

# Knowledge, Practice and Barriers of Health Care Wastes Segregation Among Health Care Providers in University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, 2017





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## Abstract

**Background:** Healthcare wastes can be potentially risky to health care providers, patients, the community and the environment particularly when it is inappropriately placed at the time of generation. Data on the knowledge and practice of healthcare professionals on health care waste segregation is scarce in our setting. Therefore, the objective of the study was to assess knowledge, practice and associated factors of health care waste segregation among health care providers at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, 2017.

**Methods:** Institution based cross sectional study was conducted from April 10 to May 10, 2017. Pretested self-administered questionnaire and observational checklist were used. The data was coded, cleaned and entered into Epi Info version 7 statistical software and analyzed using SPSS version 20.

**Result:** This study revealed that health care providers who had adequate knowledge and appropriate practice about health care waste segregation were 39% and 42.6% respectively. In the multivariable analysis training (AOR 1.81 CI 95% 1.15, 2.88), and reward (AOR 1.80 CI 95% 1.10, 2.89) were significantly associated with the knowledge. And training (AOR 1.71 CI 95% 1.08, 2.71), personal needs to use personal protective equipment for health care waste handling (AOR 3.15 CI 95% 1.97, 4.45), were significantly associated with the practice of health care waste segregation.

**Conclusion and Recommendation:** Health care providers' knowledge and practice towards health care waste segregation in University of Gondar Comprehensive Specialized hospital was inadequate. Training and reward were significantly associated with knowledge. And training and personal needs to use personal protective equipment for handling health care waste segregation were associated with practice of health care providers on health care waste segregation. Provide regular training and rewarding to the health care providers is important.

**Keywords:** Health Care Provider; Health Care Waste Segregation; Knowledge; Practice

## Introduction

Healthcare Wastes (HCW) are any waste which is generated during the diagnosis, treatment or immunization of human beings from healthcare organizations such as hospitals [1]. Waste segregation is the essence of waste disposal at the source of HCW generation during health care provision [2]. HCW have been a source of infectious diseases to the healthcare staff, clients, and for the general community particularly when wastes segregated on the wrong way. According to 2015 WHO report from the total amount of HCW generated through health-care activities nearly 15% of it holds

hazardous waste [3]. The contribution of inappropriate practice and inadequate knowledge to the placing of HCW by health care providers were results to serious consequences of health problem and a significant impact on the health care delivery, environment and community as a whole [4]. Different study showed that inappropriate segregation of waste poses serious health risks for waste handlers, waste collectors, patients and health care provider's [5-7]. There is also strong evidence that HIV and hepatitis viruses B and C transmitted via health care waste [1].

Among these health risks and risk of infection transmission on HIV/AIDS 0.3%, Viral Hepatitis B (HBV) 1.8% and Hepatitis C (HCV) 30% respectively [3]. In spite of the fact that health care wastes have a serious consequence, it's has not received sufficient attention because of unavailability of responsible person, HCWMC, guide line and, insufficiently color coded bin, and also inconsistency training health care workers are not knowledgeable and practice as standards [8-13]. As a preliminary observation and interview result from the key respondent of health providers the researcher observed the University of Gondar Comprehensive Specialized Hospital (UGCSH) wastages are not properly segregated due to lack of PPE, color-coded bin, lack of training about infection prevention and health care waste management, unavailability of guidelines, absence of responsible person and weak supervision, absence of staff motivation, low monthly income (salary), professional category, working section (department). These problems lead to the expose to sharp injury and infection for HCPs, patients and environment especially for HIV, hepatitis B, and hepatitis C, unfavorable working climate [12,14].

Despite of these problems, the knowledge and the practice limitation of health care providers towards health care waste segregation plays a significant role [15]. Therefore, the aim of this study was to assess the knowledge, practices and factors associated with health waste segregation among health care providers at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia.

## Methods and Materials

An institution based cross-sectional study was conducted from April 10 to May 10, 2017. The study was conducted at University of Gondar Comprehensive Specialized Hospital North Gondar Administrative Zone, Amhara National Regional State. It is located at about 748 km and 180 km far from Addis Ababa and Bahirdar respectively. University of Gondar is one of the Universities in Ethiopia established in 1954 as a Public Health College and Training Centre. All health care providers working at University of Gondar Comprehensive Specialized Hospital were the source population. Health professionals who had less than six months of working experience were excluded. The sample size was determined by using single population proportion formula to obtain the sample size needed to estimate the knowledge and practice of health care wastes segregation among health care providers in university of Gondar comprehensive specialized hospital.

$$n = \frac{(z\alpha/2)2p(1-p)}{d^2}$$

So the total sample size was 420 by adding 10% non-respondent rate. According to their professional category participants were assigned proportionally. Simple random sampling technique was used. Data were collected by using structured and pre-tested self-administered questionnaire and observational checklist that was developed after reviewing related studies [16-26]. It was modified to fit the study population. Observational checklist was used to assess the practice in terms of segregation. Pre-test was conducted on five percent of the questionnaire to check compatibility of the

tool and training was given for data collectors and supervisors before actual data collection. Data were checked for completeness, coded and entered to Epi-info version 7 statistical software and was exported to SPSS (Statistical Package for Social Science) windows version 20 for analysis.

Frequencies and cross tabulations were used to summarize descriptive statistics of the data. Bivariate logistic analysis was used primarily to check variables which have associations with the dependent variable. Model fitness was checked by using Hosmer and Lemeshow goodness of fit which was >0.05. Significant and non-significant variables in the bivariate analysis were then entered into multiple logistic regression for controlling the possible effect of confounders and finally the variables with significant association at P-value < 0.05 were identified on the basis of Odds Ratio with 95% confidence interval.

## Operational Definition

- a. **Health Care Provider:** Healthcare provider was included physicians, nurses, midwives, laboratory technicians, anaesthetist and physiotherapist.
- b. **Adequate Knowledge:** If the study participant who scored above or equal to the mean score of 8.3 from the knowledge questions was taken as adequate knowledge.
- c. **Inadequate Knowledge:** If the participant scored below the mean score, then taken as inadequate Knowledge.
- d. **Appropriate Practice:** If the participant achieved above or equal to the mean score of 4.9 from the practice questions, then taken as appropriate practice.
- e. **Inappropriate Practice:** if the participant achieved below the mean score, then taken as inappropriate practice.

## Result

### Socio Demographic Characteristics

A total of 420 participants were participated in the study with 100% response rate. 52.1% were males. The mean age of the respondents was 28.6(SD+ 5.3) years. Two thirds of them (63.1%) were single and two thirds of them (63%) were nurses. 97.4% were degree holders. One third of them (35.2%) have monthly income of less than 4446 Ethiopia birr. Two thirds of them (74.5%) had below five year experience (Table 1).

**Table 1:** Socio demographic characteristics of the respondents for the study of knowledge, practice and associated factors of health care waste segregation among health care providers at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, 2017 (n=420).

Variables	Variable category	Frequency	
		n = 420	%
Sex	Male	219	52.1
	Female	201	47.9
Age	20-25 years	110	26.2
	25-30 years	216	51.4
	30-35 years	59	14.0

	>35 years	35	9.4
Marital status	Single	265	63.1
	Married	155	36.9
Level of education	Diploma	11	3
	Degree and above	409	97
Profession	Nurse	266	63
	Medical doctor	108	26
	others <sup>a</sup>	46	11
Monthly income	<4446	148	35.2
	4446-5546	62	14.8
	5546-9217	105	25
	>9217	105	25
Working Experience in years	< 5 years	313	74.4
	5-10 years	81	19.2
	10-15 years	16	4
	> 15 years	10	2.4

Length of stay on working	8 hours	142	33.8
	> 8 hours	278	66.2
working section	OPD	93	22
	Ward	327	78

Key: <sup>a</sup> =Represents other professionals included laboratory technologist, physiotherapy, anesthesiologist, OPD = Outpatient department.

### Knowledge

In this study 164 (39%), N=420 of the study participants had adequate knowledge regardless of health care waste segregation. Among this 97(57.3%) and 85(51.8%) of the respondent were males and in the age group of 20-25 years respectively. 110(67%) of the respondent were unmarried. And 98(59.8%) were nurse. 163(99.4%) of the participants were degree and above. In the multivariate analysis variables like, training [AOR: 1.81, 95%CI: 1.15, 2.86] and rewarding [AOR: 1.8, 95% CI: 1.1, 2.89] were associated with the outcome variable (Table 2).

**Table 2:** Associated variables with knowledge on health care waste segregation among health care providers at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, 2017(n=420).

Variable	Category	Knowledge		COR(95%CI)	AOR(95%CI)
		Adequate knowledge N	Inadequate knowledge N		
Sex	Male	94	125	1.41(0.95,2.08)	1.57(0.99,2.45)
	Female	70	131	1	1
Age	20-25 year	45	65	1	1
	25-30 year	85	131	0.93(0.59,1.49)	1.05(0.61,1.77)
	30-35 year	25	34	1.06(0.56,2.02)	1.36(0.63,2.95)
	>35 year	9	26	0.50(0.21,1.17)	0.69(0.21,2.24)
Marital status	Single	110	155	1	1
	Married	54	101	0.75(0.50, 1.14)	0.83(0.51,1.35)
Profession	Medical doctor	51	57	1	1
	Nurse	98	168	0.52(0.33,0.82)	1.06(0.21,4.44)
	Others	9	37	0.22(0.09,0.49)	0.59(0.005,1.66)
Level of qualification	Diploma	1	10	1	1
	Degree and above	163	246	6.62(0.84,52.25)	5.58(0.65,48.79)
Work section	OPD	22	71	1	1
	Ward	142	185	2.48(1.46,4.19)	1.80(0.93,3.50)
Working experience	<5 years	129	184	1	1
	5-10 years	28	53	0.58(0.19,2.44)	1.37(0.65,2.88)
	10-15 years	3	13	0.32(0.14,1.98)	0.67(0.14,3.17)
	>15 years	4	6	0.95(0.41,5.09)	4.37(0.77,24.28)
Stay on working	8 hours	53	89	0.89(0.59,1.36)	1.07(0.66,1.75)
	>8 hours	111	164	1	1
Monthly income	<4446	51	97	1	1
	4446-5546	31	31	0.64(0.28,0.77)	1.36(0.69,2.79)
	5546-9217	56	49	0.87(0.47,1.64)	0.47(0.21,1.07)
	>9217	26	79	0.29(0.16, 0.52)	1.64(0.32,8.48)
Rewarding	Yes	63	70	1.66(1.09,2.51)	1.80(1.10,2.89)*
	No	101	186	1	1

Training	Yes	80	97	1.56(1.05,2.32)	1.81(1.15,2.86)*
	No	84	159	1	1
Availability of sufficient	Yes	63	122	1.46(0.98 ,2.17)	1.31(0.78,2.18)
Color coded bin	No	101	134	1	1
Availability of PPE	Yes	80	107	1.33(0.89,1.97)	1.34(0.81,2.24)
	No	84	149	1	1

Key \* = Represents variables significantly associated at P-value is  $\leq 0.05$ , AOR = Adjusted Odds Ratio, COD = Crude Odds Ratio, PPE = Personal Protective Equipment, OPD = Outpatient Diagnosis.

### Practice Health

Among the study participants 179(42.6%), N=420 had appropriate practice of health care waste segregation. Of this 90(50.3%) were females and in the age group of 20-30 years. And 109(60.9%) were single. Of the participants 107(59.8%) were nurse and 175(97.8%) were degree and above respectively. Most of the respondents work experience 120(70.4%) were five years

and below. And their length of stay on work without rest 111(62%) were eight hours and above. 104(58%) were had adequate knowledge. In multivariable analysis training (AOR 1.71 CI 95% 1.08, 2.71), personal needs to use personal protective equipment for health care waste handling (AOR 3.15 CI 95% 1.97, 4.45), were significantly associated with the practice of health care waste segregation (Table 3).

**Table 3:** Associated variables with practice on health care waste segregation among health care providers at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, 2017(n=420).

Variable	Category	Practice		COR(95%CI)	AOR(95%CI)
		Appropriate practice N	Inappropriate practice N		
Sex	Male	89	130	1	1
	Female	90	111	1.18(0.80,1.74)	1.28(0.81,2.03)
Age	20-25 year	53	57	1	1
	25-30 year	89	127	0.75(0.47,1.19)	0.69(0.41,1.17)
	30-35 year	21	38	0.78(0.31,1.14)	0.78(0.36,1.67)
	>35 year	16	19	0.91(0.42,1.94)	1.18(0.41,3.38)
Marital status	Single	109	156	1	1
	Married	70	85	1.18(0.73,1.63)	1.24(0.77,2.00)
Profession	Medical doctor	55	53	1	1
	Nurse	107	159	0.56(0.41,1.01)	0.08(0.01,1.02)
	Others	25	21	0.56(0.28,1.15)	0.80(0.23,2.71)
Level of qualification	Diploma	5	6	1	1
	Degree and above	175	234	1.31(0.37,4.54)	1.84(0.47,7.29)
Work section	OPD	29	64	0.53(0.33,0.87)	0.59(0.31,1.13)
	Ward	201	126	1	1
Monthly income	<4446	66	82	1	1
	4446-5546	20	42	0.59(0.31,1.10)	0.57(0.27,1.18)
	5546-9217	38	67	0.56(0.34,0.93)	0.72(0.34,1.51)
	>9217	50	55	1.05(0.63,1.75)	2.84(0.44,3.27)
Guideline	Yes	78	86	1.39(0.93,2.06)	1.43(0.89,2.27)
	No	101	155	1	1
Budget	Yes	32	35	1.28(0.75,2.16)	1.08(0.58,2.00)
	No	147	206	1	1
Rewarding	Yes	59	74	1.11(0.73,1.68)	1.12(0.73,1.81)
	No	120	167	1	1
Training	Yes	111	66	1.66(1.12,2.45)	1.71(1.08,2.71)*
	No	122	121	1	1

Availability of sufficient	Yes	101	84	1.81(0.83,1.81)	1.20(0.72, 1.99)
Color coded bin	No	140	95	1	1
Availability of PPE	Yes	113	74	1.25(0.85,1.85)	1.10(0.66, 1.84)
	No	128	105	1	1
Personal needs to use PPE	Yes	169	81	2.84(1.89,4.25)	3.15(1.97,4.45)*
	No	72	98	1	1
Knowledge	Adequate	104	60	1.51(1.01,2.25)	1.52(0.96, 2.43)
	Inadequate	137	119	1	1

Key \* = Represents variables significantly associated at P-value is  $\leq 0.05$ , AOR = Adjusted Odds Ratio, COD = Crude Odds Ratio, PPE = Personal Protective Equipment, OPD= Outpatient Diagnosis.

## Discussion

This study aimed to assess the knowledge, practice and associated factors towards health care waste segregation among health care providers at University of Gondar Comprehensive Specialized Hospital. The overall prevalence of knowledge of HCPs was 39% and practice was 42.6%. In the present study Knowledge of HCPs on health care waste segregation were 39% which was lower than studies done in South Africa 47.2% [18], India 50% [17]. The possible reasons to this difference may be organizational structure, resource utilization and possibility of HCWM training. However, the current finding is higher than studies done in Egypt 32.4% [16]. This could be due the reason that the degree of emphasis of health care facilities on healthcare waste management, on job training and the accessibility of healthcare waste management documents in the working environment.

Practice of HCPs on health care waste segregation were 42.6% which is lower than studies done in Bangladesh 56% [9], Cairo 84.8% [13], Haramaya 47% [23]. The possible explanation for this variation might be due to accessibility of equipment, working environment and health care setting. Regarding factors, respondents who received training were 1.81 times more likely to have adequate knowledge on HCWS compared to respondents who had not received HCWM training. Which is supported by a study conducts in India [17]. It might be individuals who received training used to gain several information and simultaneously participants become knowledgeable regarding HCWS. Participants who were rewarded were 1.8 times more likely to have adequate knowledge towards HCWS as compared to those participants who were not. It is because participants who were rewarded by their managers have increased affinity towards their work which leads them to read and explore knowledge that can increase their awareness towards HCWS.

Respondents who received training were 1.71 times more likely to have appropriate practice on HCWS compared to respondents who did not receive HCWM training. This is in line with a study conducted in India and Gondar; participants who received training was achieved appropriate health care waste segregation practice [5,24]. This similarity might be due to individuals who received training may gain appropriate information and help them to know the way of waste placing in different waste bin to

achieve appropriate practice of health care waste segregation. The respondents who use PPE for HCW handling had 3.15 times more likely apply appropriate practice compared to who do not use PPE for HCW handling which is similar with a study conducted in Bangladesh, participants who used PPE for handling of health care waste were achieved appropriate health care waste segregation practice [27]. And the other similarity might be the nature of health care waste is noxious and the participants who were not interested to use PPE were disposing inappropriately in to the nearest bin but a participant who uses PPE to be handling HCW had better practice.

## Limitation of the Study

The study design was cross sectional, which measures the exposure and outcome simultaneously but cannot measure the cause and effect relationship.

## Conclusion

This study showed that health care provider's knowledge and practice towards health care waste segregation in University of Gondar Comprehensive Specialized hospital was inadequate. Training and reward were factors for knowledge and also training and personal needs to use personal protective equipment for handling health care waste segregation were factors for practice of health care providers on health care waste segregation.

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## References

- Chartier Y (2014) Safe management of wastes from health-care activities. World Health Organization.
- Haifete AN (2016) Knowledge, attitude and practice of health care workers on waste segregation at two public training hospitals, in Khomas region, Namibia. University of Namibia.
- WHO, United Nations' Children's Fund (2015) Water, sanitation and hygiene in health care facilities: Status in low and middle income countries and way forward. Water sanitation hygiene p. 35.
- Mansab MR (2014) Sharp waste management at kidongo chekundu national mental hospital zanzibar tanzania. Master's thesis, The Open University of Tanzania.



5. Kumar M, Singh RK, Umesh VR (2015) Awareness and practices about bio-medical waste among Health care workers in Tertiary care hospital of Haldwani, Semantic Scholar 159: 72-73.
6. Ola-Adisa EO, Mangden EY, Sati YC, Adisa JO (2015) Knowledge, attitudes, beliefs and practices in medical waste management-an appraisal of Jos north Lga, Plateau State, Nigeria. Int J Res Humanities and Social Studies 2(12): 43-56.
7. Muduli K, Barve A (2012) Challenges to waste management practices in Indian health care sector. International Conference on Environment Science and Engineering, IACSIT Press, Singapore. Volume 32.
8. Ismail IM, Kulkarni AG, Kamble SV, Borke SA, Rekha R, et al. (2013) Knowledge, attitude and practice about bio-medical waste management among personnel of a tertiary health care institute in Dakshina Kannada, Karnataka. Al Ameen J Med Sci 6(4): 376-380.
9. Sarker MA, Harun-Or-Rashid M, Hirosawa T, Abdul Hai MS, Siddique MR, et al. Evaluation of knowledge, practices, and possible barriers among healthcare providers regarding medical waste management in Dhaka, Bangladesh. Med Sci Monit 20: 2590-2597.
10. Sanjeev R, Kuruvilla S, Subramaniam R, Prashant P, Gopalakrishnan M (2014) Knowledge, attitude, and practices about biomedical waste management among dental healthcare personnel in dental colleges in Kothamangalam: A cross-sectional study. Health Sciences 1(3): 1-12.
11. Kumar R, Samrongthong R, Shaikh BT (2013) Knowledge, attitude and practices of health staff regarding infectious waste handling of tertiary care health facilities at metropolitan city of Pakistan. J Ayub Med Coll Abbottabad 25(1-2): 109-112.
12. Mostafa GM, Shazly MM, Sherief WI (2009) Development of a waste management protocol based on assessment of knowledge and practice of healthcare personnel in surgical departments. Waste Manag 29(1): 430-439.
13. Hakim SA, Mohsen A, Bakr I (2014) Knowledge, attitudes and practices of health-care personnel towards waste disposal management at Ain Shams University Hospitals, Cairo. East Mediterr Health J 20(5): 347-354.
14. Haifete AN, Justus AH, Iita H (2016) Knowledge, attitude and practice of healthcare workers on waste segregation at two public training hospitals. Euro J Pharmaceu Med Res 3(5): 674-689.
15. Makhura RR (2016) Knowledge and practices of health care workers on medical waste disposal in Mapulaneng Hospital in the Ehlanzeni District of South Africa. University of Limpopo.
16. Nour MO, Babilghith AO, Natto HA, Al-Amin FO, Alawneh SM (2015) Knowledge, attitude and practices of healthcare providers towards MERS-CoV infection at Makkah hospitals, KSA. Int Res J Med Med Sci 3(4): 103-112.
17. Gupta NK, Shukla M, Tyagi S (2017) Knowledge, attitude and practices of biomedical waste management among health care personnel in selected primary health care centres in Lucknow. Int J Community Med Public Health. 2016; 3(1): 309-313.
18. Makhura RR, Matlala SF, Kekana MP (2016) Medical waste disposal at a hospital in Mpumalanga Province, South Africa: Implications for training of healthcare professionals. S Afr Med J 106(11): 1096-1102.
19. Mesfin A, Worku W, Gizaw Z (2014) Assessment of health care waste segregation practice and associated factors of health care workers in Gondar university hospital, North West Ethiopia, 2013. Universal J Public Health 2(7): 201-207.
20. Manga VE, Forton OT, Mofor LA, Woodard R (2011) Health care waste management in Cameroon: A case study from the Southwestern Region. Resources, Conservation and Recycling 57: 108-116.
21. Azuik EC, Adinma ED, Nwabueze SA, Azuik ED, Mbanuzuru VA, et al. (2015) Healthcare waste management: What do the health workers in a Nigerian tertiary hospital know and practice. Science 3(1): 114-118.
22. Alemayehu T, Alemayehu W, Assefa N (2015) Community risk perception on healthcare wastes in hospitals and health centres of Eastern Ethiopia. Sciences Journal of Public Health 3(1): 37-43.
23. Azage M (2013) Healthcare waste management practices among healthcare workers in healthcare facilities of Gondar town, Northwest Ethiopia. Health Science Journal 7(3): 315-326.
24. Ananth AP, Prashanthini V, Visvanathan C (2010) Healthcare waste management in Asia. Waste Manag 30(1): 154-161.
25. Olukanni DO, Azuh Dominic E, Toogun Tunde O, Okorie Uchechukwu Emenas, (2014) Medical waste management practices among selected health-care facilities in Nigeria: A case study. Academic Journals 9(10): 431-439.
26. Biswas A, Amanullah AM, Santra SC (2011) Medical waste management in the tertiary hospitals of Bangladesh: An empirical enquiry. ASA Univ Rev 5(2): 10.
27. Molina VB (2002) Waste management practices of Hospitals in Metro Manila. University of the Philippines Manila Journal 7(3-4): 17-22.

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