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Appraisal on HealthCare Waste Generation Rate and Management Practice of Hawassa Comprehensive and Specialized Hospital and Alatyon Hospital

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Abstract
Incineration has been found to be the leading source of highly toxic dioxin, furans, mercury, lead, and other dangerous air pollutants, Despite its common wate disposal method in most hospitals. Data were collected for 24 hours from each sampling unit in different color coded polyethylene bags. Measurement was done by using Weighing Scale in which analog was used at each study units/wards and Corresponding. A total of 3212.19 kg wastes were generated per week in the two hospitals (referral and Alatyon). From which more than three-fourth 2664.99(83%) of wastes were generated from Hawassa Comprehensive Specialized Hospital and the rest 17% wastes generated from Alatyon hospital. There was a big difference in generation rates of total HCW between public and private hospitals. The two hospitals do not practice waste separation/segregation at generation point. And treatment practices are not also according to the standard, so it needs practicing of cleaner's skill by training on how to manage waste.
Keywords: Hospital, hazardous waste, management practice**,** waste generation rate
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INTRODUCTION

Poor management of healthcare waste is a potential health risk to patients, healthcare workers and the general public, as well as to the environment. A systematic review of 150 articles published since 2000 revealed that at least 50% of the world population is threatened by environmental, occupational and public health risks due to poor healthcare waste management (WHO, 2006).

The wastes generated from the health care centers have been an important source of environmental and public health problem and the present indiscriminate disposal of these waste in the municipal dumps is a potential health hazard. A focus on installing complex and expensive disposal technologies like incinerators rather than implementing a practice of waste management with in the healthcare centers has been the in diligence of most medical administrators, towards resolving the problem, creating a chain of secondary problems of environmental pollution due to toxins like dioxins and furans (Achills *et al.* 2013; Manga *et al*. 2011; Özkan 2013).

The method of disposing waste in most hospitals which are found in developing country are incineration despite the fact that, incineration has been found to be the leading source of highly toxic substances such as Dioxin, Furans, Mercury, Lead, and other dangerous air pollutants. These emissions have serious adverse consequences on worker safety, public health, and the environment. Dioxins, for example, have been linked to cancer, immune system disorders, diabetes, birth defects and other health effects. Medical waste incinerators are a leading source of dioxins and mercury in the environment (Debere et al, 2003).

For public health reasons all wastes that have come into contact with infectious materials are treated as infectious wastes. Since most medical facilities in developing countries do not adequately segregate infectious or hazardous waste from ordinary domestic type waste, the total quantity of waste classified as infectious and thus needing special treatment is greater than would be expected from the increase in medical waste alone (Achillas *et al*., 2013; Manga *et al*., 2011; Özkan ,2013).

Solid waste disposal poses a great problem in Hawassa city. Because it leads to land pollution if openly dumped, water pollution if dumped in low lands and air pollution if burnt. Areas of shore lines of lake hawassa, are facing serious environmental degradation and public health risk due to uncollected disposal of waste on streets and other public areas, clogged drainage system indiscriminately dumped wastes and by contamination of water resources near uncontrolled dumping sites.

The vast economic potential from the waste demands the application of the integrated solid waste management (ISWM) hierarchy in terms of resource, protecting human health, environment, and reduction of GHGs from the improper SWM practices (Rao et al, 2004).

This study was conducted to provide data on the health care waste management of the Selected Hospitals representing Public and Private Health Care Centers, which are found in Hawassa city.

MATERIALS AND METHODS

Description of the Study Area

Hawasa is a city in Ethiopia, on the shores of Lake Hawasa in the Great Rift Valley. It is located 275 km South of Addis Ababa via Debre Zeit, 130 km east of Sodo, and 75 km north of Dilla. The town serves as the capital of the Southern Nations, Nationalities, and Peoples Region, and is a special zone of this region. The city administration has a total area of 157.2 sq. kms divided in to eight sub cities and 32 kebeles. Hawassa sub city is one of the 8 sub-cities.

This study is conducted at Hawassa University Comprehensive Specialized Referal Hospital and Alatiyon Hospital. The Hospitals are selected by clustered random sampling and there are no recent studies that have been taken place to asses waste generated per day and Management of generated HealthCare wastes and the management system of each hospital. Also to make the report of the generation rate of HealthCare waste among these hospitals because health Care Waste management is emerging as a problem in the City of Hawassa.

Hawassa University Comprehensive Specialized Hospital is Located at Eastern part of hawassa City along the shores of Lake hawassa. It has a Total number of 3000 employees, and 1000 beds. In average 500 patients and clients comes to the hospital to get different kinds of services

Alatyon Hospital is located at southern part of hawassa city along the way to Yirgalem. It gives many services for peoples who come from different areas of hawassa city and nearby cities. It has a Total number of 500 employees, and 512. In average 50 patients and clients comes to the hospital to get different kinds of services.

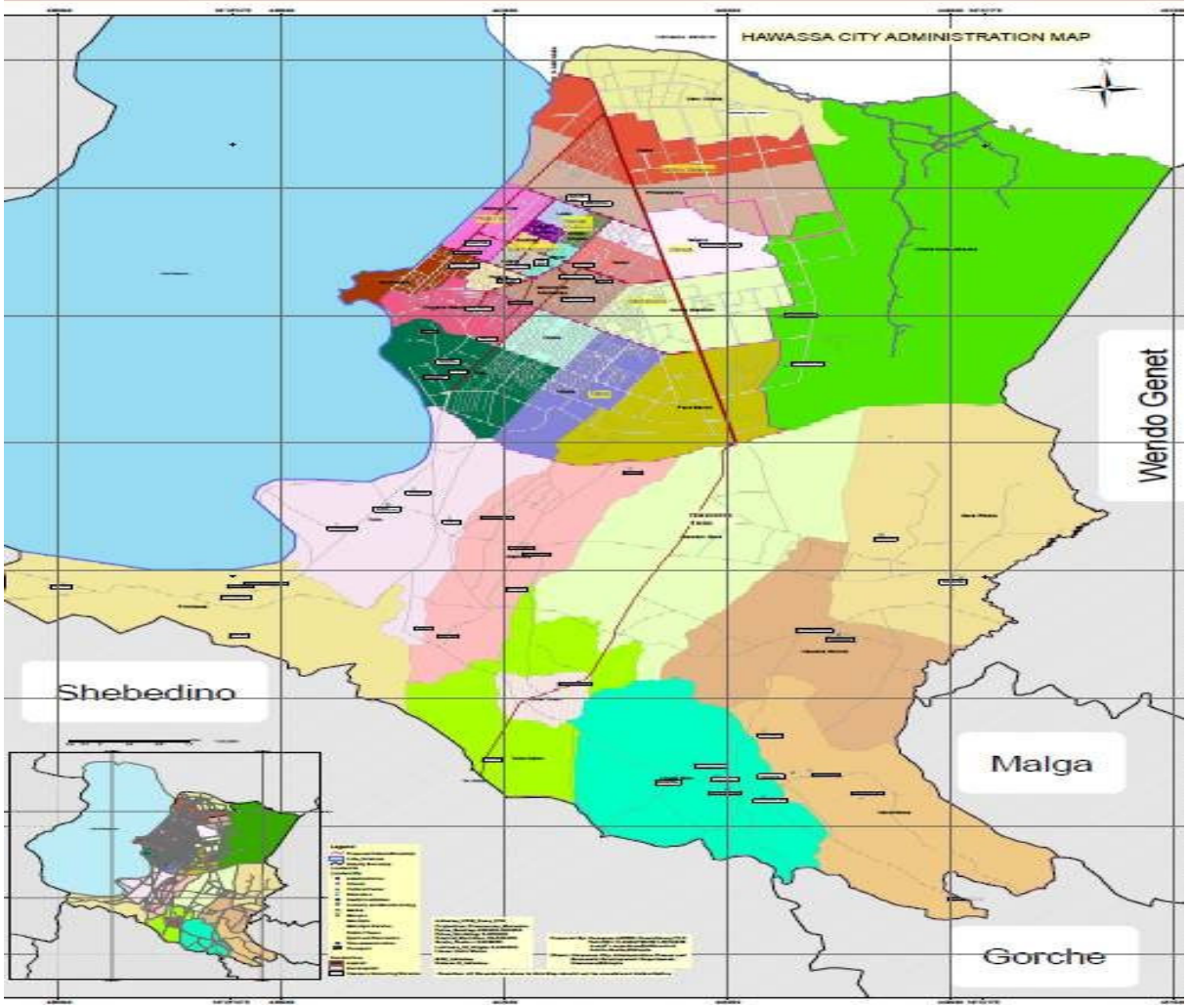

Fig 1: Hawassa City Administration Map

RESULTS AND DISCUSSIONS

Generation and classification of healthcare waste

A total of 3212.19 kg wastes were generated per week in the two hospitals (referral and Alatyon). From which more than three-fourth 2664.99 (83%) of wastes were generated from Hawassa Comprehensive Specialized Hospital. Nearly half 1082.3(40.61%) and 249.4(45.58%) of wastes were non-hazardous from Hawassa Comprehensive Specialized Hospital and Alatyon Hospital respectively. And small amount 85.9 (3.22%) and 22.6 (4.13%) of wastes were radiological respectively [Table 1].

Table 1: Characteristics of waste generated within two hospitals in each department, Hawassa city, Hawassa, Ethiopia, 2017

Waste categories in 2 hospitals	Referral hospital	Alatyon hospital
	Weight(kg/7day)	Weight(kg/7day)
Pathological waste	190.40	57.3
Infectious waste	758.35	131
Pharmaceutical waste	360.14	52.42
Sharp waste	187.9	34.47
Non-hazardous waste	1082.3	249.4
Radiological waste	85.9	22.6
Total waste generated	2664.99	547.19

The highest generation rate of total non-hazardous waste (0.107 kg/bed/day) was found in Hawassa specialized referral hospital while the lowest rate sharp waste (0.025 kg/bed/day) was found in referral hospital and also in the Alatyon hospital highest generation rate of non-hazardous waste (0.036 kg/bed/day) while the lowest generation rate was pharmaceutical waste (0.023 kg/bed/day). There was statistically significant difference between waste generation rate in specialized hospital and Alatyon hospital ($(X^2=247.08$, p-value < 0.00001). The average waste generate in Alatyon and hospital with mean and standard deviation was 14.28(±6.93) (Table 3)

Table 2: Total health care waste generation (kg/bed/ 7day) in each section /department in two hospitals, Hawassa city, Hawassa, Ethiopia, 2017

Waste categories in 2 hospitals	Referral hospital	Alatyon hospital
	(kg/bed/day)	(kg/bed/day)
Pathological waste	0.036	0.311
Infectious waste	0.029	0.297
Pharmaceutical waste	0.031	0.25
Sharp waste	0.025	0.276
Non-hazardous waste	0.107	0.396
Radiological waste	0.035	0.76
Total waste generated	0.263	1.53
Alatyon vs. referral hospital	(X2=247.08, p-value < 0.00001)	
Average waste generated Alatyon vs. referral hospital	Mean with SD (14.28±6.93)	

The majority of waste from referral hospital was infectious (median: 14.78%, range: 3.28-26.28%) and pathological waste (median: 17.5%, range: 0.7-34.3%) and the rest sharps and pharmaceutical were (median: 12.8%, range:-81.4-107%) and (median: 15.6%, range:-78.17-109.37%) respectively (Table 3).

Table 3: Daily percentage of health care waste generation rates (median, IQR*) in the studied hospitals in Hawassa city, Hawassa, Ethiopia, 2017

Name of hospital	Kg/7day					
	pathological	Infectious waste	pharmaceutical	Sharp waste	Non-HW	Radiological
Referral Hospital	17.5(±16.80)	14.78(±11.5)	15.6(±93.77)	12.8(±94.2)	15(± 91.9)	17.5(±96.5)
Alatyon Hospital	14.31(±97.38)	13.66(±93.7)	11.5(±94.8)	12.7(±95.33)	18.2(±96.6)	35(±92.9)

This study is important to determine the size of medical wastes generation rate and describe the types of wastes generated and practice waste management in the Hawassa Referal and Alatyon hospital. In the current study found that the waste generated in healthcare activities is classified in to two: Non-hazardous and hazardous waste. Non-hazardous wastes are wastes that create no risk of injury or infections.

Proper management of two hospital waste minimizes the risk both within and outside health care facilities. The first priority is to segregate wastes in to reusable or non-reusable, hazardous or non- hazardous components.

An important management is to set the institution of sharps management system, waste reduction, avoidance of hazardous substances as far as possible. Moreover, it has to ensure workers 'safety and provide secure method of waste collection and transportation.

In the hospitals surveyed the average generation rate is 1.793kg/bed/day. This rate is higher than 0.934kg/bed/day in Dhaka (Bangladesh), and lowers than 4.5/kg/bed/day in USA and 2.5kg/bed/day in France. But nearly consistent with a study on medical waste generation of 0.573kg/bed/day in Lagos (Abah and ohimain, 2011).

This study found that a total of 3212.19 kg wastes were generated per week in two hospitals (referral and Alatyon). From which more than three-fourth 2664.99(83%) of wastes were generated from Hawassa Compressive Specialized Hospital. This finding was higher from previously conducted study in Addis Abeba, according to this work; the total HCW generation rate in the hospitals was varied from 0.361 to 0.669 kg/day (Mesfin Kote Debere; eta'l, 2013). The WHO has estimated the amount of HW in developing countries to be about 16%, 1% sharps and15% infectious waste (WHO; 1999). In the present work, however, the amount of HW was higher in the studied hospitals than the amounts recommended by the WHO.

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