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Instrument processing knowledge and practice amongst healthcare workers in Addis Ababa, Ethiopia

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Abstract

The recent outbreaks of healthcare associated infections (HAIs) as a result of poor cleaning, disinfection and sterilization of medical equipment, and concerns about the possible spread of highly contagious infections has brought the issue of instrument processing in the forefront of infection prevention. Conversely, in many developing countries such as Ethiopia instrument processing practice (IPP) among healthcare workers (HCWs) is not quantified yet. A cross-sectional study was conducted to assess HCWs instrument processing knowledge and practice in health centres of Addis Ababa, Ethiopia in January, 2017. Simple random sampling technique was employed to select 328 HCWs. Data were collected using a structured questionnaire and checklist. Univariate analysis, binary and multivariable logistic regression was computed. Adjusted odds ratio (AOR) with corresponding 95% confidence interval (CI) were used to quantify the strength of association and p-value ≤ 0.05 was used to declare statistical significance. Less than half 46.3% (95%CI: 40.9, 51.5%) of HCWs are knowledgeable on instrument processing and 67.1% (95%CI: 61.9, 71.6%) of HCWs had safe IPP. High risk perception towards transmitting an infection while working (AOR: 5.35; 95%CI: 2.44, 11.73), being knowledgeable on instrument processing (AOR: 2.81; 95%CI: 1.50, 5.27), and having positive attitude towards infection prevention (AOR: 2.39; 95%CI: 1.19, 4.84) were the most important variables associated with safe IPP. In general, HCWs instrument processing practice was not safe enough. Moreover, a significant number of HCWs lacks adequate instrument processing knowledge. Hence, enhancing HCWs awareness on IPP should be undertaken along with urgent improvement in routine monitoring of autoclaves.

Keywords: Decontamination, disinfection, sterilization, medical devices, Ethiopia

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Introduction

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.[1] Moreover, it is the cutting edge in the fight against health care associated infection (HAIs).[2,3]

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.[1-5] 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.[1,4-7]

The objective of decontamination is to protect individuals who handle surgical instruments and other items that have been in contact with blood or body fluids from serious diseases; since it inactivates hepatitis B virus (HBV), hepatitis C virus (HCV), and HIV and reduces the number of microorganisms, it is the first step in processing instruments.[1,5,8] Cleaning is also equally essential and a prerequisite to ensure effective disinfection or sterilization; neither sterilization nor HLD could be effective without prior cleaning.[5] Once an item is cleaned, rinsed and dried, sterilization will be the final phase in instrument processing to eliminates all microorganisms including bacterial endospores from inanimate objects by high-pressure steam (autoclave), dry heat (oven), chemical sterilants, or radiation.[1,5,8] Moreover, the quality of the sterilization process is a central factor in the control and prevention of HAIs, and it should be monitored routinely using biological and chemical indicators.[5-7] In this regard, compliance with the correct sterilization practice in all healthcare facilities is absolutely necessary.[3,4,7,8]

Currently, poor instrument processing practice (IPP) concerns both the medical and the general community.[4,5] On top of this, the risk of serious blood borne viruses such as human immunodeficiency virus (HIV), HCV and HBV, among healthcare workers (HCWs) and staff who process surgical instrument and equipments is increasing.[8] Moreover, multiple studies in different countries have also documented lack of compliance with established guidelines for disinfection practice and infection prevention precautions among HCWs.[4,9-16]

In resource limited countries such as Ethiopia, despite the high prevalence of HAIs [17-19] and poor compliance on standard precautions,[20-22] HCWs' IPP is not quantified so far. It is crucial to decrease and prevent the risk of infections, and to improve the quality of health care service assessment of HCWs' instrument processing practice. However, there is no available information with regard to the issues of reusable medical instrument decontamination, cleaning and sterilization by HCWs in Ethiopia and particularly in health centres of Addis Ababa where the vast majority of the community seeks service. In view of this, the main purpose of this study was to assess HCWs' IPP and associated factors in health centres of Addis Ababa, Ethiopia. The findings from this study may provide valuable information for healthcare facilities to design appropriate progressive interventions and strategies to reduce the risk associated with instrument processing.

Methods

A cross-sectional study was employed to assess HCWs' IPP and associated factors in 10 randomly selected Health Centres (HCs) of Addis Ababa, Ethiopia, from January 9 to 30, 2017. Addis Ababa (the capital city of Ethiopia) is administratively divided into ten sub-cities; from each sub-city one HC was selected by simple random sampling technique. A total of 592 full-time employed HCWs were working in the selected HCs, and eligible to participate in this study.

A single population proportion formula was used to calculate the sample size assuming 50% of the HCWs would have safe IPP, with 95% level of confidence and 5% margin of error. Finite population correction formula was also considered since the source population is less than 10,000. The final sample size of this study was 369 including the possible 10%

non-response. HCWs were selected from each HC by simple random sampling technique, after allocating the sample size proportional to the size of the Health Centre.

A pre-tested interviewer administered a structured questionnaire, and a checklist was used to collect data. These were adapted from relevant literature and assessment tools.[1,5,6,8] The questionnaire included questions on demographic characteristics of HCWs, knowledge on instrument processing, attitude towards infection prevention, perception of risk towards transmitting an infection while working, and HCWs' IPP. There were 10 questions used to assess HCWs' IPP with a response of always or yes and no. Each correct practice was awarded one point, otherwise zero. A composite score was constructed by adding yes responses, each with a value of one; hence the score varied from 0 to 10 marks. Subsequently, the mean was used as a cut point to classify IPP of HCWs, seeing as the data sample was symmetrically distributed. HCW scores equal to or above the mean value were considered to have safe IPP, otherwise unsafe. The same procedure was used to classify HCWs knowledge on instrument processing as knowledgeable or not knowledgeable. HCWs attitude towards infection prevention and perception of risk towards transmitting an infection while working were assessed by five point Likert-type scale options ranging from strongly agree to strongly disagree, and very high risk to not sure respectively. The total score for attitude and perception varied from 10 to 50. Accordingly, HCWs who scored ≥ 80% (40-50) of attitude questions were considered to have positive attitude towards infection prevention and respondents who scored ≤ 79 (10-39) were categorized as negative attitude. Likewise HCWs who scored ≥ 80% (40-50) of perception questions were categorized as having high risk perception towards transmitting an infection while working and those who scored 61-79% (31-39) and ≤ 60% (10-30) were categorized as moderate and low risk perception respectively.

The questionnaire was prepared in English after extensive literature review, and translated to Amharic (local language) and back translated to check its consistency. In addition, the data collection tool was pre-tested on 10% of the actual sample size and the necessary corrections were made. Data were collected by trained environmental health officers. Prior to the interview consent was obtained from each respondent after explaining the purpose of the study. Throughout the data collection process close supervision was made for completeness of questionnaires and consistency.

The data obtained were cleaned, checked and entered into EpiData version 3.1 software (EpiData Association, Odense Denmark) and exported to SPSS 20.0 version (Armonk, NY: IBM Corp) for further analysis. A summary descriptive was computed to calculate frequency distribution for some important variables. Bivariate binary logistic regression analyses were performed to examine and assess the presence of association between the dependent variable (IPP) and independent variables. Finally, to describe the independent predictors of IPP, multivariable logistic regression has been used; backward stepwise logistic regression analysis was considered. Adjusted Odds ratios (AOR) with corresponding 95% confidence interval (CI) were estimated to assess the strength of association and p-value ≤ 0.05 was considered for all statistical significant tests as a cut-off point.

The study was reviewed by Addis Ababa city government health bureau Institutional Review Board (IRB) and the necessary permission letter was sought from all sub-city health office to access HCs. Informed verbal consent was obtained from the each HCW after explaining the purpose of the study; only respondents willing to participate were recruited for the study. Both privacy and confidentiality of the response of each participant was ensured during and after data collection.

Results

Socio-demographic characteristics of the study participants

A total of 328 HCWs participated in the study, with a response rate of 89%. The mean (standard deviation (SD)) age and years of service (work experience) of HCWs were 27.70 (± 5.17) and 3.62 (± 2.68), respectively (Table I).

Knowledge on instrument processing

One hundred and thirty three (40.5%) HCWs recognized the Spaulding risk classification that serves

Table I. Socio-demographic characteristics of healthcare workers from selected health centers in Addis Ababa, Ethiopia, January 2017 (n=328)

Characteristics	Number of HCWs	Percentage
Sex		
Male	109	33.2
Female	219	66.8
Age group (years)		
<25	128	39.0
25-30	143	43.6
31-35	37	11.3
≥ 36	20	6.1
Profession		
Nurses & Midwifery	225	68.6
Physicians and Health officers	60	18.3
Laboratory technician and others*	43	13.1
Department		
OPD, E-OPD and Triage	114	34.8
Delivery Room, Minor-OR & Dressing and Injection room	74	22.6
MCH, ART & TB-clinic	59	18.0
Laboratory	44	13.4
Follow up and inpatients	37	11.3
Level of Education		
Diploma	190	57.9
First Degree and above	138	42.1
Year of service in the current health center		
< 3	180	54.9
3-6	103	31.4
>6	45	13.7
Marital status		
Single	198	60.4
Married	130	39.6
Ever had infection prevention training		
Yes	89	27.1
No	239	72.9
Awareness on infection prevention and patient safety guideline of Ethiopia		
Yes	179	54.6
No	149	45.4
Availability of poster, SOP or guideline in work place targeted on instrument processing		
Yes	177	54.0
No	151	46.0
Vaccination against hepatitis B		
Yes	210	64.0
No	118	36.0

OPD=Outpatient department, E-OPD= Emergency Outpatient department, OR= Operating theater, SOP= Standard operating procedure, Maternal and child health (MCH), TB = Tuberculosis

Table II. Instrument processing knowledge of healthcare workers in health centers of Addis Ababa, Ethiopia, January 2017 (n=328)

Variables	Yes (n)	Percentage
Ever know the Spaulding categories of potential infection risks	133	40.5
Items and practices affect sterile tissues or the blood system consider as critical item/practice	113	34.5
Decontamination is the first step in instrument processing	192	58.5
The objective of decontamination is to protect HCWs while handling used instruments	276	84.1
Decontamination inactivate HBV, HCV and HIV	262	79.9
Chemical disinfection can kills all living microorganisms including bacterial spores	125	38.1
After proper decontamination and cleaning 0.1% chlorine solution for 20 min provide HLD	211	64.3
Sterilization is a process where all microorganisms, including bacterial spores are killed	321	97.9
Steam sterilization is a preferred method for reusable surgical instruments	221	67.4
Sterilization can be achieved by high-pressure steam, dry heat oven, or using chemical sterilants	321	97.9
All instruments should be decontaminated first, thoroughly cleaned and dried before being sterilized	269	82.0
The temperature, pressure, and time combinations for steam sterilization is 121°C (250°F), pressure of 106 kPa (15lb/in^2) for 20 minutes unwrapped items and 30 minutes for wrapped items	109	33.2

as the basis for selecting the prevention practice or process to use. The majority (97%) of HCWs knew decontamination can inactivate HBV, HCV and HIV. Conversely, only a small proportion of HCWs (33.2%) knew the correct temperature, pressure, and time combinations for steam sterilizer. The total composite score showed that 152 (46.3%) (95%CI: 40.9, 51.5%) of HCWs were knowledgeable on instrument processing and 176 (53.7%) (95%CI: 48.5, 59.1%) were not knowledgeable (Table II).

Attitude and risk perception

Regarding HCWs attitude and risk perception, 267 (81.4%) (95%CI: 77.1, 85.7%) HCWs had positive attitude towards infection prevention and 99 (30.2%) (95%CI: 25.3, 35.7%) had high risk perception towards transmitting an infection while working, 119 (36.3%) (95%CI: 31.4, 41.8%) had moderate risk perception, and 110 (33.5%) (95%CI: 28.7, 38.4%) low risk perception.

Instrument processing practice

A total of 283 (86.3%) of HCWs always performed decontamination before cleaning and 147 (44.8 %) of HCWs reported they always placed contaminated items for 10 minutes in a 0.5% decontaminant chlorine solution. One fifth (22.6%) of HCWs wear all the necessary personal protective equipment (PPE) like mask, eyewear, apron and heavy duty utility gloves while performing instrument processing. No

HCWs reported the use of biological indicators such as *Bacillus stearothermophilus* or *Bacillus subtilis* bacteria to test performance of steam and dry heat sterilizer, respectively. As evidenced from observational assessment, all instrument processing areas were observed used the recommended three compartment instrument processing practice. However, none of HCs autoclaves were calibrated ever and regularly monitored by biological indicators. A total composite score on IPP showed that 220 (67.1%) (95%CI: 61.9, 71.6%) HCWs had safe IPP whereas 108 (32.9%) (95%CI: 28.4, 38.1%) had unsafe practice (Table III and IV).

Factors associated with instrument processing practice

In the binary logistic regression analysis, HCWs years in service, HCWs' current working department, awareness on infection prevention and patient safety guidelines of Ethiopia, presence of poster, standard operating procedure (SOP) or guideline in HCWs' working place targeted on instrument processing, awareness of Spaulding categories of potential infection risks, HCWs' perception of risk towards transmitting an infection while working, knowledge on instrument processing, attitude towards infection prevention and hepatitis B vaccination status were found to be associated with HCWs IPP (Table V). To determine the independent factors associated with HCWs' IPP, multivariable logistic regression was used; backward stepwise logistic regression analysis was considered and to check the correctness of the final model, the Hosmer and Lemeshow test for the overall goodness of fit was used, with a value of 0.174 that is insignificant, which means the final model was correct. Accordingly, some variables remained independent predictors for having safe IPP. HCWs who had high and moderate risk perception towards transmitting an infection while working were 5.35 and 2.2 times more likely to have safe IPP as compared to their counterparts (AOR: 5.35; 95%CI:2.44, 11.73 and AOR: 2.20; 95%CI:1.17, 4.17 respectively). HCWs who are knowledgeable regarding instrument processing were 2.81 times more likely to have safe IPP than those who are not knowledgeable

Table III. Instrument processing practice of healthcare workers in health centers of Addis Ababa, Ethiopia, January 2017 (n=328)

Variables	Yes (n)	Percentage
Do you always perform proper instrument processing as per the recommendations	252	76.8
Do you always perform decontamination before cleaning	283	86.3
Do you always place contaminated items in decontaminate solution for 10 minutes	147	44.8
Do you immediately immerse surgical instruments in decontaminant solution after use?	259	58.9
Do you always wear all the necessary PPE (like mask, eyewear, apron and heavy duty utility gloves) during instrument processing?	74	22.6
Do you always disinfect stethoscopes?	102	31.1
Do you always thoroughly clean items before sterilization?	322	98.2
When you prepare 0.5% decontaminate chlorine solution do you take one part concentrated solution and add to nine parts of water?	294	89.6
Do you always perform HLD after applying proper decontamination, and thorough cleaning?	117	35.7
Do you always monitor the correct temperature, pressure and time combination for sterilization cycle?	139	42.4
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?	0	0
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	32	9.8

Table IV. Observational assessment of health centers instrument processing status in Addis Ababa, Ethiopia, January 2017 (n=94)

Variables	Yes (n)	Percentage
Three-compartment instrument processing technique witnessed	94	100
Availability of disinfectant compounds witnessed	94	100
Instrument processing bucket were coved at the time of assessment	73	77.6
All instrument processing bucket were correctly leveled	64	68.1
Compartments leveled with time and date of disinfectant preparation	14	14.8
Proper High Level Disinfection (HLD) practice witnessed	19	20.2
Poor handling and storing system of sterilized instruments observed	32	34.0
Calibrated autoclaves and dry heat oven witnessed (n=27)	0	0
Autoclaves checked regularly using chemical indicators (n=27)	1	3.7
Autoclaves monitored using biological indicators witnessed (n=27)	0	0
Autoclave without monitoring gage observed (n=27)	1	3.7
Autoclave monitored using chart and recording system (n=27)	0	0

(AOR: 2.81; 95%CI: 1.50, 5.27) and 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) (Table V).

Discussion

Outbreaks of HAIs are imminent when instruments are poorly processed; as a result, safe IPP is the first strike in the fight against HAIs. In this regard, having adequate knowledge on instrument processing (such as decontamination, cleaning, sterilization or HLD) by HCWs is expected. The data from this study indicated that HCWs instrument processing knowledge was suboptimal, with less than half (46.3%) of HCWs knowledgeable on instrument processing. The finding imply that a significant number of HCWs lack adequate knowledge, which may possibly hinder HCWs' IPP since there may be a co-dependency between HCW knowledge and practice as evidenced from the multivariable logistic regression analysis. In this study two third (64.3%) of HCWs knew high level disinfection should be applied for specific contact time. This is comparable with the finding from Italy where 86.9% of HCWs agreed that disinfectant should be applied for the specified contact time.[12] In this study, a significant number of HCWs (38.1%) wrongly believed that chemical disinfection can kill all living microorganisms including bacterial spores. On the other hand, a small proportion of HCWs (33.2%) knew the correct temperature, pressure, and time combinations of steam sterilizer. This finding was comparable to a report from western India.[4] In addition, the finding was much lower than another study conducted in India on perception and practice regarding infection control measures which reported 78.5% of HCWs had knowledge about sterilization procedures.[13] This study also highlights that only 40.5% of HCWs recognized Spaulding categories of potential infection risks. Spaulding proposed three categories of potential infection risk which serve as the basis for selecting the prevention practice or process to use sterilization of medical instruments, and still serves as a good basis for setting priorities for any infection prevention program.[1,23]

In the present study the majority (81.4%) of HCWs had positive attitude towards infection prevention; the finding is much higher than the study finding from Eastern Ethiopia[24] and comparable with studies from different parts of the world.[4,12] The possible explanation for this variation may be time and health

Table V. Association between healthcare workers instrument processing practice and determinant variables in health centers of Addis Ababa, Ethiopia, January 2017

Characteristics	Instrument processing practice		Crude OR (95%CI)	Adjusted OR (95%CI)
	Safe 220 (%)	Unsafe 108 (%)		
Sex				
Male	75 (34.1)	34 (31.5)	1.13 (0.68,1.84)	
Female	145 (65.9)	74 (68.5)	1	
Age				
<25	79 (35.9)	49 (45.4)	0.40 (0.13,1.27)	
25-30	102 (46.4)	41 (38.0)	0.62 (0.19,1.97)	
31-35	23 (10.5)	14 (13.0)	0.41 (0.11,1.48)	
≥ 36	16 (7.3)	4 (3.7)	1	
Year of service in the current health center				
< 3	110 (50.0)	70 (64.8)	0.34 (0.15,0.77)*	0.62 (0.24,1.58)
3-6	73 (33.2)	30 (27.8)	0.53 (0.22,1.26)	0.69 (0.26,1.84)
>6	37 (16.8)	8 (7.4)	1	1
Profession				
Nurses & Midwifery	155 (70.5)	70 (64.8)	0.96 (0.47,1.95)	
Physicians and Health officers	35 (15.9)	25 (23.1)	0.61 (0.27,1.39)	
Laboratory technician	30 (13.6)	13 (12.0)	1	
Educational level				
Diploma	130 (59.1)	60 (55.6)	1.15 (0.73,1.84)	
First Degree & above	90 (40.9)	48 (44.4)	1	
Department				
OPD, E-OPD and Triage	72 (32.7)	42 (38.9)	1	1
Follow up and inpatients	19 (8.6)	18 (16.7)	0.62 (0.29,1.30)	0.79 (0.32,1.99)
Delivery Room & Dressing and Injection room	59 (26.8)	15 (13.9)	2.29 (1.16,4.54)*	1.92 (0.86,4.26)
Laboratory	31 (14.1)	13 (12.0)	1.39 (0.66,2.95)	1.41 (0.54,3.71)
MCH, ART & TB-clinic	39 (17.7)	20 (18.5)	1.14 (0.59,2.20)	1.86 (0.85,4.08)
Ever had infection prevention training				
Yes	60 (27.3)	29 (26.9)	1.02 (0.61,1.72)	
No	160 (72.7)	79 (73.1)	1	
Awareness on infection prevention and patient safety guideline of Ethiopia				
Yes	133 (60.5)	46 (42.6)	2.06 (1.29,3.28)*	
No	87 (39.5)	62 (57.4)	1	

continued on next page

Table V. Continued

Characteristics	Instrument processing practice		Crude OR (95%CI)	Adjusted OR (95%CI)
	Safe	Unsafe		
Availability of poster, SOP or guideline in work place targeted on instrument processing				
Yes	129 (58.6)	48 (44.4)	1.77 (1.11,2.82)*	0.93 (0.51,1.69)
No	91 (41.4)	60 (55.6)	1	1
Awareness on Spaulding category				
Yes	99 (45.0)	34 (31.5)	1.78 (1.09,2.89)*	
No	121 (55.0)	74 (68.5)	1	
HCWs perception of risk towards transmitting an infection while working				
High	85 (38.6)	14 (13.0)	8.14 (4.12,16.06)*	5.35 (2.44,11.73)**
Moderate	88 (40.0)	31 (28.7)	3.81 (2.18,6.64)*	2.20 (1.17,4.17)**
Low	47 (21.4)	63 (58.3)	1	1
Knowledge on instrument processing				
Knowledgeable	129 (58.6)	23 (21.3)	5.24 (3.07,8.92)*	2.81 (1.50,5.27)**
Not knowledgeable	91 (41.4)	85 (78.7)	1	1
Attitude towards infection prevention				
Positive	76 (70.4)	191 (86.8)	2.77 (1.57,4.89)*	2.39 (1.19,4.84)**
Negative	32 (29.6)	29 (13.2)	1	1
Vaccinated against hepatitis B				
Yes	152 (69.1)	58 (53.7)	1.93 (1.19,3.09)*	1.51 (0.84,2.72)
No	68 (30.9)	50 (46.3)	1	1

OR=Odds Ratio, *(P<0.05) crude, **(p<0.05) adjusted

facility difference. As regards to HCWs risk perception towards transmitting an infection while working, 30.2% of HCWs had high risk perception, which is closely similar with the finding from Italy.[12] The present study showed that 86.3% of HCWs always perform decontamination before cleaning. This finding is in agreement with the national infection prevention guideline recommendation.[1,5] Only about one fifth (22.6`%) of HCWs reported that they always wear all the necessary personal protective equipments (PPE) like mask, eyewear, apron and heavy duty utility gloves while performing instrument processing, regardless of the strong recommendation to wear the essential PPE while processing instruments.[5,8]

Findings from this study showed that almost two third (67.1%) of HCWs had safe IPP. Similar sub-optimal standard precautions practices among HCWs were also reported from other infection prevention related studies.[20,25-27] In this study, regardless of the strong national infection prevention guideline recommendation to monitor sterilization process, none of HCs used biological tests to monitor autoclaves' performance. This finding is of a concern, since studies

clearly showed that the quality of sterilization and disinfection is critical for the control and prevention of HAIs, since infections can be acquired easily due to poor instrument processing.[7,8] Because sterilization of all patient-care items is not necessary, health-care policies must identify, primarily on the basis of the items' intended use, whether cleaning, disinfection, or sterilization is indicated.[6] However, in Ethiopia there is no national guideline targeted on disinfection and sterilization practice in healthcare facilities.[1,5] As a result, it is strongly recommended to use the guideline for disinfection and sterilization in healthcare facilities, presented by the Centers for Disease Control and Prevention,[6] on the preferred methods for cleaning, disinfection and sterilization of patient care medical devices, since failure to comply with scientifically-based guidelines has led to numerous outbreaks.[6] Moreover, the rationale for the recommended decontamination, cleaning and sterilization steps should be clearly understood by all clinic staff.[5,11,28,29]

HCWs who had high and moderate risk perception towards transmitting an infection while working were five and two times more likely to had safe IPP as compared to their counter parts respectively. This finding was similar to the study reported from Italy where performing appropriate antisepsis was higher among nurses with a higher perception of risk of transmitting an infectious disease while working.[12] In this study HCWs who are knowledgeable regarding instrument processing were more likely to have safe IPP than those who are not knowledgeable. Similar findings were also reported from Bahir Dar (Ethiopia) [26] and Addis Ababa(Ethiopia).[25] In the same way, the present study also showed that comparing with HCWs who had negative attitude towards infection prevention, HCWs who had positive attitude were two times more likely to have safe instrument processing practice. In accordance with this finding different studies also report comparable findings.[12,25,26,30]

The present study has some limitations that must be considered. As this is a cross-sectional study, limitations that come with this type of design need to be taken into account. Secondly, the bias attributable to self-reporting should also be considered while interpreting the findings. Despite these limitations, this study provides remarkable findings with respect to HCWs' IPP in Addis Ababa as well as in Ethiopia.

Conclusion

In general, a significant number of HCWs lack adequate knowledge on instrument processing. Moreover, none of the HCs perform routine monitoring of sterilization procedure and almost two third of HCWs had safe IPP. The overall findings of this study indicate that HCWs' IPP is not safe enough. It is concluded that, in working to create an infection-free environment in HCs it is important and absolutely necessary to enhance HCWs awareness on IPP and operational ability along with urgent implementation of routine sterilization monitoring procedures in all HCs.

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