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Safety Precaution Practices and Associated Factors Among Public Hospital Cleaners: Case In Addis Ababa, Ethiopia.

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Abstract
Cleaners working in hospitals are exposed to different health problems than other health personnel due to low knowledge and skill, poor biomedical waste management, hospital acquired infections, and poor safety precaution practices. However, little attention has been given to this flaming issue. This study was therefore designed to assess safety precaution practices and associated factors among public hospital cleaners in Addis Ababa city. An institutional based cross-sectional study was deployed among 320 cleaners in six public hospitals selected through cluster random sampling methods, from July to August 2019.
Data collected through pre-tested structured interviewer-administered questionnaires, and the collected data was entered into Epi -Info version 7software and then exported to SPSS version 20 for further analysis. Variables with p-value of ≤ 0.2 at bi-variable logistic regression earmarked for the multi-variable logistic regression analysis, and in this model, variables of p- value < 0.05 were considered as the important predictors of the safety precaution practices.
We found that safety precaution practice was very low among study participants and was highly associated with inadequate knowledge, employment condition, employee organization, work experience, health and safety training, supportive supervision, work rotation in different units of the hospital, and also knowing the availability of soap or hand rub alcohol. Therefore, strengthening regular training and awareness, conducting program based supportive supervision, strengthening work rotation, adequate and continues supply of safety commodities for cleaners are essential to improve safety precaution practices that lessen the work related health challenges among hospital cleaners.

Key Words: *Cleaners, Safety Precaution Practices, public hospitals, Addis Ababa.*

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I. INTRODUCTION

Work essential to people's lives, for the survival of their family and society in general. At workplaces, environmental or occupational hazards are most likely major cause of morbidity, disability, and mortality among working population [1]. The World Health Organization (WHO) places occupational risks as the 10th leading cause of mortality. It was estimated that 5.8 million people worldwide die from injuries while several millions are injured [2].

Physical hazards encountering cleaning workers encompass among others include falls from ladders, elevated platforms and wet or slippery floors, falling objects, sharp objects, moving or rotating machinery parts, not only from the work equipment used but also from the environment where the cleaning work is performed [3].

The International Labor Organization (ILO) estimated that over 2.3 million fatalities occur annually worldwide, of which over 350,000 are caused by occupational accidents, and close to 2 million by work-related diseases [4]. Four percent (4%) of the world's Gross Domestic Product (GDP) or about US $2.8 trillion is lost because of occupational accidents and diseases due to loss of skilled staff, absenteeism, migration, early retirements, and high insurance premiums [5].

Healthcare facilities generate a large amount of healthcare waste (HCW), which is complex to manage because of its variety and potential to create health and safety hazards if improperly handled [6]. Cleaning hospitals is far more complex than other kind due to nature and kind of wastes to be handled. However, cleaners in this sector are found to be poorly educated and trained with little attention paid to their comfort and safety. It is uncommon for them to have vaccinations or proper protective equipment. Disposable latex gloves may be provided, but they are thin and serve little protection [7]. Cleaners may perform poorly at the job and allow key

microbial reservoirs in the clinical environment go unrecognized. They are also liable to hazards of several magnitudes [8].

The workers in hospitals are at risk of exposure to blood-borne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV), HIV/AIDS and other potentially infectious materials (OPIM). The impact of infections from workplace includes absenteeism, treatment costs, retraining of workers, replacement of employees, and reduced productivity [9].

In resource poor countries, the HIV/AIDS, HBV, and HCV rates of infections can exceed 20% as compared to developed countries. Most of the cleaners had low knowledge about waste management as compared to doctors and other educated hospital workers and few cleaners had a positive attitude towards health care wastes [6]. Among laundry workers, cleaners, porters, and central supply workers; it was demonstrated that cleaners sustained the majority (66%) of injuries due to inappropriate disposal which was associated with 55% of all injuries [10]. A study conducted among hospital cleaners showed that only 82 (37.1%), 12 (7.0%) and 183 (78.5%) regularly used face mask, safety goggles and gloves, respectively. Cuts/lacerations were reported among 50% of respondents with injury while falls and needle stick injuries were reported as commonly occurring accidents. The fall was commonly due to wet and damp floor, inappropriate footwear, improper cleaning, nature of floor and poor vision [11].

The Ethiopian Federal Ministry of Health has made efforts to scale up infection prevention program initiative [12]. Despite these efforts, the practice of infection prevention activities is low among health care workers (HCWs) in governmental health facilities in Addis Ababa [13].

As of 2007 WHO indicates that standard safety precautions also are known as standard precautions that are to break the chain of infection focusing particularly but not exclusively on the mode of transmission, portal of entry and susceptible host sections of the chain [14]. Center for Diseases Control (CDC) also recommended that universal precautions be renamed standard precautions, which combine the major features of the universal precautions and body substance isolation (BSI) [15]. According to WHO, the standard precautions in health care include hand hygiene, use of appropriate personal protective equipment (PPE), use of aseptic technique to reduce patient exposure to microorganisms and management of sharps, blood spills, linen, and waste to maintain a safe environment [8].

The work environment and hospital safety climate influence compliance with universal precautions and other safety-related behaviors. Although numerous factors are cited as essential elements of an overall safety climate, three things are significantly correlated with compliance with Universal Precautions: 1. senior management commitment and support for safety programs, 2. absence of barriers to safe work practices, and 3. cleanliness and orderliness of worksite [16].

In 2002 WHO reported that about three million HCWs worldwide receive percutaneous exposure to blood- borne pathogens each year. These injuries may result in 15,000 HCV, 70,000 HBV and 500 HIV infections, and more than 90% of these infections occur in developing countries. Worldwide, about 40% of HBV and HCV infections and 2.5% of HIV infections in HCWs are attributable to occupational sharps exposures, which are mainly preventable [17].

Every year, an estimated 16,000 million injections are administered worldwide, but not all the needles and syringes are properly disposed afterwards. Lack of proper management of these wastes will further lead to nosocomial infections, infertility, genital deformities, hormonally triggered cancers, mutagenicity, dermatitis, asthma and neurological disorders in children, typhoid, cholera, hepatitis, AIDS and other viral infections. This kind of malpractices will also affect other healthcare workers, patients, visitors, fetuses in the wombs of mothers, members of public and scavengers [18].

Cleaning is a physically demanding job that includes numerous and varied tasks. Cleaners are at risk of minor cuts, bruises and burns from machinery, from hand tools and from handling refuse and chemicals. A study conducted on occupational injury among cleaners of health sector, using the Workplace Health Indicator Tracking and Evaluation (WHITETM) database (web-based surveillance System) by British Columbia indicated that less accident occurred among those who used PPE regularly than those cleaners who did not. Among a total of 145 reported injuries, musculoskeletal injuries were the most prevalent nature of injury for cleaners, representing 86 (59%) of all injuries. From the total reported injuries, cleaners in acute care facilities (86%), female cleaners (90%), full-time cleaners (47%), and inexperienced cleaners having 1-5 years of work experience (35%) were at the highest risk of occupational injury. However, rates of injury for cleaners were higher than those for nurses and twice the average for all occupations. Cleaners working in healthcare facilities are likely to be exposed to additional occupational risks specific to the health care sector [19].

Davies S., (2009) showed that hospital cleaning therefore requires teaching and training. However, cleaners are often not provided with any form of training and new recruits are often provided with nothing more than a routine introduction to the cleaning process [20].

Systematic review on the effectiveness of interventions aimed at increasing hand washing in healthcare workers indicates that hand hygiene is the simplest and most important among the standard precautions

advocated. Hand hygiene is always the final step after removing and disposing of PPE (utility gloves, mask, eye protection (goggles), face shield, gown/apron, safety boots, and cap) [21].

A cross-sectional study conducted on hazards of hospital cleaners in a tertiary health facility in Southwest Nigeria noticed that most of the cleaners 156 (67.7%) spent less than 8 hours at work daily. Hospital cleaners often lack basic preventive measures including education and training for health and safety. The study further detailed that Burns/scald was the most prominent injury sustained, followed by cuts and lacerations. Burns/scald resulted from harsh chemicals, friction, steam, or hot water, while carrying out routine cleaning [11].

A Selective literature review and analysis of a study carried out at Frankfurt university hospital on risk of needle stick injuries from an occupational medicine and virological viewpoint shows cleaners were found to be at risk of all injury categories when compared with other health care workers in general [22].

Selection of PPE for use is based on the type of anticipated exposure, the durability and appropriateness of the PPE for the task [23]. In 2017, a cross-sectional survey conducted on barriers and factors affecting personal protective equipment usage in St. Mary's Hospital Lacer in Northern Uganda indicated cleaners and enrolled nurses were less likely to use personal protective equipment compared to registered nurses and doctors [24]. On the other hand, a descriptive cross-sectional study conducted in Sudan on KAP among cleaners towards health care waste in Omdurman and Bahry Teaching Hospitals pointed out that about 65.5% of cleaners used PPE during work and 31.5% of cleaners did not use PPE during work. Majority (81%) of cleaners washed hand after completion of cleaning, 19% of cleaners did not [25].

The 2012 Medical Centre standard hospital guideline in health worker safety in Tanzania, Bugando indicated that the health care wastes that includes infectious wastes, pharmaceutical waste, genotoxic wastes, radioactive wastes, and wastes from patients generated in health care facilities causes healthcare- associated infections lead to death, disability and excess medical costs to the affected persons, including patients, health workers, and their relatives [9].

The reasons for relatively low regular use of PPE was due to ignorance, lack of knowledge on proper use, lack of proper education and training on health and safety at work, level of perception of risk of injury and availability of PPE [26]. Fewer accidents occurred among those who used PPE regularly than those `cleaners who did not.

In Ethiopia, under labor proclamation No. 377/06 Article 92, it is clearly stated that the fundamental obligations of an employer with regard to putting in place of all the necessary measures in order to ensure work places are safe, healthy and free from any danger to well-being of workers, but the proclamation is still not well applied at workplaces [27].

Therefore, the aim of this study was to assess safety precaution practices and factors associated to it among cleaners working in public hospitals in Addis Ababa.

II. METHODOLOGY AND DATA

This study was conducted in public hospitals found in Addis Ababa. There were ten sub-cities, 119 Woredas, 11 public hospitals, 99 public health centers, 2 private health centers, 2 non- governmental hospitals, 2 police hospitals, 36 private hospitals, and around 700 (medium, higher and specialty clinics) found in Addis Ababa [28]. Among the 11 public hospitals, Saint Paul's Hospital Millennium Medical College (SPHMMC) and Tikur Anbessa Specialized Hospital (TASH) were excluded from the study because SPHMMC was totally outsourced cleaning services in the month of April 2019 that the cleaners did not fulfill at least 6 months' work experience, and above during the study period, and unavailable data of cleaners by service year working in TASH.

There were a total of 447 cleaners working in nine public hospitals found in Addis Ababa. The study was conducted from July to August 2019.

An institutional based cross-sectional study design was used to assess safety precaution practices and associated factors among cleaners of public hospitals. All cleaners working in public hospitals found in Addis Ababa were the source population of the study. The study populations were all cleaners working in selected public hospitals who fulfilled the inclusion criteria. All Cleaners working in those selected public hospitals who were active during the time of data collection and who had at least a minimum of six months, and above working experience in those hospitals, except those unwilling to cooperate, were included in the study.

Sample size determination and sampling techniques

Sample size was calculated using single population proportion formula ($ni= (Z\alpha/2)^2\ p\ (1-p)\ /\ d^2$) considering the following assumptions. $Z\alpha/2$=Z value at 95% CI (1.96); p= Estimated maximum prevalence rate by considering an assumption of 50% proportion was considered since there was no previous study done on this similar study, d=Margin of error tolerable is 5% (0.05) and along with 5% non- response rate used to calculate

the sample size of the study participants. Since the source population was <10,000, correction formula was used to estimate the final number of study subjects included.

Assuming 5% non-response rate, design effect (1.5) was considered for the adjustment of the effect of clustering and the final sample was 320. First, the nine eligible public hospitals were assigned as nine groups to select public hospitals by employing cluster random sampling methods. Out of the nine assigned public hospitals, six were randomly selected by cluster random sampling method through lottery methods. Accordingly, the total number of cleaners working in these six selected public hospitals who had at least six months, and above work experience were in Gandhi Memorial Hospital= 34, Ras Desta Damtew Memorial Hospital=56, Zewditu Memorial Hospital =68, Tirunesh Beijing Hospital= 46, Yekatit 12 Hospital Medical College =44, and Menelik II Referral Hospital=72.

The list of cleaners who were working in these selected public hospitals of having six months, and more work experience was obtained from human resource department of the hospital, and from representatives for those employed by the agency. Since, the total number of cleaners working in the selected hospitals were who had at least six months, and above work experience was 320, which was in perfect match with the calculated sample size; all the cleaners included from the six public hospitals to take part in study without employing sampling methods to study participants.

Operational definitions:

Safety precaution practice is defined as an act of performing safety precaution practice during work time, and categorized as good and poor safety precaution practice based on the study participants' responses towards the domain of safety precaution practice as indicated below:

(i) ***Good safety precaution practice***: study participants who were responded correctly eleven (11) questions and above out of fourteen (14) safety precaution practice questions, which was earning scores above 75% considered as good safety precaution practice.

(ii) ***Poor safety precaution practice:*** study participants who were responded less than eleven (11) questions out of fourteen (14) correctly on safety precaution practice questions, which was earning scores less than 75% considered as poor safety precaution practice.

Knowledge score is defined as having an understanding about communicable diseases and safety precaution, and categorized as adequate and inadequate knowledge based on study participants responses towards knowledge questions as follows:

(i) ***Adequate knowledge:*** Cleaners who were responded correctly more than eight (8) out of eleven (11) on knowledge questions correctly, which was earning scores above 75% on knowledge questions scaled as adequate knowledge.

(ii) ***Inadequate knowledge:*** Cleaners who were responded eight or less than eight questions (≤ 8) out of eleven (11) on knowledge questions, which was earning scores less than 75% on knowledge questions scaled as inadequate knowledge.

Alcohol consumption: Consumption of any kind of alcohol during work time based on degree of frequencies and categorized as always (who were drink alcohol all working days per week), usually (who were drink alcohol three to four working days per week), and sometimes (who were drink alcohol one to two working days per week).

Chat Chewing: It is the practice of chewing chat based on frequencies and categorized as always (who were chew chat all working days per one week), usually (who were chew chat three to four working days per one week), and sometimes (who were chew chat one to two working days per one week).

Cigarette Smoking: Smoking of cigarette based on degree of frequencies and categorized as always (who were smoke all working days per week), usually (who were smoke three to four working days per week), and sometimes (who were smoke cigarette one to two working days per week).

Data collection tools and procedures

A pre-tested interviewer-administered questionnaire was used for data collection. First, the data collection tool was prepared in English and then translated into Amharic language. Before starting the actual data collection process, the tool was evaluated on similar study participants from other hospital who was not included in the final study. Four data collectors with the background of BSc in Environmental health were recruited for the data collection. Then, the questionnaire was labeled using unique individual and hospital identification code numbers.

Data quality measures

To assure the consistency of data collection tool, it was re-checked the translated questionnaire and corrective actions were as appropriate. The questionnaire was pre-tested initially among 5% of the total sample size (16 cleaners) working in public hospitals out of the selected public hospitals prior to the commencement of

study and it was checked for its clarity, understandability, and completeness, and then some questions that need revision were revised and defects were corrected before used for the final data collection. Training was given for data collectors on how to approach and collect the data from the study participants. After the data collection, the collected data were re-checked for its completeness and consistency by the principal investigator.

Data processing and analysis

The data was entered in to EP-Info Version 7 software and then exported to SPSS version 20 for further statistical analysis. Ten percent (10%) of collected questionnaires double entry were made on Epi-Info version 7, and then after data exported to the SPSS version 20, frequency and cross tabs were used for data cleaning. Data was edited and cleaned by running simple frequency and cross-tabulation to check for inconsistencies and completeness, and sorting to identify outliers. Initially, descriptive statistics was done to summarize the characteristics of the study participants. Bi-variable logistic regression analyses were computed to identify factors having significant association with the outcome variables and all variables having p-value ≤ 0.2 were identified to adjust for possible confounders and to identify factors associated with the dependent variable and detect their strength of association. Both crude odds ratio (COR) and adjusted odds ratio (AOR) results were reported, and variables having p-value < 0.05 were considered statistically significant in the final analysis (multi-variable logistic regression model). Finally, the findings result was presented in the form of narrative, frequency tables, and figure.

III. RESULTS AND DISCUSSIONS

Socio--demographic characteristics of study participants

Size of 297 cleaners was participated in the study making a response rate of 92.8%. The mean age of study participants was 26.99 (±7.55 SD) years. All 297 (100%) of the study participants were females. Among these, 156 (52.5%) aged between 18-25 years. One hundred twenty six (42.4%) of them have attended primary education (1-8) while 122 (41.1%) of them have secondary school (9-12) education. 149 (50.2%) of them were single, 130 (43.8%) were married. 141 (50.8%) of them were earning less than 1,250 Birr per month whereas 146 (49.2%) of them were earning 1,250 Birr and more per month. 218 (73.4%) of them were temporary workers. 134 (45.1%) of them were employed by hospitals themselves. Among the study participants, 202 (68%) of them had work experience of less than 3 years (For detail table 1).

Table 1: Socio-demographic characteristics of study participants working in selected public hospitals in Addis Ababa, Ethiopia (n=297).

Variables	Coding categories	Frequency	Percentage
Age in full years	18-25	156	52.5
	26-30	67	22.6
	>=31	74	24.9
Religion	Orthodox	198	66.7
	Muslim	42	14.1
	Protestant	50	16.8
	Others	7	2.4
Ethnicity	Oromo	76	25.6
	Amhara	127	42.8
	Tigre	16	5.4
	Gurage	38	12.8
	Wolaita	30	10.1
	Others	10	3.4
Educational Status	Primary (1-8)	126	42.4
	Secondary (9-12)	122	41.1
	Certificate	29	9.8
	Diploma and Above	20	6.7
Marital status	Single	149	50.2
	Married	130	43.8
	Others (divorced, widowed)	18	6.1
Monthly Income in Ethiopian Birr (ETB)	1,000-1,249	151	50.8
	>=1,250	146	49.2
Employment condition	Contracted /temporarily Workers	218	73.4
	Permanent workers	79	26.6
Employee Organization	By hospital themselves	134	45.1
	By agency	163	54.9
Work experience in years	< 3	202	68
	>=3	95	32

Working environment conditions

Only 206 (69.4%) of the study participants got training on health and safety precautions before starting to work, of which 95 (46.12%) had good safety precaution practice. Among study participants, 269 (90.6%) were got health and safety information. Out of these, 193 (65%) from health personnel, 40 (13.5%) from friends, 10 (3.4%) from mass media, 15 (5.1%) from family and 11 (3.7%) got from other sources. 223 (75.1%) of them received supportive supervision during their routine work. Two hundred twenty-three (76.4%) of them were oriented on shift work. Two hundred twenty-four (75.4%) of them were clear over the presence of work rotation in different units of the hospital.

From study participants, 155 (52.2%) work for $\leq$ 8 hours a day. Two hundred sixty-eight (90.2%) of them could indicate the presence of personal protective equipment. Among these, 239 (89.2%) were aware of heavy-duty gloves, 184 (68.7%) disposable gloves, 107 (39.9%) safety boot, 240 (89.6%) gown/apron, 223 (83.2%) mask, 155 (57.8%) head cover, 39 (14.6%) eye goggles, 23 (8.6%) face shield, and others 3 (1%). Among study participants, 291 (98.0%) and 187 (63.0%) responded the availability of water and soap or hand rub alcohol to use respectively. Among these, 291 (98%), 174 (59.8%), 79 (27%) and 35 (12%) of them were responded water available always, usually and sometimes respectively, while 103 (55%), 22 (11.8%) and 64 (34.22%) of them were responded soap or hand rub alcohol available always, usually and sometimes respectively (For detail table 2).

Table 2: Working environment conditions of selected public hospitals in Addis Ababa, Ethiopia (n=297).

Variables	Coding categories	Frequency	Percentage
Got training on health and safety before starting work	Yes	206	69.4
	No	91	30.6
Got health and safety information in the past 12 months	Yes	269	90.6
	No	28	9.4
Got Health and safety supervision	Yes	223	75.1
	No	74	24.9
Is there work shift	Yes	227	76.4
	No	70	23.6
Working Hours per day	< = 8 hours	155	52.2
	>8Hours	142	47.8
Work rotation in different units of the hospital	Yes	224	75.4
	No	72	24.2
Is working room has an opening window for ventilation	Yes	287	96.6
	No	10	3.4
Has the working room enough light?	Yes	275	92.6
	No	22	7.4
Is working floor comfortable for walking	Yes	265	89.2
	No	67	22.6
Is personal protective equipment available	Yes	268	90.2
	No	29	9.8
Availability of water	Yes	288	97.0
	No	9	3.0
Know the availability of soap or hand rub alcohol	Yes	187	63.0
	No	110	37.0

Behavioral conditions of the study participants

Among the study participants, 14 (4.7%) were drink alcohol during work time and all of them (100%) were drink alcohol during work sometimes. Neither of the study participants smoke cigarettes nor chew chat. One hundred twenty three (41.4%) had job stress due to workload 67 (54.5%), family problem 27 (21.9%), 73 (59.3%) low income, 7 (5.7%) disease and 2 (1.6%) other reasons. Among the study participants, 98 (33.0%) used the work guidelines while the others 199 (67.0%) not used that 5 (2.5%), 178 (89.4%), 14 (7%) and 2 (1%) of them were due-to inability to read, work guidelines not provided, lack of time to read and other reasons respectively. Among study participants, 88 (29.6%) and 209 (70.4%) of them were satisfied and not satisfied with their job respectively due-to 196 (93.8%) had a complaint of their salary, 23 (11.0%) poor staff relationship, 13 (6.2%) poor communication, 63 (30.1%) absence of recognition, 13 (6.2%) poor management, 67 (32.1%) patient/client insult, 60 (28.7%) inferiority and 1 (0.5%) other reason. Among study participants, 110 (37%), 160 (53.9%) and 27 (9.1%) sleep from 7:00- 9:00 hours per day, < 7:00 hours per day and > 9:00 hours per day respectively.

The know how towards safety precaution

Two hundred eighty-nine (97.3%) of them were know safe handling and disposal of biomedical wastes is important for health and safety. Among the study participants, 291 (98%), 280(94.3%), 195 (65.7%), and 148 (49.8%) responded that they know communicable diseases, human immune virus, hepatitis B virus, and hepatitis C virus can be transmitted through cut or injury by contaminated sharp and needle respectively.

Among the study participants, 286 (96.3%) and 276 (92.9%) responded that they know using personal protective equipment during work and washing hands with water and soap can prevent communicable diseases respectively. The overall knowledge score of the study participants, 152 (51.2%) of them had adequate knowledge and others 145 (48.8%) had inadequate knowledge (For detail table 3).

Table 3. Knowledge status of study participants working in selected public hospitals towards safety precaution, Addis Ababa, Ethiopia (n=297).

Variables	Coding categories	Frequency	Percentage
Know safe handling and disposal of BMWs important for health and safety	Yes	289	97.3
	No	8	2.7
Know cut or injury by contaminated sharp and needle cause communicable diseases	Yes	291	98.0
	No	6	2.0
Know HIV can be transmitted by cut or injury by contaminated sharp or needle with blood	Yes	280	94.3
	No	17	5.7
Know HBV can be transmitted by cut or injury by contaminated sharp or needle with blood	Yes	195	65.7
	No	102	34.3
Know HCV can be transmitted by cut or injury by contaminated sharp or needle with blood	Yes	148	49.8
	No	149	50.2
Malaria can be transmitted by cut or injury by contaminated sharp or needle with blood	Yes	40	13.5
	No	257	86.5
Know if somebody injured by sharp materials or needles during work, he/she must get medical service immediately have an importance	Yes	287	96.6
	No	10	3.4
Know using PPEs in good manner during work can prevent health risk injuries	Yes	285	96.0
	No	12	4.0
Know using PPEs during work can prevent communicable diseases	Yes	286	96.3
	No	11	3.7
Only using hand gloves can prevent health risks	Yes	135	45.5
	No	162	54.5
Know washing hands with water and soap can prevent communicable diseases	Yes	276	92.9
	No	21	7.1
Overall knowledge score	Inadequate knowledge	145	48.8
	Adequate knowledge	152	51.2

Safety precaution practices among study participants

Among the study participants, 295 (99.3%) of them reported they use personal protective equipments (PPEs) during performing their task while others were not. Among PPE users, 267 (90.5%), 23 (7.8%) and 5 (1.7%) use PPEs always, usually and sometimes respectively. Among study participants, 113 (38%) of them faced injury in the past 12 months. They reported the reason of injury occurrence, 33 (29.2%) due to work busy, 7 (6.2%) due to new for the work, 40 (35.4%) of them not used PPEs, 17 (15.0%) of them due to behavior of the work, 6 (5.3%) of them said due to overcrowding and 10 (8.8%) of them did not remember the reason why they faced the injury. Among the injury, 79 (69.9%) needle-stick injuries, 31 (27.4%) cut, 8 (7.1%) burn, 2 (1.8%) fracture, 7 (6.2%) dislocation, 4 (3.5%) electrocution and 1 (0.9%) other type. During the injury, 52 (46.0%) of them immediately got medical care, 28 (24.8%) of them got post exposure prophylaxis (PEP), 27 (23.9%) of them washed the injured area with water and soap, 31 (27.4%) of them did not take any action and 3 (2.7%) of them reported other action. Among the study participants, 95 (32.0%) and 198 (66.7%) of them got immunization against Hepatitis B virus and tetanus toxoid vaccine respectively.

Among the study participants, 235 (79.1%) of them disinfect/decontaminate cleaning devices/materials with disinfectants like chlorine solution. Out of these, 179 (76.2%), 35 (14.9%) and 22 (9.4%) of them disinfect always, usually and sometimes respectively. Among study participants, 228 (76.8%) of them separately transport biomedical wastes (BMWs) as separated at the source by types without mixing together. Among the study participants, 212 (71.4%), 116 (39.1%), 11 (3.7%) and 52 (17.5%) were use dust bin trolley, closed bucket, open bucket and others (biohazard plastic bag) materials for transporting (BMWs) to the disposal place respectively.

Among the study participants, 280 (94.3%) of them wash their hands with water and soap during completion of their task. Among them, 208 (74.3%), 56 (20%) and 17 (6.1%) wash their hands always, usually and sometimes respectively. Among the study participants, 139 (46.8%) of them use hand rub alcohol. Out of these, 85 (61.2%), 12 (8.6%) and 40 (28.8%) use hand rub alcohol always, usually and sometimes respectively. In this study good safety precaution practice was found to be 106 (35.7%), which was very low, that needs attention (For detail figure 1).

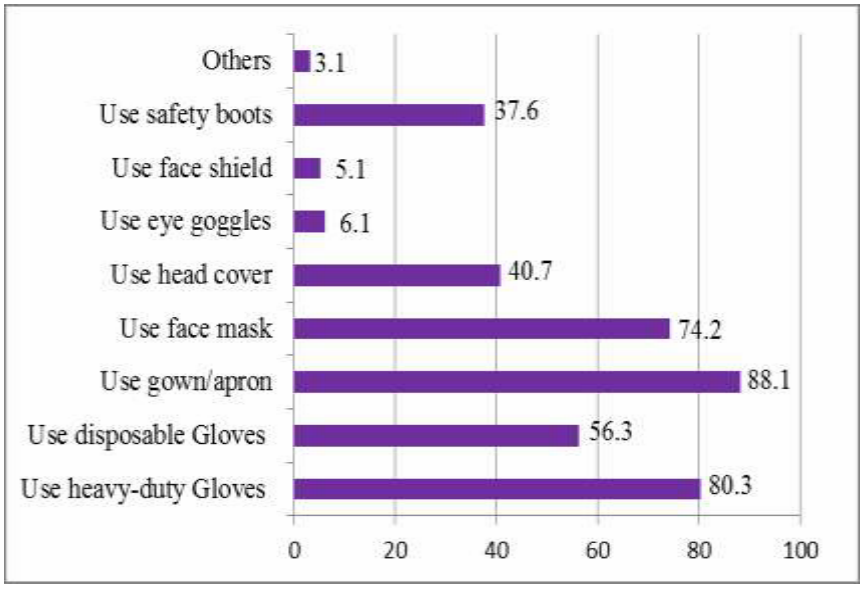

Figure 1: Percentage of personal protective equipment (PPE) user on duty among study participants working in the selected public hospitals in Addis Ababa, Ethiopia (n=295).

Factors associated with safety precaution practices

In multi-variable logistic analysis out puts, study participants who were contracted temporarily [AOR=0.07, 95%CI: 0.02-0.20], employment by hospital [AOR=0.26, 95%CI: 0.08-0.73], work experience of 6 months to less than 3 years [AOR=0.34, 95%CI: 0.14-0.78], having health and safety training [AOR= 2.73, 95%CI: 1.14-6.56], having health and safety supportive supervision [AOR=4.59, 95%CI: 1.51-14], with work rotation in different units of the hospitals [AOR=3.23, 95%CI: 1.20-8.69], aware of the availability of soap or hand rub alcohol in the hospital [AOR=3.77, 95%CI: 1.71-8.28], and with inadequate knowledge [AOR=0.22, 95% CI: 0.10-0.46] were found to be important predictors of the safety precaution practices (For detail table 4).

Table 4: Logistic regression analysis outputs result, Addis Ababa, Ethiopia (n=297).

Variables	Coding categories	Safety Precaution Practice		COR [95% CI]	AOR [95%CI]	p-value
		Good Practice	Poor Practice			
Age in full years	18-25	45	111	0.53(0.300-0.95)	2.26(0.64-7.98)	0.20
	26-30	29	38	1.00(0.51-1.95)	3.57(0.99-12.90)	0.05
	>=31	32	42	1	1	-
Educational Status	Primary (1-8)	58	68	1.99(0.72-5.51)	0.85(0.19-3.70)	0.83
	Secondary (9-12)	32	90	0.83 (0.29-2.34)	0.39(0.09-1.69)	0.21
	Certificate	10	19	1.23 (0.36-4.18)	0.32(0.06-1.74)	0.32
	Diploma and above	6	14	1	1	-
Employment Condition	Contracted temporarily	54	164	0.17(0.10-0.30)	0.07(0.02-0.20) *	**0.00***
	Permanent	52	27	1	1	-
Employee Organization	Hospital	56	78	1.62(1.01-2.62)	0.26(0.08-0.73) *	**0.01***
	Agency	50	113	1	1	-
Work experience in years	< 3	50	152	0.23 (0.14-0.39)	0.34(0.14-0.78) *	**0.01***
	>=3	56	39	1	1	-
Drink alcohol during work	Yes	1	13	0.130 (0.02-1.01)	0.10(0.01-1.91)	0.06
	No	105	178	1	1	-
Got training on health and safety before starting work	Yes	95	111	6.22(3.13-12.38)	2.73(1.14-6.56) *	**0.00***
	No	11	80	1	1	-
Got health and safety information in the past12months	Yes	104	165	8.19(1.91-35.25)	0.83 (0.10-6.95)	0.86
	No	2	26	1	1	-
Got health and safety supportive supervision	Yes	100	123	9.21(3.84-22.11)	4.59(1.51-14.00) *	**0.01***
	No	6	68	1	1	-
Is there work shift	Yes	99	128	6.96(3.05-15.86)	1.63(0.36-7.37)	0.52
	No	7	63	1	1	-
Work rotation in different units of the hospital	Yes	97	127	5.35(2.53-11.28)	3.23(1.20-8.69) *	**0.02***
	No	9	63	1	1	-
Is the working room has Light?	Yes	103	172	3.79(1.10-13.13)	1.06(0.27-5.46)	0.94
	No	3	19	1	1	-
Is working floor	Yes	102	163	3.49(1.17-10.38)	0.55(0.14-2.19)	0.40

comfortable for walking	No	4	63	1	1	-
Is PPE available	Yes	104	164	8.56(1.99-36.76)	6.27(0.99-39.78)	0.05
	No	2	27	1	1	-
Know the availability of Soap or hand rub alcohol	Yes	91	96	6.00(3.24-11.11)	3.77(1.71-8.28) *	**0.00***
	No	15	95	1	1	-
Sleeping time per day (hours)	7:00—9:00	22	88	2.00(0.55-7.25)	0.53(0.12-2.43)	0.41
	<7:00	81	79	8.20(2.38-28.33)	1.17(0.25-5.43)	0.85
	>9:00	3	24	1	1	-
Overall knowledge score	Inadequate Knowledge	23	122	0.16(0.09-0.27)	0.22(0.10-0.46) *	**0.00***
	Adequate knowledge	83	69	1	1	-

***Note: *** Variables at P-value <0.05 of AOR (95% CI) were shows the presence of strong association between the variables and safety precaution practice.*

Good safety precaution practice was found 106 (35.7%) among study participants, which is very low and should need concern for prevention of diseases, protection from injuries, and wellbeing of the cleaners. Among study participants, 219 (74.3%), 111 (37.6%), 18 (6.1%), 237 (80.3%) and 15 (5.1%) were used face mask, safety boots, safety goggles, heavy-duty gloves and face shield respectively, which was higher than that of study conducted in hospital in Nigeria for face mask 82 (37.1%) and safety boots 17 (9%) but, nearly similar for safety goggles 12 (7.0%), heavy-duty gloves 183 (78.5%) and face shield 9 (5.3%) [11]. In this study among study participants who washed their hands with water and soap were 280 (94.3%) which was greater than study done in hospital found in Sudan, which was 81% [25]. Among study participants, 206 (69.4%) had got health and safety training before starting their work and the others left did not get that the problem was also founded study done in hospital cleaners in Nigeria often lack basic preventive measures including education and training for health and safety [11].

Among the study participants, the reason of not properly use the PPEs that nearly half of them, 144 (48.5%) were responded due to shortage of PPEs, 18 (6.1%) did not know the importance, 59 (19.9%) were due to lack attention/negligence, 60 (20.2%) said using PPEs not give comfort, 5 (1.7%) of them said using PPEs decrease work performance and 1 (0.3%) was said due to other reason, which also indicated as limitations of personal protective equipment by U.S department of human and health services guideline in 2013 that the reasons of low regular use of PPE could be due to ignorance, lack of knowledge on proper use, lack of proper education and training on health and safety at work, level of perception of risk of injury and availability of PPE [26].

In this study among the injured cleaners within the past 12 months 113 (38.1%), 40 (35.4%) of them were due to not used personal protective equipment during the occurrence, and 33 (29.2%) of them were due to busy during the time of injury occurred. The utilization of PPEs should be used correctly and practiced for safeguarding the health and well-being of cleaners from the injuries, communicable diseases in the hospitals, and others. Among the injured, 52 (46.0%) of them were got medical care immediately, 28 (24.8%) were got PEP, and 31 (27.4%) did not take any action after they injured, which needs awareness creation for cleaners on getting medical service importance during the occurrence of injury.

Majority of the cleaners 235 (79.1%) disinfect/decontaminate the cleaning devices/materials with chlorine solution, 228 (76.8%) separately transport BMWs at the source without mixing together, and majority of the cleaners 212 (71.4%) used dust bin trolley, 116 (39.1%) used closed bucket and 52 (17.5%) used biohazard plastic bag for transporting biomedical wastes, which is safe method of transportation.

In this study employment status and employee organization of the workers were significantly associated factors that the contracted temporarily cleaners who were working in the public hospitals had less likely to affect good safety precaution practice as compared to permanent workers, which was 93.5% and the workers who employed by the hospital itself indicated that 73.6% less likely to have good safety precaution practice as compared to workers employed by the agency. Work experience of the study participants were also one of the significant factor for safety precaution practices that cleaners who had an experience less than 3 years less likely to have good practice as compared to cleaners who had an experience of 3 years and more, which was 76.5%.

Training and supportive supervision were the associated factors for safety precaution practices that study participants who got health and safety training 2.73 times [AOR= 2.73, 95% CI: 1.14-6.56] more likely to have good safety precaution practices as compared to who did not got, and who got health and safety supportive supervision 4.59 times [AOR= 4.59, 95% CI: 1.51-14.00] more likely to have good safety precaution practices as compared to who did not got it. Cleaners who had inadequate knowledge were 78.1% [AOR= 0.22, 95% CI: 0.10-0.46] less likely to have good safety precaution practices as compared to who had adequate knowledge score. Therefore, strengthening training or capacity building and supportive supervision for the cleaners on the areas of health and safety precaution should be continuously done to halt the problem of poor safety precaution practices among cleaners in the hospitals.

Work rotation was the significantly associated factor for safety precaution practices that study participants who were work by rotation in different units of the hospitals were 3.23 [AOR= 3.23, 95% CI: 1.20-8.69] times more to have good safety precaution practices as compared to who did not have work rotation. Then, conducting the work rotation in different units of the hospitals for all cleaners should be strengthened that the cleaners may have different exposure and got experience from health professionals in the working units. Availability of soap or hand rub alcohol was the associated factor for safety precaution practices that study participants who were know the availability of soap or hand rub alcohol in the hospital were 3.77 [AOR= 3.77, 95% CI: 1.71-8.28] times more to have good safety precaution practices as compared to who did not know the availability. Therefore, awareness creation for cleaners on the presence of the safety commodities is very important.

IV. CONCLUSIONS

Working in hospitals are risky place as compared to working in offices, schools and other institutions due to many patients with different disease types and other clients daily go to hospitals for services, and also bio-medical wastes are generated from hospitals. Good safety precaution practice by cleaners at workplace is crucial to prevent them and others from communicable diseases, injuries, morbidity, mortality, and disability. In this study, good safety precaution practice was found low among the public hospital cleaners in Addis Ababa. Knowledge status, employment condition, employee organization, work experience, health and safety training, supportive supervision, work rotation in different units of the hospital, and also knowing the availability of soap or hand rub alcohol were influencing factors for cleaners' level of safety precaution practices. Then, gap filling on identified factors can bring good safety precaution practices and safe cleaners' health, which in turn reduce absenteeism.

As there is no published data on safety precaution practices and associated factors among cleaners working in public hospitals in Ethiopia, the result of this study could pave way for further scientific studies in the area.

V. RECOMMENDATIONS

The public hospitals should give special emphasis for cleaners working in to improve their safety through;

- Avail adequate personal protective equipments and other safety commodities for cleaners.
- Program based training and awareness creation for the cleaners should be strengthened.
- Program based internal supportive supervision for the cleaners should be strengthened.
- There should be follow up of the cleaners to use the safety wear while performing their duties on daily basis.
- Work rotation in different units of the hospital should be strengthened.
- Cleaners also should apply safety precaution standards for their health and well-being.

The Federal Ministry of Health and Addis Ababa City Administration Health Bureau should work on promoting and supporting the implementation of safety precaution standards in the hospitals by;

- Providing health and safety training for the hospital cleaners.
- Conducting health and safety supportive supervision in hospitals should be strengthened.

Ethics approval and consent to participate

Before starting the data collection process, ethical clearance was obtained from the Ethical Review Board of Saint Paul's Hospital Millennium Medical College, and Addis Ababa Public Health Research and Emergency Management Directorate. Administrative permission was obtained from each selected public hospitals and also verbal consent was obtained from each study participants prior to data collection. Finally, data were collected anonymously.

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