ORIGINAL ARTICLE

Knowledge, attitude and practices regarding medical waste management among healthcare professionals of Bolan Medical Complex Hospital Quetta, Balochistan

Attaullah Bangulzai, Syed Aqeel Akbar Shah Gillani, Naseem Khan Achakzai, Rubina Mir, Tahira Kamal Baloch, Noor Khajjak, Zara Arshad

Abstract:

Biomedical waste is a complete waste that is generated during the healthcare delivery process within the healthcare facilities (HCFs). There are two main types of healthcare waste; Hazardous waste (Sharps, cytotoxic, radioactive, infectious, pathological, chemical, and pharmaceutical waste) and non-hazardous waste (general waste or waste that does not pose any biological, chemical, radioactive, or physical hazard).

Objective: Assessment of awareness, attitude and practices regarding Medical waste management among Healthcare professionals.

Material and Methods: An institution-based cross-sectional study was deployed on 264 medical staff of Bolan Medical Complex (BMC) hospital, Quetta for assessment of Knowledge, Attitude, and Practice about medical waste management. The data was collected by a structured questionnaire of 23-item scale divided into four sections was used to collect the data which was adopted from an established medical waste management (MWM) tool. Data was entered into SPSS and scores of all variables were calculated the cutoff point was settled for the differentiation of every output variable. The ethical approval from an internal review board of Institute and permission from hospital was obtained to conduct the study. Written informed consent was taken from the every participant of the study the data was analyzed by SPSS version 20.

Results: Demographics of the study shows that 137 out of 264 were females which 51.9% of the sample collected and 48.1% were male participants. Mean age of the study participants was 35.86±7.03 years, 51.5% of total participants were doctors, 33.3% nurses and the paramedical staff was 15.5%. The data was collected from all departments but the major portion of the data was from medicine (35.5%) and surgery department (25.5%). Final results shows that 174(66%) having high awareness 91(34.4%) were doctors and attitude results where 60.2%(159) were positive while 39.8%(105) were negative. The overall practices results are also given, where "Good" response was 77.3%(204) while overall response to statement of environmental enabling factors were 37.9% "Yes" only.

Conclusion: This study concludes that medical waste management has not received adequate reflection in governmental hospitals, since there is inadequate and inefficient segregation, collection, transportation and storage of bio-medical waste.

Keywords: Awareness, attitude, medical waste management, environmental enable factors.

Received
date:10th December, 2021
Accepted
date: 19th June, 2022

Bolan Medical Hospital, Quetta
A Bangulzai
SAAS Gillani
NK Achakzai
R Mir
TK Baloch
N Khajjak
Z Arshad

Correspondence:
Dr.

Cell No:+92 300-
email: amirzebjadoon@gmail.com

Introduction:

Biomedical waste is a complete waste that is generated during the healthcare delivery process within the healthcare facilities (HCFs).[1] There are two main types of healthcare waste; Hazardous waste (Sharps, cytotoxic, radioactive, Infectious, pathological, chemical, and pharmaceutical waste) and non-hazardous waste (general waste or waste that does not pose any biological, chemical, radioactive, or physical hazard).[2]

Countries produce different quantities of waste.

Most of the hazardous waste is produced in high-income countries (0.5kg/ hospital bed per day) against the 0.2kg waste in low-income countries. Nonetheless, low-income countries fail to separate the two types of waste, making it more difficult to manage.[3] The major source of waste in healthcare setup is house keeping, administrative, and food preparation activities. Another more dangerous are produced in wards, clinics, diagnostics, and operation theatre.[4]

Globally, typical waste comprises 85% non-hazardous waste followed by 10% Infectious and 5% chemical/ radioactive wastes.[5] Owing to the increase in population, socio-economic burdens of the country, and COVID-19 pandemic, the healthcare waste production in the countries has increased.

According to impact analysis of COVID-19 in Taiwan, a total of 4.14% increase in healthcare production annually is observed in the said country.[6]

Asian developing countries have rapid urbanization and population boom. This all makes the countries face the challenges of distribution of limited resources, and developmental limitations like infra-structure, etc.[7] The health care waste (HCW) generation varies from country to country. According to an environment association survey in Cambodia, a total of 342.54kg health care waste was generated against 3,114 beds. Whereas in Japan the total amount was 285,000 tons of infectious waste and 945,000 tons of non-infectious waste was estimated. Mongolia on the other hand showed 2,655 kg per day of health care waste generation rate. Yet the Republic of Korea showed 82,633 tons of health care waste.[8,9] India reported the health care waste generation ranging between 0.56 to 2.31 kg/day, whereas in Bangladesh the rate was observed to be 0.5 to 1.58.[10]

Pakistan is a struggling territory in the list of third-world countries.[11] It is continuously striving to fulfill the healthcare needs of its people by trying to strengthen the pillars of its health care system. Furthermore, owing to COVID-19 a rise in the poverty level of 33.7% is projected which is doubling the effort to sustain the system of the country overall.[12] According to a mini review the total HCW generated in Lahore was amongst the highest in the country, and an HCW generation of the whole country varies between 1.28 to 2.0 kg/ day per bed.[13]

Awareness and behaviors of the healthcare professionals about different steps of health care waste management including generation, segregation, collection, storage, transportation, treatment, and end-up with final disposal[14] are key to keeping the health care system running safely thus protecting the health of patients and health care professionals in the short-term and also ensuring the sustainability of the environment in the long-term.[15] This study was aimed at assessing the knowledge, attitudes, and practices (KAP) of the healthcare staff in tertiary healthcare facility along with factoring in the determinants that could affect the KAP.

Material and Methods:

An institution-based cross-sectional study was deployed from September 2018 to November 2018 in Bolan Medical Complex (BMC) hospital, Quetta. It is the administrative city of the province of Balochistan and is spread over the geographical area of 2,653 km^2 (1,024 sq mi).[16] BMC is a state-of-the-art hospital with tertiary level facilities for a catchment population of over 1.1 million.[17] This makes it the largest tertiary care and teaching hospital of the province, which is providing services in the field of Neurology, Ophthalmology, General Medicine, Pulmonology, Psychiatry, and other medical sciences.

All the healthcare staff (Doctors/ Paramedics/ Allied) working in the study setting in any cadre for 6 months and above were included in the study. The technique used for choosing sampled data was probability simple random sampling. A list of all the healthcare staff was taken from the relevant units after ethical clearance. To equally divide the sample per unit, the proportional distribution of units/ sections was done related to sample size. Using a lottery method, the re-

quired staff from each unit was then finalized and data was collected.

The sample size (n) was calculated to be 264, using a formula:

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

where: e= 6% or 0.06, Z^2= 3.84, α= 5% or 0.05, p=50% or 0.5

The dependent variables of the study were Knowledge, Attitude, and Practice about medical waste management. The independent variables were taken to be socio-demographic profile, years of experience, and determinants like enabling factors, etc. A structured questionnaire was used to collect the data which was adopted from an established medical waste management[18] (MWM) tool. The questionnaire was a 23-item scale divided into four sections. The first section was about the socio-demographic profile of the hospital staff like years of education, department, etc. This is followed by a section on assessing knowledge of the respondents about MWM and measured on a three-Likert scale of yes (0), no (1), and don't know (2). The attitude about MWM was measured using a five-Likert scale from strongly agree (0) to strongly disagree (4). Afterward, the practice of the staff members was assessed using a three-Likert scale of always (0), sometimes (1), never (2). Finally, determinants that could affect the KAP of the respondents were assessed using a set of questions, and the responses were recorded using a three-Likert scale of yes (0), no (1), and don't know (2). Data was entered into SPSS 20 and scores of all variables were calculated the cutoff point was settled for the differentiation of every output variable.

The ethical approval from an internal review board of Health Services Academy was obtained to conduct the study. Formal permission from the management of the selected hospital was obtained. Written informed consent was obtained from the participants before filling a questionnaire. The confidentiality and anonymity of the participants were maintained throughout the research period.

Results:

The collected data shows the demographic characteristics of the healthcare setup the gender wise distribution shown that 137 out of 264 were females which 51.9% of the sample collected and 48.1% were male participants. The reported mean age of the study participants was 35.86±7.03 years, professionally 51.5% of total participants were doctors while 33.3% were nurses and the paramedical staff was 15.5% part of the data. The working patron of the medical staff of hospital was divided in three shifts so the data was collected from all the rotations. The data was collected from all departments i.e. medicine, surgery, gynecology, emergency, administration, operation theater and others but the major portion of the data was from two departments medicine (35.5%) and surgery department (25.5%).

For the assessment of awareness about Medical Waste Management different questions were included in the questionnaire such as where to thrown all the infectious blood/vomitus contaminated in waste bin (colour coded) or how to waste infectious patient's body fluids. Some about the handling of sharp objects which can cause infections like Hepatitis B, C & HIV etc and disposal of placentas. Results shows that almost all the participants of the research were aware about the hazards of the waste except a portion of paramedics. All the doctors responded that they knew about the waste management and the guidelines exist for it. The knowledge of nurses about the waste management was also satisfactory. But the paramedics were very less aware about its hazards and they are ones who are more prone to pricks contacts and suffered from lethal diseases. Which is quite concerning and the major reason reported behind was lack of training and working capacity. Overall the results were found satisfactory in doctors and nurses but the awareness of paramedics need to be improve and on ground facts and figures portray a miserable state of waste management at BMCH as shown in the figure below.

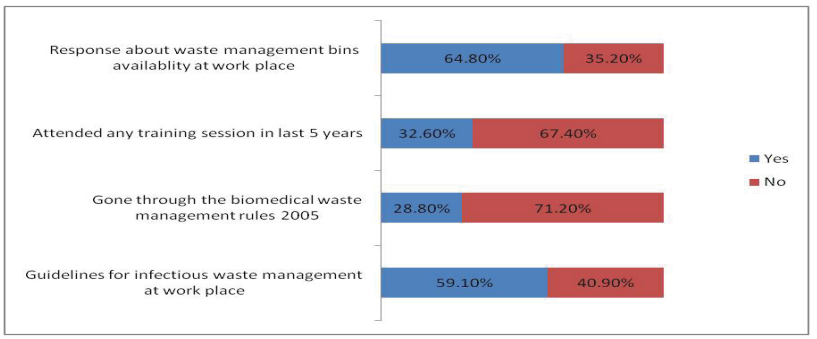

Figure 1: Awareness of Doctors, Nurses and paramedics at a glance

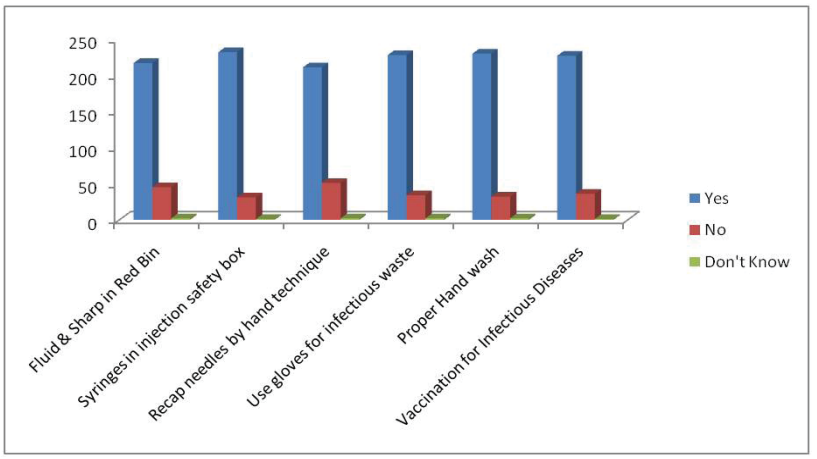

Figure 2: Practices of Doctors, Nurses and paramedics at a glance

Table 1: Overall awareness, attitude, practices and environmental enable factors

		n=(264)			
		Profession			Total Number with Percentage
Variable	**Level**	Doctor	Nurses	Paramedics	
Awareness	High	91 (34.4%)	26 (9.8%)	57 (21.5%)	174 (66%)
	Low	45 (17%)	15 (5.6%)	30 (11.3%)	90 (34%)
Attitude	Positive	87 (32.3%)	48 (18.1%)	24 (9%)	159 (60.2 %)
	Negative	49 (18.5%)	39 (14.9%)	17 (6.4%)	105 (39.8 %)
Practices	Good	114 (43.1%)	62 (23.4%)	28 (10.6%)	204 (77.3 %)
	Bad	22 (8.3%)	25 (9.4%)	13 (4.9%)	60 (22.7 %)
Environmental enable factors	Yes	36 (12.5%)	45 (16.2%)	19 (7.1%)	100 (37.9 %)
	No	41 (15.5%)	29 (10.9%)	12 (4.6%)	82 (31.1 %)
	Don't Know	64 (24.2%)	15 (5.6%)	08 (3%)	82 (31.1 %)

The attitude was assessed by likert scale and extracted with scores calculation by asking different questions. The overall attitude of the staff about MWM was noticed good about importance of infectious waste management, breaking of injection ampoule, incineration etc but they found confused about chemical disinfection is an effective method or not at all.

The assessment of their practices was also performed by different questions in the questionnaire which results are shown in figure 2.

The assessment Knowledge (Awareness) Attitude and practices was done in every profession with details including the environmental enable factors. The below mentioned table is showing the overall awareness, attitude, practices and environmental enable factors of all participants of this study separately.

Out of 264 total participants 174(66 %) having high awareness 91(34.4%) were doctors, while 90 (34%) were low awareness in which doctors were reported 45(17%). The overall results of participants of the study about attitude, where 60.2% (159) were positive while 39.8% (105) were negative. The overall practices results are also given, where "Good" response was 77.3% (204) and response to "Bad" were 22.7 % (60). Out of 264, 114 doctors (43.1%), 62 nurses (23.4%) and 28 (10.6 %) paramedics responded to "Good". Overall response to statement of environmental enabling factors were 37.9 % "Yes" and 31.1 % were reported "No" and 31.1 % "Don't know" respectively.

Discussion:

Bolan Medical Complex Hospital Quetta (BMCH) is a tertiary care level and teaching hospital. Generally the condition of waste management at BMCH is not satisfactory at any level. Findings related to the management of the solid and liquid wastes revealed alarming results. The wards depicted improper implementation of the waste management's rules and regulations. Usually the waste was collected at the place from where it is being generated in all the wards. Color coding was implemented in few wards. And there was also partial labeling of infectious and noninfectious waste. Syringe cutting was not being practiced by the majority of the nurses in spite of the presence of the syringe cutter. The closed bags and trolleys were

observed in removing the waste but there was no fixed schedule for it.

The incinerator was available in the premises of the hospital and was in workable condition, open from all sides. The infectious materials were in accessible range to animals, rodents, birds and human beings. No any respondent was aware about the incinerator temperature where it releases poisonous gases in the environment.

This study revealed the alarming situation of unawareness in the health care working staff generally, for instance 51.5% staff did not know where the infectious blood or vomitus be thrown whether in general waste bin or any other bin and the 33% of questionnairees were not aware about the disposal of the Hepatitis B, C and HIV infected syringes.

A study conducted by Siddharudha Shivalli and Vasudha Sanklapur in Tertiary Care Hospital regarding Healthcare Waste Management: Qualitative and Quantitative Appraisal of Nurses, where Almost half of the nurses (47%) had excellent knowledge (>70% score) about healthcare waste management. However, one-fifth (19%) of them displayed poor knowledge (<50% score) about the same.[19]

Study conduct in Tanzania "Public Health Risks from Mismanagement of Healthcare Wastes in Shinyanga Municipality Health Facilities, by Kizito Kuchibanda and Aloyce W Mayo where the overall knowledge were found 47% 20 which is almost similar to this study.

Another study conducted in Tertiary care Hospital Khairpur shows that Health care providers have high perception of 80.2% regarding infection control and waste management. The level of knowledge of health providers in this study is also similar to conducted study.[21] This study shows the response to high awareness were reported 66%.

The study conducted by Ramesh K in Metropolitan city of Pakistan showed that the doctors has better understanding and knowledge about infectious waste management. Mostly doctors 48(60%) while, 45(52%) of nurses and 20(36%) of paramedics were aware of the segregation of infectious waste as per WHO guidelines while this knowledge was poor in paramedics. Attitude of doctors 64%, Nurses 58% and paramedics were 32% regarding infectious waste management. Majority of the doctors (65%) had good attitude regarding the waste thrown in the proper waste bin. It was also noticed that practices of doctors were 38%, nurses 36% and paramedics were below 30%. These finding of the both studies similar to the results of conducted study where the awareness and knowledge doctors were 91(34.4%), nurses 26(9.8%) and paramedics 57(21.5%), while the attitude of our study were 87(32%) for doctors, 48(18.1%) for nurses and 24(9.1%) for paramedics staff, (19.3%).[22]

A study was conducted in Tamil Nado, India by L Joseph, H Paul, J Prem kumar, to assess the awareness on biomedical waste segregation among the healthcare workers, an audit was conducted in September 2009.[23] The results revealed, among the samples audited, 53% were aware of the segregation of cytotoxic drugs, 90% on segregation and disposal of sharps, 72% on infectious plastics. Only 67% were aware of the different colour bags used for segregation.

The awareness category indicates that the level of awareness is just 60% which is not satisfactory in this advanced era of technology; even a big considerable portion of the staff was unaware about the basic knowledge regarding waste management. The level of attitude is below the satisfactory level which is only 60.2% and it also needs to improve. In the same way the level of practice also needs improvement. Whereas the biggest problem lies in the environmental category where only 37.9% give satisfactory answers.

In Pakistan there are guidelines for hospital waste management in the form of hospital management rules 2005, prepared by the ministry of environment in consultation with the environmental Health Unit of the Ministry of Health and other stack holders covering all aspects of safe hospital waste management, including the

risk associated with waste, formulation of waste management teams, their responsibilities, segregation, collection, transportation, storage and disposal methods but no satisfactory results regarding proper hospital waste management has been achieved yet.

Resilient and responsive administration and management system is porous and in need of up gradation to engage the concerned staff in order to reduce the risk of hazards related to poor handling and disposal of medical waste in Bolan Medical and Teaching Hospital, Quetta.

Conclusion:
This study concludes that medical waste management has not received adequate reflection in governmental hospitals, since there is inadequate and inefficient segregation, collection, transportation and storage of biomedical waste. After further inquiry with health care staff, answers revealed that segregation applied only for sharp waste which is collected in special sharp boxes at the beginning after usage. Collection done first by medical staff then transported with other types of waste by cleaners. Most of respondents don't know where medical storage place is, and don't know if there is mark to show place of storage. There is a dire need for regular workers training, continuing education, and management evaluation processes for systems and personnel.

Conflict of interest: None

Funding source: None

Role and contribution of authors:
Attaullah Bangulzai collected the rdata, references and did the initial writeup.

Syed Aqeel Akbar Shah Gillani, collected the data, and also helped in introduction writing.

Naseem Khan Achakzai, collecte the data, references and also helped in discussion writing.
Rubina Mir, collected the data and helped in interpretation of data.

Tahira Kamal Baloch, collected the references and also helped in material and method writing.

Noor Khajjak, collected the data and helped in compiling the result.

Zara Arshad, critically review the article and made final changes.

References:
1. Deress T, Jemal M, Girma M, Adane K. Knowledge, attitude, and practice of waste handlers about medical waste management in Debre Markos town healthcare facilities, northwest Ethiopia. BMC Research Notes. 2019;12(1).
2. Health-care waste [Internet]. Who.int. 2022 [cited 16 August 2018]. Available from: https://www.who.int/news-room/fact-sheets/detail/health-care-waste
3. Knowledge, attitudes and practices of health-care personnel towards waste disposal management at Ain Shams University Hospitals, Cairo [Internet]. World Health Organization - Regional Office for the Eastern Mediterranean. 2018 [cited 19 August 2018]. Available from: http://www.emro.who.int/emhj-vol-20-2014/volume-20-5/knowledge-attitudes-and-practices-of-health-care-personnel-towards-waste-disposal-management-at-ain-shams-university-hospitals-cairo.html
4. Yazie T, Tebeje M, Chufa K. Healthcare waste management current status and potential challenges in Ethiopia: a systematic review. BMC Research Notes. 2019;12(1).
5. Sharma M, Sharma M, Kapoor P, Verma S, Maheshwari R, Gupta H. Assessment of Knowledge, Attitude and Practice Regarding Biomedical Waste Management among Health Care Personnel in Jawahar Lal Nehru Medical College and Hospital, Ajmer (Rajasthan). International Journal of Medical Research Professionals. 2016;2(4).
6. Tsai W. Analysis of medical waste management and impact analysis of COVID-19 on its generation in Taiwan. Waste Management & Research: The Journal for a Sustainable Circular Economy. 2021;39(1_suppl):27-33.
7. [Internet]. 2018 [cited 11 July 2018]. Available from: https://www.researchgate.net/publication/271450046_Solid_waste_management_in_Asian_countries_Problems_and_issues
8. Phillips G, Creaton A, Airdhill-Enosa P, Toito'ona P, Kafoa B, O'Reilly G et al. Emergency care status, priorities and standards for the Pacific region: A multiphase survey and consensus process across 17 different Pacific Island Countries and Territories. The Lancet Regional Health - Western Pacific. 2020;1:100002.
9. Prem Ananth A, Prashanthini V, Visvanathan C. Healthcare waste management in Asia. Waste Management. 2010;30(1):154-161.
10. Khan B, Cheng L, Khan A, Ahmed H. Healthcare waste management in Asian developing countries: A mini review. Waste Management & Research. 2019;37(9):863-875.
11. Khan M, Zerby J. The Socioeconomic Position of Pakistan in the Third World. The Pakistan Development Review. 1981;20(3):347-365.
12. Rasheed R, Rizwan A, Javed H, Sharif F, Zaidi A. Socio-economic and environmental impacts of COVID-19 pandemic in Pakistan—an integrated analysis. Environmental Science and Pollution Research. 2021;28(16):19926-19943.
13. Diaz L. Waste management in developing countries and the circular economy. Waste Management & Research: The Journal for a Sustainable Circular Economy. 2017;35(1):1-2.
14. D□az L. Water, Sanitation and Health—Electronic Library. Waste Management. 2004;24(4):429.

15. YORULMAZ M. COMPARISON OF%20TURKEY WITH DEVELOPEDC OUNTRIES IN TERMS OF HEALTH MANAGEMENT PROFESSION. International Journal of Social Humanities Sciences Research (JSHSR). 2018;5(27):2730-2736.
16. Efficiency of Poultry Production in District Quetta Balochistan Pakistan. Journal of Poverty, Investment and Development. 2020;.
17. Khan T, Mahmud Z, Tasawar Z, Mushtaq R. Blood pressure distribution in a schoolage population of Quetta, Pakistan. Anthropologischer Anzeiger. 1994;52(3):231-238.
18. https://iiste.org/Journals/index.php/ADS/article/view/52906. Arts and Design Studies. 2018;.
19. hivalli S, Sanklapur V. Healthcare Waste Management: Qualitative and Quantitative Appraisal of Nurses in a Tertiary Care Hospital of India. The Scientific World Journal. 2014;2014:1-6.
20. Kuchibanda K, Mayo A. Public Health Risks from Mismanagement of Healthcare Wastes in Shinyanga Municipality Health Facilities, Tanzania. The Scientific World Journal. 2015;2015:1-11.
21. Baqar M,Kumar R, Hospital Infection Control Practices Among Nursing staff Working at Tertiary Care Hospital of Khairpur Sindh, J Liaquat Uni Med Health Sci, 2018 17 (2)117-22,
22. Knowledge , attitude and practices of health care staff regarding infectious waste handling of tertiary care health facilities at metropolitan city if Pakistan, J Ayub Med Coll Abbottabad, 2013 ; 25 (1-2)
23. Joseph L, Paul H, Premkumar J, Rabindranath, Paul R, Michael J. Biomedical waste management: Study on the awareness and practice among healthcare workers in a tertiary teaching hospital. Indian Journal of Medical Microbiology. 2015;33(1):129-131.` 111