Original article

Hospital Waste Handler's Knowledge of Health care Waste Management at Gondar University Hospital: An institutional-based cross-sectional study

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Abstract

Background: Improper management of infectious waste is associated with various occupational infections and injuries. Among healthcare workers, waste handlers have the highest incidence of exposure to biomedical waste. Limited knowledge toward handling healthcare waste is a major cause for improper handling of healthcare waste. The objective of this study was to measure the level of hospital waste handlers' knowledge of healthcare waste management and identify factors associated with their level of knowledge

Methods: An institutional-based cross-sectional study was conducted among waste handlers at Gondar University Hospital, Ethiopia from May to June 2017. A stratified sampling technique was used to select 152 study participants. Face-to-face interviews were conducted using structured questionnaires to collect data from respondents. The data was analyzed using logistic regression model to identify influencing factors on the level of knowledge of waste handlers on healthcare waste management.

Results: A total of 152hospital waste handlers participated in this study. The proportion of waste handlers who had a good knowledge of healthcare waste management at Gondar University Hospital was48%.The findings of the study indicated educational level, working department and work experience as factors that were significantly associated with hospital waste handlers' level of knowledge about healthcare waste management in the hospital.

Conclusion: Waste handlers working at Gondar University Hospital exhibit low levels of knowledge about health care waste management compared to other developing countries. Educational level, working department and work experience were influencing factors on hospital waste handlers' level of knowledge about health care waste management. [*Ethiop. J. Health Dev.* 2018;32(4):243-248]

Keywords: Hospital waste handlers, biomedical waste, healthcare waste management, Gondar University Hospital, Ethiopia

Introduction

Healthcare waste is produced from the diagnosis, treatment or immunization of human beings in healthcare institutions and nursing homes, and also includes waste produced from work conducted in animal research laboratories (1). Unlike other wastes, it requires special handling due to its hazardous nature, since it poses severe occupational health hazards, and could cause public health problems and environmental pollution if handled improperly (2-4).

Most of the waste produced in healthcare institutions is non-hazardous. According to the World Health Organization (WHO), only 10-25% of hospital waste is infectious (1). Globally, it is estimated that 0.5-2.0 kg of healthcare waste is generated per bed per day (5). Generally, low- and middle-income countries produce lower amounts of healthcare waste than high-income countries (6-8). However, improper handling and management of healthcare waste leads to the generation of an increased proportion of hazardous waste (9).

Improper management of infectious waste is associated with various occupational infections. Common infections includes hepatitis B and C, typhoid, cholera, tuberculosis, skin infections, respiratory infections and HIV/AIDS (10, 11).

All healthcare workers are exposed to healthcare waste, although some groups of workers are more exposed than others, increasing the risk to their health (12). Health workers who spend most of their time with patients, such as nurses and waste handlers, are at high risk of exposure from biomedical waste. Research reveals that of all healthcare workers, waste handlers have the highest incidence of exposure to biomedical waste (12, 13). Moreover, even in developed countries, such as the USA, cleaning staff have been found to have higher numbers of bacterial infections (14) and higher rates of occupational injuries than other healthcare workers (15).

Healthcare staff's knowledge about health care waste is critical to ensure that it is properly handled (16). Low level of knowledge toward waste management in hospitals are a cause for improper handling of healthcare waste (17). Mismanagement of medical waste due to low levels of knowledge among health care workers may also have serious health effects on the environment in terms of air, water and land pollution (5).

This research aimed to measure hospital waste handlers' knowledge on the health care waste management, as well identifying factors associated

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with their level of knowledge. Accordingly, the research team devised 16questions designed to assess waste handlers' knowledge of the health care waste management at Gondar University Hospital; adopted from Ethiopian Health Care Infection Prevention Guideline. Those who answered 12 to 16(75%) of the questions correctly were classified as having 'good knowledge'; those who answered fewer than 12 correctly were classified as having 'poor knowledge'.

Methods
Aim of the study: The objective of this study was to measure hospital waste handlers' level of knowledge about healthcare waste management and to identify factors associated with their level of knowledge.

Study design: An institutional-based cross-sectional study was employed to conduct this research.

Study area and period: The study was conducted at University of Gondar Hospital from May to June 2017. University of Gondar Hospital is located in the north-west of Ethiopia, about 750km from the capital city, Addis Ababa. It is a central referral hospital for the North Gondar administrative region, serving approximately 5 million people. About 0.62kg/bed/day of healthcare waste is produced from the inpatient department; from the outpatient department, 0.32kg/patient/day of waste is produced. In both cases, just under 54% of the waste produced is hazardous(18). Currently, a total of 170 waste handlers work in the housekeeping and waste handling sections of the hospital.

Sample size and sampling technique: The sample size was determined using single proportion reduction formula, as follows: a population proportion of 50%, margin of error of 4%, confidence interval of 95%. The resulting study sample was 152 hospital waste handlers. Stratified sampling technique was used to incorporate knowledge differences among workers in different hospital departments.

Data collection tools: Face-to-face interviews were conducted using structured questionnaires in order to determine waste handlers' level of knowledge of their healthcare waste management, as well as identify their Socio-economic, work environment and behavioral characteristics.

Data quality control: Data collectors and supervisors received two days' training on procedures and techniques of data collection. Prior to the start of the data collection process, the data collection tools were pre-tested at Debark District Hospital. In addition, continuous and strict supervision was carried out during the data collection process.

Ethical considerations: Before data collection, ethical approval and ethical clearance was obtained from the Institutional Review Board of the College of Medicine and Health Sciences, University of Gondar. Verbal consent was sought from each respondent after explaining the purpose and objectives of the study. Confidentiality was assured for information collected from study participants. Privacy was also ensured during the interviews and the right to quit at any time during the data collection.

Data processing and analysis: Data were entered using Epi-Info version 7.1, and SPSS (Statistical Package for Social Sciences) for Windows version 20.0 was used to clean and prepare the data for the purpose of binary logistic regression analysis. Ap-value of less than 5% was used to declare association factors with the level of knowledge about the health care waste management system.

Results
Status of waste handlers' knowledge of the healthcare waste management: Seventy-three(48%) hospital waste handlers displayed that they had a good knowledge about the management of waste at University of Gondar Hospital.

Socio-demographic characteristics: The majority of waste handlers in this study were females (68.4%), between the ages of 18 to 28 years old. About 23.7% of respondents had completed primary school education and more than half (54.6%) had less than three years of work experience (Table 1).

Behavioral characteristics of respondents: Almost all the respondents use personal protective equipment (PPE) at work (91.4%) and handle safety boxes properly (90.1%). However, a significant proportion of respondents (40.8%) admit working during night shift causes them to feel fatigued (Table 2).

Table 2: **Distribution of behavioral characteristics of waste handlers at Gondar University Hospital (n=152).**

Variables	Number	%
Night shift		
No	36	23.7
Yes	116	76.3
Sleeping problem from night shift		
No	90	59.2
Yes	62	40.8
Investigation of workplace before work		
No	61	40.1
Yes	91	59.9
PPE usage		
No	13	8.6
Yes	139	91.4
Segregation practice		
No	51	33.6
Yes	101	66.4
Proper use of safety box		
No	15	9.9
Yes	137	90.1

Work environment of respondents: About two-thirds of respondents (66.4%) revealed the availability of training regarding waste management to waste handlers. In addition, the majority of respondents (73.7%) disclosed that they have additional responsibilities provided by their respective department heads other than working as a janitor at the hospital (Table 3).

Table 3: **Distribution of work environment characteristics for waste handlers at] Gondar University Hospital (n = 152).**

Variables	Number	%
Availability of training for regular workers		
No	51	33.6
Yes	101	66.4
Availability of training for new workers		
No	52	34.2
Yes	100	65.8
Additional workload for waste handlers		
No	112	73.7
Yes	40	26.3
Safe work culture		
No	45	29.6
Yes	107	70.4
Psychological support from department heads		
No	79	52.0
Yes	73	48.0
Availability of waste management plan		
No	52	34.2
Yes	100	68.2

Factors associate with waste handlers' knowledge of waste management: Those respondents with diplomas are 12.7 times more likely to have good knowledge of how to manage waste compared with those waste handlers with only primary-level educational status (AOR =12.7; 95%CI: 7.64-19.8).

Moreover, waste handlers with 4 to 6 years of work experience are 3.8 times more likely to have good knowledge than those waste handlers with 3 years' work experience or less (AOR = 3.8, 95% CI:1.2-11.9). Those waste handlers who work in the pediatrics department are 6.7 times more likely to have good knowledge of waste management than those who work in the outpatient department (AOR =6.7; 95% CI:1.20-14.82) (Table 4).

Table 4: **Logistic regression of waste handlers' knowledge of hospital waste management and associated factors(n=152).**

Variables	Waste handler's knowledge of Waste Management		Crude OR (95%CI)	Adjusted OR (95%CI)
	Good	Poor		
Sex				
Male	17(35.4%)	31(64.6%)		1.00
Female	61(58.7%)	43(41.3%)	2.59(1.27-5.25)*	2(0.37-10.1)
Marital status				
Single	49(57%)	37(43%)		1.00
Divorced	3(18.8%)	13(81.3%)	4.7(1.2-8.5)*	2.8(0.43-18.1)
Married	26(52%)	24(48%)	5.74(1.5-9.63)*	3.4(0.9-14.68)
Educational level				
Primary school	6(16.7%)	30(83.3%)		1.00
Secondary school	44(55.4%)	37(45.7%)	3.8(0.88-16.3)	5.9(2.23-15.8)
Diploma	28(80%)	7(20%)	20(15.3-28.2)*	12.7(7.64-19.8)*
Work department				
Outpatient	6(40%)	9(60%)		1.00
Medical	2(15.4%)	11(84.6%)	0.27(0.04-1.65)	0.43(0.04-4.24)
Surgical	4(36.4%)	7(63.6%)	0.85(0.72-4.26)	0.48(0.05-3.98)
Gynecology and obstetrics	11(47.8%)	12(52.2%)	1.37(0.36-5.13)	3.1(0.57-19.9)
Hospital offices	36(64.3%)	20(35.7%)	2.7(0.83-8.6)	2.6(0.61-11.1)
Medical laboratory	1(11.1%)	8(88.9%)	0.187(0.18-1.91)	0.21(0.01-3.0)
Pediatrics	18(72%)	7(28%)	3.8(0.99-14.92)	6.7(1.20-14.82)*
Work experience				
<3 years	39(47%)	44(53%)		1.00
4–6 years	31(63.3%)	18(36.7%)	1.9(0.94-4.0)*	3.8(1.2-11.9)*
≥ 7 years	8(40%)	12(60%)	0.75(0.28-2.03)	0.34(0.05-2.26)
Alcohol drinking habit				
Yes	14(29.2%)	34(70.8%)	0.26(0.12-0.54)**	1.96(0.62-6.2)
No	64(61.5%)	40(38.5%)		1.00
Working during night shift causes fatigued				
Yes	38(61.3%)	24(38.7%)	1.98(1.02-3.82)*	0.67(0.24-1.81)
No	140(44.4%)	50(55.5%)		1.00
Psychological support				
Yes	50(68.5%)	23(31.5%)	3.96(2.1-7.8)**	0.37(0.13-1.06)
No	28(35.4%)	51(64.6%)		1.00
Safe work culture				
Yes	68(63.6%)	39(36.4%)	6.1(2.73-13.66)**	0.53(0.15-1.92)
No	10(22.2%)	35(77.8%)		1.00
Availability of training				
Yes	43(42.6%)	58(57.4%)	0.34(1.66-0.69)*	1.1(0.14-9.12)
No	35(68.6%)	16(31.4%)		1.00

Note: 1.00 =Reference;* Significant at p-value <0.05; ** Significant at p-value <0.01

Discussion
From this research, we established that 48% of hospital waste handlers at the Gondar University Hospital have a good level of knowledge about healthcare waste management. This finding is comparable with similar research done in Hawassa (Ethiopia), Cameroon, Dhaka (Bangladesh), Pakistan, Gaza (Palestine) and various Indian hospitals (13, 19-22). However, this proportion is lower compared to the level of knowledge held by hospital waste handlers in Dakar and Kenya hospitals (23, 24). In general, healthcare workers in developing countries show poor knowledge about how to handle medical waste (25). The possible reason for the low level of knowledge held by waste handlers at Gondar University Hospital might be the lack of healthcare waste management training (5, 26), lack of knowledge about the healthcare waste management system on the part of hospital administration (27), lack of strict oversight by hospital administrators (28),and lack of motivation on the part of hospital waste

handlers (29).Still, various research studies suggest that a lack of knowledge can be overcome by providing training regarding healthcare waste management in hospitals (30, 31).

In this study, respondents with a diploma were 12.7 times more likely to have a good knowledge of waste management compared to those waste handlers with only primary-level educational status. This finding is similar to a study conducted in a medical science school in Iran, a tertiary hospital in Pakistan, and a waste management facility in Delhi, India (21, 32-33).Educational level might not necessarily be associated with the knowledge of healthcare waste handlers as in a case in a tertiary hospital in South India(19). However, this finding is particularly important due to the fact that hospital waste handlers are usually from low socio-economic backgrounds (32, 34). Moreover, studies suggests the positive effect of educational status in terms of improving hospital waste

handlers' knowledge of healthcare waste management (35).

Similarly, waste handlers with 4 to 6 years of work experience were 3.8 times more likely to have good knowledge than waste handlers with fewer than or equal to 3 years' work experience as a janitor. This finding is similar to the results of studies conducted in selected hospitals in Kenya, tertiary healthcare facilities in Pakistan, and of 'waste scrapers' in India (21, 33, 36).The possible reason for this might be that workers with greater experience have a chance of undertaking training courses on how to handle healthcare waste, or might learn first-hand in their jobs about the effects of inappropriate healthcare waste-handling practices. However, it is worth noting that there is at least one research study which indicates that work experience has no direct association with waste handlers' knowledge about healthcare waste management (37).

Those waste handlers who work in the pediatrics department at University of Gondar Hospital were 6.7 times more likely to have a good knowledge of waste management than those who work in the outpatient department. This finding is similar to a study carried out in a Pakistan teaching hospital, indicating that there is a difference in knowledge about the management of healthcare waste across hospital departments (38). This might be due to the managerial practice of stationing newly recruited and inexperienced janitorial staff in the outpatient department, where there is high patient turnover that results in high hospital waste generation.

Conclusion:
Waste handler sat Gondar University Hospital exhibit lower levels of knowledge compared to equivalent staff in hospitals in other developing countries.

In the current study, educational level, working department and work experience were influencing factors for waste handlers' level of knowledge about how to handle and manage healthcare waste.

Authors' contributions: DHC participated in the conception and design of the study, data collection and analysis, and interpretation of the findings. AD participated in the design of the study, interpretation of the findings, and preparation of the manuscript. SDW participated in data collection, and analysis and interpretation of the findings.

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