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EXPLORING SOCIETAL DYNAMICS IN THE IMPLEMENTATION OF BIOMEDICAL WASTE MANAGEMENT STRATEGIES BY HEALTHCARE PROFESSIONALS

Iqra Tariq[1], Dr. Zaitoon Bibi[2], Dr. Nesipho Given Mlalzi[3], Azka Murtaza[4], Anila Rajab[5], Hafsa Akmal[6]

1. Ph.D. Scholar, Department of Sociology, Govt. College University Faisalabad.
2. Assistant Professor Sociology, Fatima Jinnah Women University Rawalpindi.
3. Medical Practitioner in General Medicine, United Kingdom.
4. Lecturer Sociology, Govt. Associate College for Women, Mulhal Mughlan, Chakwal.
5. Lecturer Sociology, Govt. College for Women University Faisalabad.
6. M.Phil. Scholar, Department of Sociology, University of Agriculture Peshawar.

Corresponding author: zara.khan94@ymail.com

ABSTRACT

Biomedical Waste (BMW) is produced during surgeries, medical procedures, diagnostic methods, and other medical activities. Due to its dangerous and unsafe nature, biomedical waste needs special attention on how it is separated, disposed of, and dealt with. All medical professionals have a critical role in the disposal of biomedical waste. Ensuring that biomedical waste is managed and disposed of safely is a responsibility that falls on everyone associated with working in, managing, and financing the medical field. Biomedical waste management (BMWM) with efficiency is imperative for healthy masses and a cleaner environment. This study will shed light on BMWM rules and regulations of 2005, and what are the operational problems in executing these rules. These rules are for the betterment of biomedical waste separation, transference, and ejection. To minimize environmental pollution due to BMW in Pakistan. **Objectives:** This research was conducted in government hospitals of Punjab, Pakistan. This study evaluated the BMWM strategies implied by healthcare professionals in this region. **Methodology:** This is a qualitative study. 450 participants were enrolled performing different jobs in health care departments. A custom-made questionnaire was used to inquire about BMWM practices used in the hospitals for data collection.

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The collected data was processed in SPSS version 22. **Result:** The research shed light on the fact that even though there were rules and committees to ensure proper biomedical waste management, biomedical waste was still not dealt with in various hospitals due to a lack of training of health care professionals regarding this matter. **Suggestion:** Teamwork between departments devoted to the safe disposal of BMW, support and financial aid from the government, and committed health workers and healthcare facilities are required to ensure a safe BMWM. Consistent monitoring to ensure the execution. The ground rule of biomedical waste management is separation at source and minimizing waste. There's a need for more studies and exploration in developing eco-friendly medical gadgets for a greener and cleaner environment.

Keywords: *2005, Bio Medical Waste, Pakistan, Healthcare,*

INTRODUCTION

Biomedical waste is described as waste produced during the diagnosis, treatment, and vaccination of humans. It also includes any activities performed on animals for research purposes. It means following BMW from the beginning to the end, during its classification, separation, preservation, transition, and disposal.

The fundamentals of BMWM are the 3Rs- reduce, recycle, and reuse. The goal is to reduce the production of BMW and reutilization as much as possible, rather than discarding them in landfills. Preferred methods of BMWM are avoid, minimize, re-utilize, recycle, and discard.

The aim is to deal with the waste at its origin. BMW treatment and disposal facilities are where BMW is refined and discarded. 10 to 25% of Biomedical waste is dangerous whereas 75 to 95% is harmless. The precarious BMW can cause physical, chemical, and microbiological risk to masses, and health care professionals.

In June 2007, a WHO meeting in Geneva stressed executing environmentally conscious ways of dealing with medical waste. The highlight of the meeting was that through smart financial decisions and dedication hazards of BMW to the ecosystem and masses can be minimized. The shareholders of bankrolling and reinforcing health care activities should be bound to share the expenses of proper disposal of BMW. It also falls on manufacturers to make eco-friendlier medical gadgets and to ensure they

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can be disposed of safely. WHO emphasized that the government should set aside a budget to improve the efficiency of BMW management and disposal. Original and innovative practices/gadgets should be used to reduce the massive quantities of hazardous BMW. NGOs should also take an interest in this matter and work with the government to make the environment safer and healthier for the general population.

The first edition of "The Blue Book" by WHO on safe and effective ways to manage Bio medical waste was published in 1999. The second edition of "The Blue Book" which came out in 2014 has more innovative and effective techniques to prevent Biomedical waste from reaching landfills. Newer topics like BMWM in case of emergencies, pandemics, and climate crises are also talked about in the second edition.

Waste produced during medical treatments, surgeries, vaccination, and diagnosis of diseases is classified as bio-medical waste by WHO. This waste needs special attention due to its hazardous nature (Mandal & Dutta, 2009). Biomedical waste can cause infections, and due to its infectious and dangerous nature, it is critical to dispose of it effectively. However, not enough attention has been given to this matter in developing countries (Tsakona et al., 2007; Jang et al., 2006; Da Silva et al., 2005; Alagöz & Kocasoy, 2008). Steps have been taken by environmental protection teams for the safe disposal of BMW (Prabhu, 2016). All countries need blunt laws and clear guidelines for BMWM, but developing countries often neglect these laws and guidelines drawn by WHO (Hassan et al., 2012). Pakistan is the fifth most populated country in the world, millions of people in it go to government hospitals for medical treatments and investigations daily. Sadly, the bio-medical waste management and disposal in these hospitals do not fall on the standard of WHO (Razzak, et al., 2014). Healthcare professionals and paramedical staff play a vital role in BMWM, this calls for a need to educate healthcare workers on BMWM in Pakistan.

OBJECTIVES

1. To look into the understanding and behaviors of medical professionals towards biomedical waste management and its safe disposal techniques and how their knowledge about it affects the execution.

2. To find out the degree of implementation of the Hospital Waste Management Rule of Pakistan 2005 within government and private hospitals.
3. To shed light on the difficulties and challenges that healthcare professionals face in the execution of BMWM strategies and techniques with a focus on its social, economic, and environmental aspects.

REVIEW OF LITERATURE

Dangerous and harmful biomedical waste is generated by healthcare facilities globally. Dealing with toxic waste efficiently is challenging for developing countries. Owing to the gravity of this situation, many investigators in developing countries have dug deep into biomedical waste management practices, techniques, and the problems faced by healthcare workers in BMWM. They have tried to get to the reason for substandard biomedical waste management practices and tried to give solutions for it (Nemathaga et al., 2008; Marinković et al., 2008; Kumar et al., 2010; Bdour et al., 2007). It is crucial to dispose of and treat biomedical waste appropriately. The inefficient manipulation and handling of BMW imposes a risk to public health and the environment (Shalini, 2010). Biomedical waste and its disposal were not seen as an issue until the late 1970s. The United States recognized that medical waste was different from regular waste produced in urban areas in the 1980s and 1990s. According to the World Health Organization Survey 2002, there are 22 countries with no appropriate techniques for biomedical waste disposal (Kumar et al., 2010). There was an increased concern about the spread of Human Immunodeficiency virus/infection and hepatitis B infection (HBV) due to improper biomedical waste disposal (Arshad et al., 2011). Waste from healthcare facilities is often mixed with domestic urban waste and dumped into landfills. Lately, several efforts have been put into place by environmental protection authorities to ensure the safe disposal of clinical waste (Prabhu, 2016).

Lack of education and training about BMWM, indifference of authorities towards this issue, and poor application of laws are the reasons why clinical waste management has become a huge problem in Pakistan (Arshad et al., 2011). At the moment various techniques are being used to ensure the safe disposal of clinical waste, for example, on-location ignition, steam sanitization, autoclave purification, microwave burning, and chemical/mechanical sterilization. Non-biomedical waste

in Pakistan is dealt with in three different ways namely ignition, dumping in landfills, and open disposal. Since BMW is hazardous, its proper separation in healthcare facilities is crucial for proper disposal and management (Arshad et al., 2011).

THEORETICAL FRAMEWORK

The theory of planned behaviors (TPB) predicts the behavior of humans toward medicine and health care (Godin & Kok, 1996, McEachan et al., 2011). TPB can be used to modify the behaviors and intentions of the general population towards healthcare (Buunk et al., 2011). Research has shown that the TPB can be implemented in healthcare workers to shape their intentions and behaviors toward clinical waste in a better way. Assuming that medical professionals use the information given to them about BMW logically and fairly and consider how their actions towards BMW would affect them and the general population's health before making decisions. This study used TPB to predict and modify the behaviors of healthcare workers about BMW.

TPB components and waste management

Behaviors of healthcare professionals toward biomedical waste can be studied by implementing TPB, and changes can be made accordingly, to resolve their issues and make sure that biomedical waste is segregated properly at medical centers.

Attitude towards behavior

If we educate the masses about health issues caused by the hazardous nature of biomedical waste, we can change their attitude towards biomedical waste practices.

Subjective Norms

By changing the perception of the general population about BMW, and educating them about how its proper management and disposal can reduce toxic waste and health problems caused by it we can bring a monumental change in BMWM.

Perceived behavior control

Factors that make proper management of BMW easier or more strenuous are the accessibility of different colored dustbins and proper knowledge about how to use them, the workload of hospital staff, and a committed BMWM committee overseeing everything.

BIOMEDICAL WASTE RULE 2005:

The notable features of Biomedical Waste Rule 2005 Pakistan are:

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Categorization of Clinical Waste: According to Biomedical Waste Rule 2005 Pakistan, BMW is categorized based on its property and how dangerous it is. These categories are infectious waste, pathological waste, sharp needles, chemical waste products, medicinal waste, biological waste, etc.

Segregation: Separation of medical waste into appropriate categories at the site of its production can minimize the spread of infection and contamination. BMW must be segregated into different color dustbins according to their category.

Packaging and Labeling: It is important to pack biomedical waste into water-resistant and tear-resistant packs. Their packaging should be properly labeled and information written on the container about what type of waste it is and how toxic it is.

Transportation: There are specific rules and guidelines provided by WHO regarding the transportation of clinical waste from the place of production to disposal units. The vehicles transporting biomedical waste must be properly furnished to prevent leakage during transportation.

Treatment: Appropriate equipment should be installed in biomedical waste treatment facilities to kill pathogens, and sterilize BMW. More commonly BMW is treated by burning, ignition, autoclaving, by treating with chemicals, and using microwaves.

Disposal: Biomedical waste should be disposed of in a way that its toxic effects on the environment are minimal. Standard methods of disposing of BMW are burying, landfills, incineration, and other methods approved by the establishment.

Record-Keeping and Reporting: Authorities dealing with production, treatment, and disposal should be compelled to maintain records of all these activities. To ensure compliance consistent reporting to higher authorities should be ordered.

Training and Awareness: To increase awareness about efficient dealing, separation, and dumping of biomedical waste, all healthcare workers and ruling authorities should be educated about biomedical waste management.

Enforcement and Penalties: Higher authorities should impose heavy fines in case of non-compliance with biomedical waste rules. More serious actions like suspending medical licenses and legal actions can also be taken.

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Biomedical Waste Rule 2005 aims to build an extensive framework for a safer and better environment and protect the masses from the toxic effects of biomedical waste.

BIO-MEDICAL WASTE SITUATION IN PAKISTAN:

Pakistan faces several issues when it comes to biomedical waste management, namely insufficient architecture, poor rules and regulations, and lack of awareness. Here we'll talk about some of these challenges:

Lack of Infrastructure: Most hospitals in Pakistan lack proper architecture for separation, safekeeping, treatment, and dumping of biomedical waste. This gives rise to inadequate biomedical waste management practices and the risk of infections.

Inadequate Regulations: While there are rules in place in Pakistan concerning biomedical waste management, there is a lack of implementation and observance. There is a lack of administration and observation regarding these rules and regulations.

Limited Awareness: There is a lack of education regarding biomedical waste management among healthcare professionals, waste managers, and the general population. This can lead to inadequate biomedical waste management and increase the risk of contamination and exposure to disease-causing microorganisms.

Environmental and Health Risks: Inadequate biomedical waste disposal gives rise to environmental and health issues. Toxic biomedical waste can contaminate soil, water bodies, and air leading to increased infections and diseases.

Need for Capacity Building: There is a need for more buildings with upgraded architecture for proper segregation, storage, and treatment of biomedical waste. Awareness and training programs about biomedical waste management can also help reduce the risks of infections and improve BMW practices.

In conclusion, to improve biomedical waste management conditions in Pakistan there is a need for committed and collective efforts by higher authorities, healthcare management, waste management teams, and the general public to guarantee proper segregation, handling, treatment, and disposal of biomedical waste.

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METHODOLOGY

This study was quantitatively conducted in public health care centers. All the participants were healthcare workers and were enrolled through multistage sampling. This research evaluates biomedical waste management and awareness in government hospitals in Pakistan. 17 Government District Headquarters (DHQ) Hospitals in Punjab were selected for the study. Through convenient sampling, 450 participants were chosen from these hospitals for interviews. 30 participants from each selected hospital were interviewed in detail to accumulate data. A custom-made interview was held keeping in view older studies about biomedical waste management and Hospital Waste Management Rule Pakistan 2005. The collected information was processed through the Statistical Package for Social Sciences (version 22).

MAJOR FINDINGS

The participants of this research belong to different departments of hospitals to gain different perspectives and extensive data. Separation of biomedical waste at source is necessary for adequate handling, transit, and dumping. Different colored dustbins with labels were used for this purpose in all hospitals. However, the research showed that the separation of biomedical waste at hospitals was not adequately practiced. Bdour et al., (2007) found malpractice in the separation of biomedical waste in healthcare facilities. Even though, the healthcare workers were aware of the use of different colored dustbins for different types of waste. Nevertheless, janitorial staff, clerical staff, and especially the patient and their helpers were unaware of the proper use of color-coded waste bins. They overlooked the instructions to use the dustbins for proper segregation of biomedical waste even if they were mentioned in some places. It showed the irresponsible behavior of junior staff towards biomedical waste practices. Hassan et al., (2012) stated that the management of many hospitals in Pakistan showed negligent behavior in handling, transporting, and disposing of biomedical waste. The biomedical waste management committee of the hospital has a meaningful role in the separation, managing, carting, and dumping of biomedical waste. BMWM committee is also accountable for the proper training of hospital staff on how to handle toxic biomedical waste. Research showed negligence of BMWM committees of healthcare facilities. Kumar et al., (2010) revealed multiple justifications for poor

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BMW practices such as lack of interest by healthcare workers, non-interested junior staff, increased workload, lack of information and training on biomedical waste management, and lack of funds.

Research suggested that the hospital management was coaching hospital staff about biomedical waste management, but these activities were substandard. This shows a need for better and proper training in biomedical waste management. Hassan et al., (2012) conducted a study in eighteen hospitals in Khyber Pakhtunkhwa, Punjab, and Islamabad. He found that most public and private hospitals lack proper education and coaching about biomedical waste management. Based on the Environmental Protection Act 1997, the Federal Government of Pakistan presented Hospital Waste Management Rule Pakistan 2005. According to this proper biomedical waste disposal and management was made necessary in all private and government hospitals of Pakistan. However, the research showed inadequate enactment of these rules. Research showed a lack of accountability on behalf of hospital staff, and inefficient monitoring by higher authorities of healthcare facilities. These findings resemble those of Sharma & Chauhan (2008) in India who cited that significant issues behind inadequate BMWM are lack of commitment, malpractice of biomedical waste management, no accountability for malpractice, and mistreatment of biomedical waste management. Biomedical waste not disposed of properly can cause profound health concerns for the population living near the dumps. Mismanagement of toxic waste can impose some serious environmental hazards. BMW can also infect earth and water bodies and can give rise to widespread diseases.

CONCLUSIONS

Biomedical waste management requires the team effort of devoted government and efficient BMW techniques practiced by health professionals and healthcare facilities. Check and balance BMW practices and strict laws for its implementation. We all deserve to live in a healthy and safe ecosystem. The separation of BMW at its source is the backbone of BMWM. BMWM rules of 2005 are better than the ones before. The use of non-PVC medical gadgets should be preferred and environment-friendly ways to dispose of biomedical waste should be supported. Everyone involved in BMWM should commit to making the environment clean and safe.

RECOMMENDATIONS

- ✓ Spread awareness and educate local communities about bio-medical waste management and disposal techniques.
- ✓ Build alliances between healthcare workers, waste management teams, and lawmakers to enact safe waste management and disposal.
- ✓ Educating and training medical professionals to ensure that they are updated about biomedical waste management practices and laws.

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Conflicts of interest

No conflicts of interest found.

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