COLLEGE OF HEALTH SCIENCES

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING

KNOWLEDGE AND PRACTICE OF INSTRUMENT PROCESSING AND ITS ASSOCIATED FACTORSOR NURSES WORKING AT ADDIS ABABA UNIVERSITY, TIKUR ANBESSA HOSPITAL, ADDIS ABABA, ETHIOPIA 2021

BY: RIGBE SEGED (BSC)

OCTOBER 2021
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INVESTIGATOR: RIGBE SEGED (BSC)
ADVISORS: Mr. NIGUSE TEDALE (MSC, ASSISTANT PROFESSOR)
Mr. DEBELA GELA (MSC, ASSISTANT PROFESSOR)

A RESEARCH PAPER TO BE SUBMMITED TO SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, SCHOOL OF NURSING AND MIDWIFERY IN PARTIAL FULFILMENT OF THE REQUERMENTS OF MASTER OF SCIENCE IN PERIOPERATIVE CARDIOTHORACIC NURSING

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APPROVAL SHEET

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COLLEGE HEALTH SCIENCE SCHOOL OF ALLIED SCIENCES

DEPARTMENT OF NURSING AND MIDWIFERY

I, the undersigned MSc student, declare that I have submitted my original work on a title _____for the examination

Submitted by:

_____ _____ _____

Name of student Signature Date

This thesis work has been submitted for examination with my approval as an advisor.

Approved by:

1. _____ _____ _____

Name of Major Advisor Signature Date

2. _____ _____ _____

Name of Co-Advisor Signature Date

3_____ _____ _____

Name of Examiner Signature Date

4_____ _____ _____

Head, School Nursing and Midwifery Signature Date

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ABBREVIATION

CSSD	Central Sterile Supply Department
HAIs	Hospital Acquired Infection
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCWs	Health Care Workers
HIV	Human Immune Virus
HLD	High Level Disinfectant
LMIC	Low and middle income countries
PPE	Personal protective equipment
TST	Temperature, steam and time

ABSTRACT

Introduction: There are a number of requirements and necessary steps involved in instrument processing, including preparation, cleaning and packaging of instruments for sterilization. The nurses require a high level of knowledge in instrument processing and skills to practice it in operation room to prevent hospital acquired infection. This will enable quality care which increase likelihood of infection prevention and promote optimal quality care.

Objective: To determine knowledge and practice of instrument processing and associated factors among operation room nurses at Addis Ababa University, Black Lion Hospital, 2020

Methodology: Institution based Cross sectional study was conducted to assess the knowledge and practice of instrument processing and associated factors among operation room nurses at Black Lion Hospital, 2021. Systematic random sampling was done to select study subjects. The Practice of sterile technique was assessed by using the observation checklist among Operating room nurses. Structured questionnaire was also used for collection knowledge and associated data. Instruments was pre tested, cheeked, cleaned and entered in to Epi-data version 3.1 and imported to SPSS version 25.0 software for analysis. Associations between independent variables and dependent variables were analyzed by using binary logistic regression model with bivariate and multivariable logistic regression analysis technique. P-values < 0.05 were considered statistically significant.

Results: The overall knowledge and practice of participants on instrument processing was **37(31.10%)** and **41(34.5%)** respectively,**.** Service year **[(AOR=0.002) (95%CI) 0.10(0.02, 0.43)],** Higher level of education **[(AOR=0.02) (95%CI) 0.09(0.01, 0.12)]**, positive attitude **[AOR=0.01 (95%CI) 7.33(3.01, 12.99)]**, training **[(AOR=0.012) (95%CI) 0.30(.12, 0.76)]**, Refreshment and promotion **[(AOR=0.001)(95%CI)1.33(1.01, 2.92)]** and Availability of disinfectant **[(AOR=0.012) (95%CI)3.42(1.32, 8.88)]** are significantly associated with knowledge and practice of instrument processing.

Conclusion: Only about one third of participants have good knowledge and good practice on instrument processing. The finding alerts stake holders to do something in changing the condition.

Keywords: **Instrument processing, knowledge, practice, operation room, Nurses**

1. INTRODUCTION

1.1 Background

Instrument processing is an old practice that has been evolving in its concept, techniques, and technologies to ensure reduction or elimination of potentially pathogenic microorganisms (1). Incomplete or inappropriate instrument processing has the potential to cause harm to both patients and health care workers involved in the process (2). A system for instrument processing should include, at a minimum: following existing standards and recommendations, consideration of physical work flow, occupational safety, selection of equipment, necessary supportive materials, quality assurance and instrument inventory management (2).

Proper processing of instruments and other items that have come in contact with patients' body fluids is critical in reducing the transmission of infections during clinical procedures and patient care (3). If surgical instruments or medical devices are not adequately cleaned, and then either high-level disinfected or sterilized, health care-associated infections can result, including surgical site infections, infections with blood borne pathogens (e.g., hepatitis B and C, HIV), and ventilator- or catheter-associated infections. Therefore, it is critical that the health care workers (HCWs) who are responsible for processing instruments follow all steps carefully to provide adequately cleaned and high-level disinfected or sterilized instruments for patient care (4).

The recent outbreak of HAIs as a result of poor and improper cleaning, disinfection or sterilization of reusable medical equipment and concerns about the possible spread of blood-borne infections, and the impact of emerging highly contagious diseases has brought the issue of instrument processing to the forefront of infection prevention (5,6).

The basic practices recommended to reduce disease transmission from soiled instruments and other reusable items are decontamination, cleaning, and sterilization; when sterilization is not feasible or equipment is not available, high level disinfection (HLD) by boiling, steaming, or soaking in a chemical disinfectant is the only acceptable alternative (3).

1.2 Statement of the problem

It is well recognized that the risk of transmission of pathogens when providing medical care and the reduction in the rates of the incidence of HAIs can be kept low through appropriate standardized prevention procedures (7). However, it has been documented that the level of compliance with the use of proven HAIs measures by healthcare workers (HCWs) has been disappointing, despite the fact that evidence-based procedures promoting appropriate practices in HCWs settings are published (8).

According to the research review done, the barriers in LMICs included poorly defined instrument reprocessing policies and procedures, inappropriate staff training, and limited resources. Some shortfalls such as with training and education may be feasibly addressed; others such as sterilization infrastructure may be more challenging. Yet these shortfalls need to be overcome, as failure place both the patient and healthcare workers at risk (9).

As the study conducted in Baihir Dar showed, instrument processing was carried out including decontamination and sterilization processes. sixteen areas of decontamination were observed 4 of them were labeled with date but not recent old labeling the solution were not changed with daily base some of decontaminant solutions prepared with inappropriate container and not covered, decontaminate solution were cloudy but were not changed. The concentration of the chlorine solution was correct for the moment(10).

Regarding sterilization method autoclave ten, oven nine and boiler one from observed autoclave which is tested with TST for correct sterilization was practiced in one health facility the rest were not using TST indicator for their correct sterilization (10).However, there is limited data that shows knowledge and practice of nurses and associated factors regarding instrument processing, therefore this study add value to the few available studies and help the policy maker for certain decisions to fill the gap.

1.3 Significance of the study

This study intended to assess knowledge and practice of instrument processing and associated factors among staff nurses which can act as baseline information for Policy or decision makers.

It can also serve as important document for the selected institutions to assess the institutions' in-service training needs to improve their service delivery thereby improving the quality of health service provision which needs evidence based practice. Therefore, this study expected to provide overview for leaders and managers of organizations to make their service provision evidence-based and of quality.

Since there is limited studies on the knowledge and practice of nurses in public hospitals in relation to instrument processing the present study fills the knowledge gap that exists. This research can also be a source or stepping stone for other researchers in the area of instrument processing in Ethiopia.

2. LITERATURE REVIEW

2.1. Introduction

It is mandatory to carry out adequate sterilization procedures in the hospital for safe guarding human life. Because despite stupendous advances in the medical field, hospital acquired infection remains the most serious concern (11).

Standards for instrument reprocessing are defined in HICs, with well-established training systems for central sterile supply departments (CSSD). Numerous steps exist in the CSSD for instrument reprocessing, including a one-way flow for soiled items through cleaning and decontamination; inspection and packaging; sterilization and sterile storage. The end result of this process should be complete instrument sets terminally sterilized and ready for use during surgery. Final peri-operative verification of sterilization is compulsory in the World Health Organization (WHO) Surgical Safety Checklist using proper physical, chemical, and biologic indicators (9).

The issue of health care-associated infections (HAIs) continues to be one of the most important public health problems in many countries throughout the world. These infections remain one of the most common complications affecting hospitalized patients and results in morbidity, mortality, and additional costs (12).

The use of physical or chemical means to remove, inactivate, pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal is termed as decontamination (1,2). Decontamination is the combination of processes, including cleaning, disinfection and/or sterilization, used to make a re-usable item safe for further use on patients (2–4).

Cleaning is the act of removing visible organic residue (e.g. blood and tissue) and inorganic salts from patient care equipment and preparing it for safe handling and/or further decontamination. Cleaning also removes sufficient numbers of microorganisms to reduce risks for those who touch or handle the object. Disinfection is thermal or chemical destruction of most pathogenic and other types of microorganisms, but not all bacterial spores (8,13). Whereas sterilization destroys all microorganisms (bacteria, viruses, fungi, and parasites) including bacterial endo spores from inanimate objects by high pressure steam (autoclave), dry heat (oven), chemical sterilants or radiation. In this regard, strict compliance with the recommended decontamination process at all

level is required. Since failure to properly disinfect or sterilize equipment carries not the only risk associated with a breach of host barriers but also the risk for person-to-person transmission (e.g., hepatitis B virus) and transmission of environmental pathogens (e.g., Pseudomonas aeruginosa) (13)

2.2. Overview of Processing Instruments and Devices

During transportation of items to the instrument processing area, it is mandatory to wear PPE, including gloves and gown, while transporting contaminated devices in order to prevent accidental exposure to blood and body fluids (4). Transport contaminated devices to the instrument processing area as soon as possible after the conclusion of the procedure. Transport contaminated items fully enclosed in a puncture-resistant container that prevents spills of liquid. The container must be labeled as biohazard using a biohazard symbol. Clean and disinfect transport containers after each use. Use predetermined designated routes to transport contaminated items to the reprocessing area. Avoid high-traffic areas to prevent the risk of cross-contamination. Do not transport sterile and soiled devices together on the same trolley/cart (4).

2.3. Knowledge of instrument processing

Different study revealed that knowledge about surgical instruments processing of health workers was suboptimal. The study conducted in mount Royal university, Calgary Canada regarding knowledge test results performed with thirty three nurses indicates that the mean pre course assessment of instrument processing was 57%, in which about 43% of participant have poor knowledge about techniques of instrument processing (14)

A study conducted in Italy for instrument disinfection and sterilization practice overall, 67·3% of nurses agreed with the correct answer to all of the four questions on knowledge chosen by the authors as an indicator of ‘good’ knowledge (15).

Study conducted in Egypt port-said general hospital showed that operating room nurse's overall knowledge scores regarding basics of sterilization and principles, infection control measures were found (30.98±16.99) (16).

Study conducted in two private hospitals of Sana'a, the capital city of Yemen, the results showed that the majority (87%) of the nurses had a fair level of knowledge on the different NI preventive measures. However, 9% of them had a poor level of knowledge, and only 4% of them had a good level of knowledge on the different NI preventive measures (17).

As the result of the study conducted in Addis Ababa on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa showed that among the total HCWs, 335(55.4%) HCWs had good knowledge of infection prevention measures (18).

Another study conducted on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia, revealed that 152 (46.3%) of HCWs were knowledgeable on instrument processing and 176 (53.7%) were not knowledgeable (19).

2.4. Practice of Instrument processing

Different literatures revealed that the practice of instrument processing among health workers was suboptimal and had tremendous variation throughout the world. A study conducted by Kulkarni S, Chillarge C. on Knowledge, attitude and practice regarding sterilization among staff in central sterile supply department of brims bidar, in India revealed that 24 (92%) very high practice (20).

The study conducted by Sessa A, et al., on investigation of nurses' knowledge, attitudes, and practices regarding disinfection procedures in Italy, showed that, the vast majority of the nurses self-reported that they perform the disinfection in their working activity. However, among these HCWs, appropriate procedures were observed with different frequencies ranging from 8.1% for placement of urinary catheter to 62.6% for surgical wound disinfection (21).

Study conducted in two private hospitals of Sana'a, the capital city of Yemen indicates that the majority (71%) of nurses had fair overall practices, whereas 26% of them demonstrated good practices on different infection prevention and control measures (17).

As study conducted by Geberemariyam BS on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia, revealed that, 220 (67.1%) HCWs had safe IPP whereas 108 (32.9%) had unsafe practice (19).

Study conducted by Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa, showed that, regarding infection prevention practice, 400(66.1%) HCWs had good infection prevention practices (18).

2.5. Factors associated with instrument processing knowledge and practice

2.5.1. Socio-demographic factors

Different study revealed that socio-demographic factors such as marital status, educational level, years of experience worked in nursing have highly significant association with nurse's overall knowledge and practice regarding instrument processing and infection control measures. A study conducted in Italy for instrument disinfection and sterilization practice indicated that nurses in orthopaedic surgery had a significantly lower knowledge and practice compared to others (P=0·005). (15).

Another study conducted by Sessa A, et al., on an investigation of nurses' knowledge, attitudes, and practices regarding disinfection procedures in Italy Nurses showed that, with a higher level of education were more likely to know that urinary and respiratory tract infections were the two HAIs that occurred most frequently (OR = 1.94; 95% CI 1.18-3.19) (21).

A study conducted by Elazzar amia E, Qalawa and SAA. on Nurse's awareness of infection control measures in operating room, revealed that, there are a highly significant relation were found between nurse's socio-demographic characteristics and their knowledge regarding basis of sterilization and principles, infection control basics mainly in items related to marital status, educational level, years of experience worked in nursing and hospital department they worked with p= (0.003, 0.001, 0.001, 0.026) respectively (16).

In contrast of these, studies conducted Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa Geberemariyam BS on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia and showed that no association between professionals socio-demographic factors and instruments processing knowledge and practice (18, 19).

2.5.2. Knowledge of professionals to practice instrument processing

Different studies showed that professionals' knowledge had significant association with practice of instrument processing. Study conducted in Egypt port-said general hospital showed that operating room nurse's overall good knowledge with basics of sterilization and principles, infection control measures were found be 3.5 times more likely to have good instrument processing practices than their counter parts AOR=3.5, 95% CI:1.05-4.36) (22).

Another research finding conducted by Sri Yusnita IS., et al., on Knowledge, attitude and perceived adherence with universal precautions among health care workers in the obstetrics and gynecology department of an Indonesian teaching hospital, showed that, there was significant association between knowledge and attitude perceived adherence to universal precaution (r=0.314; P<0,001). This study suggest tailor made interventions were needed to improve adherence to UP (23).

Study conducted by Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa showed that, HCWs who had good knowledge regarding infection prevention measures were 1.5 times more likely to have good infection prevention practices compared to their counterpart(AOR=1.53,95%CI:1.05-2.22) (18).

Another study conducted by Geberemariyam BS on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia revealed that, HCWs who are knowledgeable regarding instrument processing were 2.81 times more likely to have safe IPP than those who are not knowledgeable (AOR: 2.81; 95%CI: 1.50, 5.27) (19).

Again the other study conducted by Biniyam S. on decontamination of patient equipment: nurses' self-reported decontamination practice in hospitals of southeast Ethiopia, revealed that, Nurses who have reported good infection prevention practice were 7.313 times more likely to had acceptable decontamination practice than there counterpart [AOR = 7.313; 95% CI: 4.030, 13.272, p value = 0.000] (24).

In contradiction to the above literatures, studies conducted by Kulkarni S, Chillarge C. on Knowledge, attitude and practice regarding sterilization among staff in central sterile supply department of brims bidar, in India revealed, by Elazzar amia E, Qalawa and SAA. on Nurse's awareness of infection control measures in operating room and study in Itally revealed that no significant association between health workers knowledge and practice of instruments processing (15, 16, 20).

2.5.3. Professionals' attitude and risk perception towards knowledge and practice

Different studies showed that health workers attitude and their risk perceptions while working have significant association with knowledge and practice of instrument processing. Study done by Sessa A, et al., on an investigation of nurses' knowledge, attitudes, and practices regarding disinfection procedures in Italy, revealed that, an appropriate behavior was more likely in nurses with a higher perception of risk of transmitting an infectious disease while working (OR =1.56; 95% CI 1.01-2.42) which leads to proper practice for infection prevention (21).

Study conducted by Geberemariyam BS. on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia, revealed that, HCWs who had positive attitude towards infection prevention practices were two times more likely to have good infection prevention practices compared to HCW who had negative attitude towards infection prevention practices (AOR=2.03, 95%CI: 1.26-3.26) (19).

Another finding of study conducted by Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa revealed that, the odds of appropriate behavior were higher if the nurse had a higher educational level (OR =1.68; 95% CI 1.06-2.66) (18).

Another study conducted by Sahiledengle B. on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia, revealed that, HCWs who had positive attitude towards infection prevention were 2.39 times more likely to have safe IPP as compared to those who had negative attitude towards infection prevention (AOR: 2.39; 95%CI: 1.19, 4.84). This study also revealed that, high risk perception towards transmitting an infection while working (AOR: 5.35; 95%CI: 2.44, 11.73) was the most important variable associated with safe IPP (25).

2.5.4. Hospital related factors with instrument processing

Studies revealed that hospital related factors such as availability of guidelines and posters, continuous flow of water, continuous training, education and mentoring for health workers were significantly associated with knowledge and practice of instrument processing of health workers.

A study conducted by Fast O. et al. on Mixed methods evaluation of the impact of a short term training program on sterile processing knowledge, practice, and attitude in three hospitals in Benin, reveled that, education and mentoring improved how workers understood and approached their work and to what they paid attention. Sterile processing workers were also better able to identify resources available to do their work and showed improved understanding of the impact of their work on patient safety (14).

Study conducted by Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa revealed that, having awareness on availability of standard operating procedures (AOR=1.97, 95%CI: 1.34-2.93) and presence of continuous water supply (AOR=1.68, 95%CI: 1.11-2.56) were predictors of good infection prevention practices (18).

Another study conducted by Biniyam S. Decontamination of patient equipment: nurses' self-reported decontamination practice in hospitals of southeast Ethiopia, revealed that, Nurses who were working in the department having instructive posters or guideline target on instrument processing were 2.675 times more likely to had acceptable decontamination practice [AOR = 2.675; 95% CI: 1.376, 5.200, p-value = 0.004] (24).

Another study done by Fast OM, et al., on the impact of a short-term training program on workers' sterile processing knowledge and practices in12 Ethiopian hospitals revealed that, process, structural, and knowledge changes were identified following program implementation. Knowledge test results indicated an increase of greater than 20% in participant sterile processing knowledge. Changes in process included improved flow of instruments from dirty to clean, greater attention to detail during the cleaning and decontamination steps, more focused inspection of instruments and careful packaging, as well as changes to how instruments were stored. This study also revealed

that, 53 participants from the12 hospitals completed both the pre-course and post-course SP knowledge tests. Analysis of test scores shows significant improvements in participants' SP knowledge acquisition. The mean pre-course test score was 19.30(±4.65) and mean post-course 27.77(±6.99). The mean difference was 8.47 at t-value 10.574 ($p<0.001$) (24).

2.6. Summary of literatures

Incomplete or inappropriate instrument processing has the potential to cause harm to both patients and health care workers involved in the process (2). If surgical instruments or medical devices are not adequately cleaned, and then either high-level disinfected or sterilized, health care-associated infections can result, including surgical site infections, infections with blood borne pathogens (e.g., hepatitis B and C, HIV), and ventilator- or catheter-associated infections. Therefore, it is critical that the health care workers (HCWs) who are responsible for processing instruments follow all steps carefully to provide adequately cleaned and high-level disinfected or sterilized instruments for patient care (4).

A great deal of research has been conducted to assess factors influencing instrument processing, but there are a few researches on the same topic in the Ethiopian setting. Therefore the purpose of this study is to assess sterile technique practice and factor affecting compliance among OR nurses.

2.7. Conceptual framework

Various studies revealed that there is relationship between socio demographic, knowledge of instrument processing, health workers' perceptions and attitude and hospital management factors and knowledge and practice of instrument processing. Having more knowledge, positive attitude

and perception, training and awareness on instrument processing has positive impact on knowledge and practice of instrument processing and also same demographic characteristics like level of education, experience, age and level of education on sterile technique has impact on practice of instrument processing.

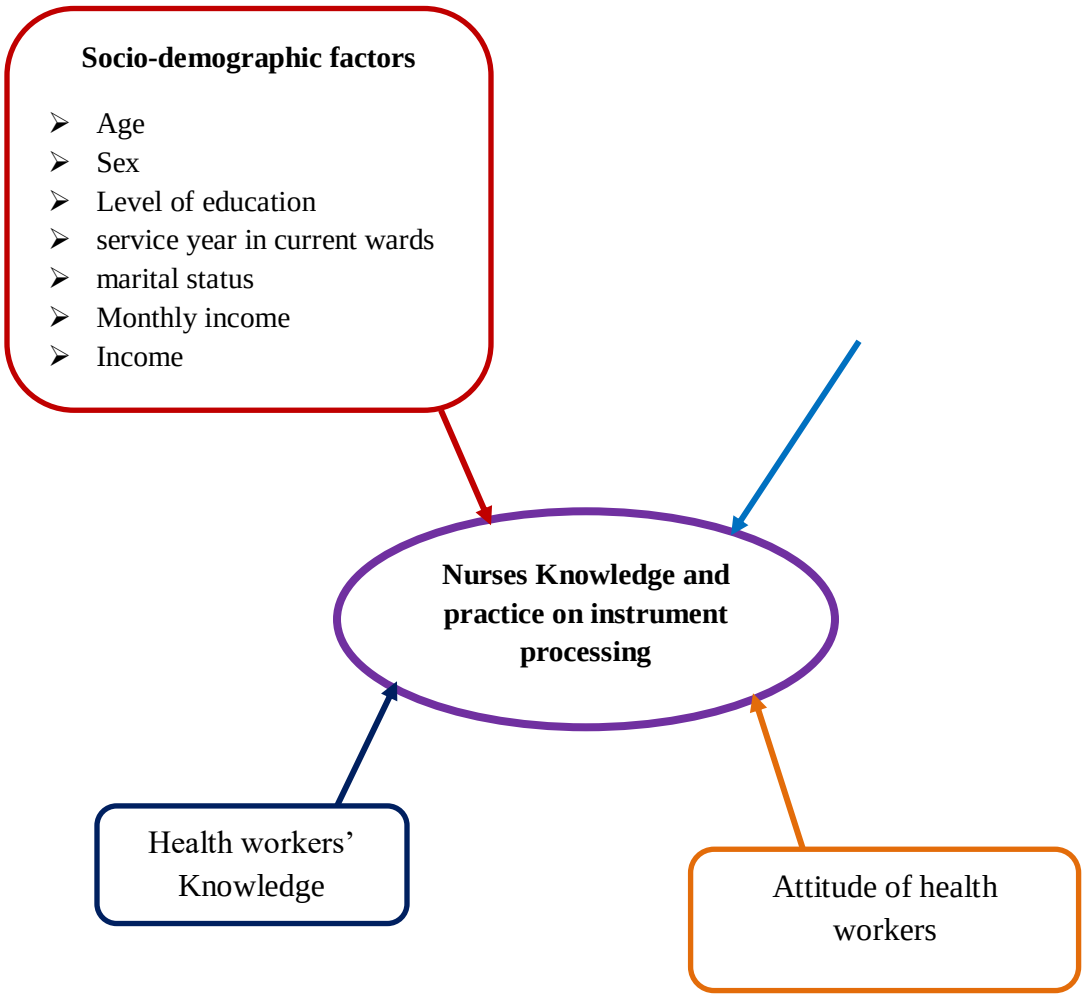

Figure 1: Conceptual frame work of knowledge and practice of instrument processing among operation room nurses at TASH, Addis Ababa, Ethiopia, 2021; developed by Principal investigator after literature review.

3. OBJECTIVES

3.1 General objectives

To determine knowledge and practice of instrument processing and associated factors among operation room nurses at TASH, Addis Ababa, Ethiopia, 2021.

3.2 Specific objectives

1. To determine the level of knowledge on instrument processing among operation room nurses surgical nurses at TASH, Addis Ababa, Ethiopia, 2021.
2. To assess the practice of instrument processing among operation room nurses at TASH, Addis Ababa, Ethiopia, 2021.
3. To identify associated factors with knowledge and practice of instrument processing among surgical nurses at TASH, Addis Ababa, Ethiopia, 2021.

4. METHODS

4.1 Study area and period

The study will be conducted at Addis Ababa University in Tikur Anbessa Specialized Hospital (TASH). Addis Ababa University is a state university in Addis Ababa, the capital city of Ethiopia. It was established in 1950 and named as University College of Addis Ababa and later in 1962 renamed as Haile Selassie I University after the Ethiopian Emperor Haile Selassie I. Then in 1975 the institution received its current, Addis Ababa University. It is the training center for fellows, postgraduate undergraduate, medical students, dentists, nurses, Radiographers and laboratory technicians. Addis Ababa University has thirteen campuses. Twelve of these are situated in Addis Ababa, and one is located in Bishoftu, about 45 kilometers away.

Black Lion hospital is the largest teaching hospital managed by Addis Ababa University, College of Health Sciences. It is a very large referral University hospital with approximately 370,000-400,000 patients flow per year. The hospital has 800 beds, with 169 specialists, 65 non-teaching doctors, 627 nurses and 11 operating theatre rooms. The study was be conducted at the selected governmental hospital from April, 15-June, 15 2021,

4.2 Study design

Institution based cross sectional study design was conducted.

4.3 Source population

All nurses working in operation theatre and who are on duty during study period were considered as source population for the study.

4.4 Study population

All randomly selected nurses working in operation room at the time of data collection was a study population

4.5 Inclusion exclusion criteria

4.5.1 Inclusion criteria

Nurses working in surgery department, Major operating, Oby/Gyni Orthopedics minor operating and serialization center.

4.5.2 Exclusion criteria

Nurses on Maternity leave annual leave during data collection

4.6 Sample size determination

The sample size was calculated by using single population proportion formula. Taking prevalence as 46% from recently conducted research in Ethiopia (19), Z = 95% Confidence level and d = 5% marginal error. Thus, required sample size was calculated as;

$$\frac{n = (Z\ \alpha/2)^2\ P\ (1-P)}{d^2}$$

Where, Z = 95% Confidence interval: Z1-α/2 =1.96, P =0.5, d =0.05

$$\frac{n = (1.96)^2\ 0.5(1-0.5)}{(0.05)^2} = 381$$

Since the source population of this study was less than 10,000 we used population correction formula. $Nf = \frac{n}{1 + \frac{n}{N}}$

Where, Nf = Final sample size, N = Source population = 169, n= Total sample size =381

Thus Nf = 381/ (1+381/169) = 117. By adding 10% non response rate the final sample size was 117+117(0.1) = 117+12 = **121.** Therefore the final sample size was **121.**

4.7 Sampling procedures

Nearly all nurses working in Operating Room and CSSD of TASH were included in the study as study subjects.

4.8 Study variables

4.8.1 Dependent variable (outcome variable)

- ✓ Knowledge of instrument processing
- ✓ Practice of instrument processing

4.8.2 Independent variables

- ✓ Socio-demographic factors: (Age, sex, educational level, service year, marital status)
- ✓ Attitude of nurses towards instrument processing
- ✓ Hospital management factors (Availability of, Disinfectants, Guidelines and poster, Training, refreshment and promotion)

4.9. Operational Definitions

The overall knowledge and practice will be estimated by taking the average score of all subscales. The subscale score will be obtained by summing items score and dividing by the total number of

items. If it will be above or equal to the average, it had good knowledge and less than the average it had poor knowledge. This assumption works for all operational.

Good knowledge: - Participant who scored above mean for knowledge questions.

Poor knowledge: - Participant who scored below mean for knowledge questions.

Practice: In this study practice is that followed by observation checklist not by self-reported activities of nurses performed in operation room on instrument processing.

Good practice: Participants those scored above mean for practice questions.

Poor practice: Participants those scored below mean for practice questions

Positive Attitude: Participants those scored above mean for attitudinal statements.

Negative Attitude: Participants those scored below mean for attitudinal statements.

4.10. Data collection procedure

Three Data collectors (BSC nurses), and one MSc nurses for supervision activities who are not employees of the study hospitals were selected to reduce bias. Both data collectors and supervisors were fortunately previous experienced of data collectors. The training was given for data collectors and supervisor for one day on method of extracting the needed information, how to fill the information on a structured questionnaire and the ethical aspect in approaching the participants as well as the aim of the study and contents of the instruments. Therefore, the data collectors were become familiar about each question. They had approached the participants in a polite and respectful manner. The supervisor had monitored the data collection process of the data collectors and if any problem happens, they had tried to solve or contact the principal investigator.

4.11. Data collection tool

The data was collected by using pretested, structured self-administer questionnaire which consists of socio-demographic information, knowledge and practice questions toward instrument processing was used and it is prepared based on literature review. The questionnaire was prepared in English version. The questionnaire had three parts, Part I- 7 questions of socio-demographic characteristics, Part II- 8 question related to knowledge of nurses on instrument processing, Part III- 12 question related to practice of nurses on instrument processing based on self report, and part IV- 12 questions on check list that was filled by observation, part V-6 questions based on liker scale to test attitude of nurses and part VII-5 question to test hospital management factors. Data was collected by structured self-administered questionnaire and observation checklist. 5% of the

tools were pretested in Zewditu Memorial Hospital, five days before the actual data collection data which is not added to analysis process.

4.12. Data analysis

The collected data were checked usually for its completeness and the response were coded and entered in into the computer using Epi data version 3.1 statistical package and the 10% of the response were randomly selected and checked for the consistency of data entry.

Then data has been exported to windows of Statistical Package for Social Science (SPSS) version 25.0 for data analysis. During the process of analysis, descriptive statistics was used to provide an overall and coherent presentation and description of the data.

Binary logistic regression was done using bivariate analysis technique to see the crude significant relation of each independent variable with dependent variables. Variables with 95% confidence interval and P value at <0.05 during the bivariable analysis was entered to multivariable logistic regression analysis to see the relative effect of confounding variables and interaction of variables. Odd ratio with 95% CI was performed on variables to determine the strength of association of variables. P-value less than or equal to 0.05 was taken as cut of value to be significant.

4.13. Data quality management

To assure the data quality, the questionnaires were pre-tested, followed by modification. Each questionnaire had been checked for completeness, missed values and unlikely responses; those incomplete questionnaires were omitted from the analysis. Principal investigators and supervisor had made spot-checking and reviewing the complete questionnaires by the data collectors ensures completeness and consistency of the information that were collected; before the actual data possessing entry of 5% of the data to EPI data software package was made to maintain the data quality.

4.14. Ethical consideration

Ethical clearance was obtained from ethical clearance committee of school of nursing and IRB of college of health sciences of Addis Ababa University. After receiving ethical clearance, permission to conduct the research was obtained from Black Lion Hospital. Information sheet was prepared and read to all eligible participants of the study to obtain verbal informed consent, all participants was informed the purpose of the study and their participation was voluntary.

4.14. Dissemination of the result

The study will be submitted to College of Health Sciences, School of Nursing and Midwifery,

Addis Ababa University, Black Lion Specialized Hospital. The documents will be disseminated to all responsible bodies. Furthermore, the manuscript will be submitted to national or international peer review journals for possible publication. Hard and soft copies will be made available in the library of AAU, for graduate students as well as for other researchers and reader.

5. Results

5.1. Socio-demographic characteristics

From the total of 121 samples 3 questioners were excluded as result of incompletes and inconsistencies making the response rate of 98.3%. The analysis was done on data collected from 119 Nurses working in Operating Room of Tikur Anbesa Specialized Hospital. The participant's age was range from 25 to 59 years, with a mean of 22.18(±1.22) years. Most of the respondents, 50(42.00%) were between 25-30 years old. More than half 72(60.50%) of the respondents were

female. Of total responses nearly three forth 85(71.40%) were married. Majority 105(88.20%) of the respondents were BSC holders. Majority 41(34.50%) of the respondents had greater than 10 years work experience. Majority 62(46.30%) of the respondents had more than 2 years service experience in OR currently. Majority 75(63.00%) of participants were earn monthly income between 7000-1200 Ethiopian Birr (ETB) (As show in Table 1)

Table 1: Socio Demographic Characteristics of Nurses working in Operating Room of TASH Addis Ababa, Ethiopia January to March, 2021 (n=119)

S. N	Characteristics	Frequency	Percentage
1	**Sex**		
	Male	47	39.50%
	Female	72	60.50%
2	**Age**		
	25-30	50	42.00%

	31-35	38	31.90%
	≥ 36	31	26.10%
3	**Marital Status**		
	Married	85	71.40%
	Single	34	28.60%
4	**Clinical Year of Experience**		
	6 months to 4 years	12	10.10%
	5-6 years	26	21.80%
	7-10 years	40	33.60%
	>10 years	41	34.50%
5	**Service months/year in current ward/department**		
	<2	52	43.70%
	>2	67	46.30%
6	**Educational status of respondents**		
	MSc	12	10.10%
	BSc	105	88.20%
	Diploma	2	1.70%
7	**Monthly income**		
	1000-5000	8	6.70%
	500-7000	32	26.90%
	7000-12000	75	63.00%
	>12000	4	3.40%

5.2. Knowledge of nurses about instrument processing

Out of the total 119 respondents, 86(72.30%) of them stated that Items and practices affect sterile tissues or the blood system consider as critical item/practice. Table 2 shows that the correct response for question the objective of decontamination is to protect health care workers while handling used instruments about three fourth 87(73.10%). About 33(27.70%) of respondents report yes response for decontamination inactivate HBV HCV AND HIV. About 100(84.00%) replied that steam sterilization is a preferred method for reusable surgical instruments.

Table 2: Knowledge of instrument processing among OR Nurses working in TASH Addis Ababa, Ethiopia February to March, 2021, (n=119)

S.N	Characteristics	Yes	No
1	Items and practices affect sterile tissues or the blood system consider as critical item/practice	86(72.30%)	33(27.70%)
2	Ever know the Spaulding categories of potential infection risks	104(87.40%)	15(12.60%)
3	Decontamination is the first step in instrument processing	87(73.10%)	32(26.90%)
4	The objective of decontamination is to protect health care workers while handling used instruments	111(93.30%)	8(6.70%)
5	Decontamination inactivate HBV HCV AND HIV	33(27.70%)	86(72.30%)
6	Chemical disinfection can kills all living microorganisms including bacterial spores	52(43.70%)	67(53.30%)
7	After proper decontamination and cleaning 0.1% chlorine solution for 20minprovid HDL	77(64.70%)	42(35.30%)
8	Sterilization is a process where all microorganisms, including bacterial spores are killed	104(87.40%)	15(12.60%)
8	Steam sterilization is a preferred method for reusable surgical instruments	100(84.00%)	19(16.00%)

5.3. Overall knowledge of nurses on instrument processing

All 8 Questions regarding knowledge of instrument processing were scored and pulled together and the mean score was computed to determine the overall knowledge of respondents. The overall knowledge question composite showed that about 78(65.5%) got below mean score; while about 41(34.5%) were score more mean out of 8 knowledge questions. Respondents who scored above mean are considered as having good knowledge (as show Figure 1).

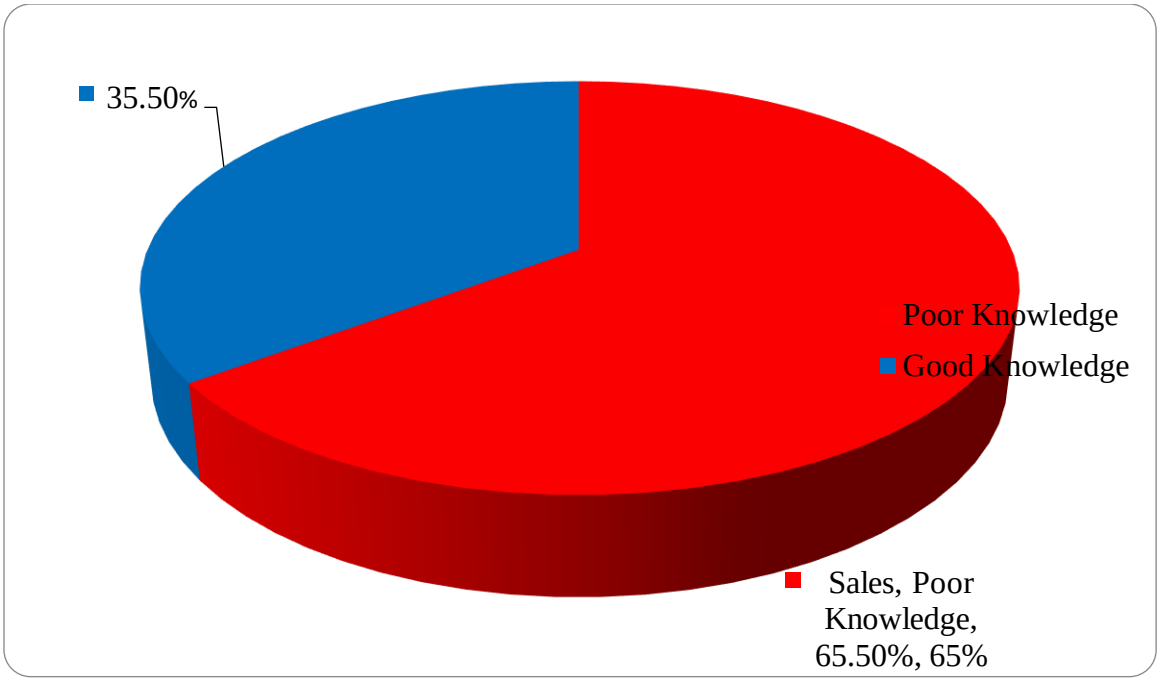

Figure 2: Over all knowledge of instrument processing among OR Nurses working in TASH Addis Ababa, Ethiopia February to March, 2021, (n=190)

5.4. Extent of OR Nurses Practice on instrument processing in self report

Table 3, shows that practice to instrument processing practice as reported by nurses, out of the total sample, 113(95.00%) of nurses reported that Sterilization can be achieved by high-pressure steam, dry heat oven, or using chemical sterilants, about 102(85.70%) reported All instruments should be decontaminated first, thoroughly cleaned and dried before being sterilized. Only about 37(31.10%) respondents were reported that they always perform proper instrument processing as per the recommendations as shown in table below.

Table 3: Extent of practice as self report on instrument processing among Nurses working in TASH Addis Ababa, Ethiopia January to March, 2021 (n=119)

S.N	Characteristics	Yes	No
1	Sterilization can be achieved by high-pressure steam, dry heat oven, or using chemical sterilants	113(95.00%)	6(5.00%)
2	Steam sterilization is a preferred method for reusable surgical instruments	100(84.00%)	19(16.00%)

3	All instruments should be decontaminated first, thoroughly cleaned and dried before being sterilized	102(85.70%)	17(14.30%)
4	The temperature, pressure, and time combinations for steam sterilization is 121°C (250°F), pressure of 106 kPa	89(74.80%)	30(25.20%)
5	Do you always perform proper instrument processing as per the recommendations	37(31.10%)	82(68.90%)
6	Do you always perform decontamination before cleaning	84(70.60%)	35(29.40%)
7	Do you always place contaminated items in decontaminate solution for 10 minutes	59(49.60%)	60(50.40%)
8	Do you immediately immerse surgical instruments in decontaminant solution after use?	93(78.20%)	26(21.80%)
9	Always wear all the necessary PPE during instrument processing?	51(42.90%)	68(57.10%)
10	Do you always disinfect stethoscopes?	59(49.60%)	60(50.40%)
11	Do you always thoroughly clean items before sterilization?	92(77.30%)	27(22.70%)
12	When you prepare 0.5% decontaminate chlorine solution do you take one part concentrated solution and add to nine parts of water?	87(73.10%)	32(26.90%)

5.5. Extent of OR Nurses Practice on instrument processing followed by Check list

Table 4, shows that practice of nurses to instrument processing practice followed by observation check list. Out of the total participants, 74(62.20%) of nurses practiced that three compartment instrument processing technique witnessed, about 47(39.50%) practiced that instrument processing bucket were coved at the time of assessment. About 59(49.60%) participants were practiced that they Autoclave monitored using chart and recording system as shown in table below.

Table 4: Extent of practice followed by observation check list on instrument processing among Nurses working in TASH Addis Ababa, Ethiopia January to March, 2021 (n=119)

S.N	Characteristics	Yes	No
1	Three compartment instrument processing technique witnessed	74(62.20%)	45(37.80%)
2	Availability of disinfectant compounds witnessed	80(67.20%)	39(32.80%)
3	Instrument processing bucket were coved at the time of assessment	47(39.50%)	72(60.50%)
4	All instrument processing bucket were correctly leveled	24(20.20%)	95(79.80%)
5	Compartments leveled with time and date of disinfectant preparation	38(31.90%)	81(68.10%)
6	Proper High Level Disinfection (HLD) practice witnessed	40(33.60%)	79(66.40%)
7	Poor handling and storing system of sterilized instruments observed	42(35.30%)	77(64.70%)
8	Calibrated autoclaves and dry heat oven witnessed	27(22.70%)	92(77.30%)
9	Autoclaves checked regularly using chemical indicators	29(24.40%)	90(75.60%)
10	Autoclaves monitored using biological indicators witnessed	73(61.30%)	46(38.70%)
11	Autoclave without monitoring gage observed	30(25.20%)	89(74.80%)
12	Autoclave monitored using chart and recording system	59(49.60%)	60(50.40%)

5.6. Overall practices of nurses on instrument processing

All questions regarding practice of instrument processing as pre respondents self report were scored and pulled together and the mean score was computed to determine the overall practice of respondents. The overall practice question composite showed that about 61(51.30%) got below mean score; while about 58(48.70 %) were score more than mean out of 12 practice questions. And again all participants' score followed by check list pulled together and the mean score was computed to determine the overall practice of participant. The overall practice checklist composite showed that about 82(68.90%) practice below mean score; while about 37(31.10%) were practice

more than mean out of 12 practice checklist. Respondents/participants who scored above mean are considered as having good practice (as show Figure 2). This shows that the practice level during self report is different from when actually followed by observation check list.

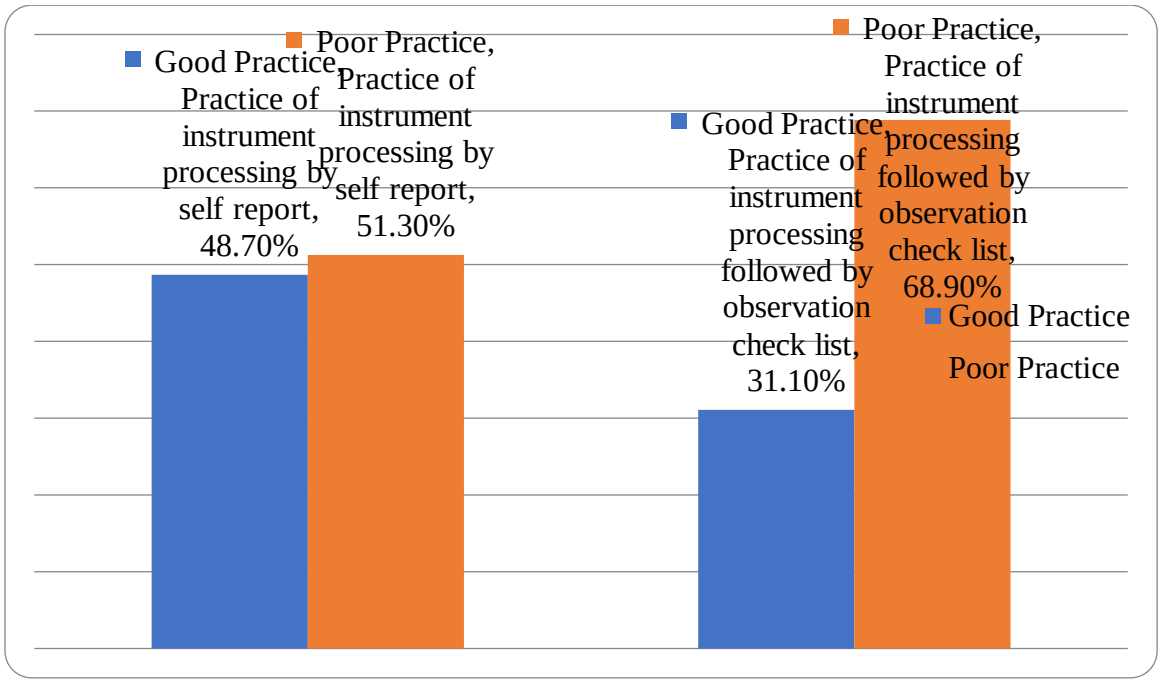

Figure 3: Distribution of overall practice on instruments processing by self report and followed by observation checklist among OR Nurses working in TASH Addis Ababa, Ethiopia February to March, 2021, (n=119)

5.7. Attitude of Nurses towards instrument processing

Out of the total 119 respondents, 111(93.30%) of them were agree on the assumption that the objective of decontamination is to protect HCWs while handling used instruments; and only about 17(14.30%) disagree on the assumption that All instruments should be decontaminated first, thoroughly cleaned and dried before being sterilized; as shown in the table 5

Table 5: Attitude towards instruments processing among OR Nurses working in TASH, Addis Ababa, Ethiopia February to March, 2021, (n=119)

S.N	Characteristics	Agree	Disagree

1	The objective of decontamination is to protect HCWs while handling used instruments	111(93.30%)	8(6.70%)
2	Decontamination inactivate HBV, HCV and HIV	33(27.70%)	86(72.30%)
3	All instruments should be decontaminated first, thoroughly cleaned and dried before being sterilized	102(85.70%)	17(14.30%)
4	Availability of poster, SOP or guideline in work place targeted on instrument processing makes safe	80(67.20%)	39(32.80%)
5	Always thoroughly clean items before sterilization is mandatory	77(64.70%)	42(35.30%)
6	Always wearing all the necessary PPE during instrument processing is important	51(42.90%)	68(57.10%)

5.8. Overall attitude of OR nurses on towards instrument processing

Questions regarding attitude of nurses towards instrument processing were pulled together and the mean score was computed to determine the overall attitude of respondents. Out of total respondents about 42(34.88%) were score blew mean scored above the mean. Respondents who scored above the mean score attitude are considered to have positive attitude.

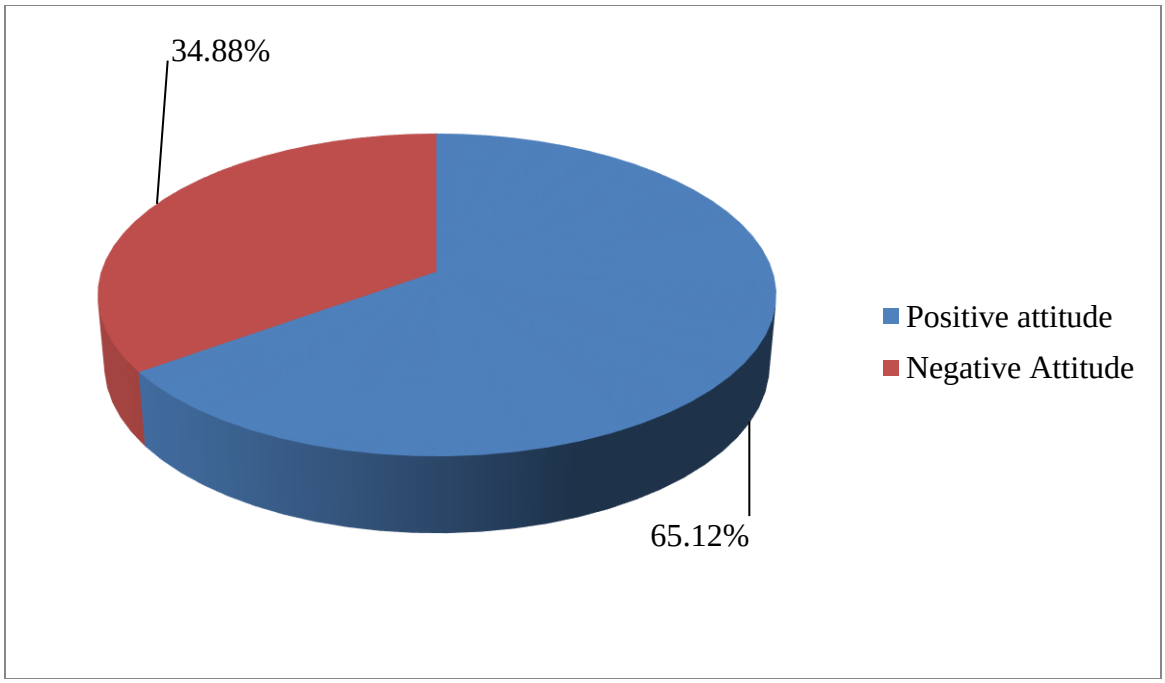

Figure 4: Distribution of overall Attitude towards instrument processing among OR Nurses working in TASH, Addis Ababa, Ethiopia February to March, 2021, (n=119)

5.9. Hospital management factors towards instrument processing

Out of total respondents, about 92(77.30%) were responded that instrument processing training was not given regularly. Of total about only 39(32.80%) of respondents responded that poster SOP or guideline was available in work place respondents, as shown in table 6 below.

Table 6: Hospital management factors towards instruments processing among OR Nurses working in TASH, Addis Ababa, Ethiopia February to March, 2021, (n=119)

S.N	Characteristics	Yes	No
1	Instrument processing training of respondents given	27(22.70%)	92(77.30%)
2	Awareness on infection prevention and safety guideline available in work place	113(95.00%)	6(5.00%)
3	Availability of poster SOP or guideline in work place respondents	39(32.80%)	80(67.20%)
4	Availability of disinfectant in work place	76(63.90%)	43(36.10%)
5	Refreshment and promotion given regularly	39(32.80%)	80(67.20%)

Table 7: Association of selected socio-demographic variables with nurses Knowledge on instrument processing in TASH in Addis Ababa, Ethiopia, 2021.(n =119)

Variables	Good Knowledge	Poor Knowledge	COR(95%CI)	P-value	AOR(95%CI)	P -value
Sex						
Male	21	26	2.1(0.970, 4.546)	0.06	0.36(0.13, 0.96)	0.94
Female	20	52	1.00		1.00	
Age						

25-30	15	35	1.031(0.64, 1.65)	0.90	4.19(0.84, 20.9)	0.08
31-35	17	21	0.481(0.90, 2.34)	0.30	1.93(0.48, 7.80)	0.35
≥ 36	9	22	1.00		1.00	
Marital Status						
Married	29	56	1.053(0.46, 2.43)	0.903	1.47(0.44, 4.95)	0.53
Single	12	22	1.00			
Clinical Year of Experience						
>10 years	13	28	0.43(0.08, 2.25)	0.46	2.90(0.31, 27.1)	0.35
7-10 years	17	23	1.14(0.40, 3.23)	0.32	0.72(0.16, 3.27)	0.67
5-6 years	9	17	1.59(0.64, 3.95)	0.80	0.50(0.14, 1.80)	0.29
6 months to 4 years	2	10	1.00		1.00	
Service in year in current ward/department						
≥2	5	25	3.40(1.20, 9.70)	0.02*	0.10(0.02, 0.43)	0.002*
<2	36	53	1.00		1.00	
Educational status of respondents						
MSc	9	3	6.0(2.70, 15.10)	0.01*	0.09(0.01, 0 .12)	0.02*
BSc	30	71	0.85(0.15, 4.86)	0.85	0.80(0.12, 5.56)	0.82
Diploma	2	4	1.00		1.00	
Monthly income						
1000-5000	4	15	2.81(0.44, 18.06)	0.28	0.06(0.01, 0.59)	0.29
5000-7000	28	36	0.98(0.24, 4.06	0.98	0.65(0.13, 3.23)	0.60
7000-12000	6	23	2.92(0.87, 9.77)	0.08	0.23(0.54, 0.93)	0.49
>12000	3	4	1.00		1.00	

***Adjusted for all significant variables p <0.05**

In order to identify factors associated with Knowledge of instruments processing of OR nurses, regarding socio-demographic characteristics, bivariate logistic regression with enter method was used with 95% CI and p value < 5%, and all variables regardless of their significance entered to multiple-logistic regression and service in year in current ward/department and Educational status of respondents were identified as independent predictor of knowledge on instrument processing from socio demographic factors. The odds of nurses who given service more than two years within the ward/department was **0.10** times **[(AOR=0.002) (95%CI) 0.10(0.02, 0.43)]** higher to have a

good knowledge of instrument processing than those who given service less than two years. The odds of nurses who had MSC in education were **0.09** times **[(AOR=0.02) (95%CI) 0.09(0.01, 0.12)]** higher to have a good knowledge of instrument processing than those who diploma, as shown on (Table: 7) above.

Table 8: Association of selected socio-demographic variables with nurses practice on instrument processing in TASH in Addis Ababa, Ethiopia, 2021.(n =119)

Variables	Good Practice	Poor Practice	COR(95%CI)	P-value	AOR(95%CI)	P -value
Sex						
Male	12	35	0.69(0.30, 1.56)	0.37	1.534(0.59, 4.01)	0.38
Female	24	48	1.00		1.00	

Age						
25-30	8	42	0.26(0.09, 0.75)	0.01*	3.25(0.74, 14.2)	0.12
31-35	15	23	0.90(.34, 2.37)	0.84	2.41(0.69, 8.45)	0.17
≥36	13	18	1.00		1.00	
Marital Status						
Married	30	55	2.55(0.95, 6.83)	0.06	0.42(0.12, 1.43)	0.16
Single	6	28	1.00		1.00	
Clinical Year of Experience						
>10 years	17	24	0.13(0.02, 1.10)	0.06	1.44(0.47, 4.42)	0.53
7-10 years	12	28	0.42(0.14, 1.28)	0.13	1.14(0.27, 4.85	0.86
5-6 years	6	20	0.61(0.24, 1.52)	0.28	3.55(0.32, 39.2)	0.30
6 months to 4 years	1	11	1.00		1.00	
Service in year in current ward/department						
≥2	11	19	1.68(1.28, 2.62)	0.03*	1.72 (1.23, 3.25)	0.04*
<2	25	64	1.00		1.00	
Educational status of respondents						
MSc	6	6	5.00(0.44, 56.6)	0.19	0.10(0.01, 1.51)	0.10
BSc	29	72	2.01(0.23, 17.99)	0.53	0.29(0.03, 3.05)	0.30
Diploma	1	5	1.00		1.00	
Monthly income						
1000-5000	8	11	0.55(0.08, 3.59)	0.53	1.68(0.20, 14.2)	0.63
5000-7000	21	43	0.29(0.08, 1.08)	0.07	3.14(0.72, 13.8)	0.13
7000-12000	5	24	0.67(0.24, 1.92)	0.46	1.29(0.39, 4.22)	0.68
>12000	2	5	1.00		1.00	

***Adjusted for all significant variables p <0.05**

Again, to identify factors associated with practice of instruments processing of OR nurses, regarding socio-demographic characteristics, bivariate logistic regression with enter method was used with 95% CI and p value < 5%, and all variables regardless of their significance entered to multiple-logistic regression and service in year in current ward/department was identified as independent predictor of knowledge on instrument processing from socio demographic factors. The odds of nurses who given service more than two years within the ward/department was **1.23**

times **[(AOR=0.04) (95%CI) 1.72(1.23, 3.25)]** higher to have a good practice of instrument processing than those who given service less than two years, as shown in (Table 8) above.

Table 9: Association of Nurses knowledge with practice on instrument processing in TASH in Addis Ababa, Ethiopia, 2021(n =119)

Variables	Good Practice	Poor Practice	COR(95%CI)	P-value	AOR(95%CI)	P -value
Good Knowledge	14	27	0.76(0.34, 0.91)	0.01*	1.32(1.10, 2.97)	0.003*
Poor Knowledge	22	56	1.00		1.00	

***Adjusted for all significant variables p <0.05**

As indicated in table 9 above, the Nurses knowledge was found to be significant factors for Knowledge of instrument processing in perioperative setting. The odds of nurses who had Good knowledge about instrument processing were **about 1.32 times [(AOR=0.003) (95%CI) 1.32(1.10, 2.97)]** higher to have a good practice regarding practice of instrument processing than those who had poor knowledge.

Table 10: Association betweenNurses attitude andKnowledge of instrument processing in TASH in Addis Ababa, Ethiopia, 2021(n =119)

Variables	Good Knowledge	Poor Knowledge	COR(95%CI)	P-value	AOR(95%CI)	P -value
Positive Attitude	41	37	2.96(1.34, 7.71)	0.003*	4.22(1.10, 12.97)	0.001*

Negative Attitude	12	29	1.00		1.00	

***Adjusted for all significant variables p <0.05**

Attitude of nurses was found to be significant factor for nurses' knowledge to instrument processing as shown in (table 10). The odds of nurses who have positive attitude towards sterility technique were **4** times **[AOR=0.001 (95%CI) 4.22(1.10, 12.97)]** higher to have a good Knowledge regarding practice of instrument processing than those who had negative attitude towards instrument processing**.**

Table 11 Association of Nurses attitude towards practice of instrument processing in TASH in Addis Ababa, Ethiopia, 2021(n =119)

Variables	Good Practice	Poor Practice	COR(95%CI)	P-value	AOR(95%CI)	P -value
Positive Attitude	49	29	3.72(2.24, 11.11)	0.001*	7.33(3.01, 12.99)	0.01*
Negative Attitude	9	32	1.00		1.00	

***Adjusted for all significant variables p <0.05**

Attitude of nurses was also found to be significant factor for practicing instrument processing. The odds of nurses who have positive attitude towards instrument processing were **7** times **[AOR=0.01 (95%CI) 7.33(3.01, 12.99)]** higher to have a good practice regarding practice of instrument processing than those who negative attitude as shown in (Table 11)**.**

Table 12: Association of hospital management factors with knowledge of instrument processing in TASH in Addis Ababa, Ethiopia, 2021(n =119)

Variables	Good Practice	Poor Practice	COR(95%CI)	P-value	AOR(95%CI)	P -value
Instrument processing training of respondents given						
Yes	24	42	2.27(1.03, 5.01)	0.043*	0.30(.12,0 .76	0.012*

No	12	41				
Awareness on infection prevention and safety guideline available in work place						
Yes	33	73	1.22(0.37, 3.99)	.748	3.36(0.79 , 14.2)	0.10
No	3	10				
Availability of poster SOP or guideline in work place respondents						
Yes	20	36	0.57(0.27, 1.23)	0.15	050(0.22, 1.15)	0.104
No	16	47				
Availability of disinfectant in work place						
Yes	29	47	1.90(0.83, 4.33)	0.13	2.02(0.86, 4.77)	0.108
No	7	36	1.00			
Refreshment and promotion given regularly						
Yes	23	16	0.72(0.24, 0.91)	0.009*	1.33(1.01, 2.92)	0.001*
No	25	55	1.00		1.00	

***Adjusted for all significant variables p <0.05**

Hospital magement factors were also identified as predictors of Knowledge of instruments processing of OR nurses. Bivariate logistic regression with enter method was used with 95% CI and p value < 5%, and all variables regardless of their significance entered to multiple-logistic regression, and Instrument processing training and Refreshment and promotion were identified as independent predictor of knowledge on instrument processing from socio hospital management factors. The odds of nurses who taken Instrument processing training was **0.30** times **[(AOR=0.012) (95%CI) 0.30(.12, 0 .76)]** higher to have a good knowledge of instrument processing than those who did not take training. The odds of nurses who got Refreshment and promotion were **1.33** times **[(AOR=0.001) (95%CI) 1.33(1.01, 2.92)]** higher to have a good knowledge of instrument processing than those who did not get, as shown on (Table: 12) above.

Table 13: Association of Hospital management factors with practice of instrument processing in TASH in Addis Ababa, Ethiopia, 2021(n =119)

Variables	Good Practice	Poor Practice	COR(95%CI)	P-value	AOR(95%CI)	P -value
Instrument processing training of respondents given						

Yes	12	41	1.95(1.86, 4.41)	0.001*	5.13(3.01, 12.92)	0.008*
No	24	42	1.00		1.00	
Awareness on infection prevention and safety guideline available in work place						
Yes			1.63(0.74, 3.59)	0.22	1.21(.25, 5.74)	0.82
No			1.00		1.00	
Availability of poster SOP or guideline in work place respondents						
Yes	20	36	1.51(0.39, 5.84)	0.55	0.63(0.27, 1.45)	0.28
No	16	47	1.00		1.00	
Availability of disinfectant in work place						
Yes	29	47	0.32(0.12, 0.80)	0.015*	3.42(1.32, 8.88)	0.012*
No	7	36	1.00		1.00	
Refreshment and promotion given regularly						
Yes	25	14	1.72(1.42, 4.19)	0.003*	0.44(.17, 1.11)	.083
No	28	52	1.00		1.00	

***Adjusted for all significant variables p <0.05**

Again Hospital management factors were identified as predictors of practice of instruments processing of OR nurses Bivariate logistic regression with enter method was used with 95% CI and p value < 5%, and all variables regardless of their significance entered to multiple-logistic regression, and again Instrument processing training and Availability of disinfectant in work place were identified as independent predictor of practice on instrument processing. The odds of nurses who taken Instrument processing training was **5.13** times **[(AOR=0.008) (95%CI) 5.13(3.01, 12.92)]** higher to have a good practice of instrument processing than their counter parts. The odds of Availability of disinfectant were **3.42** times **[(AOR=0.012) (95%CI) 3.42(1.32, 8.88)]** higher to have a good practice of instrument processing than their counter parts, as shown on (Table: 13) above.

6. DISCUSSIONS

This investigation determined the extent of knowledge and practice of instruments processing among operating room nurses. This contributed to the growing body of knowledge regarding infection prevention and sterile technique. In this study, about 41(34.5%) of the respondents have

good overall knowledge about instrument processing. The result of this study is lower than the study conducted by the study conducted in mount Royal university, Calgary Canada, in Italy, Sana'a, the capital city of Yemen, in Addis Ababa, Ethiopia by Sahiledengle B, et al., 57%, 67·3%, 87% and 55.4% respectively (14, 15, 16, 18). The reason for this difference might be the difference in socio-demographic and economic characteristics like educational back ground of the study participants and technological advancement in Canada and Italy study design with that of Addis Ababa.

The result of this study was in line with the study conducted in Addis Ababa, Ethiopia by Geberemariyam BS which was 46.3% (19). But, the result of this study was more than the study conducted in Yemen 4% (17). The possible reason for this difference might be political instability in Yemen. Another reason might be difference in classification of knowledge as poor fair and good in that study while, this classification was as poor and good.

Nearly one third 37(31.10%) of participants have overall good practice followed by check list about instrument processing, while 58(48.70%) have good overall practice during self report for administered questionnaires. This shows that the practice level during self report is different from when actually followed by observation check list.

The result of this study is lower than the study conducted by brims bidar, in India by Kulkarni S and Chillarge C., by Sessa A, et al., on investigation of nurses' knowledge, attitudes, and practices regarding disinfection procedures in Italy, Geberemariyam BS on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia and study conducted by Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa 92%, 62.6%, 67.1% and 66.1% respectively (18, 19, 20, 21). The possible explanation for this difference might be difference in socio-economic and technological advancement in Italy and India, while that of Ethiopia might be difference in study setting. The result of this study was more than the study conducted in Sana'a, the capital city of Yemen, 26% (17). The possible reason for this difference might be political instability in Yemen.

Socio-demographic factors have significant association with knowledge of nurses on instrument processing. On the multivariate analysis, more work experience in the give ward and educational level of participants were significantly associated with the knowledge of nurses on instrument processing. The odds of nurses who given service more than two years within the ward/department was **0.10** times **[(AOR=0.002) (95%CI) 0.10(0.02, 0.43)]** higher to have a good knowledge of instrument processing than those who given service less than two years. The odds of nurses who had MSC in education were **0.09** times **[(AOR=0.02) (95%CI) 0.09(0.01, 0.12)]** higher to have a good knowledge of instrument processing than those who diploma. The possible reasons for these findings might be as the participants spent more time on instrument processing and increment of their educational level might help them to combine and use evidence based practice.

The result of this study is in line the study conducted by Sessa A, et al., on an investigation of nurses' knowledge, attitudes, and practices regarding disinfection procedures in Italy and study conducted by Elazzar amia E, Qalawa and SAA. Nurse's awareness of infection control measures in operating room (16, 21).

The result of this study is disagree with the studies conducted by Geberemariyam BS on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia and study conducted by Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa (18, 19), where this study revealed that there was association between nurses socio-demographic factors and knowledge of nurses on instrument processing, while those were not.

Socio-demographic factors have also significant association with practice of nurses on instrument processing. On the multivariate analysis, more work experience in the give ward of participants was significantly associated with the practice of nurses on instrument processing from socio-demographic factors of participants. The odds of nurses who given service more than two years within the ward/department was **1.23** times [**(AOR=0.04) (95%CI) 1.72(1.23, 3.25)]** higher to have a good practice of instrument processing than those who given service less than two years The possible reasons for these findings might be as the participants spent more time on instrument processing might help nurses good performance.

The result of this study was in line with the study Sessa A, et al., on an investigation of nurses' knowledge, attitudes, and practices regarding disinfection procedures in Italy and study conducted by Elazzar amia E, Qalawa and SAA. Nurse's awareness of infection control measures in operating room (16, 21). In contrast of these, this study disagree with the studies conducted Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa and by Geberemariyam BS on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia (18, 19).

Knowledge of nurse has also significant association with practice of instrument processing in perioperative setting. The odds of nurses who had Good knowledge about instrument processing were about **1.32** times **[(AOR=0.003) (95%CI) 1.32(1.10, 2.97)]** higher to have a good practice regarding practice of instrument processing than those who had poor knowledge. This shows that the more nurses knowledgeable on instrument processing the more they practice it. The result of this study is align with the study conducted in Egypt port-said general hospital showed that operating room nurse's, finding conducted by Sri Yusnita IS., et al., on Knowledge, attitude and perceived adherence with universal precautions among health care workers in the obstetrics and gynecology department of an Indonesian teaching hospital, Study conducted by Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa and study conducted by Geberemariyam BS on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia and study conducted by Biniyam S. on decontamination of patient equipment: nurses' self-reported decontamination practice in hospitals of southeast Ethiopia (18, 19, 22, 23).

The result of this study disagree with studies conducted by Kulkarni S, Chillarge C. on Knowledge, attitude and practice regarding sterilization among staff in central sterile supply department of brims bidar, in India revealed, by Elazzar amia E, Qalawa and SAA. on Nurse's awareness of infection control measures in operating room and study in Italy, which revealed that no significant association between health workers knowledge and practice of instruments processing (16, 20).

Central finding of this investigation was the positive association between knowledge and attitude with practice of instrument processing. In this study, attitude of nurses has also significant association with nurses' knowledge and practice on instrument processing. The odds of nurses who have positive attitude towards sterility technique were **4** times **[AOR=0.001 (95%CI) 4.22(1.10, 12.97)]** higher to have a good Knowledge regarding practice of instrument processing than those who had negative attitude towards instrument processing. The odds of nurses who have positive attitude towards instrument processing were **7** times **[AOR=0.01 (95%CI) 7.33(3.01, 12.99)]** higher to have a good practice regarding practice of instrument processing than those who negative attitude. This shows that the positive attitude nurses do have towards instrument processing leads them to acquire good knowledge on instrument processing and exerts positive impact on good practice of instrument processing in perioperative setting.

The result of this finding is in line with the studies conducted by by Sessa A, et al., on an investigation of nurses' knowledge, attitudes, and practices regarding disinfection procedures in Italy study conducted by Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa re by Sahiledengle B. on Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa (18, 21, 25).

In this study hospital management factors also has significant association with knowledge of nurses on instrument processing. Instrument processing training and Refreshment and promotion for nurses are significantly associated with nurses' knowledge on instrument processing among hospital management factors. The odds of nurses who taken Instrument processing training was **0.30** times **[(AOR=0.012) (95%CI) 0.30(.12, 0.76)]** higher to have a good knowledge of instrument processing than those who did not take training. The odds of nurses who got Refreshment and promotion were **1.33** times **[(AOR=0.001) (95%CI) 1.33(1.01, 2.92)]** higher to have a good knowledge of instrument processing than those who did not get.

Again, Instrument processing training and Availability of disinfectant in work place were identified as independent predictor of practice on instrument processing from hospital management factors in this study. The odds of nurses who taken Instrument processing training was **5.13**

times **[(AOR=0.008) (95%CI)5.13(3.01, 12.92)]** higher to have a good practice of instrument processing than their counter parts. The odds of Availability of disinfectant were **3.42** times [(**AOR=0.012) (95%CI) 3.42(1.32, 8.88)]** higher to have a good practice of instrument processing than their counter parts. These implicate that training and refreshment as well as promotion on instrument processing, and availability of disinfectants regularly facilitates knowledge gain and effective practice of instrument processing.

This study is in line with studies conducted by Fast O. et al. on Mixed methods evaluation of the impact of a short term training program on sterile processing knowledge, practice, and attitude in three hospitals in Benin, Sahiledengle B, et al., on Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa, Biniyam S. Decontamination of patient equipment: nurses' self-reported decontamination practice in hospitals of southeast Ethiopia and Fast OM, et al., on the impact of a short-term training program on workers' sterile processing knowledge and practices in12 Ethiopian hospitals (14, 18, 24, 26).

STRENGTH AND LIMITATION OF THE STUDY

Strength of the study

- ✓ The findings of this study provide valuable information for improving the quality of programs to work on method of boosting nurse's knowledge and practice on instrument processing to reduce nosocomial infection. This is possible by enabling the identification of knowledge gaps instrument processing techniques.

- ✓ The other strength of this study was the use of observation check list to follow practices towards instrument processing. Therefore, it minimizes the risk that nurses have been reported what have been expected of them but their actual practices was different.
- ✓ Again, the other strength of this study was the involvement of all nurses working in OR of TASH, which might reduce the sense of selection bias.

Limitation of the study

- ✓ However, this investigation was conducted among single hospital nurses from one province only.
- ✓ Exclusion of nurses from other provinces may limit the generalizability of this investigation.
- ✓ Another potential limitation of the investigation is the use of questionnaires and checklist to measure the knowledge and practices which may affect to information bias.
- ✓ Lack of universality of observation check list to follow practices towards sterility technique again another drawback.
- ✓ Because the design of this study was cross sectional, it might be subjected to chicken and egg dilemma.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Only about one third 41(34.5%) of participants have good knowledge and nearly one third 37(31.10%) of them have good practice when followed by observation checklist on instrument processing. The finding alerts stake holders to do something in changing the condition. Findings of this study revealed knowledge and practice of instrument processing has significant association

with knowledge, attitude, education, service experience in OR, training and refreshment and availability of disinfectant.

Result shows that the more knowledgeable the nurses' are; get refreshment training and positive attitude toward instrument processing and availability of disinfectants; the more knowledge and skillful they are in the practice of sterile technique. This result reinforce the importance of get refreshment training, increment of their education, use of best available evidence in clinical judgments among operating room staff nurses to keep them updated with the new trends and developments in infection control and sterile technique principles in order to become increasingly efficient and effective at preventing nosocomial infections.

The results generated from this investigation will provide insight to Nursing Administrators who are aiming to improve safe, complication free, and positive surgical outcome. Hospital programs for new nurses may likewise benefit from this investigation by providing information to newly hired nurses that will improve and enhance performance and provide quality nursing care to their surgical patients. This study focuses on a small number of respondents, thus further study utilizing a bigger population maybe done. Furthermore, studies identifying other factors which may be related to knowledge and practice of sterile technique may be investigated.

Recommendation

To Ministry of Health

- ✓ Should design mechanisms that can strength the existing services in escalating knowledge and practice of nurses to improve safe, complication free, and positive surgical outcome of our community.

To TASH

- ✓ Nursing Administrators who are aiming to improve safe, complication free, and positive surgical outcome should work continuously on nurses performance
- ✓ Teaching and evaluation of students on sterile technique should be improved to increase adherence to sterile technique
- ✓ Provide short and long- term training, refreshment and promotions.
- ✓ Should provide scholar ship to update and upgrade staff nurses

To Perioperative Nurses

- ✓ Should attend more training on sterile technique to be more familiar with new ideas in practicing sterile technique because the training can give theoretical background pertaining to prevention of infection, this also can make them aware of the importance of implementing sterile technique principles.
- ✓ They should ensure regular practice of sterile technique.

To Researchers

- ✓ Should conduct researches on the same topic and area by taking this result as background data.

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ANNEXES

Annex I. Information Sheet

I. Introduction

Research Topic: Assessment of knowledge and practice of instrument processing and its associated factors among operation room nurses in Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia, 2020

Investigator: Rigb Segad

Dear Respondent:

I am a Masters student at Addis Ababa University, College of Health Sciences, School of Allied Health sciences, Department of Nursing and Midwifery. I kindheartedly request you to participate in a study that is aimed at assessing the knowledge and practice of instrument processing and its associated factors among operation room nurses in Tikur Anbessa Specialized Hospital in Addis Ababa.

Participation in this study is voluntary; you can also withdraw at any time from the study if you feel uncomfortable. Refusal to participate will not affect your work or care you shall seek at any of the health facilities in any way. Confidentiality will be ensured by not using your name or address on the questionnaire. There are no risks involved in participating in this study.

The study has no immediate benefits to the respondents, but will have benefits later in improving the knowledge of staff in long runs by implementation of study findings at time of training in higher institutions and thereby help to reduce instrument processing related knowledge and practice and associated factors discrepancy.

I welcome any question if you have any about the study and your participation. Should you have any questions about the research or any related matters, please contact the researcher at

+251-934973120. Email: segedwedage2011@gmail.com

Annex II. Consent sheet

I understand the nature of the study, benefits, and my right to voluntary participation, confidentiality and withdrawal from the study without any oppression. I have had the opportunity to ask questions and answered to my satisfaction. To express my agreement I have signed below.

I hereby freely consent to take part in this study.

Signature of the participant_____

Date_____

Supervisor Name _____ signature_____

Date_____/_____/____E.C.

Name of interviewer

Date _____/_____/_____E.C. signature_____

Yours Faithfully,

Annex III. English questionnaire

Part I: Socio-Demographic related questions

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

Room_____

Ser.No	Socio-Demographic	Response	Remark
101.	Sex	1. Male 2. Female	
102.	Age	_____in years	
103	Clinical experience in months /year	_____	
104.	Service months/year in current ward/ department	_____	
105	Highest nursing qualification attained	1. MSc 2. BSc 3. Diploma 4. Other (specify) ____	
106	Marital status	1. Married 2. Single 3. Divorced 4. Widowed	
107	Monthly in come	_____ in ETH birr	

Part II: Questions on Knowledge of instrument processing.

	Questions	Alternatives/choices of response	Skip
201	Ever know the Spaulding categories of potential infection risks	1. Yes 2. No	
202	Items and practices affect sterile tissues or the blood system consider as critical item/practice	1. Yes 2. No	
203	Decontamination is the first step in instrument processing	1. Yes 2. No	
204	The objective of decontamination is to protect health care workers while handling used instruments	1. Yes 2. No	
205	Decontamination inactivate HBV, HCV and HIV	1. Yes 2. No	
206	Chemical disinfection can kills all living microorganisms including bacterial spores	1. Yes 2. No	
207	After proper decontamination and cleaning 0.1% chlorine solution for 20 min provide HLD	1. Yes 2. No	
208	Sterilization is a process where all microorganisms, including bacterial spores are killed	1. Yes 2. No	
209	Steam sterilization is a preferred method for reusable surgical instruments	1. Yes 2. No	

Part III: Questions on practice of instrument processing.

	Questions	Alternatives/choices of response	Skip
301	Do you always perform proper instrument processing as per the recommendations	1. Yes 2. No	
302	Do you always perform decontamination before cleaning	1. Yes 2. No	
303	Do you always place contaminated items in decontaminate solution for 10 minutes	1. Yes 2. No	
304	Do you immediately immerse surgical instruments in decontaminant solution after use?	1. Yes 2. No	
305	Do you always wear all the necessary PPE (like mask, eyewear, apron and heavy duty utility gloves) during instrument processing?	1. Yes 2. No	
306	Do you always disinfect stethoscopes?	1. Yes 2. No	
307	Do you always thoroughly clean items before sterilization?	1. Yes 2. No	
308	When you prepare 0.5% decontaminate chlorine solution do you take one part concentrated solution and add to nine parts of water?	1. Yes 2. No	
309	Do you always perform HLD after applying proper decontamination, and thorough cleaning?	1. Yes 2. No	
310	Do you always monitor the correct temperature, pressure and time combination for sterilization cycle?	1. Yes 2. No	
311	Do you perform weekly biological test for dry heat or steam sterilizer? Or is there a system that perform biological test for sterilizers that you usually used?	1. Yes 2. No	
312	Do you use chemical indicators to monitor time, temperature, and pressure for steam sterilization and time and temperature for dry heat sterilization in every sterilization procedure	1. Yes 2. No	

Part IV Observational of instrument processing status

	Questions	Alternatives/choices of response	Skip
401	Three-compartment instrument processing technique witnessed		
402	Availability of disinfectant compounds witnessed		
403	Instrument processing bucket were coved at the time of assessment		
404	All instrument processing bucket were correctly leveled		
405	Compartments leveled with time and date of disinfectant preparation		
406	Proper High Level Disinfection (HLD) practice witnessed		
407	Poor handling and storing system of sterilized instruments observed		
408	Calibrated autoclaves and dry heat oven witnessed		
409	Autoclaves checked regularly using chemical indicators		
410	Autoclaves monitored using biological indicators witnessed		
411	Autoclave without monitoring gage observed		
412	Autoclave monitored using chart and recording system		

Part –V: Attitudinal question on 1-5 liker scale (1= strongly disagree, 2= disagree, 3= neutral, 4 = agree, 5= strongly agree)

S.N	Questions	1	2	3	4	5
501	The objective of decontamination is to protect HCWs while handling used instruments					
502	Decontamination inactivate HBV, HCV and HIV					
503	All instruments should be decontaminated first, thoroughly cleaned and dried before being sterilized					
504	Availability of poster, SOP or guideline in work place targeted on instrument processing makes safe					
505	Always thoroughly clean items before sterilization is mandatory					
506	Always wearing all the necessary PPE during instrument processing is important					

Part VI: Hospital management question

S.N	Questions	Code	Remark
601	Ever had instrument processing training	1. Yes 2. No	
602	Awareness on infection prevention and patient safety guideline of Ethiopia	1. Yes 2. No	
603	Availability of poster, SOP or guideline in work place targeted on instrument processing	1. Yes 2. No	
604	Availability of disinfectant in work place	1. Yes 2. No	
605	Refreshment and promotion given regularly	1. Yes 2. No	

Thank you for your Participation!