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Health Care Waste Management Practice in a Hospital

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ABSTRACT

Background: Health-care waste is a by-product of health care. Its poor management exposes health-care workers, waste handlers and the community to infections, toxic effects and injuries including damage of the environment. It also creates opportunities for the collection of disposable medical equipment, its re-sale and potential re-use without sterilization, which causes an important burden of disease worldwide. The purpose of this study was to find out health care waste management practice in hospital.

Methods: A cross-sectional study was conducted in Narayani Sub-Regional Hospital, Birgunj from May to October 2006 using both qualitative and quantitative methods. Study population was four different departments of the hospital (Medical/Paediatric, Surgical/Ortho, Gynae/Obstetric and Emergency), Medical Superintendent, In-charges of four different departments and all sweepers. Data was collected using interview, group discussion, observation and measurement by weight and volume.

Results: Total health-care waste generated was 128.4 kg per day while 0.8 kg per patient per day. The composition of health care waste was found to be 96.8 kg (75.4%) general waste, 24.1 kg (8.8%) hazardous waste and 7.5 kg (5.8%) sharps per day by weight. Health staffs and sweepers were not practicing the waste segregation. Occupational health and safety was not given due attention. Majority of the sweepers were unaware of waste management and need of safety measures to protect their own health.

Conclusions: Health care waste management practice in the hospital was unsatisfactory because of the lack of waste management plan and carelessness of patients, visitors and staffs. Therefore the hospital should develop the waste management plan and strictly follow the National Health Care Waste Management Guideline.

Key words: health care waste, management, practice, sub-regional hospital

INTRODUCTION

Health care waste includes all the waste generated by health care establishments, research facilities, and laboratories. In addition it includes the waste originating from 'scattered' source- such as that produced in the course of health care undertaken in the home (dialysis, insulin injections etc).[1] According to Biomedical Waste (Management and Handling) rules, 1998 of India, 'Biomedical waste' means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining there to or in the production or testing of biological and including different categories.[2] Between 75 to 90% of the waste produced by health care providers is 'non-hazardous' which is general health care waste comparable to domestic waste. The remaining 10 to 25% of health care waste is regarded as 'hazardous' waste.[3]

Health care establishment generates solid waste, which

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is harmful to public health and environment due to its infectious and hazardous nature. However the health care institution's service and number has increased, the hazard from the improper waste management has also been increased to the greater extent.[4] Health care waste management refers to all the activities, administrative and operational, involved in the handling, treatment, storage, and disposal of waste. The management of health care waste requires its removal and disposal from the health care establishments as hygienically and economically as possible, by methods that all stages minimizes the risk to public health and to the environment.[5]

The objective of the study was to find out health care waste management practice at Narayani Sub-Regional Hospital, Birgunj.

METHODS

A cross-sectional study was conducted in Narayani Sub-Regional Hospital, Birgunj during May-October, 2006. Both quantitative and qualitative research method was applied. The ethical approval was taken from Sub-Regional Hospital, Birgunj to conduct the study. Verbal informed consent was taken from participants before interview. The study population was four different departments of the hospital (Medical/Paediatric, Surgical/Ortho, Gynae/Obstetric and Emergency), Medical Superintendent, In-charges of four different departments and all 31 sweepers.

The Medical superintendent and In-charge of different departments were interviewed on their health care waste management practice regarding segregation, collection, transportation, storage, treatment and disposal of health care waste and existing hospital policy on health care waste management. Similarly, 31 sweepers were interviewed to assess their knowledge and practice regarding health care waste management. Measurement of the health care waste was done by using spring balance and bucket. Before going to do measurement of waste, the waste was segregated in to 3 different types viz. general waste, hazardous waste and sharps.

After segregation, waste was measured for weight and volume by standard weighing balance and volume measuring container respectively and noted down in the note book. The amount of wastes generated was measured daily for 15 days and average amount and volume of waste produced per person per day was calculated. Observation was made at different locations like waste generation point, collection and segregation sites, transportation, storage, treatment and disposal sites to ensure in the quantity produced. Similarly, practices adopted by the hospital were examined critically. Group Discussion was done among the in-charges of different departments of the hospital and in-charge of sweepers. It was done to gather more information and to validate the data collected in interview. Questionnaire, Observation checklist, group discussion guideline, spring balance and bucket were used as tools for data collection.

Pre-testing of the tools was done in Gandaki Regional Hospital, Pokhara. Triangulation of the data was done for the internal validity of the study.

RESULTS

Analysis of health care waste

Total health care waste generated in Narayani Sub-Regional Hospital was found to be 128.4 kg per day and total waste generation per patient was 0.8 kg per day. General wastes were nearly 4 times and 12 times more than that of hazardous and sharps respectively (Table 1).

Based on measurement, the composition of health care waste in Narayani Sub-Regional hospital was found to be general waste 75.4% by weight and 71.0% by volume, hazardous waste 18.8% by weight and 21.0% by volume and sharps 5.8% by weight and 8.0% by volume (Table 2).

Among four departments Surgical/Ortho department produced more wastes than others i.e. 46.7 kg / day by weight and 80.0 lit/day by volume and least waste was produced by Emergency i.e. 12.1 kg/day by weight and 12.5 lit/day by volume. General and hazardous wastes were produced higher in Surgical/Ortho ward where as sharps wastes were produced higher in Emergency than others. Sharp wastes occupies 20.7% of the total wastes in Emergency where as in other departments it occupies 2 to 5% of the wastes which is nearly 5 times lower than Emergency department (Table 3).

Table 1. Total waste generation by hospital

Hospital	Total beds	Bed occupancy rate (%)	Waste produced (kg/day)				Waste generation (kg/ pt/day)
			General	Hazardous	Sharps	Total	
Narayani Sub-Regional Hospital	250	65	96.8	24.1	7.5	128.4	0.8

Table 2. Health care waste composition by weight and volume

Type of waste	By weight Kg/day (%)	By volume Lit/day (%)
General waste	96.8 (75.4)	168.0 (71.0)
Hazardous waste	24.1 (18.8)	49.5 (21.0)
Sharps	7.5 (5.8)	19.0 (8.0)
Total	128.4 (100)	236.5 (100.0)

Table 3. Waste generation from different departments

Name of department	Type of waste	Amount of waste Kg/day (%)	Amount of waste Lit/day (%)
Medical/ Paediatric ward	General	30.7 (76.4)	52.0 (72.2)
	Hazardous	7.5 (18.6)	15.0 (20.8)
	Sharps	2.0 (5.0)	5.0 (7.0)
Total	-	40.2 (31.3)	72.0 (30.4)
Surgical/ Ortho ward	General	35.0 (75.0)	56.0 (70.0)
	Hazardous	9.2 (19.7)	18.0 (22.5)
	Sharps	2.5 (5.3)	6.0 (7.5)
Total	-	46.7 (36.4)	80 (33.8)
Gynae/ Obstetric ward	General	23.5 (80.0)	40.0 (72.7)
	Hazardous	5.4 (18.3)	13.0 (23.6)
	Sharps	0.5 (1.7)	2.0 (3.7)
Total	-	29.4 (22.9)	55.0 (23.3)
Emergency	General	7.6 (62.8)	20.0 (67.8)
	Hazardous	2.0 (16.5)	3.5 (11.8)
	Sharps	2.5 (20.7)	6.0 (20.4)
Total	-	12.1 (9.4)	29.5 (12.5)
Grand total	-	128.4 (100.0)	236.5 (100.0)

Segregation of waste

As per the study segregation of the waste was not practiced properly. In the past, different color-coding buckets had been managed for the segregation of waste at generation point but the system had not been followed accordingly. During the time of study there was no proper segregation system. Color coding buckets were not practiced for the segregation of wastes. There was a provision of needle proof containers in each room of different departments of the hospital, which was used sometimes only by nurses for the segregation of needles, but it was also observed that needles and sharp wastes were mixed with general waste in the bucket.

Collection of waste

There was no separate collection system for general, hazardous and sharps wastes. All wastes were collected in the same bucket and taken either to the municipal collection point or hospital collection point according to the sweeper's convenience. It was observed that almost all containers were uncovered and all containers were plastic buckets. There was no system of documentation and registration of collected wastes.

Transportation of waste

Manual transportation of waste was found in the hospital. Vehicles were not used for waste transportation from the point of generation to the treatment/disposal area. Sweepers used 20 lt. bucket for the transportation of waste but the waste was found unsealed during transportation

Storage of waste

Storage system of collected waste was not found and observed during the study period.

In-charges of different departments of the hospital, nurses, other health workers and sweepers were unknown about the concept of storage of hazardous waste after collection and segregation. There was no separate room for the storage of waste. The generated wastes were directly disposed either into municipal container or disposal area of the hospital. It was found that sometimes wastes were stored haphazardly in toilet area in typical conditions like long holydays, strikes, and heavy rainfall.

Treatment of waste

The hospital did not have proper treatment facilities. The hospital had one incinerator and it was used only for the treatment of placenta in the past. Later it was stopped on special request of public who live near the incinerator as it produced bad smell. Now surprisingly it was found that placenta and tissues produced during operation were burned openly at the disposal site of the hospital. Needle and syringes were burned openly before disposal.

Disposal of waste

The hospital had adopted two types of disposal system, burial and dumping. Waste disposal within health care institution was not effective, as it was simply buried or openly dumped. General, hazardous and sharps wastes were not segregated before disposal; they were buried or dumped together. There was not special and scientific pit for burial. The dumping and burial sites were very close to the hospital, which was making nuisance. During the study period, it was observed that street children were coming to collect plastics, syringes and needles at hospital dumping site.

Hospital policy, occupational health and safety

The house keeping department of the hospital was functionless. At administration level there was not designation of responsible person for organization and management of segregation, collection, transport, storage, treatment and disposal of health care waste. The separate budget was not allocated for hospital waste management. National guideline or manual document on management of hospital waste was not available there. Hospital had neither waste management plan nor own written document of health care waste management. The source of water was within 50m of waste disposal site of the hospital.

Hospital hadn't adopted any vaccination program to the persons involved in segregation, collection, transport, storage, treatment and disposal of health care waste. Hospital hadn't organized any training related to health care waste management to concern hospital staffs and sweepers and newly appointed staffs. Hospital was unable to provide sufficient protective measures such as utility gloves, surgical gloves, masks, aprons, caps, and boots according to the demand of sweepers therefore the condition was grave.

Knowledge and Practice of sweepers

About 35.0% of the sweepers thought that sharps need more care while handling and most of them were literate. About 65.0% of the respondents answered they never practiced of segregation. About 32.0% had no idea and 3.0% segregated the waste. About 52.0% of the sweepers said that it is not a good practice to collect general, hazardous and sharps into same bucket, but 19.0% said it is a good practice. Hundred percent of sweepers used gloves as protective measures but only 58.0% used mask, 16.0% used apron and 3.0% used boots during handling of waste. All sweepers were injured in the past one year while handling waste out of them about 42.0% injured less than 5 times. None of the sweepers had taken the vaccine against Hep-B. Hospital had not provided any in-service training to the sweepers related to health care waste management.

DISCUSSIONS

In an average 128.4 kg of waste was produced per day from Narayani Sub-Regional Hospital. Of the total wastes, 75.4% waste was general, and hazardous and sharps constitute about 24.6%. A study done in Kathmandu showed that small amount (25%) was of hazardous nature, which requires special handling and treatment prior to final disposal.[6]

If there were proper management of general waste then bulk of the total waste could be managed effectively. As hazardous and sharp wastes are infectious to human health, it should be managed properly to protect the health and environment.[2] Most of the health care waste was produced by Surgical/Ortho department i.e. 46.7 kg/day, which was followed by Medical/Paediatric department that produced 40.2 kg/day. Therefore proper attention should be paid to manage the waste produced from these departments. During the study it was found that all types of waste were collected in the same bucket and disposed either into the hospital disposal site or municipal collection point without segregation. It is observed that on an average, 28.0% separate only sharps, 19.4% separate sharps, infectious and non infectious, 8.3% separate the waste as infectious and non infectious, there is no separate collection of sharps and 44.4% do not segregate waste at all.[7] It was also found that all containers were uncovered. Proper waste handling and segregation are key steps that should be followed carefully for the minimization and effective management of health care wastes. Since 80 to 85% of the wastes is usually non-hazardous in nature and can be disposed along with the municipal solid waste, it is important that hazardous waste component is separated from the general waste.[3]

Manual transportation by using uncovered plastic buckets was practiced that may cause splitting of waste and may be hazardous to human health. Health care waste should be transported within the hospital and other facility by means of wheeled trolleys, containers or carts that are not used for any other purposes. There was no storage facility and separate room for the storage. All types of wastes were stored haphazardly inside the toilet when sweepers were absent for long time, which was not a safe practice. Central storage facility should be located within the hospital premises close to the incinerator. The area should be large enough to contain all the hazardous wastes, produced by the hospital. In-charges of different departments of the hospital, nurses, other health workers and sweepers were unaware about the storage of hazardous wastes. Open incineration was practiced for the treatment of health care waste in the hospital. Placenta and body parts were burned separately which was a good practice where as other general, hazardous and sharps were pilled up together for long days, and then openly burned and buried. An incinerator was provided, which was used for the treatment of placenta in the past. But now the incinerator has not been used for the treatment of any hazardous waste. There was no regular treatment and disposal practice followed by the hospital. The wastes were disposed in the absence of a special health care waste treatment facility. Such unsafe disposal practices may lead to transmission of HIV/AIDS and Hepatitis B.

Appropriate training package related to waste management had not been developed which is required for health staff and sweepers. There was a functionless housekeeping department, which should be responsible for over all health care waste management. Sufficient protective materials couldn't be provided to the waste handlers. Study on 36 institutions by ENPHO showed that 56% provide gloves and or masks to the handlers. In addition to gloves and masks, 19% of the institutions have provision of vaccination against Hepatitis B, 25% do not provide any safety measures.[5] Waste management committee was not formed which has a due importance to look after occupational health and safety activities. Hospital lacks the national guideline and own written document for effective waste management. It is essential that everyone concerned by health-care waste should understand that health-care waste management is an integral part of health care, and that creating harm through inadequate waste management reduces the overall benefits of health care[8].

The mixing of general, hazardous and sharps wastes were might be due to lack of proper training and instruction about waste segregation system. It was also due to carelessness of patients, visitors and staffs. Even hospital administration, doctors, nurses and other staffs had not given due priority to effective waste management. On the basis of analysis done in the hospital, it was found that total health care waste generated was 128.4 kg per day and 0.8 kg per patient per day. The composition of health care waste was found to be general waste 96.8 kg/day by weight and 168.0 lit/day by volume, hazardous waste 24.1 kg/day by weight and 49.5 lit/day by volume and sharps 7.5 kg/day by weight and 19.0 lit/day by volume. Only 5.8% of the waste was sharps, 18.8% hazardous, and the rest 75.4% was general, therefore proper waste segregation could minimize the amount of hazardous waste that facilitates cost effective, easy treatment and disposal. Based on the study the hospital should regulate the house keeping department as it is the center for effective health care waste management.

Althogh the study has made an effort to find the flaws in the system of waste management in Narayani Sub-Regional Hospital , it has its limitation. A better designed study at a regional, national level with more elaboration and randomisation

CONCLUSIONS

The study concludes that the waste management system in Narayani Sub-Regional Hospital is poor. The segregation, collection, transportation, storage and disposal practice of the hospital waste was found unsatisfactory. Hospital should develop health care waste management plan strictly following the National Health Care Waste Management guideline. Training package for waste management should be developed for all hospital staffs including sweepers.

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