Knowledge, Attitude and Practices Regarding Biomedical Waste Management among Post Graduate Residents in a Tertiary Care Hospital of Lucknow

Trideep Jyoti Deori¹, Sugandhi Sharma¹*
¹Junior Resident, Department of Community Medicine & Public Health, King George’s Medical University, Lucknow, UP, India

*Corresponding Author:
Dr. Sugandhi Sharma
King George’s Medical University, Lucknow, UP, India

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ABSTRACT

Background: It is estimated that 10-25% of the healthcare waste generated is hazardous & presents physical, chemical and/or microbiological risk to the general population and health-care workers associated with handling, treatment, and disposal of waste. Every concerned health personnel is expected to have proper knowledge, practice and capacity to guide others for waste collection and management and proper handling techniques. Majority of the problem can be avoided if the health care waste is properly managed. Thus, this study was conducted with the aim to assess knowledge, attitude and practices among 1st year post graduate residents in a tertiary care hospital of Lucknow.

Methods: It was a hospital based cross-sectional study carried out in March 2017 on 1st year Junior Residents of King George’s medical University, Lucknow. Data was collected using a structured, self-administrated questionnaire which was designed to assess the knowledge, attitude and practices on various aspects of biomedical waste (BMW) management.

Results: Majority (72%) of the residents had an average knowledge about BMW management. Only about one-fourth of them (27.7%) knew about the maximum time beyond which the waste can’t be stored in the hospital while about half of the residents (56.2%) thought that their knowledge regarding biomedical waste is adequate. It was alarming to note that 11.6 percent of the residents were not vaccinated against Hepatitis B.

Conclusions: The residents had average knowledge about BMW management, legislation and color coding. Though the attitude of residents regarding BMW was good but in practice it was average. There is an essential need for better education to further improve the practices of BMW management by well-designed seminars, programs and workshops.

Keywords: Biomedical waste management, knowledge, attitude, practice, junior residents

INTRODUCTION

The term “biomedical waste” has been defined as “any waste that is generated during diagnosis, treatment or immunization of human beings or animals, or in the research activities pertaining to or in the production or testing of biological and includes categories mentioned in schedule I of the Government of India’s Biomedical Waste (Management and Handling) Rules 1998”¹. It is estimated that 10-25% of the healthcare waste generated is hazardous & presents physical, chemical and/or microbiological risk to the general population and health-care workers associated with handling, treatment and disposal of waste”. 
In countries like India, where there is a big and complex health care system, mixed economy, private and Government hospitals working together, while providing services generate a huge amount of waste. Hospital waste is generated in India and the waste generation rate ranges from 0.5 to 2 kg/bed/day\(^3\). Uttar Pradesh being the 4\(^{th}\) highest in generating Bio-medical waste (43554 kg/day)\(^4\) after Karnataka, Maharashtra and Tamil Nadu.

Several studies have also indicated that the inappropriate handling and disposal of hospital waste poses health risks to health workers\(^5,\ 6,\) and \(^7\). Since the implementation of the Biomedical Waste Management and Handling Rules (1998), every concerned health personnel is expected to have proper knowledge, practice and capacity to guide others for waste collection and management and proper handling techniques. Majority of the problem can be avoided if the health care waste is properly managed. It encompasses, planning, organizational, administrative, financial, legal, engineering aspects and human resource development and their management involves inter-disciplinary relationships. Thus, this study was conducted with the aim to assess knowledge, attitude and practices on various aspects of BMW such as its hazards, rules, management, the color coding for segregation and methods used for disposal.

Questionnaire was divided into three parts as below:

1. Part 1 comprised of five questions on “Assessment of Knowledge of Biomedical Waste Management”
2. Part 2 included five questions on “Assessment on Attitude Towards Biomedical Waste Management”
3. Part 3 had six questions on “Assessment on Practices Related to Biomedical Waste Management”

**PROCEDURE FOR DATA COLLECTION:** After taking written consent for the study, the questionnaire was personally administered and the residents were explained regarding the motive of the study and how to complete the questionnaire. It was emphasized that the confidentiality of the responses made by them would be strictly maintained.

**DATA ANALYSIS:** Data compilation and analysis was done using software SPSS 23.0 version. Proportions and percentage were used to interpret the result. Questions were marked right or wrong. Each correct response was given one score and the total was calculated for each part. Grading was done as good (>80\%), average (>60-80\%) and poor (≤60\%) based on the scores secured.
RESULTS

Figure-1: Grading of Knowledge of BMW Management among Postgraduate Medical Residents

Majority (72%) of the residents had an average knowledge about BMW management and around one-fourth of them (20%) had good knowledge on the subject while 8 percent of the residents were found to have poor knowledge.

Table-1: Knowledge of Postgraduate Residents about Bio-Medical Waste Management

<table>
<thead>
<tr>
<th>KNOWLEDGE OF BIOMEDICAL WASTE MANAGEMENT</th>
<th>CORRECT ANSWERS n (%)</th>
<th>INCORRECT ANSWERS n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Aware of Biomedical waste management rules and legislation</td>
<td>112 (86.2%)</td>
<td>18 (13.8%)</td>
</tr>
<tr>
<td>2 Segregation of BMW as per Color coding</td>
<td>102 (78.5%)</td>
<td>28 (21.5%)</td>
</tr>
<tr>
<td>3 Time of storage of BMW in hospital</td>
<td>36 (27.7%)</td>
<td>94 (72.3%)</td>
</tr>
<tr>
<td>4 Percentage of infectious waste in total biomedical waste</td>
<td>77 (59.2%)</td>
<td>53 (40.8%)</td>
</tr>
<tr>
<td>5 Symbol of Biomedical waste</td>
<td>109 (83.8%)</td>
<td>21 (16.1%)</td>
</tr>
</tbody>
</table>

Table-1 shows that majority (86.2%) of the residents were aware of BMW management rules but only about one-fourth of them (27.7%) knew about the maximum time beyond which the waste can't be stored in the hospital. A majority (78.5%) of the residents knew about the segregation of BMW as per color coding while 59.2 percent of the residents were aware about the percentage of infectious waste generated in the hospital. About 16.1% residents didn't know the symbol for the biomedical waste.
Table-2: Attitude of Postgraduate Medical Residents Towards Bio-medical waste Management

<table>
<thead>
<tr>
<th>ATTITUDE TOWARDS BIOMEDICAL WASTE MANAGEMENT</th>
<th>YES n (%)</th>
<th>NO n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 BMW management is a team work</td>
<td>130 (100%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>2 BMW should be included in PG curriculum</td>
<td>126 (97.0%)</td>
<td>4 (3.0%)</td>
</tr>
<tr>
<td>3 Further training in BMW required</td>
<td>109 (83.8%)</td>
<td>21 (16.1%)</td>
</tr>
<tr>
<td>4 Safe management increases the financial burden of the hospital</td>
<td>52 (40 %)</td>
<td>78 (60%)</td>
</tr>
<tr>
<td>5 Importance of labeling biomedical waste</td>
<td>119 (91.5%)</td>
<td>11 (8.5%)</td>
</tr>
</tbody>
</table>

Table-2 shows that these attitude-based questions were well-responded. All of the residents considered that BMW management is a team work. Majority (97%) of residents felt that biomedical waste management should compulsorily be made part of the post graduate curriculum. Majority of them (83.8%) were willing for the further training on biomedical waste management. 40.0 percent of residents felt that safe management increases the financial burden of the hospital. About 91 percent residents felt that it is important to label the biomedical waste.

Table-3: Practices Related to BMW Management Among Postgraduate Residents

<table>
<thead>
<tr>
<th>PRACTICES RELATED TO BIOMEDICAL WASTE MANAGEMENT</th>
<th>CORRECT ANSWERS n (%)</th>
<th>INCORRECT ANSWERS n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Practicing segregation of BMW at work site</td>
<td>106 (81.5%)</td>
<td>24 (18.5%)</td>
</tr>
<tr>
<td>2 In which bin Broken glass bottles/ vials are discarded</td>
<td>78 (60.0%)</td>
<td>52 (40.5%)</td>
</tr>
<tr>
<td>3 Disposal of cotton, gauze and blood-soaked items</td>
<td>108 (83.0%)</td>
<td>22 (17.0%)</td>
</tr>
<tr>
<td>4 Disposal of general waste</td>
<td>118 (90.8%)</td>
<td>12 (9.2%)</td>
</tr>
<tr>
<td>5 Not recapping the used needle</td>
<td>100 (100%)</td>
<td>0</td>
</tr>
<tr>
<td>6 Vaccinated against Hep B</td>
<td>115 (88.4%)</td>
<td>15 (11.6%)</td>
</tr>
</tbody>
</table>

Table-3 illustrates the practices regarding segregation of waste & color coding of BMW. Maximum (81.5%) residents were practicing segregation of BMW at work site. 60 percent of the residents correctly answered about discarding the broken glass bottles and vials. Majority (83.0% and 90.8% respectively) of the residents correctly practiced about discarding contaminated cotton and general waste in the right bin. All (100%) of the residents did not recap used needles. It was alarming to note that 11.6 percent of the residents were not vaccinated against Hepatitis B.
DISCUSSION

The study revealed several lacunae in the knowledge, and practices among the postgraduate residents.

Health professionals have an ethical responsibility towards the environment and themselves. Because of the nature of their profession, they must not forget that they are at risk for treating patients who may have infectious diseases.

In this study, most of the residents were in average category as per their scores. A majority of residents had an average knowledge regarding BMW management. Similar findings were observed in a study done by Sekar M et al (2018)8. 86.2 percent of residents were aware about biomedical waste management rules and legislation. This result was found to be consistent with the findings of the study done by Mehta T K et al (2018)9. In the present study, 27.7 percent post-graduates knew about correct duration till which bio-medical waste can be stored. Similar findings were observed by Singh S et al (2019)10. About 78 percent of the participants knew that segregation of waste must be done at the point of waste generation and this finding was consistent with the findings of study done by Karmakar N et al (2016)11 and Amin P et al (2018)12. Symbol of BMW was correctly identified by a majority of resident and this observation was similar with the findings of study done by Singh S et al (2019)10.

The attitude-based questions in the present study were well-responded. All of the residents felt that BMW management is a team work. These findings were in accord with a study done by Malini A et al (2018)13. A majority (97.0%) of them felt that biomedical waste management should compulsorily be made part of the postgraduate curriculum. Mehta T K et al (2018)9 and Singh S et al (2019)10 showed similar results. A majority of residents expressed the need of BMW management training. About 42.0 percent of residents felt that safe management of bio medical waste increase the financial burden on management. These observations were found to be consistent with the finding of study done by Malini A et al (2018)13 but were contrasting with the findings of Singh G P et al (2014)14. Maximum residents considered it to be important to label BMW. Mehta T K et al (2016)9 also showed similar findings.

Regarding the practice related to BMW management, 82% of the residents were practicing segregation of BMW as per different color coded bags, which is nearly similar to the findings of study done by Amin P et al (2018)12. Practices regarding disposal of broken vials were not found to be appropriate as about only 60.0 percent of residents were practicing it. These figures were higher than a study done by Singh S et al (2019)10. A good number of residents were disposing of general waste and blood socked item in the correct bin. These findings were similar to the findings by Sharma M et al (2016)15. On asking about vaccination against Hepatitis B, the 88.0 percent of residents were found to be immunised against Hepatitis B. Similar figures were reported by Kushwaha R et al (2016)16. All the residents were following the practice of not recapping the used needle which was found to be similar with results of Mehta T K et al (2018)9 and Amin P P et al (2018)12.

CONCLUSION:

The study shows that overall the residents have average knowledge and practice about BMW management. Though the attitude of residents regarding BMW was good.

Our study revealed that the importance of training regarding bio medical waste management cannot be overemphasized, lack of proper and complete knowledge about bio medical waste management impacts practices of appropriate waste disposal.

There is a need of regular training of BMW management. As many residents were not immunized against Hep B so it should be made compulsory before their admission to get vaccinated.

DECLARATIONS

Funding: None.
Conflict of interest: None.

Ethical approval: Ethical clearance was obtained from the Institutional Ethical Committee of the King George’s Medical University UP, Lucknow.

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4. Central Pollution Control Board, Annual Report on Biomedical Waste Management as per Biomedical Waste Management Rules, 2016 For the year 2017


