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Knowledge, Attitude and Practices of Biomedical Waste Management among Health Care Personnel in Selected Primary Health Care Centres: A Literature Review

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Abstract

Background: Lack of adequate knowledge regarding bio-medical waste management leads to health risks as well as environment apprehension. Proper handling and disposal of bio-medical waste is therefore very important. The present study aimed to assess the knowledge and practice of bio-medical waste management among the health care personnel in selected primary health care centers in Lucknow. ***Methods:*** This was a Cross-Sectional study conducted among health care personnel working at the Primary Health Centres. A total of 89 health care personnel comprising of doctors, nurses, health workers, laboratory technicians, pharmacists and class IV workers were interviewed with a pre-designed and pretested semi-structured questionnaire. ***Results:*** About 35.0% of the staff nurses, 56.2% of paramedical staff and none of the class IV workers had complete knowledge about colour coding and segregation of bio medical waste. As compared to other health care personal, only 18.8% of class IV workers had heard about universal precautions, while 45.4% were concerned about needle stick injury. None of the class IV workers had ever received training for BMW management. Proportion of staff nurses, paramedical staff and class IV immunized for Hep B Vaccine was 50%, 21.8% and 9.1% respectively. ***Conclusions:*** The study revealed lack of knowledge and awareness about bio-medical waste management amongst primary healthcare workers which results in inadequate handling and management, thereby exposing them as well as the general public to health and environmental hazards. ***Design:*** A literature review. ***Material and Method:*** PubMed, Researchgate, Google scholar database were used to search the literature, Studies were included only if the data on biomedical waste management.

Keywords: Knowledge; Attitude; Practices; Biomedical waste; Healthcare personnel.

Introduction

Biomedical waste is defined as waste generated during the diagnosis, testing, treatment research or production of biological products for humans or animals. It includes syringes, live vaccines, laboratory samples, body parts, bodily fluids and waste, sharp needles, cultures and lancets. Biomedical waste can be categorized into nonhazardous and bio-hazardous.[1] Approximately 75- 90% of the biomedical wastes are non hazardous and as harmless as any other municipal waste. The remaining 10-25% is hazardous and can be injurious to humans or animals and deleterious to

environment.[2]

Bio-medical waste is of great importance due to its potential environmental hazards and health problems. The waste produced in the course of health care activities carries a higher potential for infection and injury than any other type of waste.[3]

Objectives

The Objectives of this study was to systematically review the literature to:

1. The literature review would be easily accessible.
2. It is related to the study and will be helpful in my further.

RESULT

About 35.0% of the staff nurses, 56.2% of paramedical staff and none of the class IV workers had complete knowledge about colour coding and segregation of bio medical waste. As compared to other health care personal, only 18.8% of class IV workers had heard about universal precautions, while 45.4% were concerned about needle stick injury. None of the class IV workers had ever received training for BMW management. Proportion of staff nurses, paramedical staff and class IV immunized for Hep B Vaccine was 50%, 21.8% and 9.1% respectively.

Conclusion

The study revealed lack of knowledge and awareness about bio-medical waste management amongst primary healthcare workers which results in inadequate handling and management, thereby exposing them as well as the general public to health and environmental hazards.[4] Literature review reveals that risk the knowledge and practices among biomedical waste management.

Inclusion and Exclusion Criteria

Studies were included only if the data onknowledge, attitude and practice regarding biomedical waste management. Studies publish from January 2005 to November 2019 were considered, the studies which were revealing prevalence differences in gender were included. The conferences articles, abstract, case report were excluded.

METHOD

Data and Sources of Data

Literature search

A literature review search was carried out in the following electronic bibliographic databanks: Medline / pubMed and the Google Scholar, included all publications up to September 2019. Search words collected biomedical waste management for all years. Restriction based on 2005 January to September 2019 publication year.

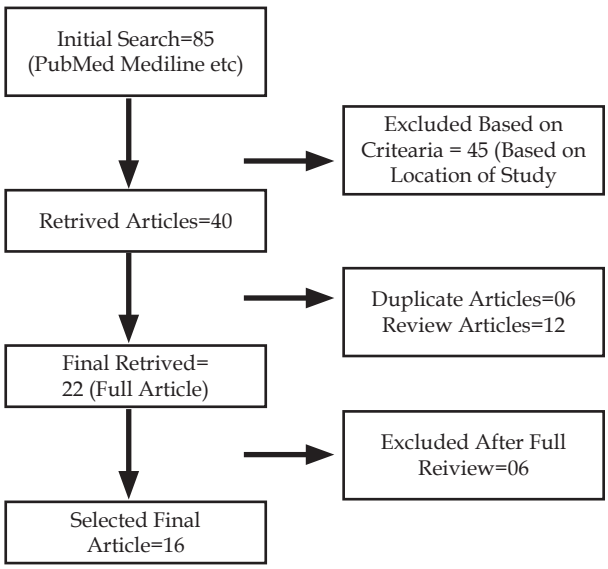

Fig. 1: Study selection process

Results and Discussion

Literature review suggest that these are few factors influencing the prevalence such as age, socio economic condition and working experience, gender, vaccination. Study by khakharvipul 2012, overall positive rate of hbsag was (1%) and positivity was higher among experience of more than 30 years in health profession. Another study done by ***Dr sathishr. Patil (2016)*** reveals that Sero prevalence (2.25%) was found to be significant among 51-60 years of age group, similar study done by Dr. Lavalina Agrawal suggests that the highest Sero-prevalence (3.9%) of hbsag was found in patient's Age group of 35-44 years as well as a study done by Singhal boardsero positivity significantly higher among vaccinated (79%) then unvaccinated among health care providers. Praveen Kumar Gautam study (2018) revels that overall prevalence was 2.28% ands Sero positivity was higher among in age group of 21-30 years. Another study by Purushottam K. Kaundal suggests that Sero positivity (28.9%) and it's higher among younger age group age group 21-40 years.

Table 1:

S. No	Author detail with year of publication	Region of study	Study design	Study sample	Period	Gender	Major findings
1	Neeraj Kumar Gupta1, Mukesh Shukla2*, Shantanu Tyagi3	primary health care centres of Lucknow.	Cross-Sectional study	89 health care personnel	1 Month	89 health care personnel	About 35.0% of the staff nurses, 56.2% of paramedical staff and none of the class IV workers had complete knowledge about colour coding and segregation of bio medical waste. As compared to other health care personal, only 18.8% of class IV workers had heard about universal precautions, while 45.4% were concerned about needle stick injury. None of the class IV workers had ever received training for BMW management. Proportion of staff nurses, paramedical staff and class IV immunized for Hep B Vaccine was 50%, 21.8% and 9.1% respectively.(Gupta, 2016)[5]
2	Imaad Mohammed Ismail*, Annarao G. Kulkarni, Suchith V. Kamble, Sagar A. Borker, Rekha R and Amruth M	KVG Medical College, Sullia, Karnataka, India.	Cross sectional study	120 health care personnel	May 2012 to August 2012	120 health care personnel	The study revealed that knowledge regarding colour coding and risks of handling bio-medical waste was poor across all the 4 groups especially among class-IV waste handlers. Majority of the study participants had never undergone any training on bio-medical waste management and there was a felt need for the same. A meagre 36% doctors, 43% nurses, 30% lab-technicians and 13% class-IV waste handlers were discarding the bio-medical waste according to colour code. Among the class-IV waste handlers 67% reported needle stick injury. Conclusion: As the knowledge and practice regarding bio-medical waste management was poor there is a need to conduct periodic training and retraining workshops with special focus on proper use of personal protective gear.[6]
3	Fawaz Pullishery1* , Ganesh Shenoy Panchmal2 , Sabin Siddique3, Anna Abraham4	health care personnel in different hospital settings in Mangalore	Cross sectional study	157 health care personnel	year 2014	157 health care personnel	The study was conducted using a pretested questionnaire and a cross-sectional study design was selected. The present study was carried out among health care personnel in different hospital settings in Mangalore which included private hospitals, medical colleges, dental colleges, community health centers, primary health centers, dental clinics, nursing homes, laboratories, veterinary clinics etc. Around 52% of the participants agreed that they have awareness regarding Bio-medical Waste (Management and Handling) Rules, 1998. Among these 65.9% of nurses and 82.05% of doctors agreed that they have awareness regarding the same (Fig. 1). No sanitary staff had any knowledge regarding the Bio-medical Waste (Management and Handling) Rules, 1998. These findings were similar to other studies by Pandit, et al. and Rao in which technically qualified personnel like the doctors, nurses, and laboratory staff have high knowledge regarding these rules but it was low among the sanitary staff.[10, 11,7]

4	Gajanan C. Soyam1*, Prabhakar A. Hiwarkar1, Umesh G. Kawalkar1, Vishal C. Soyam2, Vimal K. Gupta3		cross sectional study	155 health care workers	5-Jul-17	n 155 HCWs of hospital	Total of 155 HCWs were selected. Majority of HCWs were in the age group of 30.3 years±5.6 (mean age±SD) Almost half (54.2%) of study population comprised of female. Most of them were nursing staff. Mean years of experience in service was 4.8±3.7 (mean age±SD). Majority HCWs in this study took education up to senior secondary and they possess respective professional qualification. Statistically significant numbers of HCWs vaccinated with HBV vaccine and received training of bio-medical waste management.[8]
5	Teshiwal Deress, 1 Fatuma Hassen, 2 Kasaw Adane, 1 and Aster Tsegaye2	Debre Markos town which is located in Amhara regional state	Descriptive cross-sectional study	total of 296 HCPs	November 2016 to June 2017.	total of 296 HCPs	Data were entered into the Epi-data 3.1 software and exported into SPSS version 20 for analysis. Bivariate and multivariate logistic regression analyses were computed. Variables with a P value.[9]
6	Ahmed Yar Mohammed Dawood Al Balushi1, Muhammad Muqeet Ullah1, Amal Ali Al Makhamri2, Fatma Sulieman Al Alawi2, Mansoor Khalid3 & Hilal Masaud Al Ghafri4	Al-Buraimi hospital, Oman	Cross sectional study	Total of 207 HCP	30th September 2015 to 30th March 2016	Total of 207 HCP	Overall response rate was 125 (60.3%) from total 207, mean age 36.14±8.9 and age ranges from 20 to 58 years with mean age (doctors 42.5, nurses 29.8, laboratory technician 29.2 and housekeeping staff 36). Female proportion of 82 (65.6%) was higher as compare to males 43 (34.4%). The study was analyzed on the basis of "satisfactory" and "unsatisfactory" scores using "cut-off point" tools. Nurses had better satisfactory knowledge (90.9%), attitude (94.5%) and practice (80%) scores as compare to other participants. The overall "satisfactory" knowledge, attitude and practice scores were found to be statistically insignificant (P=0.100, P=0.346, P=0.364 respectively). No significant relationship established between dichotomized variables of knowledge and practice (P = 0.264) as well as attitude and practice (P = 0.147).[10]
7	*Sidra Ajmal & Maleeha Ajmal	Jinnah Hospital Lahore, A Government Hospital	cross sectional study	300 Nurses	-	300 Nurses	300 nurses and paramedics fulfilling the inclusion criteria were enrolled for the study. It was found that 50.3% of the respondents had good knowledge of biomedical waste management, 45.7% had average knowledge and 4% had poor knowledge. 70.7% respondents had good practices of biomedical waste management, 23.7% had average practices and 5.7% had poor practices. Overall, the respondents had good knowledge and practice levels and the practice level was better as compared to their knowledge level. Further, the nurses had better theoretical knowledge of biomedical waste management than the paramedics, especially with respect to written guidelines available for biomedical waste management.[11]
8	Mukesh Kumar1, Rajesh Kumar Singh2, Umesh3, Vinita Rawat	Health care workers in tertiary care hospital of haldwani, nainital	Cross sectional study	Total of 220 HCW	August 2014 to December 2014	Total of 220 HCW	Awareness regarding disposal of items in red, yellow and puncture proof containers was 32.7%, 51.8% and 60.9% in health care workers respectively. Only 35.4% of health care workers had undergone training on biomedical

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							waste management and 31% health care workers were found to be unvaccinated against hepatitis B infection.[12]
9	Fawaz Pullishery1*, Ganesh Shenoy Panchmal2, Sabin Siddique3	Different hospital settings in Mangalore	Cross sectional study	Total 157 health care personnel	Year 2014 a	Total 157 healthcare personnel	Doctors, nurses, and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. Knowledge regarding the color coding and waste segregation was found to be better among nurses and laboratory staff as compared to doctors.[13]
10	Dr Madhu Kumar Dr Rashmi Kushwaha	A cross sectional stud	250 Medical student	Total of 250 medical students	-	Total of 250 medical students	A total of 250 medical students took part in the study. Their knowledge, attitude and Practice regarding BMW were assessed by using predesigned and semi-structured questionnaire. The data was analysed using proportions and percentages. st Table 1 show that 50.4% of MBBS 1 professional student had the knowledge of colour coding and segregation. It also shows poor knowledge regarding the color coding for waste separation, biomedical waste management and handling. Approximately nd 62.4% of MBBS 2 professional have good knowledge regarding nd color coding for waste separation. 2 professional as comparison st to 1 professional medical student have good knowledge regarding health care waste hazardous, waste management handling, biomedical waste management and plan (Table1). None of the medical students have received training regarding Bio Medical Waste management.[14]
11	Emmanuel Chukwunonye Azuike1, Echendu Dolly Adinma1, Simeon Achunam Nwabueze1	Nnamdi Azikiwe University Teaching Hospital	Cross-sectional Descriptive study	856 health workers.	February 2, 2015	856 health workers.	One hundred and seventy nine (54.1%) of the respondents were males while 149 (45%) were females. The commonest age group was 25-34 years (49.5%). Three hundred and twenty (96.7%) of the respondents had tertiary education, 8 (2.4%) had secondary education, while 3 (0.9%) had primary education and none of the respondents had no education at all. One hundred and twenty six (38.1%) of the respondents have worked for the hospital for 2-4 years while 4 (1.2%) have worked for greater than or equal to 20 years. The knowledge of healthcare waste management among the healthcare workers was high. But the practice was not optimal. Conclusion: The healthcare workers had a high level of knowledge regarding healthcare waste management but practice amongst the workers was not adequate.[15]
12	Suganya Panneerselvam Lecturer, Surya College of Nursing, Janjgir, Chhattisgar	Christian Mission Hospitals at Madurai.	Non experimental descriptive design.	30 nurse	7/15/2016	30 nurse	Research design was non experimental descriptive design. Convenience sampling technique was used to select the samples and 30 were selected. The data was collected based on the structured knowledge questionnaire on biomedical waste management. Research design was non experimental descriptive design. Convenience sampling technique was used to select

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							the samples and 30 were selected.
12	Suganya Panneerselvam Lecturer, Surya College of Nursing, Janjgir, Chhattisgar	Christian Mission Hospitals at Madurai.	Non experimental descriptive design.	30 nurse	7/15/2016	30 nurse	The data was collected based on the structured knowledge questionnaire on biomedical waste management. Analysis of the data was done by employing descriptive and inferential statistics. The findings revealed that, among 30 nurses 23 (77%) had adequate knowledge, 7 (23%) had moderate adequate knowledge and none of them had inadequate knowledge.[16]
13	Teshiwal Deress, 1 Fatuma Hassen,2 Kasaw Adane,1 and Aster Tsegaye	Debre Markos town which is located in Amhara regional state	Cross-sectional Descriptive study	256 HCPs	November 2016 to June 2017.	256 HCP	Sociodemographic and HCF Related Characteristics. Two hundred ninety six study participants were included from 12 HCFs. Among these, 197 (66.6%), 69 (23.3%), and 30 (10.1%) were from the hospital, health centers, and clinics, respectively. -e mean age of the study participants was 30.46 ± 6.64 years. Less than one-third (30.7%) of the study participants were vaccinated for hepatitis B virus. Regarding previous training, only 109 (36.8%) had taken BMWM training. One hundred seventy seven (59.8%) of the study participants got information from the guideline. Sixty-nine (23.3%) of the study participants had encountered needlestick/sharps injuries preceding 12 months of the data collection period. Most (97%) of the HCPs respond the availability of sufficient quantity gloves and 81.4% of the respondents also disclosed the availability all types Journal of Environmental and Public Health 3 (black, yellow, and safety box) of color coded bins in their.[17]
14	Puneet Anand*, Rakhi Jain, Anuj Dhyani	Institution in Haryana,	Cross-sectional Descriptive study	305 HCPs	May and June 2016.	305 HCPs	305 participants took part in the study. Doctors, nurses and lab technicians had good knowledge, attitude and practice regarding biomedical waste management but there was scope of improvement in certain areas. Knowledge, attitude and practices regarding biomedical waste management of class IV employees were found to be very low. Conclusions: There should be a continuous training programme for all health personnel with special focus on sanitary staff. Biomedical waste management rules should be strictly implemented at all levels.[18]
15	*Md. Asadullah, Karthik G. K. and Dharmappa B.	Private Hopitals in Udupi City, Karnataka, India	Cross-sectional Descriptive study	166 Nurse staff	October 2012 to January 2013	166 Nurse staff	The improper management of biomedical waste poses significant hazardous risk to the patients, healthcare workers, the community and environments (WHO, 2007). The biomedical waste is defined as the waste generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological including categories mentioned in the schedule-I of Biomedical Waste (Management and Handling) Rules 1998, Government of India (Radha, 2012). The inappropriate healthcare

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							waste management caused 21 million hepatitis B virus (HBV) infections (32% of all new infections); 2 million hepatitis C virus (HCV) infections (40% of all new cases); 260,000 HIV infections (5% of all new cases) in 2000. Epidemiological studies indicate that a person who experiences one needle stick injury from a needle used on an infected source patient has risks of 30%, 1.8%, and 0.3% respectively of becoming infected with HBV, HCV and HIV (WHO, 2011).[19]
16	Kokila Selvaraj, P.Sivaprakasam, B.T.Sudhir Ben Nelson, G.H.Midh	Kanchipuram Town, India	Cross sectional study	113 medical student	–	113 medical student	Our study revealed that only 55% (n=58) of the practitioners segregated waste at the point of generation, of whom 65.5% used colour coding while the rest have their own system of segregation (Fig: 2). Practice of segregation Bio Medical Waste was less in our study when compare to the study done by . Hanumante Rao (70%) (Rao, 2008). Most of them (44%) used 3 different types of containers for the segregation of bio medical waste in their hospital or clinic. Interestingly study done in Lahore in one private and one public hospital showed that the segregation and colour coding of BMW were 100%. (Mahmood et al., 2010)[20]

CONCLUSION

Literature review reveals that shows high risk of hep–B infection between health care professional associated with job, gender, vaccination and liver disease. Literature review reveals that the practices of biomedical waste management given to the different people in different settings are somewhat positive as well as negative by affecting the socio demographic variables in every different population. So, the result shows the average attitude and practice of the study.

IMPLICATION TO NURSING PRACTICE

Nursing care includes preventive, promotive, curative and rehabilitative services. There are many new initiative would be taken in prevention of hepatitis B infections, which would help in improving health among the individuals and health care professionals and prevalence would identify the cases and help to cure and prevent further infection among the health care personnel's.

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