A Study to assess the Practice of Biomedical Waste Management by the Primary Health Centres in Bangalore Rural district, Karnataka

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Abstract

Background: The twentieth century witnessed the rapid mushrooming of hospitals in public and private sectors in urban as well as in rural areas, dictated by the needs of the expanding population, producing voluminous quantities of rubbish, garbage and biomedical waste each day from wards, operation theatres and outpatient areas which affect the health of the people and environment.
Objectives: To assess the existing Biomedical Waste Management (BMWM) practices of Primary Health Centres (PHCs). To determine the association between Biomedical Waste Management practices of Primary Health Centres with its extraneous variables.
Material and Methods: Descriptive survey was used to find out the existing practice of Biomedical Waste Management in Primary Health Centres. The study was conducted on 45 Primary Health Centres in Bangalore rural district by using purposive sampling technique and data was collected through rating scale. The collected data were analyzed and interpreted by using descriptive and inferential statistics.
Results: The total mean score was 16.34 which is 10.73% of maximum Practice Score revealing very poor practice on BMWM in Primary Health Centres of all four taluks. Out of 45 Primary Health Centres, the overall mean score was 13.38 which is 8.8% for Doddaballapura taluk which shows very poor practice on BMWM.
Conclusion: From the findings of the present study, it can be concluded that the practice of Biomedical Waste Management in Primary Health Centres was very poor.
Keywords: biomedical waste management, primary health centres, practice.

Introduction

The hospital is a residential establishment which provides short term and long term medical care consisting of observational, diagnostic, therapeutic and rehabilitative services that produce biomedical wastes. With the advent of the 21st century and the increased utilization of disposable materials that have been implemented to reduce the rates of infectious diseases, it is of utmost importance to manage hazardous biomedical waste in order to advert significant untoward consequences in the form of morbidity and mortality. Health care institutions which are responsible for the safe care of the population are producing voluminous quantity of rubbish, garbage and biomedical waste each day from wards, operation theatres and outpatient areas. Proper management of biomedical waste is essential to maintain hygiene, aesthetics, cleanliness and control of environmental pollution [1].

With the growth of hospitals and health care centres in response to rapid population growth, the problem of safe handling and disposal of biomedical wastes also increased. The 20th century witnessed the rapid mushrooming of hospitals in public and private sectors in urban as well as in rural areas, dictated by the needs of the expanding population [2]. The advent and acceptance of disposables has made the generation of biomedical waste a significant factor in present hospitals and health care centres. However, biomedical waste is the common source of many communicable diseases including HIV & Hepatitis-B and C, which is a major concern around the world [3].

The management of biomedical waste is still in its infancy stage all over the world. There is a lot of confusion among the generators, operators, decision-

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makers and the general community about the safe management of bio-medical waste. The reason may be due to the lack of awareness. Hence, resource material on bio-medical waste management for hospital staffs including nurses is the need of the hour [4].

A comprehensive understanding of the quantities and characteristics of the material that needs to be managed was one of the most basic steps in the development of a plan for solid waste management. Limited reliable information was available in the open literature on the quantities and characteristics of the various types of wastes that are generated in healthcare facilities. Thus sound management of these wastes, particularly in developing countries, is often problematic [5, 6].

The ministry of Environment and Forest of India has notified bio-medical waste (Management and Handling) Rules in the year 1998. According to the bio-medical waste (Management and Handling) Rules (1998), "Bio-medical waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animal or in research activities pertaining thereto or in the production or testing of biological and including all categories of waste" [7].

A case study was conducted in Irbid city revealed that hospitals have less appropriate practices when it comes to the handling, storage, and disposal of wastes generated. There are no defined methods for handling and disposal of these wastes, starting from the personnel responsible for collection through those who transport the wastes to the disposal site. The number of patients, number of beds, and type of hospital were determined to be significant factors on the prediction of quantities of waste generation [8].

More over the author has come across rare studies in India and abroad on the estimation of waste production and management of waste in rural areas and most of them focused on the urban areas and cities health care setups. Though the waste produced by PHCs seems to be vary in quantity, it is felt that even a smallest unit of infectious material can spread the diseases faster in the rural area when compared to urban area due to non-availability of and poor facilities related to disposal of waste such as drainage, water supply, etc [9, 10].

It is felt that Primary Health Centres (PHCs) even though seem to be the smallest units of health center, may produce good quantity of waste and

improper disposal of BMW of the PHCs may have serious threat to the rural population. Thus, researcher finds it is necessary to find out the existing practice of biomedical waste management in PHCs.

Hypothesis Biomedicals

$H0_1$: There is no significant difference between the Practice Scores (PSs) of the Bio medical waste management practices of PHCs with the selected extraneous variables.

Material and Methods

A descriptive survey was used to assess the existing bio-medical waste management practice in Primary Health Centres (PHCs). The study was conducted at Primary Health Centres in Bangalore rural District, Karnataka. All the 45 primary health centres from Bangalore rural District were selected for the study. Bangalore Rural District consists of four taluks such as Nelamangala (9 PHCs), Doddaballapura (16 PHCs), Devanahalli (10 PHCs) and Hosakote (10 PHCs). Further, 392 health workers working in sample PHCs including Medical Officers (MOs) were included as samples for the study.

PHCs of Bangalore Rural District and all the health workers such as Medical Officer, Block Extension Educator (BEE), Health Inspector, Staff Nurse, Lady Health Visitor (LHV) and Health Assistant (female & male) working in these PHCs were selected as sample by using purposive sampling technique. The researcher by him-self collected the data by using five point Likert-like rating scales on biomedical waste management through non participating observation from sample PHC. The data was collected for the period of six months from 1st March 2009 to 31st August 2009. Collected data were coded, grouped and analyzed by using descriptive statistics such as percentage, mean, median and standard deviation and Inferential statistics.

Further, the overall score ranges from 0 to 152 and the level of practice is classified as Very poor (0-30 scores), Poor (31-60 scores), Good (61-90 scores), Very Good (91-120 scores) and Excellent (121-152 scores) based on the percentage of maximum scores.

Results

Results of the study presented under the following headings: **Section I: Percentage-wise distribution of extraneous variables related to PHCs:** Out of 45 Primary Health Centres, majority (84.4%) of the PHCs had one Medical Officer (MO) and around fifty percent of PHCs had MO with 6 years and above experience and worked for a period of 1-2 years at the present PHC. Only 13% of PHCs had one Block Extension Educator (BEE) and about 33% of PHCs had 2 & above Staff Nurses. Around 60% of PHCs had one Sr. Health Assistant (F) and percentage (55.56%) of PHCs had one Health Inspector and more or less similar (55.6%) percentage of PHCs also had one Jr. Health Assistant (M). Fifty six percent of PHCs were between 31-35 kms. from the city. Only around 16% of the MOs working in PHCs had attended in-service education on Bio Medical Waste Management (BMWM) of which 62.36% of the MOs attended in-service education at taluk level. Higher percentage (51.11%) of PHCs had 11to15 Health workers and only 15.56% of PHCs had 16 to 20 Health workers.

Section 1. Assessment of practice of PHCs on Bio Medical Waste Management (BMWM):
1.Assessment of existing BMWM practice in various Taluks

Table 1. Assessment of Mean, SD and Mean % of BMWM PSs of PHCs in various Taluk.

Taluk Name	No. of PHCs	Practice Scores		
		Mean	SD	Mean %
1. Nelamangala	9	16.44	3.81	10.82
2. Doddaballapur	16	13.38	3.54	8.8
3. Devanahalli	10	21.8	6.16	14.34
4. Hosakote	10	13.6	4.09	8.95
Over all	**45**	**16.3**	**4.4**	**10.73**

Taluk-wise assessment of mean, SD and mean% of Practice Scores (PSs) on Bio Medical Waste Management (BMWM) shows that highest mean PS was 21.8 ± 6.16 which is 14.34% in Devanahalli taluk and the lowest mean PS was 13.3 ± 3.54 which is 8.8% in Doddaballapur taluk. However, the overall mean PS was 16.3 ± 4.4 which is 10.73% of maximum PS. It shows very poor practice on BMWM in the PHCs under all the four taluks under study (Table-1).

Table 2. PHC-wise comparison of Mean, SD and Mean % of BMWM PSs in Nelamangala Taluk.

Name of the PHC	Existing Practice scores		
	Mean	SD	Mean %
Shivagange	21	0.65	13.82
Thadasigatta	15	0.5	09.87
Modalakote	18	0.56	11.84
Dabaspet	17	0.55	11.18
Yelekyathnalli	15	0.55	09.87
Asiruvalli	16	0.55	10.53
Marugondanahalli	15	0.55	09.87
Manne	22	0.55	14.47
Byranayakanahalli	9	0.43	05.92
Over all	**16.44**	**0.54**	**10.82**

Max Score=152

PHC wise comparison of mean, SD and mean% of Practice Score (PS) on BMWM under Nelamangala taluk shows that out of nine PHCs the highest mean PS (22 ± 0.55) which is 14.47% was for Manne PHC and the lowest mean PS (9 ± 0.43) which is 5.92% was for Byranayakanahalli PHC revealing very poor BMWM practice in all the PHCs (Table-2).

Table-3: PHC-wise comparison of Mean, SD and Mean % of BMWM PSs in Doddaballapura Taluk.

Name of the PHC	Existing Practice scores		
	Mean	SD	Mean %
Thubugere	16	0.5	10.53
Dodda hejjagi	12	0.53	7.89
Konenahalli	21	0.72	13.82
Konaghatta	13	0.48	8.55
Hulikunte	18	0.69	11.84
S.S.Ghati	19	0.51	12.5
G.Hosahalli	12	0.47	7.89
Melekote	12	0.47	7.89
Sasalu	7	0.39	4.61
Arudi	11	0.46	7.24
Kammasandra	11	0.46	7.24
Kanasavadi	13	0.48	8.55
Dodda Tumkur	13	0.48	8.55
Maralenahalli	10	0.45	6.58
Kadanuru	13	0.58	8.55
Halenahalli	13	0.53	8.55
Over all	**13.38**	**0.51**	**8.8**

Max Score=152

PHC-wise comparison of mean, SD and mean% of Bio Medical Waste Management (BMWM) PSs of PHCs in Doddaballapura taluk shows that out of 16 PHCs the highest mean PS (21 ± 0.72) which is 13.82% was for Konenahalli PHC and the lowest mean PS (7 ± 0.39) which is 4.61% was for Sasalu PHC depicting very poor BMWM practice in all the PHCs (Table-3).

Table 4. PHC-wise comparison of pre and post Interventional out comes (IO) Mean SD and Mean % BMWM PS s in Devanahalli Taluk.

Name of the PHC	Existing Practice scores		
	Mean	SD	Mean %
Aradeshehalli	29	0.63	19.08
Kundada	22	0.76	14.47
Nalluru	23	0.72	15.13
Avathi	25	0.67	16.45
C.R.Pattana	29	0.75	19.08
Khohira	16	0.6	10.53
Kharehalli	11	0.52	7.24
Saadahalli	18	0.65	11.84
G.M.Halli	28	0.76	18.42
Bhoodigere	17	0.69	11.18
Over all	**21.8**	**0.68**	**14.34**

Max Score=152

PHC-wise comparison between mean, Standard Deviation (SD) and mean% of BMWM PSs in Devanahalli taluk shows that out of 10 PHCs, the highest mean PS was (29 ± 0.63) which is 19.08% each for Aradeshehalli and C.R.Pattana PHCs and the lowest mean PS (11 ± 0.52) which is 7.24% was for Kharehalli PHC revealing very poor BMWM practice in all the PHCs (Table-4).

Table-5: PHC-wise comparison of Mean, SD and Mean % of BMWM PSs in Hosakote Taluk.

Name of the PHC	Existing Practice scores		
	Mean	SD	Mean %
Jadagenahalli	13	0.48	8.55
Soolibele	13	0.48	8.55
Anugondanahalli	17	0.55	11.18
Nandagudi	18	0.56	11.84
Khaji Hosahalli	15	0.5	9.87
Bylanarasapura	14	0.49	9.21
K.Mallasandra	16	0.5	10.53
Mugabala	16	0.5	10.53
Bendigenahalli	10	0.45	6.58
Muthasandra	4	0.31	2.63
Over all	**13.6**	**0.48**	**8.95**

Max Score=152

PHC-wise comparison of mean, SD and mean% of Bio Medical Waste Management Practice Scores (BMWM PSs) in Hosakote taluk shows that out of 10 PHCs, the highest mean PS (18 ± 0.56) which is 11.84% was for Nandagudi PHC and the lowest mean PS (4 ± 0.31) which is 2.63% was for Muthasandra PHC which shows very poor BMWM practice in all the PHCs (Table-5).

Section 2. Association between the PSs of PHCs on BMWM with their extraneous variables.

To find out the association between the Practice Scores (PSs) of BMWM of the extraneous variables under study hypotheses were formulated and chi-squire was calculated.

Table7. Association between the PSs of the PHCs with the extraneous variables.

Demographic Variables	d.f	Table Value	Existing Practice		
			Chi-Square	p-value	L o S
Number of MOs working.	1	2.71	1.69	**0.19**	NS
Years of Experience of MOs (total).	1	2.71	0.34	**0.56**	NS
Duration of service of MOs in sample PHC	2	4.61	0.20	**0.90**	NS
Number of BEE working.	1	2.71	0.48	**0.49**	NS
Number of Staff Nurses working.	1	2.71	0.04	**0.85**	NS
Number of LHVs working.	1	2.71	0.03	**0.86**	NS
Number of Jr. Health Asst. (F) working	1	2.71	2.74	**0.10**	NS
Number of Health Inspectors.	1	2.71	1.92	**0.19**	NS
Number of Jr. Health Asst. (M) working	2	2.71	4.27	**0.12**	NS
Distance of PHC from City.	1	2.71	3.74	**< 0.1**	S
Duration of training provided on BMWM.	1	2.71	0.23	**0.63**	NS
Place of training provided on BMWM.	1	2.71	0.01	**0.94**	NS
Number of health workers in PHC	2	2.71	0.76	**0.68**	NS

LoS=Level of Significance, NS= Not Significant, S= Significant, PHC= Primary Health Centre.

No significant association was found between PSs when compared to Number of MOs, Years of Experience of MO (total), Duration of service in the sample PHC, duration of service of MO, number of BEE, number of Staff Nurses, number of Lady Health Visitors, number of Health Asst. (F), Number of Health Inspectors, number of Health Asst. (M), duration of training provided on BMWM, Place of training provided on BMWM and number of health workers in PHC. Hence, it can be interpreted that the difference in mean PS values related to the above extraneous variables were only by chance and not the true difference and the null hypothesis is accepted.

However, significant association was found between existing PS value when compared to distance of PHCs from city, in the sample PHC (p<0.01). Hence, it can be interpreted that the difference in mean PS values related to distance of PHC from city and practice were true and the null hypothesis is rejected. It might be that those PHCs which were above 26 kilometers were more interested as they are not able to use facilities of the city (Table-7). Hence, it reveals that the existing practice was very poor for all the PHCs under study.

Discussion

Taluk-wise BMWM Practice Scores (PSs) before the intervention shows that the highest mean PS was 21.86 which is 14.34% in Devanahalli taluk and the lowest mean PS was 13.38 which is 8.8% in Doddaballapur taluk. Further, overall mean score was 16.34 which is 10.73% of maximum PSs revealing very poor practice on BMWM in all the PHCs under the four taluks (Table 4). It is supported by Hosny and El-Zarka (2005) who have stated that the most common problems associated with biomedical wastes are the absence of waste management, lack of awareness about their health hazards, insufficient financial and human resources for proper management, and poor control of waste disposal [10]. Tsakona, Anagnostopoulou, Gidarakos also stated that negligence was observed at every stage of the waste management practices in most of the health care centres [11].

Area-wise comparison of pre & post IOs related to mean PSs on Bio Medical Waste Management (BMWM) before intervention shows that out of five areas, the mean PS was the highest (1.51) on legal, ethical and BMWM policy areas which is 18.89% of the total score and the lowest mean PS (0.42) which is 2.11%, was for generation and segregation revealing very poor practice in the areas related to BMWM in the Primary Health Centres (PHCs) under study.

It is similar to the statement of , Anagnostopoulou, and Gidarakos who mentioned that negligence were observed at every stage of the waste management system. Inappropriate generation and segregation practices were the dominant problems, which led to increased quantities of generated infectious waste [11].

Conclusion

The PHCs had only 10.73% of the maximum practice score and area-wise practice on BMWM during pre interventional out comes shows that out of five areas the mean score was highest (15.890.42) which is 10.47%, revealing very poor practice on Bio Medical Waste Management in all PHCs.

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