

Research Article

Safety Practice and Associated Factors among Waste Handlers at Selected Government Hospitals in Somali Region, Eastern Ethiopia: A Hospital Based Cross-Sectional Study

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Abstract

Background: Healthcare waste is produced from various therapeutic procedures in hospitals, such as chemotherapy, dialysis, surgery, delivery, resection of gangrenous organs, autopsy, biopsy, and injections, and most of the wastes are toxic, harmful, carcinogenic, and infectious materials. Medical Waste handlers faced massive exposure to hazardous waste and occupational accidents as a result of manual handling of waste and working under unfavorable conditions. There are limited studies and updated information concerning these issues in the country.

Objective: To assess safety practice and associated factors among waste handlers at public hospitals in Somali Region, Ethiopia.

Method: An institutional-based cross-sectional study was carried out among 417 waste handlers in selected public hospitals from June 15 to July 15, 2021. Data were collected from respondents by using a simple random sampling technique. The collected data were entered into Epi-data 3.1 software and exported to SPSS 20 for analysis. Bi-variable analysis was done, and variables with p-values below 0.25 were identified as candidates for multi-variable analysis. Then multi-variable analysis was done, and an adjusted odd ration was computed and interpreted. A p-value less than 0.05 is the cut-off point for determining the significance of the association.

Result: The proportion of current safe practice among public hospital waste handlers was found to be 38.2% (95% CI: 33.2, 43.1). Good availability of safety materials (AOR=9.3; 95% CI: 5, 17.2), Good knowledge (AOR=7.2; 95% CI: 3.7, 14), a positive attitude (AOR: 5.4; 95% CI: 2.53, 11.47), and age group were significantly associated with safety practice.

Conclusion: The proportion of safe practices among hospital waste handlers was found to be low compared to national and international standards. Good knowledge, a positive attitude, a good supply of safety materials, and an age group are the determinants of safety practice. To provide good safety practice, adequate professional support and supervision should be in place to increase their knowledge about safety precautions, and similarly, providing enough safety materials is recommended to strengthen adherence to safety practice among hospital waste handlers.

Keywords: Safety Practice, Determinant Factors, Waste Handlers, Government hospitals, Somali Region, Ethiopia

Introduction

Workers and waste pickers handling solid waste throughout the world are exposed to occupational health and accident risks related to the content of the materials they are handling, emissions from those materials, and the equipment being used [1]. About 85% of wastes produced in health facilities are non-hazardous, and the remaining 15% of health care waste is characterized as hazardous and can pose a number of health risks [2,3]. Waste handlers are often at higher risk than health care professionals. Because healthcare professionals produce the waste and throw it in the garbage. However, waste handlers handle it extensively throughout, and mostly very little attention is

given to their safety [4]. Medical waste handlers are working in a very poor and unsafe working environment, and mostly they are victims of occupational health hazards from poor safety practices [5]. The prevalence of needle stick injuries, sharp injuries, and blood and body fluid splashes among hospital waste handlers is higher because of the lack of personal protective equipment while on duty and inappropriate waste segregation practices [6]. The occupational safety of health care waste handlers cannot be overlooked because health care waste handlers are at constant risk of exposure to blood-borne pathogens. In Ethiopia, we have a set of Standard Precautions for health safety practices that have been demonstrated to be effective in reducing the

occurrence of adverse healthcare events. Additionally, the set can help medical waste handlers and healthcare providers assess the degree to which safe practices have already been implemented in their settings and the degree to which the practices provide tangible evidence of the medical waste handler's safety improvement and increased patient satisfaction and loyalty [7].

Worldwide, information on the spread of infections resulting from waste handling is limited. Studies from developed countries have shown that occupational exposure to waste may result from exposure to various work hazards [8]. There are studies showing different health complaints, such as respiratory problems [9,10], increased risk of hepatitis A and B [11,12] and skin diseases [13], for people working in waste handling. In addition, self-reported risks, including musculoskeletal, fatigue, gastrointestinal, and hearing complaints, were also identified [14]. Professional-related risk assessment reports showed that waste collectors had the third highest needle stick injury rate (18.4 per 1000 per year) and the second highest other sharps injury rate (7.1 per 1000 per year) compared with healthcare workers [15]. One study showed that each year, waste collectors reported 50–100 puncture wounds as a result of collecting medical waste from private medical practitioners and from the disposal of needles by drug addicts [16]. Health care waste should be collected and transported in a safe way to avoid unnecessary exposure [17,18]. But about 58.8% and 41.2% of waste handlers were exposed to blood and body fluids due to carrying overfilled waste bags, which increase the risk of infection for different pathogens like HBV, HCV, and HIV/AIDS, and about 47% of medical waste handlers, had at least one accidental Sharp injury because of improperly discarded needles and sharp materials [19,20]. Unavailability or shortage of personal protective devices aggravates the risk of acquiring infection while exposed to hazardous wastes (5). Waste handlers usually do not wear sufficient protective clothing during waste handling, which increases the potential risk of accidents. Inappropriate collection, storage, processing, transport, and handling of the health care waste exposes the staff of the facility, patients, and their attendants to the risk of serious health hazards. Many healthcare facilities in developing countries dispose of their waste in dustbins along with general waste; some even re-use sharps and syringes, thereby increasing the risk of transmission of infections [21].

Even though the impact of healthcare waste on healthcare workers is well described globally [22], less attention is given to waste collectors, and countrywide official statistical data do not address the health and working conditions of waste handlers [23]. The study done in Eastern Ethiopia also showed that 30% of waste handlers were exposed to any sharp materials due to improper handling, poor waste segregation, and poor utilization of personal protective equipment (5). Waste handlers in Hawassa city in south Ethiopia have reported that they have experienced needle-stick injuries at least once in their lives at the different healthcare facilities, ranging from 25–100% [24,25]. Studies in developing countries, including Ethiopia, indicate that there are limitations on safe waste handling practices among health care waste handlers due to different factors. However, there are few studies conducted regarding the prevalence of safety practices among hospital waste handlers in Ethiopia, and less attention is given to the prevalence of safety practices and factors exposing waste handlers

to possible injuries and accidents. Hence, the intended study will determine the prevalence of safety practice and its associated factors among hospital medical waste handlers, which in turn will enable us to understand the overall situation of safety practice and minimize those factors that hinder the safety practice of hospital waste handlers.

Methods and Materials

Study Area and Period

The study was conducted in the Somali region, which is the second-largest and easternmost of the ten regions. The regional state borders the Ethiopian states of Afar and Oromia and the chartered city of Dire Dawa to the west, as well as Djibouti and Somalia to the south and north-east. Based on the 2007 census conducted by the central statistical agency of Ethiopia, the Somali region has a total population of 7,445, 2219, consisting of 3,472,490 men and 3,972,729 women. Urban inhabitants' number 1,489,044 or 20% of the population and a further 5,956,175 or 80% were pastoralists and farmers. This region has an estimated density of 20.9 people per square kilometer in an area of 279,252 square kilometers. The region is divided into six councils and 93 districts for administrative purposes. The Somali Regional Health Bureau is responsible for the overall Health activity in the region.

There are Ten Primary Hospitals, Two General hospitals, and One Referral Hospital in the Somali region, namely, Dagahbour Primary Hospital, Qabri Dahare Primary Hospital, Warder Primary Hospital, Filtu Primary Hospital, Dollo Ado Primary Hospital, Raso Primary Hospital, Hargelle, Sitti/Biki Primary Hospital, Gashamo Primary Hospital, Fik Primary Hospital, Karamara General Hospital, Godey General Hospital, and Jig-jiga University. Sheik Hassen Yabare Referral Hospital, respectively, and the major common services given by those general hospitals and referral hospitals are maternal and child health services, prevention and control of major communicable diseases, non-communicable disease prevention and control, emergency services, laboratory services, and operational services. Generally, in the Somali region, there were approximately 710 medical waste handlers working in government hospitals. In selected hospitals, there were around 458 medical waste handlers. The study was conducted from June 15 to July 15, 2021, at public hospitals in the Somali Region and Eastern Ethiopia.

Study Design

Hospital based cross-sectional study was employed.

Source Population

Source populations were waste handlers working in Somali region public hospitals.

Study Population

All selected waste handlers working in the selected public hospitals during study period.

Inclusion Criteria

All waste handlers were enrolled in the selected government hospitals, present on duty during data collection period.

Exclusion Criteria

Waste handlers who were absent during the time of data collection and those with hearing impairments.

Sample Size Determination

Sample Size Calculation for the 1st Objective

The sample size for the first objective had been determined using the single population proportion formula by considering the prevalence of safe practice as 44.1% [26,27] from a previously conducted study on safety practice among waste handlers in Adisababa city administration public hospitals in central Ethiopia. Hence, assuming a 5% marginal error (d), a 95% confidence level (alpha=0.05), and the sample size for the first objective, it can be calculated as follows:

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

n=required sample size

Z=the standard normal deviation at 95%confidence interval=1.96

P=expected proportion (44.1%)

d=margin of error that can be tolerated 5% (0.05)

1-p=proportion of population that do not possess the character of interest.

$$\text{Therefore } n = (1.96)^2 \cdot 0.441(1-0.559) = 379$$

$$(0.05)^2$$

=379 and by adding 10% non-response rate 417 was the sample size for the 1st objective.

Sample Size Calculation for the 2nd Objective

Sample size for specific objective 2 was calculated using the statcalc for sample size and power for cohort or cross-sectional studies of Epi Info version 7, considering the following assumptions (Table 1):

Therefore, from the calculated sample sizes for both objectives, the maximum sample size from the first objective, 417, was taken as the study sample since it covers the two objectives.

Sampling Technique

There are Ten Primary Hospitals, Two General hospitals, and One Referral Hospital in the Somali region; Three Primary Hospitals and One General Hospital were selected by lottery. Whereas the referral hospital was selected purposefully. Then the calculated sample size was proportionally allocated to each selected hospital based on the number of total medical waste handlers they had. To determine the total number of participants from each selected health facility, a computer-generated simple random sampling technique was used.

Sampling Procedure

Sampling procedure is shown in Figure 1.

Data Collection Tool and Procedure

The data was collected by the interviewer through a structured questionnaire. A structured questionnaire was developed by the principal investigator after reviewing WHO, FMOH infection prevention guidelines, and different literature with modifications based on research objectives. Prior to the actual data collection, the questionnaire was adjusted and corrected based on the pre-test result, and the final questionnaire was translated into Somali and then back to English to ensure its consistency. Finally, one environmental health scientist and two public health professionals conducted face-to-face interviews to collect the data using the Somali version questionnaire.

Variables

Dependent Variable

Safety practice (Safe/Unsafe)

Independent Variables

Socio-Demographic and Economic Factor

- sex
- Age
- Marital status
- Educational Status
- monthly income

Work Related Factors

- working hours per day,
- working departments/units,
- Work experience

Waste handlers risk perceptions

- Attitudes
- Knowledge about safety practice

Organizational factors

- Training,
- Supportive supervision,
- Availability of equipment'

Table 1: Sample size determination for second specific objective using some important factors of safety practice.

Factor	CI	Power (1-β)	Ratio	Proportion of outcome among exposed	Proportion of outcome among un-exposed	OR	Sample size(n)
Good Knowledge (27)	95%	80%	1	(Good) 53.3%	(Poor) 24%	3.57	100
Received Training (28)	95%	80%	1	(Trained) 73%	(Not trained)53%	2.39	202
(Yes) Availability of colour coded bin (29)	95%	80%	1	(Yes)74.2%	(No)31.1%	6.3	50

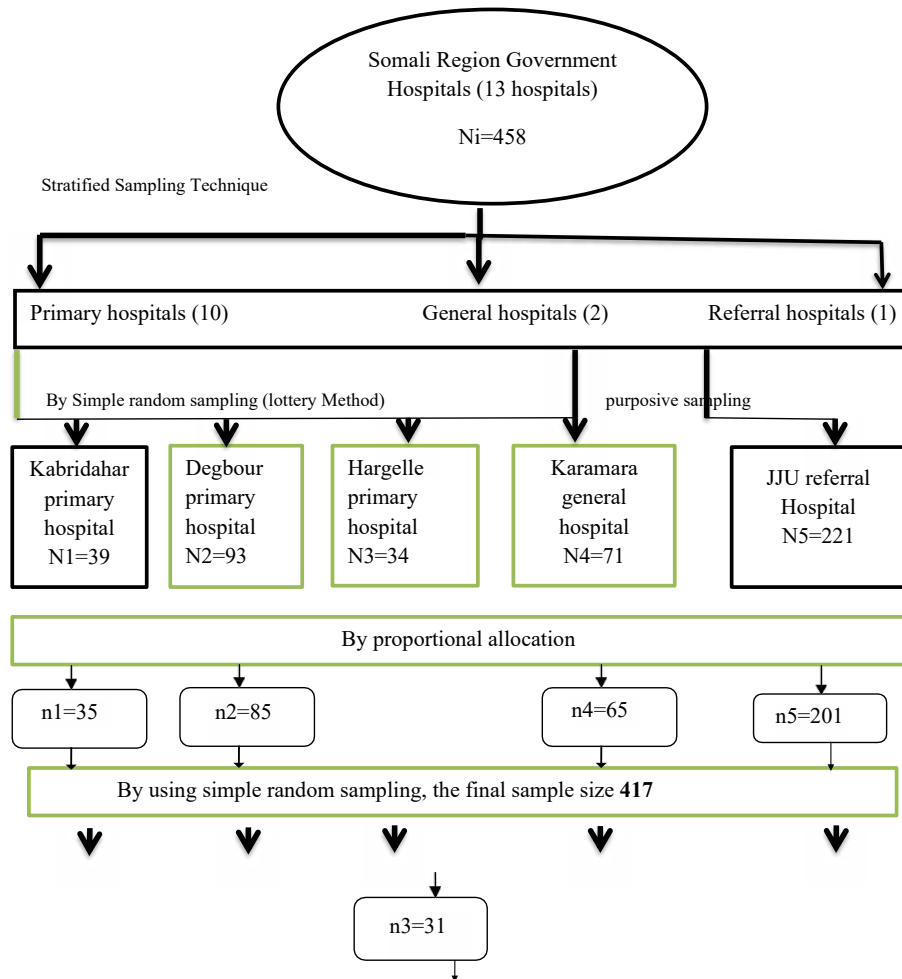


Figure 1: Schematic presentation of sampling procedure of waste handlers at selected government hospitals in Somali Region, Ethiopia 2021.

Data Quality Control

To maintain the quality of the data, adequate training was given to data collectors and supervisors for three days on the techniques of data collection. The questionnaire was pre-tested by taking 5% of the study sample at one of the selected hospitals. The collected data was checked for completeness and consistency. Each questionnaire was coded and cleaned. Then the coded and cleaned data was entered into Epi-data version 3.1 software.

Operational Definition

Safety practice is the practice of using personal protective equipment's such as (heavy duty glove, gown, boots and masks), hygiene, vaccination for HBV and appropriate waste segregation with separated bins to prevent oneself from disease causing microorganisms.

Waste handlers are cleaners that are involved in the handling of medical wastes.

Safe Practice

Respondents who scored more than mean of correct answer for seven practice questions with yes or no answer were classified as safe practiced [28].

Good Knowledge

Medical waste handlers who correctly responded 4 and above out of the 7 knowledge-based questions were considered as having good knowledge [30].

Good Attitude

Attitude questions responses were indicated with the three-point Likert type scale of measurement as "Disagree", "neutral", and "Agree" and numerical values of 1, 2 and 3 respectively were given. The mean score was determined after computing attitude assessing questions [26].

Good Supplies Availability

The presence of supplies like personal protective equipment's (heavy duty glove, gown, masks and boots), three colour coded bins and hand washing facilities like soap and anti-septic hand rub.

Trained

Waste handlers who got any types of training concerning safe waste handling.

Data Processing and Analysis

The completeness of the data was checked manually and coded accordingly. The coded and cleaned data was entered into the computer using EpiData version 3.1 and exported to SPSS version 20. After completion of data entry, it was cleaned before analysis. A description of frequency, mean, proportion, and SD was done for the first objective. Binary logistic regression was employed to identify factors associated with safety practices. Initially, bivariate analysis was done, and variables with a p-value below 0.25 were identified as candidates for multivariate analysis. Then multi-variable analysis was done, and an adjusted odd ration was computed and interpreted. A p-value less than 0.05 is the cut-off point for determining the significance of the association. The results of the study were presented in text, tables, and graphs. Multi-collinearity was checked by the variance inflation factor (VIF), and the goodness of model fit was checked by the Hosmer-Lemeshow test.

Ethical Consideration

An ethical clearance letter was acquired from the ethical review board of the College of Medicine and Health Sciences, Jigjiga University, and a permission letter was secured from the regional health bureau and delivered to the public hospital administrations. Written informed consent was secured from each participant. The confidentiality of the information and the privacy of the study participants were maintained. The participation was voluntary, and they had the right to withdraw from the interview if it was not comfortable for them.

Dissemination and Utilization of Finding

The findings will be disseminated to Jigjiga University, the School of Graduate Studies, the School of Public Health, the Department of Epidemiology, the Somali Regional Health Bureau, and those selected hospitals through presentations and printed materials.

Results

Socio-demographic Characteristics and Work Related Factors of Respondents

From the total sample of 417 included in the study. 401 waste handlers were interviewed, with a response rate of 96.2%. The mean age of the study participants was 32.1 (SD 6.1) years, and all respondents were females (100%). About 118 (29.4%) of them were in the age group 31–35 years. Married hospital waste handlers were 220 (54.9%), while 251 (66.1%) were illiterate. The majority of them, 255 (63.6%), had greater than 5 years of working experience, and 235 (58.6%) of them had an income level of 2000 birr per month. Two hundred eighty-four (70.8%) waste handlers were working their job in regular time (8 hours only). As compared with the other departments, the highest numbers of participants (133, 33.2%) and 69, 17.2%) were from the emergency and surgical wards, respectively (Table 2).

Proportion of Safety Practice

The proportion of safe practice in this study was found to be 153 (38.2%) with 95% CI: 33.2, 43.1) (Figure 2).

Table 2: Socio demographic characteristics and work related factors of medical waste handlers in selected public hospitals in Somali region, Eastern Ethiopia, August, 2021(N=401).

Sn	Variables	Category	Frequency	Percentage (%)
1	Age	≤25yrs	56	14%
		26-30yrs	107	26.7%
		31-35yrs	118	29.4%
		>35yrs	120	29.9%
2	Marital status	Married	265	66.1%
		Single	97	24.2%
		Widowed	17	4.2%
		Divorced	22	5.5%
3	Religion	Muslim	296	73.8%
		Orthodox	49	12.2%
		Protestant	24	6%
		Other	32	8%
4	Education level	Illiterate	251	62.6%
		Primary(1-8)	108	26.9%
		Secondary(9-12)	28	7%
		Diploma & above	14	3.5%
5	Service year	≤5yrs	146	36.4%
		>5yrs	255	63.6%
6	Monthly Income	≤2000ETB	235	58.6%
		>2000ETB	166	41.4%
7	Working hours per day	≤8hrs	284	70.8%
		>8hrs	117	29.2%
8	Working departments	Outpatient	50	12.5%
		Emergency	133	33.2%
		Laboratory	33	8.2%
		Surgical	69	17.2%
		Medical	33	8.2%
		Pediatric	46	11.5%
		Gyne & Obs	28	7%
		Other	9	2.2%

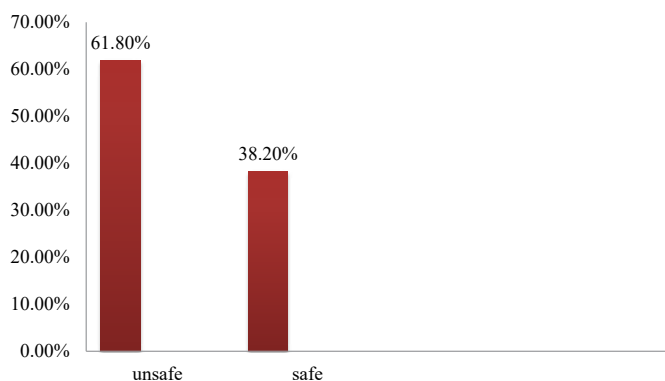


Figure 2: The prevalence of safety practice among medical waste handlers at selected government hospitals in, Somali Region, Eastern Ethiopia, August 2021. Safety Practice of health care waste handlers.

About 108 (25.9%) of them wore at least four and above four types of personal protective equipment during the handling of health care waste. where 44 (11% of them) washed their hands at all the selected critical times of hand washing. Two hundred (49.9%) of the waste handlers were immunized for HBV. Among the medical waste handlers who participated in the study, 63.6% separated hazardous and non-hazardous waste during the collection and transportation of hospital waste to the disposal site. Nearly 90% of them used a separated, color-coded bin system during collection. But 265 (66.1%) were mixing waste stored at separate bins during transportation of hospital waste to the disposal site. Only 112 (27.9%) of them asked for decontamination of hazardous waste before disposal.

Among the respondents, 384 (95.8%) had ever had a needle stick injury. 127 (30.1%) of the respondents reported that they use antiseptic hand rub after handling medical waste, and 397 (99%) of the respondents reported that they hadn't ever received post-exposure prophylaxis for HIV/AIDS. About 17 (4.2%) of the waste handlers had the intention to move medical waste using trolleys in the future.

Only 51 (12.7%) medical waste handlers of the study participants reported that they had been exposed to the blood or other body fluids of patients through contact; 383 (95.5%) of these waste handlers reported that they had ever faced a sharp injury in the last year. Finally, among all waste handlers asked, 153 (38.2%) of them were practicing safely, and the rest (248, 61.8%) were practicing unsafely (Table 3).

Knowledge of the Respondents Regarding Safety Practice

Concerning knowledge of the study participants 244(60.9%) of the respondents were having knowledge about safety practice (Figure 3).

Knowledge of the Respondents Regarding Safety Practice

Out of 401 respondents, seven knowledge questions with a yes or no answer were asked to assess their knowledge about safety practices. 289 (72.1%) of the respondents knew they were at risk of hospital-associated infections. Nearly 70% of them knew that washing hands with plain soap and water inhibits resident flora, and 68.2% of them knew that gloves should be used not only in anticipation of blood or body fluid exposure. The majority of the respondents (274, or 68.3%) knew being vaccinated for the HBV vaccine was a means of preventing infection. Nearly 60% of them had knowledge of post-exposure prophylaxis. Nearly 61% of study participants had good knowledge (Table 4).

Attitude of Health Care Waste Handlers about Safety Practice

A total of 401 respondents were asked five attitude questions with Likert-type scale options ranging from "disagree to agree to assess their attitude about safety practices. The majority of them, 195 (48.6%), agreed that washing hands with soap or alcohol-based antiseptics decreased the risk of transmission of hospital-acquired infections. Nearly 56.1% of them disagreed that gloves provide complete protection against acquiring or transmitting hospital-acquired infections, and 252 (62.8%) disagreed that hand washing is unnecessary when gloves are worn. About 245 (61.1%) of the study participants disagreed that frequent hand washing damages the skin and causes cracking, dryness, irritation, and dermatitis. A total of

knowledge about safety practice

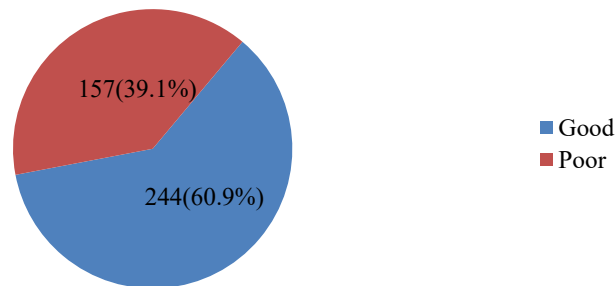


Figure 3: Proportion of knowledge on safety practice of the study participants at selected public hospitals in Somali region, eastern Ethiopia, August 2021.

Table 3: The prevalence of safety practice among waste handlers in selected public hospitals of Somali region, eastern Ethiopia, August 2021.

Sn	Safety practice	Category	Frequency	Percentage (%)
1	Wore at least four and above four types of personal protective equipment's	Yes	108	25.9%
		No	293	73.1%
2	Hand washing at five critical time	Yes	44	11%
		No	357	89%
3	Immunized for HBV	Yes	200	49.9%
		No	201	50.1%
4	use colour coded bine system	Yes	360	89.8%
		No	41	10.2%
5	separate hazardous and non-hazardous waste	Yes	255	63.6%
		No	146	36.4%
6	Ask decontamination of waste before disposal	Yes	112	27.9%
		No	289	72.1%
7	Mix waste stored in a separate bins during transportation	Yes	265	66.1%
		No	136	33.9%
8	Ever had needle stick injury	Yes	17	4.2%
		No	384	95.8%
9	Have you faced a sharp Injury in the last one year	Yes	18	4.5%
		No	383	95.5%
10	Have you ever exposed to blood or other body fluids of patients through contact	Yes	51	12.7%
		No	350	87.3%
11	Ever got post exposure prophylaxis for HIV/ADIS	Yes	4	1%
		No	397	99%
12	Move medical waste using trolley	Yes	17	4.2%
		No	384	95.8%
13	Do you use antiseptic hand rub	Yes	127	30.1%
		No	274	64.9%
	Safety practice	Safe practice	153	38.2%
		Unsafe practice	248	61.8%

235 (58.6%) of the study participants disagreed that hospital waste handlers have a very low risk of acquiring infection from improperly disposed hospital waste. More than 50% (209) of the study participants had a positive attitude towards. Safety practices (Table 5).

Table 4: Safety practice Knowledge related item responses of the study at selected public hospital waste handlers in Somali region, Ethiopia, August 2021.

Sn	Knowledge	Category	Frequency	Percentage (%)
1	Are hospital waste handlers are at risk of infections	Yes	289	72.1%
		No	112	27.9%
2	Washing hand with plain soap and water inhibit resident flora	Yes	277	69.1%
		No	124	30.9%
3	Gloves should be worn if blood or body fluid exposure is anticipated	Yes	276	68.2%
		No	125	31.8%
4	Washing your hands with soap and alcohol decrease transmission of infectious disease	Yes	284	70.8%
		No	117	29.2%
5	Immunized for HBV is a means of prevention from infections	Yes	274	68.3%
		No	127	31.7%
6	Getting PEP with in 72hr of exposure is a means of treatment	Yes	240	59.9%
		No	161	40.1%
7	Have you ever heard about safety practice	Yes	293	73.1%
		No	108	26.9%
	Knowledge about safety practice	Good	244	60.9%
		Poor	157	39.1%

Table 5: Attitude about safety practice of public hospital waste handlers in Somali region, Ethiopia, August 2021.

Sn	Attitude	Category	Frequency	Percentage (%)
1	Glove provides complete protection against acquiring / transmitting infections	Disagree	225	56.1%
		Neutral	46	11.5%
		Agree	130	32.4%
2	Washing hands with soap or alcohol based antiseptic decrease the risk of transmission of hospital acquired infections	Disagree	161	40.2%
		Neutral	45	11.2%
		Agree	195	48.6%
3	Hand washing is unnecessary when gloves are worn	Disagree	252	62.8%
		Neutral	22	5.5%
		Agree	127	31.7%
4	You have a very low risk of acquiring infection from improperly disposed hospital wastes	Disagree	235	58.6%
		Neutral	106	26.4%
		Agree	60	15%
5	Frequent hand washing damages skin and causes cracking, dryness, irritation and dermatitis	Disagree	245	61.1%
		Neutral	58	14.5%
		Agree	98	24.4%
	Attitude	Positive attitude	209	52.1%
		Negative attitude	192	47.9%

Organizational Factors Affecting Safety Practice of Hospital Waste Handlers

Out of 401 waste handlers interviewed, 185 (46.2%) had gained any type of training about safety practices, 177 (44.1%) were supervised regularly by the organization, and 39 (9.7%) had both training and regular supportive supervision (Figure 4).

Organizational Factors Affecting Safety Practice

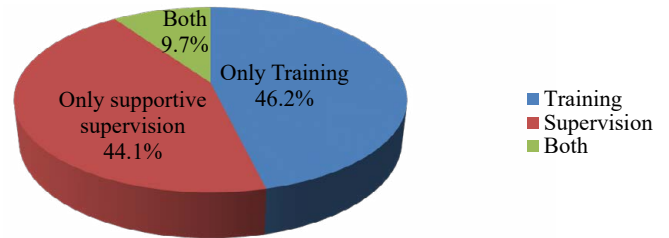


Figure 4: Organizational factors affecting safety practice of hospital waste handlers in Somali region, Eastern, Ethiopia, August 2021.

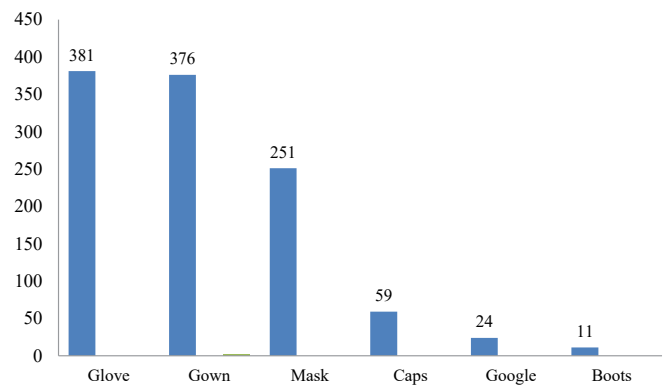


Figure 5: Availability of personal protective equipment's among waste handler in selected government hospitals in Somali region, Eastern, Ethiopia, August 2021.

Availability of Personal Protective Equipment's among Waste Handlers

A total of 401 respondents were interviewed to check the availability of personal protective equipment in the health facility. From the interviewed respondents, almost 251 (95%) of them responded that gloves were available, while 376 (93.8%) of them responded that gowns were available. Almost 62.6% of them also responded that masks were available. Nearly 14.7% of them answered that caps were available, and 24 (6%) of them responded that goggles were available at the facilities. A few respondents (2.5%) responded that boots were available at the hospitals during the data collection period (Figure 5).

Factors Associated with Safety Practice

Bivariate Analysis of Socio-demographic Factors Relating with Safety Practice

In this study, there is a significant association between respondent's age and safety practices. Waste handlers whose age is between 31 and 35 years were 78% times (COR=0.22, 95% CI=0.13, 0.379; P=0.0001) less likely to be safe practiced compared to waste handlers whose age is included in other age categories. Also, health care waste handlers whose age is between 26 and 30 were 87% times (COR=0.13, 95% CI=0.72, 0.24; P=0.0001) less likely to be safe practiced compared to waste handlers whose age is included in other age categories..

The service year also showed a significant association with safety practices. Waste handlers who have worked less than or equal to 5 years were 34% (COR=0.66, 95% CI 0.44, 0.998; P=0.049) times less

Table 6: Sociodemographic and work related factors associated with safety practice using bivariate logistic regression at public hospitals in Somali Region, Eastern Ethiopia, August 2021.

Variable	Category	Safety Practice		COR (95% CI)	P-value
		Safe	Unsafe		
Age In Years	≤25yrs	4	52	0.033(0.11-0.098)	0.0001*
	26-30yrs	25	82	0.131(0.72-0.237)	0.0001*
	31-35yrs	40	78	0.22(0.13-0.379)	0.0001*
	>35yrs	84	36	1.00	
Marital status	Married	102	163	0.52 (0.22-1.25)	0.145
	Single	32	65	0.41(0.16-1.1)	0.06
	Widowed	7	10	0.58(0.16-2.1)	0.41
	Divorced	12	10	1.00	
Education	Illiterate	84	167	1.84(0.5-6.79)	0.36
	Primary(1-8)	54	54	3.67(0.97-13.88)	0.056
	Secondary(9-12)	12	16	2.75(0.63-12.1)	0.18
	Diploma & above	3	11	1.00	
Monthly income	≤2000ETB	97	138	1.38(0.1-2.1)	0.126
	>2000ETB	56	110	1.00	
Service year	≤5yrs	55	114	0.66(0.44-0.998)	0.049*
	>5yrs	98	134	1.00	
Working hours	≤8hrs	103	163	1.1(0.69-1.62)	0.81
	>8hrs	50	84	1.00	
Working unit	Outpatient	15	35	0.54(0.21-0.81)	0.398
	Emergency	52	81	0.8(0.44-2.1)	0.75
	Laboratory	7	26	0.34(0.17-0.86)	0.17
	Surgical	28	41	0.85(0.65-3.1)	0.83
	Medical	13	20	0.81(0.67-2.94)	0.79
	Pediatric	21	25	1.1(0.5-2.93)	0.95
	Gyne & Obs	13	15	1.1(0.43-5.64)	0.92
	Others	4	5	1.00	

likely to be safe practiced compared to waste handlers who have worked greater than 5 years of working experience (Table 6).

Bivariate Analysis of Associated Variables Relating with Safety Practice

In this study, there was a statistically significant association between knowledge of waste handlers and safety practice. Waste handlers who had good knowledge were 4.3 times safer than those who had poor knowledge (COR=4.3, 95% CI 2.75, 6.75; P=0.0001).

Regarding attitude, there is also a significant association between attitude and safety practice. Respondents who had a positive attitude were 1.66 times (COR=1.66, 95% CI 1.1–2.6; P=0.024) more likely to be safe practitioners compared to respondents who had a negative attitude toward safety practices.

Whereas availability of materials is associated with safety practice, health care waste handlers who had availability of safety materials were 7.1 times (COR=7.1, 95% CI 4.4, 11.46; P=0.0001) more likely to be safe practitioners than those who had a shortage of safety materials (Table 7).

Multivariate Logistic Regression Analysis of Safety Practice among Hospital Waste Handlers in Somali Region, Ethiopia, August 2021

Bivariate logistic regression was done, and variables with p-values <0.25 were selected for the multiple logistic regression analysis, and multicollinearity was checked by looking at the VIF (variance inflation factor) in the linear regression model. In the bivariate analysis, it was found from socio-demographic variables: age group, had a statistically significant association with safety practice (p-value <0.05). From work-related variables, service year was significantly associated with safety practices. Also, the results revealed in the bivariate analysis of the variables, including knowledge, attitude, and availability of supplies, were significantly associated with safety practice.

In multivariate logistic regression, the confounding effect of one variable over the other variables was adjusted. Based on this, age category, knowledge of the participants, attitude, and availability of safety supplies were significantly associated with safety practice at a P-value of <0.05 (Table 8).

Table 7: Associated variables about safety practice of waste handlers using bivariate logistic regression at government hospitals in Somali Region, Eastern Ethiopia, August 2021.

Variable	Safety practice		COR (95% CI)	P-value	
	Categories	Safe			Unsafe
Knowledge	Good	116	104	4.3(2.72-6.75)	0.0001*
	Poor	37	144	1.00	
Attitude	Positive	113	156	1.67 (1.1,2.6)	0.024*
	Negative	40	92	1.00	
Training	Trained	83	111	1.46(0.976-2.19)	0.065
	Not trained	70	137	1.00	
Availability of materials	Good	125	96	7.1(4.4-11.46)	0.0001*
	Poor	28	152	1.00	

Table 8: Result of multiple logistic regression analysis on safety practice among hospital waste handlers in Somali region, Eastern Ethiopia, August, 2021.

Variable	Category	Safety practice		COR (95% CI)	AOR (95%CI)
		Safe	Unsafe		
Age in years	≤25yrs	4	52	0.03(0.11-0.098)	0.047(0.014-0.16)*
	26-30yrs	25	82	0.13(0.72-0.237)	0.146(0.065-0.33)*
	31-35yrs	40	78	0.22(0.13-0.379)	0.189(0.094-0.38)*
	>35yrs	84	36	1.00	1.00
Service year	≤5years	55	114	0.66(0.44-0.998)	1.2(0.62-2.34)
	>5years	98	134	1.00	1.00
Knowledge	Good	116	104	4.3(2.72-6.75)	7.21(3.7-14)**
	Poor	37	144	1.00	1.00
Availability of materials	Good	125	96	7.1(4.4-11.46)	9.3(5-17.2)**
	Poor	28	152	1.00	1.00
Attitude	Positive	113	156	1.66 (1.1,2.6)	5.4(2.53-11.47)**
	Negative	40	92	1.00	1.00

The odds of respondents with a positive attitude were 5.4 times more likely to be safe practiced compared to respondents who had a negative attitude toward safety practice (AOR: 5.4; 95% CI: 2.53, 11.47; P=0.05). The odds of waste handlers with good knowledge were 7.21 times safer than those who had poor knowledge (AOR=7.21, 95% CI 3.7-14; P=0.05). The odds of respondents who had availability of safety materials were 9.3 times higher than those who had a shortage of safety materials (AOR=9.3, 95% CI 5, 17.2); p=0.05. The odds of waste handlers with an age category between 31 and 35 years were 81.1% less likely to be safe practitioners than those whose age group was greater than 35 years (AOR=0.189, 95% CI: 0.094, 0.38; P=0.05). The results of the final multiple logistic regression models are found in the Table 8.

Discussion

The overall current prevalence of safety practice among hospital waste handlers in this study was 38.2% (95% CI: 33.2, 43.1). The finding was higher as compared with the study done in Shiraz, Iran [31]. This difference might be due to the difference in the study design, setting, and time of the study, as well as the implementation of different reforms by the federal ministry of health at hospitals like infection prevention and patient safety, which were promoting the safety practices of hospital waste handlers.

The prevalence of this study was lower than the prevalence of safety practice among medical waste handlers in Addis Ababa town and with research done in Gonder town among waste collectors, 44.1% (95% CI: 37.3-51) and 45% (95% CI: 40.3-49.4), respectively [26,32]. This difference might be due to the difference in the study setting and time, as well as the implementation of hospital infection prevention protocols. The number of participants with good safety practices reported in the finding was lower than the study done at KwaZulu-Natal (50%) [33]. This difference may be due to the study setting and time. Also, the finding was lower than the findings from Cameroon, in which 100% of the medical waste handlers used all the appropriate protective gear [34]. This difference might be due to the study setting, the difference in knowledge of hospital waste handlers, and the attention given to safety by the governing body. The finding was also lower than the finding from Debra Markos (80%) [35]. This difference may be due to the lower sample size they used.

In principle, all medical waste handlers should properly utilize personal protective equipment during the handling of medical wastes [5]. However, in this study, only 25.9% of medical waste handlers properly utilized personal protective equipment. The result was better than the study done in tertiary care health facilities at Shiraz Iran hospitals, the metropolitan city of Pakistan, and Adis Ababa

government hospitals, in which 15%, 22.8%, and 25.2% of waste handlers utilized personal protective equipment properly [26,31,36]. This difference might be due to the implementation of different initiatives by the ministry of health like CASH, infection prevention, and patient safety, as well as an increase in knowledge of hospital-acquired infections among medical waste handlers.

In this study, attitude was shown to be an independent predictor of safety practice among medical waste handlers. The odds of safety practice among waste handlers with a positive attitude were 5.4 (AOR: 5.4; 95% CI: 2.53, 11.47; P=0.05) times higher than those who had a negative attitude. This was slightly higher with the study done in Adisababa [26] which showed that health care waste handlers with favorable attitudes had 4.78 (AOR=4.78, 95% CI 1.64, 13.9) higher safe practices compared to respondents with unfavorable conditions. The difference might be due to the setting in which the study was conducted, the lower sample size they used, and the difference in providing pre-service and in-service supervision to increase their intention for safe medical waste handling.

The odds of safety practice among waste handlers with good knowledge were 7.21 (AOR=7.21, 95% CI 3.7–14; p=0.05) times higher than those who had poor knowledge. This was slightly higher with the study done by DebreMarkos and Adisababa [32,36], which showed that waste handlers with good knowledge practiced safety more than those with poor knowledge. The findings of this study were inconsistent with those of a study done in South India [8]. The difference might be due to the difference in study settings, which were undertaken at a tertiary care hospital, and the sampling techniques they used, which were purposive sampling, which may introduce selection bias, and that the knowledge acquired may not necessarily be translated into practice.

The odds of safety practice among waste handlers with adequate supplies were 9.3 (AOR=9.3, 95% CI 5, 17.2); p=0.05 times higher than those with a lack of supplies. This finding was higher in studies conducted in DebreMarkos and Adisababa [26,37], in which those respondents with adequate supplies had good safety practices. This difference might be due to the attention given by the state health bureau and hospital administration to the fulfillment of the required supplies and inputs. In this study, the age group has shown a significant association with safety practices among medical waste handlers. The odds of waste handlers with an age group between 31 and 35 years were 81.1% (AOR=0.189, 95% CI: 0.094, 0.38; P=0.05) times less likely to be safe practitioners than those whose age group is greater than 35 years. The findings were lower with the study done in Bahardar [38], which showed that respondents in the age group 30–35 years had 4.1 (AOR=4.1, 95% CI: 1.27, 13.4) times more safe practices compared to their counterparts. The difference might be due to the lower sample proportion they used.

Limitation of the Study

The study was conducted only in government hospitals, which do not represent private hospitals. Moreover, since this study was a cross-sectional study, it may not allow for the establishment of a causal link between the factors associated with safety practices.

Conclusion

The result of this study showed that the level of safety practice was low compared to the national and international standards among hospital waste handlers in relation to waste handling and safety, which may increase the chance of getting infected with hospital-acquired infections and occupational infections. So reducing those problems through adequate professional support and supervision should be in place to increase their knowledge about safety precautions, and availing of safety supplies should be implemented to increase adherence to safety practices among hospital waste handlers. This study will also help hospital administrators take appropriate interventions, including providing important PPE, motivating the worker to utilize it properly, and planning to improve the safety practices of medical waste handlers working in public hospitals in the Somali Region.

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