Research Article

Getachew Dagnew Gebreeyessus*

Knowledge, attitude, and practices on occupational health and safety principles among cleaners: the case of Tikur Anbassa Specialized Referral Hospital, Addis Ababa, Ethiopia

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Abstract: This study was conducted to determine the occupational risks of cleaners of healthcare institutions like Tikur Anbassa Specialized Referral Hospital, Addis Ababa, Ethiopia. A cross-sectional study was conducted to assess the knowledge, attitude and practice of cleaners focusing on occupational health and safety issues, including biological and chemical risks. Interview data were collected using a structured questionnaire that involved all the cleaners. Additionally, focus group discussions and use of observational checklists were applied to capture both administrative and the actual waste management aspects. The result of the study showed that all cleaners had a favorable attitude towards safety principles. However, the knowledge of cleaners on occupational safety was so poor to the level that all of them did not even know the meaning of nosocomial infection. Almost all of the cleaners, 69 (98.6%), had not taken any preemployment training by the time of the interview. All of the cleaners' practices were not fully compliant with the universal precaution principles and the major proportion, 37 (53%), of them had instances of needlestick injuries ranging from one to four times. Furthermore, the wastes in the hospital were located indiscriminately and with an uncovered container. Though cleaners had a desirable attitude, the status of occupational safety awareness and practice were not to the expected level that it should be. This institution, and similar institutions, should give emphasis to occupational safety issues with healthcare waste management. Awareness training has to be given before employment as well as refreshment trainings after engagement.

Keywords: Attitude, cleaners, needlestick injury, nosocomial infection, practice

1 Introduction

The basic concepts of sanitation and hygiene in a hospital are no different from those related to hotels, schools, and food establishments since certain areas of the hospital render the same basic service. The major difference is in the greater degree to which cleanliness and sterilization are practiced. Hospital staff who are in charge of cleaning, disinfection and waste management are at the highest risk of contracting nosocomial infections [1]. A study by the United Kingdom (UK) Water Engineering, and Development Center identified that cleaners are the highest risk labor groups and may have no alternative way to get waged. Cleaners working there are exposed to occupational health risks, which include the risk of being infected by Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) [2]. In addition to infections, occupational risks of hospital cleaners include biological, physical, ergonomic, chemical, and psychosocial risks; the biological risks are emphasized in this work [3].

Throughout the world every year, an estimated 12,000 million injections are administered and not all needles and syringes are properly disposed of, generating a considerable risk for injury and infection and opportunities for re-use [4]. Epidemiological studies indicate that a person who experiences a single needlestick injury from

***Corresponding author: Getachew Dagnew Gebreeyessus,**
Department of Urban Environmental Management, Kotebe University of Education, P.O. Box 31248, Addis Ababa, Ethiopia
Africa Center of Excellence for Water Management, Addis Ababa University, Addis Ababa, Ethiopia
Email: getachewdagn@yahoo.com
ORCID: https://orcid.org/0000-0001-5171-0465

a needle used on an infected source patient has risks of 30%, 1.8%, and 0.3% respectively to become infected with HBV, HCV, and HIV, for which precautionary measures are needed [5]. For instance, South African studies confirmed an international finding of biological, physical, chemical, ergonomic, psychosocial and trauma hazards in health service settings [4]. Nosocomial infections are responsible for about 20,000 deaths per year in the United States of America (USA), and approximately 10% of American hospital patients acquire a clinically significant nosocomial infection (about 2 million per year) [6].

The cleaners are at immediate risk of needlestick injuries and other exposure to toxic or infections materials [7]. Proper handling segregation, packaging, marking, storage, transport, treatment, and disposal of all hospital wastes are necessary to minimize the potential risk to the patient, healthcare workers, visitor, refuse handlers and community [8].

The successful implementation of safety guidelines for medical wastes depends on the knowledge, attitude and practice (KAP) of both medical staff and cleaners. However, studies reported gaps in KAP towards healthcare waste (HCW) management or handling even by medical staff [9]. Even though the supply of safety materials is limited in the context of developing countries, awareness in terms of KAP is lacking to the level that some cleaners do not receive training and are in poor observance of safety guidelines [10-13]. For countries like Ethiopia, the gaps in increasing occupational health problems are still unidentified [14].

In this regard, there are Occupational Health and Safety (OHS) rules and guidelines in many countries of the world including Ethiopia. Despite the few safety practices implemented by the private health facilities in Ethiopia, there are little or no OHS procedures and rules. There is no organized surveillance or infection control in hospitals, like other least developed nations [7].

In Ethiopia, the occupational problem of healthcare workers including cleaners is not sufficiently assessed, nor it is properly recorded. Cleaners, who are at the forefront of risk are even less aware of the problem. They receive no safety-related training for healthcare wastes, and workers' KAP is not assessed well; cleaners are perhaps the most neglected personnel in health service settings. Though there are more than 5700 public and private healthcare facilities of different levels in Addis Ababa town, it has no structured healthcare waste management policy. Neither does it have any prevention plan or surveillance and recording system on OHS risks. However, there are some guidelines developed by the Ministry of Labor and Social Affairs of the country, which have been documented since 2004. In fact, there appeared to be a pilot project by the Military International HIV Training Program, majoring on offering safety training that included the control of nosocomial and other infection control. It has been introduced on Armed Forces General Hospital (TORHYLOCH) and Bella Defense Referral Hospital (BELLA), both located in Addis Ababa in collaboration with the National Defense Forces Ministry of Ethiopia.

In order to minimize the risk of nosocomial infections and other OHS issues, the KAP of healthcare workers in general, and the cleaners in particular, is very important. Therefore, this study is conducted to determine the KAP of cleaners in Tikur Anbassa Specialized Referral Hospital (TASRH), which is located in Addis Ababa city, the capital of Ethiopia.

2 Methods and materials

2.1 Study design and area

A cross-sectional study design was applied to assess KAP of TASRH cleaners on occupational health and safety principles. Cleaners who served in TASRH for one year and above were included in this study. Cleaners who served in TASRH for less than a year were excluded in this study, as those cleaners were on a probation period.

2.2 Source population

All cleaners working in TASRH.

2.3 Study population

Those TASRH cleaners who were available during the study period and the relevant administrative people for the focus group discussions. All the cleaners and focus group discussion participants involved in the study gave responses voluntarily.

2.4 Variables

The main variables which were used in the study according to the set objectives were grouped as:

a. Independent variables
The independent variables include the cleaners' years of service, age of cleaners, sex, marital status, religion, income, and educational status.

b. Dependent variables
The dependent variables are the knowledge, attitude and practices of cleaners towards HCW handling.

Sampling technique: convenient sampling was used to collect the data.

Sample size: A total population sampling technique was applied to include all 70 active cleaners in TASRH.

2.5 Data collection and quality

Data collectors were students who had completed high school and who already took two days training, which was followed by close supervision and pilot testing. Data was collected using a pre-tested questionnaire, checklists were applied for HCW management assessment, and focus group discussions were also conducted using supportive points [15-17].

The questionnaires were tested by collecting data on 5% of the study samples or on a group of subjects with similar characteristics to account for the possible vagueness of questions, for issues with logical order and findings, time matters and uniformity among data collectors, etc., in order to evaluate the quality of the instrument. Based on the pre-test result, the study tool was rearranged and discussion was made with data collectors to reach the necessary agreements on meticulous data collection. English language is used to collect data. The data collectors asked and elaborated on the interview questions using the national language—Amharic. A similar language approach was used during focus group discussion [17].

2.6 Data analysis and operationalization

The data collected was analyzed using frequency tables, bar charts, and cross-tabulations using SPSS software. Based on the interpreted results, relations between variables and their meaning was conveyed with the use of cross bars; from the questionnaire administered, there are 14 knowledge questions presented to respondents as per the study objectives. Responses were evaluated as correct or incorrect by the investigator, based on documented facts, global principles of OHS and recommended acts formulated by authorized bodies. The knowledge level was scored separately for each question in the manner shown below:

Score 1: knowledgeable with regard to the specific question raised.

Score 0: does not have knowledge with regard to the specific question raised.

Similarly, there were 10 attitude questions pertaining to the objectives of the study. These were evaluated so that score 1 was given for conformed/ agreed/ positive/favorable responses considered by the investigator and score 0 for the other extreme. Eventually the percentage of the scores were categorized using the following categories:
- 0-49% — as unfavorable attitude;
- 50 %-75% — as moderate attitude;
- 76 %-100% — as favorable attitude

By the same way, the practice questions were analyzed based on read literature, rules or recommendations written for workers, OHS and some other principles found from published books and guidelines. Therefore, all 16 practice questions were rated using percentages and are accordingly discussed.
- Answering positive for 0-49% — is at serious risk.
- Answering positive for 50-75% — are engaged in risky practices.
- Answering positive for 76-95% —still unsafe.
- Answering positive for 96-100% — relatively safe.

Additionally, the checklist and the focus group discussion results were technically interpreted and discussed in comparison to other published findings. Chi square (x^2) tests were used to determine the significance of the associations among study variables and compare the difference between variables according to the objectives targeted. The level of significance (α) in this study was determined to be 10% (α = 0.1) [18-20].

3 Results

3.1 Socio-demographic characteristics of study subjects

Regarding demography, it was found that the cleaners' ages ranged between 21–60 years, with a mean value of 39 (SD =10). The majority of the respondents were females, which is 61 of the 70 participants (87%). For religion, Christianity accounted for 66 of them (94%),; for marital status, 35 out of 70 (51%) were married; 47 (67%) had not

completed a 10th grade education (at the time of data collection, a 10th grade education refers to the completion of high school studies in the country). Most of them, 37 of the 70 subjects (53%), had served TASRH for over 12 years in the same occupation. 66 (94%) of the respondents earned within 80 US dollars per month of wages based on the exchange rate at the time of data collection (Table 1, Fig .1).

The KAP of the cleaners is expected to be based on their educational status. Since most of them (67%) had not completed 10th grade and considerable number of them (10%) were illiterate, it is obvious that those cleaners would possibly miss the desirable knowledge level regarding occupational safety (**Fig. 1**). Indeed, over 4% of the study subjects had accomplished study above 10th grade, and hence working in a team would help cleaners share their experiences among themselves as peer learning. This educational status would be due cleaners who were living in the capital of the country, where the best access to education and other services are offered.

Table 1: The socio-economic characteristics of cleaners at Tikur Anbassa Specialized Referral Hospital

Demographic characteristics	Frequency	Percentage
Sex:		
Male	9	12.9
Female	61	87.1
Religion:		
Orthodox Christian	66	94.3
Protestant	3	43
Muslim	1	14
Marital status:		
Married	35	50.7
Unmarried	15	21.7
Others	20	28.6
Service in years:		
1-12	33	47.1
>12	37	52.9
Monthly income:		
≈40 US dollars - 80 US dollars	4	5.7
>80 US dollars	66	94.3
Age: 21- 60	70	100

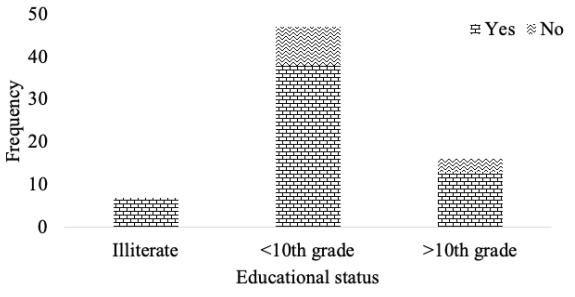

Figure 1: Responses of interviewees at risk of hepatitis, with respect to their educational status, Tikur Anbassa Specialized Referral Hospital, Addis Ababa, Ethiopia.

3.2 Attitude, knowledge and practice study results

The attitude questions were answered fully by all the study subjects. Considerable deviation has been noted from the favorable attitude. Such departures include the 12 (17%) and 13 (19%) respondents respectively, who said "no" when asked if they agree that the chance of being infected with hepatitis virus in their workplace is real, and whether blood and blood-contaminated wastes can transmit hepatitis (Table 2).

Though respondents who are illiterate seem to perceive their work place as totally risky, perhaps without understanding the level and kind of risk involved, a favorable attitude was viewed to correlate significantly with educational status on a 90% confidence level (Table 3). Among the nine attitude questions, the lowest score was 8 (80%) and highest was 10 (100%). 54 (77%) respondents scored the maximum (100%), while the remaining scored between 80% and 100%.

Amongst the knowledge questions regarding OHS, the least score was 2 (17%) and the highest was 10 (83%). While 15 (21%) respondents scored below 50%, 43 (61%) scored between 49% and 75%. The other 12 (17%) scored between 75% and 84%. A considerable proportion of the respondents were found to be unaware of risks for some of the knowledge questions, mainly regarding radioactive waste and nosocomial infection (Table 4 and 5).

The choices given related to health were presented with knowledge questions to interviewed cleaners; a major proportion of them were not knowledgeable. For example, 54 (77%) and 63 (90%) of the cleaners did not answer the questions regarding nosocomial infection and the identification of the healthcare waste. Almost all of the cleaners used gloves as their only personal protective equipment (PPE), and 13 (18%) of them did not even know that they are exposed to hepatitis infection in their work place. Furthermore, it was observed that 14 (20%) of the respondents did not know the health risks of eating in the hospital corridors (Table 6).

Regarding the practice questions, all respondents practiced hand washing after work and 65 (92.9%) of

Table 2: Frequency table showing the responses to attitude questions

Attitude questions	Yes, or agree		No or disagree	
	Frequency	Percent	Frequency	Percent
Is your job highly risky?	70	100	0	0
Needlestick injury is one of your occupational risks?	70	100	0	0
Hospital wastes are more dangerous than municipal wastes?	70	100	0	0
Gloves are important while cleaning	69	98.6	1	1.4
Washing of hand after work is important	70	100		
You have a chance of being infected with hepatitis viruses	58	82.9	12	17.1
There is relation between hospital wastes and HIV	70	100	0	0
Blood and blood wastes transmit hepatitis	57	81.4	13	18.6
Do you agree that inconsistent use of duty gloves gives no guarantee	69	98.6	1	1.4

Table 3: Respondents' belief towards chance of hepatitis infection versus educational status

Hepatitis Risk	Educational status				Chi-Square test
	>/= 10th grade	< 10th grade	Illiterate	Total	
Yes	13	38	7	58	Df = 2
No	3	9	0	12	P < 0.6
Total	16	47	7	70	$X^2 = 1.6$

Table 4: Cross-tabulation of knowledge towards the risks of eating in the working area against educational status

Eating while working is risky	Educational status				Chi-Square test
	>/= 10th grade	< 10th grade	Illiterate	Total	
Yes	14	36	6	56	Df = 2
No	2	11	1	14	P = 0.7
Total	16	47	7	70	$X^2 = 1.3$

Table 5: Response versus frequency on knowledge questions by the cleaners

Knowledge questions	Response			
	Yes		No	
	Frequency	Percent	Frequency	Percent
Do you know what nosocomial infection mean?	55	78.6	15	21.4
Do you know eating while working is highly risky in the hospital?	56	80	14	20
Do you know that pathogenic wastes have to be disinfected onsite?	61	87.1	9	12.9
Do you know your rights to safety?	56	80	14	20
Do you know whom or where to claim your safety rights?	54	77.1	8	11.4
Do you know risks from the combustion of polyvinyl chlorides?	56	80	14	20
Do you know the risks from radioactive wastes?	44	62.9	26	37.1

the 70 cleaners used gloves as their only PPE. Though more than half of the respondents had served for over 12 years and all answered 'yes' to the question on whether they use PPE or not, 91.4% of respondents did not take any kind of occupation-related training ever since they were employed. Further, some practice questions, which include the separation of healthcare wastes before collection and use of separate and marked bags to transport contaminated linen, were answered negatively.

98.6% of cleaners did not use materials like forceps while handling sharp items, and 58 (82.9%) respondents replied 'no' regarding the question on the use of puncture-proof containers for collecting sharp items. Consequently, more than half, 37 (52.9%), of the respondents had experienced a needlestick injury. These 37 respond-

Table 6: Cleaners' responses to choose questions related to knowledge, by percentage and frequency

Types of knowledge questions	Frequency	Percentage
State what hospital acquired infection is:		
Well Stated	1	1.4
Fairly stated	29	41.4
Not well stated	25	35.7
Not able to state	15	21.4
Which of the following are solid wastes?		
Piece of clothes and metals	12	17.1
Leftover food, plants leave, paper, fruit products	-	-
Used gauze and cotton	-	-
Papers and dusts only	33	47.1
Used gauze and cotton, left over foods, paper	1	1.4
Used gauze and cotton, left over foods, paper, pieces of clothes and metal	21	30
All the above	3	4.3
Which one is disease causing?		
Used needles and syringes	1	1.4
Soiled gauze, cotton, needles, syringes	4	5.7
Pieces of cloth and metal, used syringes and needles, soiled gauze and cotton	64	91.9
Regular use of apron	1	1.4
How could you protect yourself from contaminations arising during cleaning?		
Using gloves and outer garments	1	1.4
Using masks, apron, glove and boot	1	1.4
Using gloves only	68	97.1
Which diseases you are liable to due to occupation?		
Tuberculosis (TB)	2	2.9
HIV	5	7.1
Hepatitis	1	1.4
Tuberculosis and HIV	13	18.6
TB, HIV, and Hepatitis	40	57.1
Leprosy, TB, HIV, and hepatitis	4	5.7

ents reported an incident rate ranging one to more than four times; on average, each of them experienced more than two incidences, with a modal value of one exposure in the years preceding the study (Fig.2, Tables 7, 8 and 9).

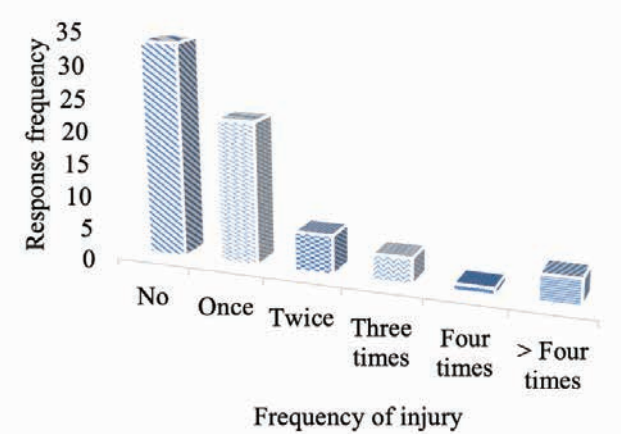

Figure 2: Response of the study subjects to needlestick injury experience at Tikur Anbassa Specialized Referral Hospital, Addis Ababa, Ethiopia.

Among cleaners who had experienced needlestick injuries, 31% had been injured once, 9% twice, and 6% more than four times. Almost all of the respondents showed that they practice proper hand washing and use of duty gloves (99%) as safe practice. The respondents were rated for the 12 practice questions, and the scores were as follows: 4 respondents scored a total of 4 out of the 12 questions, 11 respondents scored 3, 50 respondents scored 2, and 5 respondents only scored 1 (Table 8).

The needlestick injury experiences of the cleaners was cross-tabulated with their educational status (Table 9). Though the result did not show a strong relation, most of the victims appear to have less than a 10th grade educational level. Obviously, educational status alone cannot measure the problem. Therefore, the issue lies with the proper delivery of occupational awareness training, which perhaps will identify their level of safety experi-

Table 7: Summary showing response rate of cleaners to practice questions

Practice questions	Yes		No	
	Frequency	Percent	Frequency	Percent
Do you wash hands after work?	70	100		
Do you separately handle and collect solid wastes?			70	180
Do you use puncture proof closed containers for sharps?	12	17.1	58	82.9
Do you use separate and marked bags to transport contaminated linen?			70	100
Do you disinfect apron and reusable gloves before reuses?	8	11.4	62	88.6
Do you handle contaminated linens with gloves?	61	87.1	9	12.9
Do you use personal protective equipment?	70	100		
Did you take any occupational preemployment training?	6	8.6	64	91.4
Had you been injured of needles?	37	52.9	33	42

Table 8: Summary showing response rate of cleaners to choose questions related to practices

Practice questions	Frequency	Percentage
How many times are those injured- with needlestick?		
Once	22	31.4
Twice	6	8.6
Three times	4	5.7
Four times	1	1.4
>four times	4	5.7
How do you handle blood- contaminated wastes?		
Using gloves	69	98.6
Bare hands	1	1.4
Which type of PPE you use during work?		
Gloves	65	92.9
Aprons	1	1.4
Gloves and aprons	4	5.7

Table 9: Cross-tabulation of needlestick injury experiences in relation to educational status

Needlestick injury experiences	Educational status				Chi-Square test
	>/= 10th grade	< 10th grade	Illiterate	Total	
Yes	6	28	3	37	Df = 2
No	10	19	4	33	P < 0.5
Total	16	47	7	70	$X^2 = 2.7$

ence. Indeed, the better their educational status is, the more they will benefit from the trainings.

3.3 Observation and focus group discussion study results

The result of the study, which was collected using observation checklists, revealed that cleaners did not use disinfectants like alcohol, detergent, or other dilute chlorine solutions during cleaning. On the contrary, blood prints were observed in place like the hospital laundry. Sharp wastes like needles were collected in the same basket with other solid healthcare wastes. Cleaners were also observed eating in the workplace, especially laundry workers. Most cleaners have common cloakrooms, which are located around the wards.

The heterogeneous wastes, including pathological wastes, are collected in the same lidless trough, which is carried on a vehicle for disposal where it is disposed together with municipal wastes. Further, the wastes were seen spilled around the collection trough in the hospital

compound in addition to being exposed to scavengers. Moreover, there was no functional incinerator nor a placenta pit to dispose of pathological wastes within the compound.

The focus group discussions were made with the coordinator of the cleaners and the office holders of the Administration and Finance Department of TASRH. As discussed, the cleaners were provided only with reusable gloves, cotton aprons, soap, and soft paper. Cleaners were assigned to working in departments based on their will and not based on their KAP levels. Working site moves may be made if there would be complaints by the cleaners. The coordinators of the cleaners are not technical people in themselves, and are less likely to understand the OHS-related issues of cleaners. The sanitarian, who is in charge of caring for environmental health activities of the hospital, was found to have insufficient power to manage the situation. However, TASRH has lately established an infection control committee led by a physician to look after infection matters.

4 Discussion

In spite of their favorable attitude, the cleaners' knowledge and practice are undesirable. This particular truth is not only a national issue, as most developing nations share the same concern. The problem is partly due to short supply of safety equipment. In addition, knowledge based on proper training is lacking, and poor adherence to guidelines were also observable [10, 20]. As a matter of fact, among the 70 cleaners interviewed, none of them took pre-employment training related to OHS matters. On the contrary, literature emphasizes that hospital cleaning personnel should be informed about the potential risk posed due to infectious waste handling, and cleaners should be trained in safe handling procedures. Moreover, pre-employment and in-service trainings are reported to have significant impact on the workers' OHS conditions [21, 22].

Based on the personnel health guideline outlined by the USA Communicable Diseases Control Center (CDC), personnel health and safety education are highly recommended among other elements of a personal health service and infection control. Directly opposing the finding of the current study, the same document states that personnel are more likely to comply with an infection program if they understand its rationale. Thus, personnel education or training is a fundamental elements of an effective infection control program. In this regard, clearly written policies, guidelines, and procedures that ensure uniformity, efficiency, and effective coordination of activities are key. However, because of differences in the level of risk of infection, infection control education can be modified accordingly [23].

Thus, some personnel may need specialized education on infection risks related to their employment and on preventive measures that will reduce the risks. Furthermore, educational materials need to be appropriate in content and in vocabulary to the educational level, literacy, and language of the employees. The training should also comply with existing federal, state, and local regulations for employee education and training. Consequently, all healthcare personnel need to be educated about their organization's infection control policies and procedures [23].

The finding of the current study also revealed that almost all respondents had good attitude towards OHS, which is similar to a recent study conducted in Cameroon [10]. However, there were respondents who do not think that they may catch HBV and HCV, as opposed to the risks of HIV infection. For instance, when cleaners were asked if they believe that they would have a chance of being infected with hepatitis B and C in the working environment, the respondents' answers showed no association with their educational status ($p > 0.4$, DF=3); this may be due to sample size and response bias. Unfortunately, the chance of getting infected by HIV was far lower than HBV and HCV, which are 0.3%, 23-37%, and 0-7% respectively [24]. Nevertheless, a study found out that workers' safety-focused emotional and cognitive engagement are crucial to minimize accidents in general [25].

The responses to the attitude questions of this study were encouraging when compared to the result of a KAP study on Nigerian surgery trainees, which showed poor perception of respondents to risks posed by exposure to patients with HIV. However, the same former study of Nigerian healthcare workers suggested that there is a positive association between risk perception and utilization of universal precaution measures [26].

The knowledge assessment revealed that there was an apparent gap among cleaners. One reason for that would be related to the fact that recently recruited cleaners have a better educational status. For example, more than 33 (47%) respondents did not know what solid waste or healthcare waste is, and they think that solid waste is limited to dry paper and dust. Moreover, only one respondent was relatively good at stating what nosocomial infection means, unlike all other respondents; this implies that almost all are not informed about it. Therefore, cleaners may not have given attention to potentially contaminated

patient articles to avoid contamination and possible nosocomial infection. While cleaning the medical wards, carrying patient articles and transporting them to the laundry, they had unsafe practices, including the act of protecting themselves from infection using PPEs, and the application of the principles of universal protection as advised by the WHO and CDC of the USA [27, 28].

Furthermore, the cleaners' knowledge regarding the risk of eating in the working area was quite poor; 14 (20%) respondents did not know that eating in the working area is risky. In fact, the cross-tabulation of this specific question with their educational status showed no association, this may be due to the size of the sample as well as response bias. Similarly, there was no positive response regarding the risks from radioactive wastes. These and other evidence for the lack of the necessary awareness for the cleaners underscores the necessity to start pre-employment training. A related study conducted in India reported issues with workers' perception and the prevalence of work-related hazards, including eating in the workplace [29].

The lack of awareness on OHS was also evidenced by the cleaners' negative responses to questions of practice, which include whether they separately handle solid wastes or not. Moreover, this may go together with the response to practice questions on whether they disinfect reusable PPEs like aprons and gloves before reuse, which were answered negatively by 62 (88.6%) of the cleaners. This apparently contradicts the principle of standard precaution, which is a practice required for the basic level of infection control, including decontaminating surfaces and equipment with an appropriate disinfectant after every use [30].

The result of this study showed that 14 (20%) interviewees did not even know their rights to safety in their work place, as described in a document adopted by the Ministry of Labor and Social Affairs of Ethiopia. This may be related to the fact that they may not have information, and also indicates the absence of a technical person supervising them who is qualified on OHS. In this study, all the cleaners practiced hand washing and wearing of gloves, except in some instances observed during the study period, which may be due to ignorance and the unfavorable perceived risk emanating in their working environment by some cleaners. Notable, the use of gloves and hand washing alone does not guarantee safety [28, 31].

Nevertheless, no cleaner was seen wearing protective equipment like masks, capes, plastic aprons, and boots as recommended by the WHO, in contrast to reports about the use of protective clothing for healthcare waste transportation even in small hospitals in Thailand. Indeed, the provision of equipment and clothing for personal protection is among the most essential OHS measures[31]. Thus, as discussed with focus groups, the problem may be due to the absence or lack of PPE provisions by the employer during that time. This particular finding coincides with a study conducted on Nigerian surgery trainees, which found that most of them do not routinely use all the protective measures advocated for the reduction of transmission of blood-borne pathogens during surgery, with the majority ascribing this to unavailability [26].

In this study, 37 (53%) respondents replied "yes" to needlestick injury experiences. Among them, 22 experienced an injury once, 6 experienced injuries twice, 4 three times, 1 four times, and 4 more than four times, demonstrating that these cleaners experienced risky practices regarding HIV, HBV, and HCV infections [28, 32]. A related earlier study also reported that following needlestick injury, the transmission of HIV, HBV, and HCV occurred at a rate of 0.3%, 23-37%, and 0-7% respectively. In this regard, the WHO has estimated that each year, percutaneous injuries to healthcare workers account for 1,000 HIV infection, 66,000 HBV infections, and 16,000 HCV infections [33]. A study on the Nigerian surgery trainees regarding HIV infection showed that the risk of occupationally acquired blood-borne infection to healthcare workers rose beyond 0.3% to 0.4% following a single percutaneous exposure [26].

A related study on the cleaners in Jimma University's specialized hospital showed that 75% of the 40 cleaners interviewed experienced needlestick injury [34]. This finding is larger than the accidental needlestick injury experience of healthcare workers, which was 32% within a 12-month period in a preceding study [33]. The cross-tabulation of needlestick injuries with educational status of respondents in the study showed no association, ($p > 0.4$, $DF = 3$), which may be due to the sample size and the response bias; similar results were found for needlestick injury versus work experience. Therefore, in the holistic approach to reverse the occupational spread of such diseases, understanding the problem around medical practices that put the health workers, cleaners and the community at large at risk is a contemporary issue. In this regard, ensuring that healthcare workers are immune to vaccine-preventable diseases is an essential part of successful personnel health programs in healthcare facilities. In fact, the prevention of illness through comprehensive personnel immunization programs is far more cost-effective than case management and outbreak control [23].

The current study also revealed that the solid/healthcare waste management was rather poor. For instance,

57 (81%) respondents showed they do not use puncture-proof or closed containers for collection, transport and disposal of sharp healthcare items including needles. The wastes, after inappropriate collection, are transported to open containers until they are lifted onto the municipal truck for disposal; the wastes were not separated, and at the time of study there was not any kind of proper waste disposal system in the compound. Such practice clearly opposes the recommendations by WHO, hence healthcare workers including cleaners are put at risk [28].

Thus, this study demonstrated the need for policy debate regarding the risk of HIV, HBV and HCV, the provision of a minimum set of equipment to meet the requirements for universal precautions, rigorous training, and monitoring with punishments for non-use. The identification, management and compensation of healthcare workers with occupationally-acquired HIV, HBV, and HCV infections is necessary, as well as vaccine provisions for vaccine-preventable diseases, especially HBV [23, 26]. On the other hand, the waste collection system of the hospital demands due attention as it was observed to be improperly managed during the survey. To mention a few problems—there were poor collection, waste separation, transportation and disposal practices. Hence, cleaners faced health risks ranging from simple injuries that may cause HBV, HCV, and HIV infections, to other nosocomial infections including problems from hazardous healthcare wastes. Undoubtedly, improper management of healthcare wastes could cost even lives [35].

5 Limitation of the study

Even though the largest hospital was used in this case study, inclusion of other equivalent institutions through simple random sampling would have provided a better national representation. This may limit the generalizability of the current findings. Additionally, the occupational risks related to physical, chemical and psychosocial variables are not addressed significantly in this work, which may limit the holistic issues of occupational safety and health.

6 Conclusions

This study has revealed that the attitude of cleaners in the studied institution was favorable towards OHS (75% -100%). Conversely, the knowledge level of the cleaners was far behind that required for their safety. Thus, there is a need to give awareness-raising training regarding OHS for existing cleaners and pre-employment training would save much. On the other hand, all cleaners operated their work in risky condition or were unsafe; the applications of PPEs were quite low. Such unsafe practice could expose cleaners to nosocomial transmission of infective aerosols, blood-borne pathogens and other accidents. Evidently, a major proportion of them, 37 (53%), experienced different frequencies of needlestick injuries, showing that they were at risk of acquiring HBV, HCV, and HIV infections. Thus, an effective infection control committee in TASRH needs to be established. Furthermore, the healthcare waste management has to be reconsidered for proper collection, transport, storage and transport, as well as disposal. More importantly, there needs to be relevant operational manuals or guidelines based on proper policies for workers' safety.

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The author states no funding involved.

Conflicts of Interest

The author states no conflict of interest.

Informed consent

Informed consent has been obtained from all individuals included in this study. After greetings each respondent, the interviewee's permission was asked in the questionnaire to be administered. The response to the interviewees' privacy was kept confidential.

Ethical approval

The research related to human use has been complied with all the relevant national regulations, institutional policies and in accordance with the tenets of the Helsinki Declaration, and has been approved by the author's institutional review board or equivalent committee. Official

letter was received from the concerned institution, which states the purpose of the study.

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