



Clinical Waste Management in Malaysia

Dasimah Omar¹, Siti Nurshahida Nazli², Subramaniam Karuppanan²

¹ Faculty of Architecture, Planning and Surveying, Universiti Teknologi Mara, Malaysia

² Faculty of Health Sciences, Universiti Teknologi Mara, Malaysia

dasimah629@salam.uitm.edu.my

Abstract

The research is a cross-sectional comparative study carried out to determine the variations and similarities in the activities of clinical waste management practices within three district hospitals located in Johor, Perak and Kelantan. Using physical observation, administered questionnaire and interview questions, sectional data within each hospital were collated and analysed by employing Microsoft Excel and relevant statistical analysis tools like ANOVA. The results showed similarities in many areas, confirming that similar activities take place within the hospitals and variations in other areas confirming that many factors both external and internal affect the clinical waste management and other activities within the hospitals. Studies revealed many deficiencies in the management process mostly weaknesses in segregation process.

Keywords: clinical waste management; generation; segregation; storage

eISSN 2514-7528 © 2018. The Authors. Published for AMER ABRA cE-Bs by e-International Publishing House, Ltd., UK. This is an open-access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). Peer-review under responsibility of AMER (Association of Malaysian Environment-Behaviour Researchers), ABRA (Association of Behavioural Researchers on Asians) and cE-Bs (Centre for Environment-Behaviour Studies), Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA, Malaysia.

DOI: <https://doi.org/10.21834/jabs.v3i7.253>

1.0 Introduction

The study is conducted to determine and assess the clinical waste management in Malaysia focuses on district hospitals. The study covers the critical aspects in the process of clinical waste generation, separation, collection, transportation, storage, treatment and final disposal. It also examines the level of knowledge and awareness of the hospital personnel. All transportation and disposal of clinical waste in Malaysia is regulated under the Environmental Quality (Scheduled Waste) Regulations 2005. The Ministry of Health (2009) stated that the most common issues faced by clinical waste management are the improper waste segregation at source.

Based on the notification on scheduled waste by the Department of Environment Malaysia, in 2010 is 42,029.33 million tonnes (DOE, 2010) as shown in Figure 1.

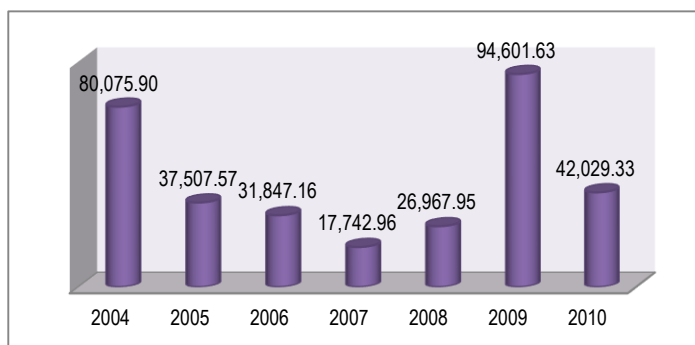


Fig 1. Clinical waste generation in Malaysia from 2004 until 2010 (Metric tonnes/year)

2.0 Research Methodology

The survey research is used to examine, evaluate and to identify the level of knowledge and awareness among the hospitals personnel. Besides interview and physical observations, questionnaire was used to collect data from the hospitals personnel. The hospitals selected were Hospital Taiping, Hospital Tumpat and Hospital Batu Pahat, to reflect management at three different regions by Radicare Sdn. Bhd., Pantai Medivest Sdn. Bhd. and Faber-Mediserve Sdn. Bhd. Site surveys were carried out to observe and examine the current practices.

An observational checklist was used to record the findings. The research was administered using survey questionnaires to identify the level of knowledge and awareness. A non-probability stratified sampling techniques were applied for each hospital with the number of questionnaires distributed for each hospital was 200. Simple random sampling was done where only ten to fifteen hospital personnel in each department. There were 600 questionnaires equally distributed to medical practitioners at the studied hospitals. The questionnaire was pretested in a pilot study involving 30 staffs from Hospital Batu Pahat. Section one covers the demographic information such as age group, gender, ethnicity,

education level, job category and duration of services. Section two covers the questions regarding the knowledge and awareness on clinical waste management in the hospitals. Questionnaires were returned two weeks after the distributions where researcher had self-picked and received by post. A total of 427 answered questionnaires were collected, 150 from Hospital Taiping, 150 from Hospital Tumpat and 127 from Hospital Batu Pahat.

Face to face structured interviews were conducted with the concession companies and hospitals representatives. Section one covers the general information including total number of employees, the total number of beds and total number of inpatients and outpatients per day. Section two covers information gathered from the concession companies. Data were analysed using statistical techniques. Descriptive statistics applied to explain the background information while frequencies and percentages to summarise information. Data regarding the level of knowledge and awareness of respondents were analysed applying variance (ANOVA) and Independent-Samples T Test.

There are some limitations. The district hospitals chosen are to reflect the regions with Hospital Taiping representing central zone, Hospital Batu Pahat, southern zone and Hospital Tumpat, northern zone. Full cooperation by hospital personnel cannot be achieved. Longer time was required for reasons such as lack of time and the questionnaires are too long.

3.0 Results and Discussion

Demographic characteristics

About 50 percent of the respondents from Hospital Batu Pahat and 42.1 percent from Hospital Taiping were in the age group of 21 to 30 years old. While 30.9 percent the respondents from Hospital Tumpat are in the age group of 51 years old. Majority of the respondents are females. The Degree and Masters Holders include the doctors, pharmacists, therapists and others. Majority of the respondents in the hospitals who are Diploma holders were nurses. Majority of the respondents have more than ten years working experiences.

Survey analysis

The clinical waste management at the hospitals is managed by the concession companies which are Pantai Medivest Sdn. Bhd. (PMSB), Faber-Mediserve Sdn. Bhd. (FMSB) and Radicare Sdn. Bhd. (RSB).

- **Clinical waste generation**

The amounts of the waste generated in the hospitals were gathered from the concession companies responsible in managing the waste. There were good records keeping by FMSB and PMSB except RCB with estimation amount of waste generation were provided. This amount reflects that bigger hospital generate more amount of wastes than smaller hospital as shown in Figure 2.

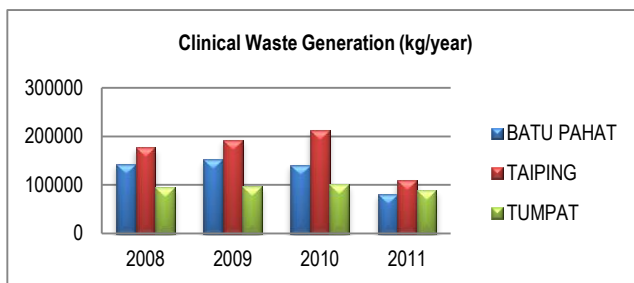


Fig 2. Statistics of clinical waste generation

- Segregation

The segregation was practiced by the hospitals but not conducted according to the rules and standards. At Hospital Batu Pahat clinical waste was deposited into yellow bins exceeds the specific limit, incubation plates were found pressed into sharp bins and improper disposal of sharps into the container. In Hospital Taiping, there was misusing of waste bags and yellow bag hung at the blood pressure machine, mistakenly providing waste bags for patients' clothes during discharge. In Hospital Tumpat there were improper size of yellow bags in departments and wards, clinical waste exceed $\frac{3}{4}$ full in the container and yellow bags hung at a trolley. Some of the hospital staffs misused the yellow bags by depositing sharp objects. There were frequently insufficient waste containers provided by the concession companies to all required departments and wards in the hospitals.

- Collection and transportation

Clinical wastes generated in the hospitals were collected on a daily basis and transported to the temporary storage area in the hospitals. During collection, new clinical waste bags and containers marked with international infectious substance symbol are used replacing the collected ones. At the end of each shift, clinical wastes were collected and transported by waste handlers. They have to carry all the containers and trolley, collect the clinical waste at generation points and change the yellow bags and containers at every location by their own. Wheeled trolleys were used in the collection process to the temporary storage area. It was found that in Hospital Batu Pahat, wheeled bins were left standing at corridors by the waste handlers. These vehicles were then cleaned and disinfected at the washing down facilities located at the central storage in lined with the legal requirement by the DOE. The waste handlers were equipped with personal protective equipment (PPE) during clinical waste collections and transportation including gloves, safety boots, face mask and apron as required by the DOE.

- Central storage

In all studied hospitals, there are central storages sites for temporary storage which was locked when not in access. Clinical wastes are stored at twelve to twenty four hours and not more than forty eight hours following the guidelines by the Ministry of Health. There were

facilities for washing down and disinfection of containers and bins. In Hospital Tumpat, hundreds of yellow plastic bags filled with clinical waste including amputated body parts, placenta, used syringes, blood-stained materials and other infectious waste were left lying outside the hospital's cold storage clinical waste store. Flies were observed at the left lying clinical waste with very bad odour at the storage and tore clinical waste bags found. The reason was the incinerator plant in Teluk Panglima Garang was closed since May 2011 due to leakages. The cold storage should play its role in keeping the waste. However, the cold storage in Hospital Tumpat was used as rest room by the waste handlers. Clear warning signs were observed in Hospital Batu Pahat and Hospital Tumpat but not in Hospital Taiping. In the other hand, only cold storage in Hospital Taiping was kept at 4°C to 6°C.

- External transportation

The external transportation process and procedures were observed similar in practiced. The vehicles used have licenses from the DOE. The off-site transportation in Hospital Taiping to the incinerator is on Monday, Tuesday, Friday and Saturday. The waste collected on Sunday and Thursday will be kept in the cold storage until the next collection on Monday. The transportation facilities to the incinerators provided by concession companies. The hospital personnel involved in the verification process of collection as required by the Ministry of Health.

- Final disposal

Incineration is the final steps in clinical waste management. All clinical waste collected and been transported to the incinerator plant were burned into ashes. PMSB sends wastes collected at Hospital Batu Pahat to Incinerator in Bukit Rambai which is about 120 km with about 2 hours transportation time. Hospital Tumpat's waste sent by RSB to the incinerator at Bukit Panglima Garang, 524 km away for about 8 hours. FMSB sends wastes collected at Hospital Taiping to Kamunting Incinerator, 73 km from the hospital with about 1 hour travelling time.

- Awareness and Knowledge

Results show that the majority of the respondents from the Hospital Batu Pahat (94.5 percent), Hospital Taiping (94.1 percent) and Hospital Tumpat (93.3 percent) have high knowledge about the clinical waste management processes in the hospitals. Respondents stated that there were correct procedures of clinical waste management in the Hospital Batu Pahat (77.3 percent), Hospital Taiping (88.8 percent) and Hospital Tumpat (90.7 percent). Only minority of the respondents with 18.8 percent from Hospital Batu Pahat, 13.8 percent from Hospital Taiping and 20 percent from Hospital Tumpat did not know the correct method of clinical waste handling based on their categories. It was found that 99.2 percent from Hospital Batu Pahat, 95.4 percent from Hospital Taiping and 95.3 percent from Hospital Tumpat segregated general waste from clinical waste. However, there were respondents that did not know the colour coding system that separate clinical and general waste with Hospital Batu Pahat 6.3 percent, Hospital Taiping 5.3 percent and Hospital Tumpat 10.0 percent. The result also shows that most of the respondents knew that the hospital has a set of transport

schedule for hospital infectious waste within the organization (Hospital Batu Pahat 93.8 percent, Hospital Taiping 88.2 percent and Hospital Tumpat 90.7 percent and were collected and transported to the designated central storage site daily (Hospital Batu Pahat 96.1 percent, Hospital Taiping 96.1 percent and Hospital Tumpat 88.7 percent). Majority of the respondents knew that the clinical waste storage room should have good lighting and ventilation (Hospital Batu Pahat 71.9 percent, Hospital Taiping 75.0 percent and Hospital Tumpat 74.0 percent) and that clinical waste storage time is from 24 hours to 48 hours (Hospital Batu Pahat 68.8 percent, Hospital Taiping 76.3 percent and Hospital Tumpat 69.3 percent). In the aspect of training, 32.8 percent from Hospital Batu Pahat, 21.7 percent from Hospital Taiping and 34.7 percent from Hospital Tumpat did not receive training in the clinical waste handling and management in hospitals. About 85.2 percent of respondents from Hospital Batu Pahat, 93.6 percent from Hospital Taiping and 80.0 percent from Hospital Tumpat knew the persons responsible to manage clinical wastes in the hospitals. Majority of the respondents from Hospital Batu Pahat (97.7 percent), Hospital Taiping (98.9 percent) and Hospital Tumpat (73 percent) were aware that clinical waste can cause risks and health hazards to health if not properly handle. They were also aware that clinical waste can cause risks and adverse effects to the environment when not handling properly with Hospital Batu Pahat (98.4 percent), Hospital Taiping (98.9 percent) and Hospital Tumpat (87 percent). It was found that 3.9 percent of respondents from Hospital Batu Pahat and 3.3 percent from Hospital Taiping while 16 percent from Hospital Tumpat stated that bags and containers for clinical waste were marked with the international infectious substance symbols. Only minority 10.9 percent from Hospital Batu Pahat, 7.2 percent from Hospital Taiping and 9.3 percent from Hospital Tumpat were not aware of locations of bag holders and waste containers in their workplace. Majority of the respondents (Hospital Batu Pahat 96.1 percent, Hospital Taiping 90.8 percent and Hospital Tumpat 79.3 percent) were aware that needle sticks and sharp injuries need to be reported. Only 3 percent of respondents from Hospital Batu Pahat, 2.6 percent from Hospital Taiping and 7.3 percent from Hospital Tumpat gave correct answer on the question of categories of clinical waste. However, majority of the respondents answered correctly on the colour coding of the clinical waste bins (Hospital Batu Pahat 93 percent, Hospital Taiping 90.8 percent and Hospital Tumpat 95.3 percent). Majority of the respondents stated that clinical wastes must be thrown in the container less than 3/4 full (Hospital Batu Pahat 79.7 percent, Hospital Taiping 81.6 percent and Hospital Tumpat 73.3 percent). About 46 percent of respondents from Hospital Batu Pahat, 25 percent from Hospital Taiping and 18 percent from Hospital Tumpat stated that they noticed needle sticks and sharps in other containers than its specific containers. There were a number of respondents stated that they were injured with needle stick or sharp injury during waste handling (Hospital Batu Pahat 11.7 percent, Hospital Taiping 9.9 percent and Hospital Tumpat 11.3 percent).

- Analytical Result

Table 1. Analytical results of testing the level of knowledge and awareness

<i>Item</i>	<i>p-value</i>
-------------	----------------

Among hospitals	<0.112
Gender	<0.009
Age group	0.172
Education level	<0.001
Duration of Services	<0.005

Table 1 shows the analytical results of testing the level of knowledge and awareness. The result shows not much and almost same mean among the hospitals with p -value of 0.112. It means that the level of knowledge and awareness of clinical waste management among respondents in the three case studies are almost similar. There are significant different of mean knowledge and awareness score in gender. The result indicated that male respondents are having higher level of knowledge and awareness of clinical waste management in the hospitals compared to female respondents. The level of knowledge and awareness of clinical waste management in the three case studies at all age categories are similar. There are significant different between the score level and the education level with p -value <0.001. Post hoc tests comparison confirmed that respondents that have Degree and higher education level have higher knowledge and awareness in management and handling in the hospitals. The result indicated that there is significant different between the variables with p -value of 0.005. It is shown that respondents with service of duration below 3 years have higher knowledge and awareness in correct handling and management compared respondents having higher length of working time.

4.0 Conclusion

From the results of the study, it shows that clinical waste management in the hospitals studied is following the required standards and regulations. However, a continuous proper management of clinical waste in the hospitals cannot be practiced as there are some deficiencies and weaknesses in the management. From the findings, the problems confronting the hospitals include lack of instructions on the aspects of clinical waste segregation and practices by nurses and intermingling of clinical waste with general waste. Besides that, improper use of clinical waste bags and containers including sharps containers are also common. There was lack of good record keeping, failure to ensure proper temporary central storage and low education and training among the hospital staffs. Future research is encouraged to be conducted as to oversee and further assess the current status of clinical waste management and the problems exist.

Acknowledgements

The authors acknowledged the financial support provided by the Research Management Institute of Universiti Teknologi MARA, Malaysia for this research.

References

- Ananth, A. P., Prshanthini, V., & Visvanathan, C. (2010). Healthcare Waste Management in Asia. *Waste Management & Research*, 30(2010), 154-161.
- DOE. (2005). *Environmental Quality Act 1974 (Act 127) & Subsidiary Legislation*. Kuala Lumpur: International Law Book Services.
- DOE. (2009). *Guidelines on the Handling and Management of Clinical Wastes in Malaysia*. Putrajaya: Ministry of Natural Resources and Environment.
- DOE. (2010). *Malaysia Environmental Quality Report 2010*. Putrajaya: Ministry of Natural Resources and Environment.
- DOSH. (2008). *Guidelines for Hazard Identification, Risk Assessment and Risk Control (HIRARC)*. Department of Safety and Health, Ministry of Human Resources Malaysia.
- DOSH. (2005). *Occupational Safety and Health Act and Regulations*. Kuala Lumpur: MDC Publishers Sdn Bhd.
- MOH. (2009). *Health Care Waste Status Report*. Putrajaya: Engineering Services Division, Ministry of Health, Malaysia.
- MOH. (2011). *Health Facts 2010*. Putrajaya: Ministry of Health, Malaysia.
- MOH. (2010). *Official Portal Ministry of Health Malaysia*. Retrieved November 10, 2011, from Listing Government Hospital: http://www.moh.gov.my/gov_hospitals
- MOH. (2009). *Project Operation Guidelines for Clinical Waste Management Services: Privatised Hospital Support Services Ministry of Health Malaysia*. (Document No. POG/ CWMS/ C-01), Putrajaya, Malaysia: SIHAT.
- MOH. (2007). *Sharps Injury Surveillance Manual*. Putrajaya: Occupational Health Unit, Disease Control Division.
- Nema, A., Pathak, A., Bajaj, P., Sigh, H., & Kumar, S. (2011). A Case Study: Biomedical Waste Management at City Hospital in Himachal Pradesh. *Sage Publications*, 29(6), 669-673.
- Rampal, L., Zakaria, R., Sook, W. L., & Md Zain, A. (2010). Needle Stick and Sharp Injuries and Factors Associated Among Health Care Workers in a Malaysian in Hospital. *European Journal of Social Sciences*, 13 (3), 354-362.
- Tudor, L. T., K.Townend, W., R. Cheeseman, C., & E.Edgar, J. (2009). An Overview of Arisings and Large-Scale Treatment Technologies for Healthcare Waste in the United Kingdom. *Waste Management & Research*, 27, 374-383.
- WHO. (2011). *Fact Sheet: Health-care Waste Management*: Retrieved October 02, 2011, from <http://www.who.int/mediacentre/factsheets/fs281/en/index.html>