens can be found on normally intact patient skin	Yes	71	69.6
	No	31	30.4
Washing your hands with soap or an alcohol based antiseptic decreases the risk of transmission of hospital acquired pathogens	Yes	86	84.3
	No	16	15.7
Use of an alcohol based antiseptic for hand hygiene is as effective as soap and water if hands are not visibly dirty	Yes	61	59.8
	No	41	40.2
Gloves should be worn if blood or body fluid exposure is anticipated	Yes	70	68.6
	No	32	31.4

There is need to wash hands before doing procedures that do not involve body fluid	Yes	32	31.4
	No	70	68.6
Can you not wear the same pair of gloves for multiple patients as long as there is no visible contamination on the gloves?	Yes	41	40.2
	No	61	59.8
TB is carried in airborne particles that are generated from patients with active pulmonary TB	Yes	80	78.4
	No	22	21.6
Do you have knowledge of specific waste disposal buckets according to the level of their contamination?	Yes	70	68.6
	No	32	31.4
Do you know preparation formula for preparing 0.5% chlorine solution?	Yes	67	65.7
	No	35	34.3
Knowledge on the level of safety boxes filled before closing and sealing.	Full	22	21.6
	One half	21	20.6
	Three fourth	59	57.8
Which of the following disease is transmitted by needle stick injury? (multiple response)	HIV	95	93.1
	HBV	80	78.4
	HCV	65	63.7
	TB	4	3.9

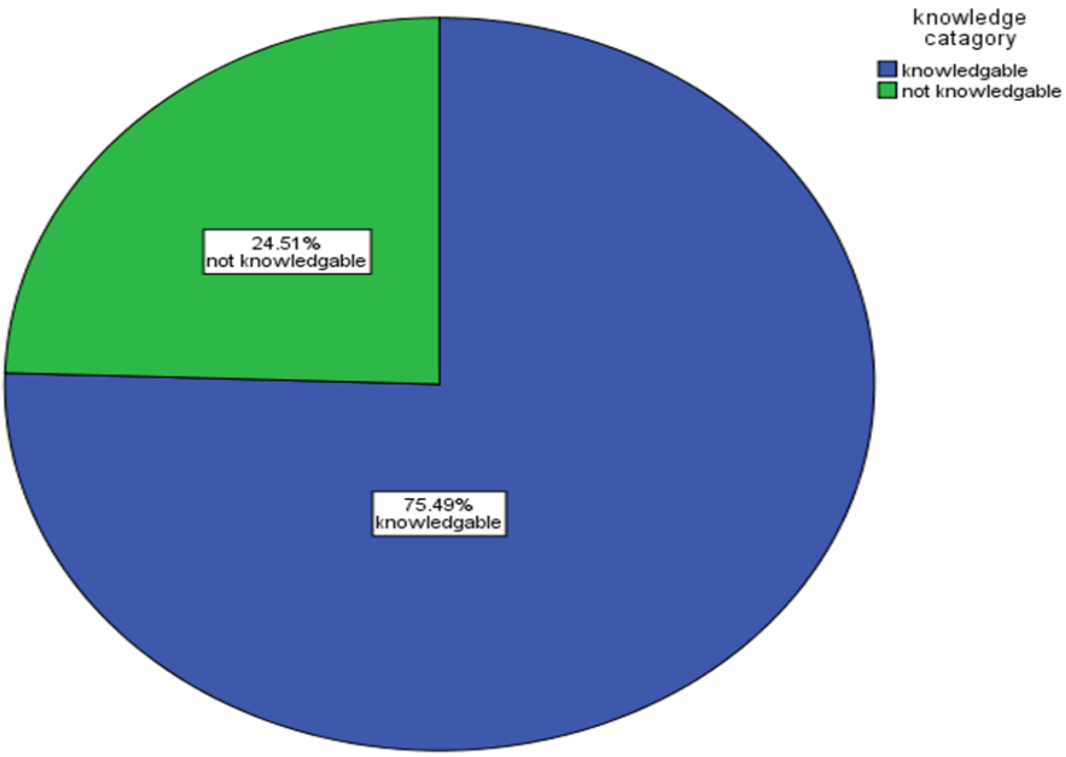

Figure1: Frequency distribution of overall knowledge score of nurses regarding infection prevention among nurses working in adult and pediatric emergency in TASH, Addis Ababa, Ethiopia, and April, 2018.

5.3. Practice of nurses on infection prevention

The mean score of the practice questions was 8.61/15 (SD= 2.395). In this study, the proportion of nurses who had safe practice of infection prevention activities was found to be 74 (72.5%) (Figure2). Regarding the time of hand washing, 72(70.6%) washed their hands before patient care, 65(63.7%) after patient care, 52(51%) if it look dirty, 54(52.9%) after toilet, 57(55.9%) after contact with blood or body fluid, 56(54.9%) before wound care, 57(55.9%) after care for wound and 53(52%) after removing gloves. Ninety (88.2%) and thirty nine (38.2%) of study participants were using soap with water and alcohol for their hand washing respectively. Concerning the uses of all personal protective equipment for infection prevention only 16(15.7%) were used all personal protective equipments while 87(85.3%) didn't. The reason for not using personal protective equipments were lack of materials (87(85.3%)), lack of awareness

(3(2.9%)) and carelessness (9(8.8%)). Regarding actions after infection exposure, fifty eight (56.9%) of participants have been exposed to blood or other body fluids. Only 49(48%) wanted to take PEP while 24(23.5%) would clean it by alcohol and 54(52.9%) would wash the contamination with water [Table3].

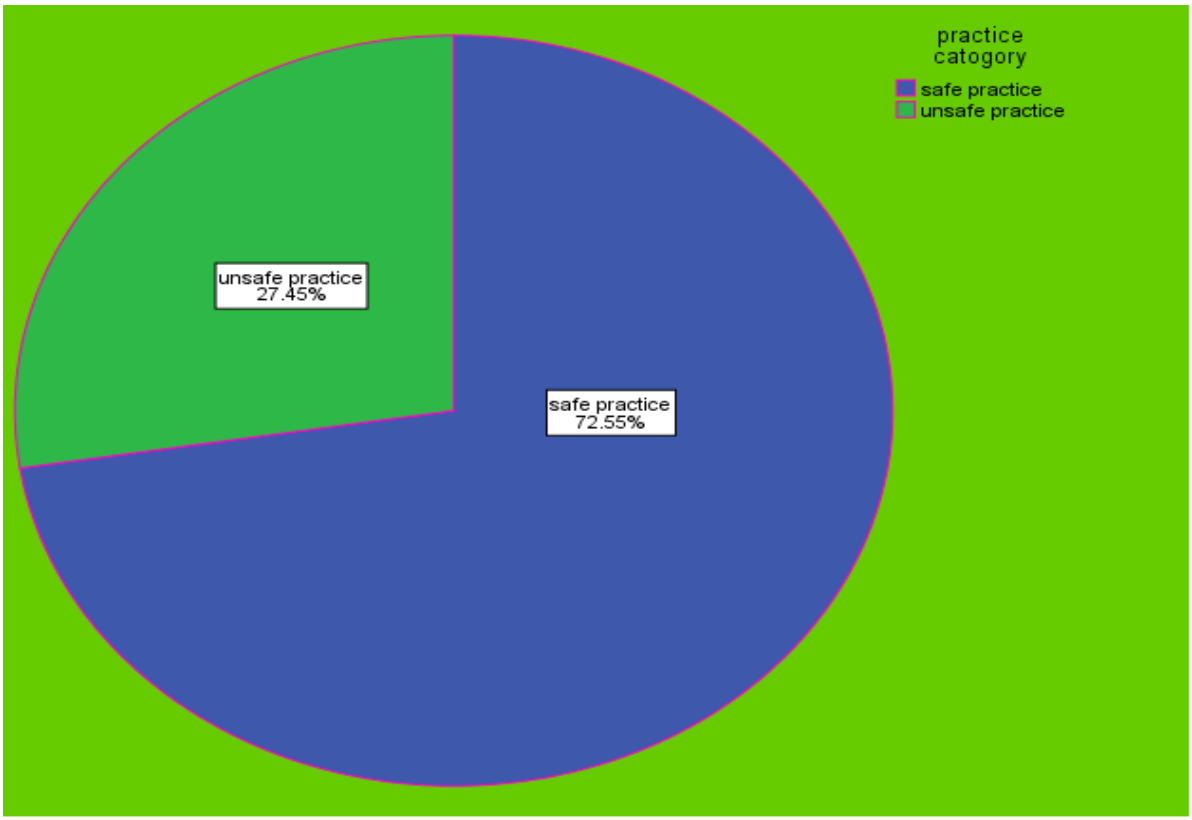

Figure 2: Frequency distribution of overall practice score of nurses on infection prevention among nurses working in adult and pediatric emergency in TASH, Addis Ababa, Ethiopia, and April, 2018

Table 3: Distribution of practice of nurses on Infection Prevention in Adult and Pediatric Emergency in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, April, 2018 (n=102).

Variable	Response	Frequency	Percentage
Hand washing	• Before patient care	72	70.6
	• After patient care	65	63.7
	• If it look dirty	52	51
	• After toilet	54	52.9
	• After contact with blood or body fluid,	57	55.9
	• Before care of wound ,	56	54.9
	• After care for wound	57	55.9
	• After removing gloves	53	52
Material for hand washing	Soap and water	90	88.2
	Alcohol	39	38.2
Use of antiseptic hand rub	Yes	90	88.2
	No	12	11.8
use of all PPE	Yes	16	15.7
	No	86	84.3
Reason for not using PPE (multiple response)	Lack of materials	87	85.3
	Lack of awareness	3	2.9
	Carelessness	9	8.8
Duration of soaking instrument into chlorine solution	10 minutes	70	68.6
	1 hour	27	26.5
	24 hours	5	4.9
Frequency of use glove?	Always	51	50
	Sometimes	49	48
	I don't use	2	2
When do you wear personal protective barriers?	Always	24	23.5
	Sometimes	68	66.7
	Never	8	7.8

	Not sure	2	2
Did you mix dry and liquid wastes?	Yes	35	34.3
	No	67	65.7
high level disinfection practice at your institution	Yes	45	44.1
	No	57	55.9
Do you clean the site before you secure IV cannula?	Yes	99	97.1
	No	3	2.9
To the above question if yes, with what?	Water with soap	7	6.9
	Alcohol	93	91.2
	Nothing	2	2
Have you ever been exposed to blood or other body fluids of patients through contact or unprotected skin?	Yes	58	56.9
	No	44	43.1
What measure did you take if you are exposed to blood or fluids, needle stick injury?	Taking Post exposure prophylaxis (PEP)	49	48
	Clean by alcohol	24	23.5
	Washing with water	54	52.9
What is your facility sterilization technique?	Boiling	19	18.6
	Steam sterilization	82	80.4
	Others	1	1
Where do you put safety boxes?	In high traffic area	21	20.6
	At corridor	56	54.9
	Any where	25	24.5

5.4. Factors Associated with Knowledge of Nurses about Infection Prevention

In both bivariate and multivariate analyses, only sex of the participants was factor which was significantly associated with knowledge about infection prevention. But the other independent variables were not significantly associated with knowledge about infection prevention. Male nurses were about 6 times more likely to be knowledgeable about infection prevention than female nurses (AOR =6.111, 95% of CI 1.687, 22.133) (Table4).

Table 4: The Comparison of nurses Practice on Infection Prevention with socio demographic characteristics among nurses working in Adult and Pediatric Emergency in TASH, Addis Ababa, Ethiopia, April, 2018.

Characteristics	Level of knowledge		COR		AOR
	Knowledgeable	Not knowledgeable	95% of CI	P-Value	95% of CI
Sex			1		1
Male	35(92.1%)	3(7.9%)	0.164(0.045,0.593)	0.006	6.111(1.687,22.133)
Female	42(65.6%)	22(34.4%)			

Where: COR-Crude Odd Ratio, PV-P-value, AOR-Adjusted Odd Ratio

5.5. Factors Associated with Practice of nurses on infection prevention

In the bivariate analysis, age, presence of infection prevention committee, and taking training on infection prevention methods were found to be significantly associated with safer practice of infection prevention. Taking training on infection prevention was found to be significantly associated with safer practice on multivariate analysis. Those nurses whose age between 20-30 years old were about 3 times more likely to practice on infection prevention as compared to those who are greater than 30 years old (AOR =3.133, 95% of CI:1.353,7.252). Those nurses who knew the presence of infection prevention committee were about 3.6 times more likely to practice safer than those who didn't. Nurses who took training on infection prevention were about 2.6 times more likely to have better infection prevention practice (Table5).

Table 5: The Comparison of nurses Practice on Infection Prevention with Socio-demographic Characteristics among nurses working in Adult and Pediatric Emergency in TASH, Addis Ababa, Ethiopia, April, 2018.

Characteristics		Practice		COR	P-value	AOR
		Safe practice	Unsafe practice	95% of CI		95% of CI
Age	20-30	56(81.2%)	13(18.8%)	1		1
	31-40	14(53.8%)	12(46.2%)	3.692(1.387,9.829)	0.008	3.133(1.353,7.252)
	>40	4(57.1%)	3(42.9%)			
Knowing about infection prevention committee	Yes	35(85.4%)	6(14.6%)	1		1
	No	39(63.9%)	22(36.1%)	3.291 (1.197,9.048)	0.049	3.602(1.185,10.95)
Training on infection prevention	Yes	43(81.1%)		1		1
	No	31(63.3%)		2.497 (1.015,6.144)	0.049	2.669(1.66,7.377)

Where: COR-Crude Odds Ratio, AOR-Adjusted Odds Ratio

6. Discussion

Infection Prevention is one of the most important challenges in delivering optimum medical care. Although all health professionals are responsible for ensuring patient safety in this regard, nurses play a major role.

In this study, the mean score of the knowledge questions was 8.59/13(66.1%). From total 102 participants, 77(75.5%) of the respondents were found to be knowledgeable about infection prevention. This study finding is high when compared with the study conducted in Zabol University, Iran in 2016, which revealed that the mean score of the participants on the knowledge of infection prevention was poor (42.5±8)(1). This difference may be due to study setting, sample size and the respondent characteristics. . It is also high when compared with cross-sectional survey conducted among health care workers (HCWs) at Tikur Anbessa Specialized Hospital and St. Paul's Millennium Medical College in Addis Ababa, which revealed that 69% of HCWs had good knowledge (24). This difference may be due to study methods and period, presence of infection prevention guidelines and provision of infection prevention training. But this study finding is low when compared with study conducted in Nigeria which indicated that the median knowledge scores of nurses were 90% (22). This difference may be due to training on infection prevention and study setting. It is also low when compared with finding from Bahirdar City which revealed that 84.2 % of the Health care providers were knowledgeable (8). This discrepancy may be due to sampling method, and characteristic of respondents.

In this study about Sixty three (61.8%) nurses believed that gloves cannot provide complete protection against acquiring infection. This finding is in agreement with the study conducted at Tikur Anbessa Specialized Hospital and St. Paul's Millennium Medical College in Addis Ababa which revealed that 56% of respondents believed that gloves do not provide complete protection against acquiring or transmitting infection (26). In this study nurses believed that HIV (93.1%), HBV (78.4%), HCV (63.7%), and TB (3.9%) were transmitted by needle stick injuries. This study finding is different from the study conducted in Bahirdar city which showed that 90.7 hepatitis B, 97.7% HIV, 44.6% hepatitis C, and least 17.2% Tuberculosis were transmitted by needle stick injuries (8). This difference may be due to training on infection prevention and characteristics of respondents.

This study finding indicated that 72.5% of nurses have a safer practice on infection prevention. The study finding is high when compared with the study conducted in Tygerberg Hospital; Cape

Town Angela in South Africa which revealed that practice questions received 53% gave a desired practice response (23). This difference may be due to study setting and characteristics of respondents. The finding is high when compared with findings from Bahirdar City (54.2%) and Wolaita Sodo (60.5%) the Health Care Providers had a safe practice (8,26). This difference may be due to setting of the study, lack of personal protective barriers supply, and lack of training on infection prevention.

Hand Hygiene

Majority of nurses (70.6%), washed their hands before patient care. This finding is high when compared Bahirdar City (50.8%) washed their hands before patient care. 63.7% washed their hands after patient care which is low when compared with Bahirdar City (82.5%) (13).This difference may be due to materials (supply), and characteristics of respondents. Concerning hand washing 88.2% of nurses used soap and water for hand hygiene, similarly 88.2% of nurses used antiseptic hand rub. This study finding indicates low practice when compared with similar study conducted in Bahirdar city which was 98% use soap and water, whereas only 8.8% used disinfectant solution (8). This difference may be due to available materials like antiseptic solution.

Factors affecting infection prevention

Male nurses were about 6 times more likely to be knowledgeable about prevention of infection than female nurses. This study finding shows similarly associated variables when compared with finding from similar study in Amara region which revealed that male nurses were about 3 times more likely to be knowledgeable about prevention of surgical site infection than female participants (25).

This study also indicated that those nurses whose age between 20-30 years old were about 3 times more likely to have a safer practice as compared to those who are greater than 30 years old. Those nurses who knew about the presence of infection prevention committee were 3.6 times more likely to have practice safer than those who didn't know about infection prevention committee. Nurses who took training on infection prevention were about 2.6 times more likely to have a safer practice than those who didn't. Study finding from Amara Region showed that female nurses were about 2 times more likely to practice surgical site infection prevention activities as compared to male nurses. Those nurses whose age greater than or equal to 30 years old were about 2 times more likely to practice surgical site infection prevention activities as

compared to those who are less than 30 years old. (25).This difference may be due to variable consideration by the principal investigator and characteristics of respondents.

7. Limitations

1. It is better if this study was supported by qualitative methods and observational check list rather than use self-administer questionnaire to assess practice.
2. The finding is not generalized to the target population because of the sampling method.
3. This study is vulnerable for the all drawbacks of cross section study design.
4. Single center study

8. Conclusion and Recommendation

Conclusion

Knowledge and practice of infection prevention activities among nurses working in adult and pediatric emergency in Tikur Anbessa specialized Hospital were found to be good. Presence of infection prevention committee and training on infection prevention were factors which were significantly associated with safe practice on infection prevention.

Recommendation

1. The studied institution should Integrate IP standard with routine works and improving sustainable supplies like PPE, and encouraging health care providers to use PPE and IP guideline.

2. Addis Ababa University College of Health Science and Health Bureau supervision and monitoring of the health care providers practice toward Infection Prevention as one of health service activities and continued training on infection prevention should be provided.
3. Further study which includes quantitative and qualitative study is recommended.

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10. Annex I: Information and Consent Sheet

Information sheet and consent form is prepared for nurses who are participated in research project, a cross-sectional study to assess knowledge, and practice on infection prevention and associated factors among nurses in Adult and Pediatric Emergency, Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2017/18.

Name of Principal investigator: Negash Abreha

Name of the organization: Addis Ababa University, College of Health Sciences, School of Medicine. Name of the Sponsor: Addis Ababa University

This information sheet and consent form is prepared to explain the study you are being asked to join. Please listen carefully and ask any questions about the study before you agree to join. You may ask questions at any time after joining the study. The investigator is final year Master of Emergency Medicine and critical care nursing graduate student from the school of Medicine, college of health science, Addis Ababa University, and two advisors from Emergency Department, Addis Ababa University.

Purpose of Research Project: - I am hopeful that this research will contribute for reducing mortality and morbidity of client and health care provider through investigate Knowledge and Practice of nurses on infection prevention and associated factors among health care workers at the institution. Procedure to assess knowledge, and practice of nurses on infection prevention and associated factors at emergency in TASH. You are invited to take part in this project. If you are willing to participate in this project, you need to understand and tick yes‖ the agreement form. Then after, you will receive the questionnaire from the data collector to give your response. You do not need to write your name on the questionnaire and all your responses and the results obtained will be kept confidentially by using coding system whereby no one will have access to your response. Risk/ Discomfort:-By participating in this research project, you may feel that it has some discomfort especially on wasting time about 30 minutes. We hope you will participate in the study for the sake of the benefit of the research result. There is no risk in participating in this research project.

Benefits: If you participate in this research project, there may not be direct benefit to you but your participation is likely to help us in assessing the Knowledge and Practice of health providers on infection prevention and associated factors at public health care facilities. Ultimately, this will help us to identify the gap and take the appropriate intervention by the authorized stakeholder. Incentives:-You will not be provided any incentive or payment to take part in this project. Confidentiality:-The information collect from this research project will be kept confidential and information about you that will be collected by this study will be stored in a file, without your name, but a code number assigned to it. In addition, it will not be revealed to anyone except the principal investigator and will be kept locked with key. Right to refuse or withdraw: You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response. You have also the full right to withdraw from this study at any time you wish, without losing any of your right. Persons to contact: If you have any question to ask, please contact

Negash Abreha. Tel: +251-933371435, Email = negashabreha@gmail.com

11. Annex II: Questionnaire:

Addis Ababa University

College of Health Science

Department of Emergency medicine

Consent form: - This questionnaire is prepared to assess the knowledge, and practice of infection prevention and associated factors among nurses working in adult and pediatric emergency in TASH, Addis Ababa, Ethiopia, 2018. The assessment is made for the partial fulfillment 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 nurse's capacity of infection prevention in Emergency, TASH. The questionnaire contains close 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 ☐ ☐

Thank you in advance for your cooperation

Data collectors Name_____ sign: _____

I. Socio-Demographic questionnaires

All questionnaires are completed anonymously. We would appreciate if you answer all the questions and answer as honestly as possible. Please circle on the number you select that best answers the question. Kindly make only one Selection unless otherwise instructed.

Ser.NO	Socio-demographic	Response	Remark
1	Sex	1. Male 2. Female	
2	Age	----------	
3	Religion	1. Orthodox 2. Muslim 3. Protestant Other(specify)_____	
4	Level of education	1. Diploma 2. BSc. Degree 3. Master's Degree	
5	Work experience?	----------	
6	Marital status	1. Married 2. Single 3. Divorced 4. Widowed	
7	Does your facility/emergency unit have infection prevention committee?	1. Yes 2. No	
8	Do your health facility/ emergency unit have an infection prevention guideline?	1. Yes 2. No	
9	Do you have training on infection prevention?	1. Yes 2. No	

II. Knowledge related Questionnaire on infection prevention

10	Did you heard about infection prevention?	1. Yes 2. No	
11	Gloves cannot provide complete protection against acquiring/transmitting infection	1. Yes 2. No	
12	Healthcare-associated pathogens can be found on normal, intact patient skin	1. Yes 2. No	
13	Washing your hands with soap or an alcohol based antiseptic decreases the risk of transmission of hospital acquired pathogens.	1. Yes 2. No	
14	Use of an alcohol based antiseptic for hand hygiene is as effective as soap and water if hands are not visibly dirty.	1. Yes 2. No	
15	Gloves should be worn if blood or body fluid exposure is anticipated	1. Yes 2. No	
16	There is no need to wash hands before doing procedures that do not involve bodily fluids	1. Yes 2. No	
17	No need to wear the same pair of gloves for multiple patients as long as there is no visible contamination.	1. Yes 2. No	
18	TB is carried in airborne particles that are generated from patients with active pulmonary TB	1. Yes 2. No	
19	Do you know specific waste disposal buckets according to the level of their contamination?	1. Yes 2. No	
20	Do you know written formula for preparing 0.5% chlorine solution?	1. Yes 2. No	
21	Do you know to what level safety boxes should be filled before closing and sealing?	1.Full 2.One half (1/2) 3. Three fourth (3/4)	
22	Which of the following disease is transmitted by	1. HIV	

	needle stick injury? (More than one answer is possible)	2. HBV 3. HCV 4. TB 5. Other (specify)	

III. Practice related questionnaires on infection prevention

Ser.No	Practice related questions	Response	Remark
23	When do you wash your hands?	1. before Patient Contact 2. After Patient Contact 3. If they look or feel dirty 4. After going to the toilet 5. After contact with blood or bodily fluids 6. Before caring for a wound 7. After caring for a wound 8. After removing gloves	
24	What do you use to wash your hand?	1. Soap 2. Alcohol 3. Nothing 4. Other (specify)	
25	Do you use antiseptic hand rub?	1. Yes 2. No	
26	Do you use all personal protective equipment's to prevent infection?	1. Yes 2. No	
27	If no, why?	1. Lack of materials	

		2. Lack of awareness 3. Carelessness 4. Other (specify)	
28	For how long instrument soaked in the chlorine solution?	1. 10minute 2. 1hrs 3. 24hrs 4. others (specify)	
29	How often do you use glove?	1. Always 2. Some times 3. I don't use	
30	When do you wear personal protective barriers?	1. Always 2. Sometimes 3. Never 4. Not sure	
31	Did you mix dry and liquid wastes?	1. Yes 2. No	
32	Did high level disinfection practice at your institution?	1. Yes 2. No	
33	Do you clean the site before IV cannula secure?	1. Yes 2. No	
34	If yes Q33, with what?	1. Water with soap 2. Alcohol 3. Nothing	
35	Have you ever exposed to blood or other body fluids of patients through contact or unprotected skin?	1. Yes 2. No	
36	What measure did you take if you are exposed to blood or fluids, needle stick injury?	1.Taking Post exposure prophylaxis (PEP) 2. Clean by alcohol 3. Washing with water 4. Other specify	

		_____	
37	What is your facility sterilization technique?	1.Boiling 2. steam sterilization 3. Other specify	
38	Where do you put safety boxes?	1. In high traffic area 2. At corridor 3. Any where	

Declaration

I, the undersigned declare that this is my original work and has not been presented in this or any other University and all source of materials used for the thesis have been fully acknowledged.

Name of principal investigator: Negash Abreha

Signature: _____ Date: _____

Place: Addis Ababa University College of Health Science Department of Emergency Medicine. This thesis has been submitted for approval to:

Advisors:

Dr.Finot Debebe (Assistant Professor)

Signature: _____

Date: _____

Mebrat Michael (BSc, MSc)

Signature: _____

Date: _____