ORIGINAL ARTICLES

Classification of medical solid waste and some related factors in clinical departments at K Hospital Tan Trieu Branch 2024

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ABSTRACT

Objective: To evaluate the current status of medical solid waste classification at the K Hospital-Tan Trieu branch and association factors.

Methods: A mixed method combining quantitative (using a cross-sectional study) and qualitative methods was conducted from January 2024 to September 2024 in 22 clinical departments of the Tan Trieu branch of K Hospital. Quantitative data were collected through observations using checklists to assess the waste classification practices of 245 medical staffs. Qualitative data were obtained through in-depth interviews with one hospital director representative, one leader of the Infectious Control Department, four leaders of the Internal Medicine Division and the Surgery Division, and two leaders of nurses from clinical departments, as well as 2 group discussions with medical staffs (16 participants). Quantitative data were entered using Microsoft Excel and processed with SPSS20.0 software. Qualitative data were transcribed, saved in Word files, and analyzed thematically.

Results: The research showed that 82.0% of healthcare workers correctly classified medical solid waste, Several positive factors influencing medical waste solid classification included the hospital management board's support, properly developed waste management procedures, effective collaboration among departments, reasonable allocation of funds for waste solid management, and adequate provision of tools for waste classification. Negative factors included not being trained about medical solid waste classification and high workloads.

Conclusion: Medical staffs at K Hospital - Tan Trieu branch have good practice in medical solid waste classification. We recommend that the Tan Trieu branch of K Hospital implement policies to reduce healthcare staffs' workloads and strengthen training on medical solid waste classification quarterly, particularly for physicians and staff with postgraduate qualifications. Communication efforts on medical solid waste classification should be enhanced through various methods within the hospital campus.

Key words: *Medical solid waste, classification.*

INTRODUCTION

Classification of medical solid waste are among the initial steps in the management process of medical solid waste. Proper implementation of this task facilitates subsequent waste treatment processes, reduces treatment costs, ensures safety for healthcare workers and patients, and contributes to mitigating the risk of infection spreading to humans and the environment (1). The Tan Trieu campus of K Hospital, with the highest number of hospital beds among all K Hospital branches, receives hundreds of thousands of cancer patients annually. The high number of patients results in a significant amount of medical solid

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waste generated at the hospital, reaching up to 5.6 tons per day (in 2023). Therefore, this study was conducted with the following objectives: 1) Describing the current status of medical solid waste classification in clinical departments at Tan Trieu K Hospital in 2024 ; 2) Analyzing factors affecting medical solid waste classification in clinical departments at Tan Trieu K Hospital in 2024.

METHODS

Research design: This study employed a mixed method combining quantitative (cross-sectional design) and qualitative research components.

Research subjects: It was conducted on doctors and nurses working in 22 clinical departments under the Internal Medicine Division and Surgery Division at Tan Trieu K Hospital.

Study site and time: At Tan Trieu K Hospital, from January 2024 to September 2024.

Sample size and sampling

Qualitative components: We applied the sample size to estimate a population proportion with specified absolute precision, with proportion of correctly classified medical solid waste, P = 85.0% (3), $z(1-\alpha/2) = 1.96$, d =0.05. Estimating the abandonment rate to be at 20%. The sample size needed was 245 medical staffs. A systematic random sampling was employed. A sampling interval of k=N/n=562/245 (~ 2) was used to systematically select 245 participants who met the selection criteria from a total of 562 doctors and nurses from the 22 departments.

Qualitative components: 8 in-depth interviews were conducted in one director of the hospital; one leader of the Infectious Control Department, two leaders of the Internal Medicine Division; two leaders of the Surgery Division; two heads of nurses of the Internal Medicine and Surgery Divisions. 16 medical staffs with the capability to provide substantial and valuable information were selected for focus group discussion. The selection was based on age, gender, work experience, job positions, ensuring diversity. Participants were equally divided between the Internal Medicine and Surgery Division.

Study variables and qualitative research topics

Objective 1: The following variables were collected, including demographic information of participants. Variables on the current status of medical solid waste classification include: (1) classification of medical solid waste at the place and time of generation; (2) classification of medical solid waste groups into categories according to regulations (infectious waste, sharp infectious waste, non-sharp infectious waste, hazardous waste, non-recyclable general waste, recyclable general waste).

Objective 2: Variables/topics of related factors affecting the classification and collection of medical solid waste: medical staff's knowledge of medical solid waste classification; nurses' knowledge of medical solid waste collection; policy, management, operational factors and costs for medical solid waste management in hospitals.

Tools and methods of data collection: Quantitative data was collected by observing the practice of medical solid waste classification by 245 medical staffs using the checklist prescribed in Circular 20/2021/TT-BYT of the Ministry of Health and Decision No. 3285/QD-BVK of K Hospital, which includes 12 criteria. The good practice is deemed qualified when all assessment criteria are met. Qualitative data was collected through 8 in-depth interviews (one leader of the hospital, one leader of the Infection Control Department, and six representatives of leaders/head nurses of clinical departments) and two group discussions (16 medical staffs).

Processing and analyzing data: Quantitative research results were entered and cleaned using Microsoft Excel software and analysed using SPSS20.0 software. Qualitative research results were transcribed using Word software and analyzed according to research topics.

Research ethics: The study was approved by the Ethics Committee of the University of Public Health under Research Ethic Decision No. 255/2024/YTCC-HD3.

RESULTS

Participants' characteristics

Table 1. General characteristics of study participants

Characteristics		n	%
Age (Mean ± SD, min – max)		33,3 ± 6,6 (23 – 54)	
Sex	Male	73	22.6
	Female	194	60.1
Professional title	Doctor	66	26.9
	Nursing	179	73.1
Highest level of education	Postgraduate	69	28.2
	College/University	186	71.8

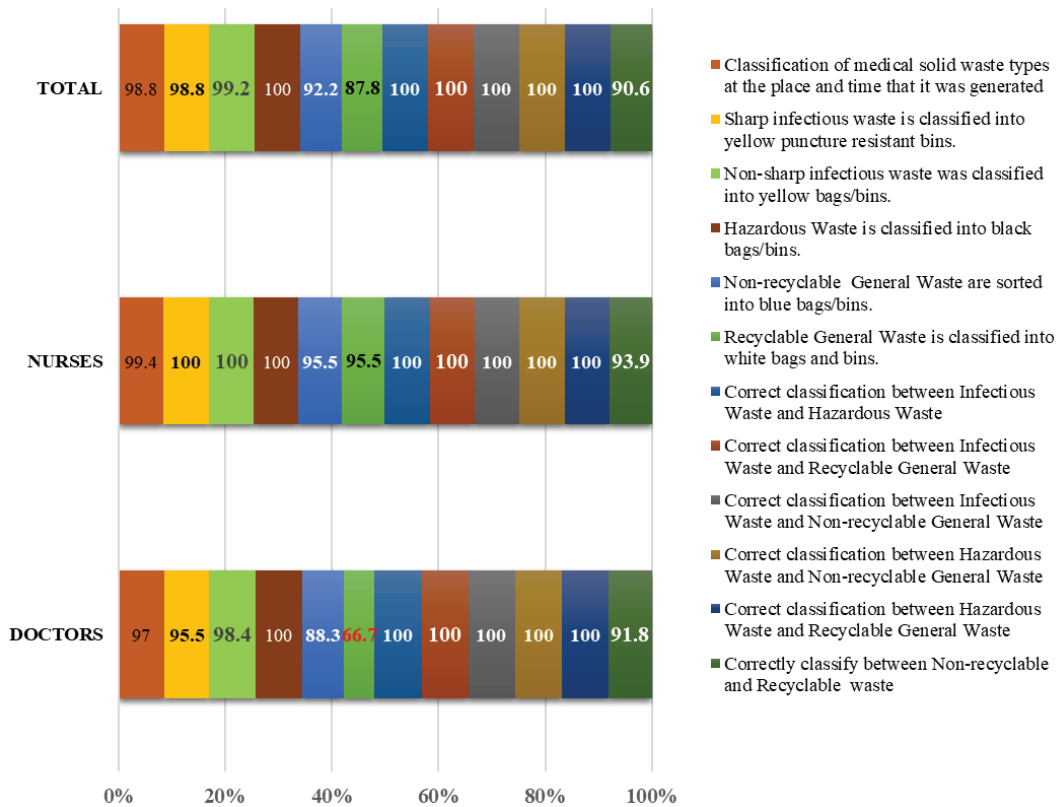

Figure 1. Proportion of correct practice in medical solid waste classification by doctors and nurses at K Hospital - Tan Trieu facility

Table 1 shows that the average age of participating health workers was 33.3 ± 6.6 years, ranging from 23 to 54 years old. Women made up the majority (60.1%), with the highest occupational title being nursing (73.1%), equivalent to the highest educational level being college/university (71.8%).

Current status of medical solid waste classification

The proportion of good practicing medical solid waste classification among healthcare staffs in 22 clinical departments, K Hospital - Tan Trieu facility is 82.0%. In terms of each evaluation criterion, the majority of the practice classification rates are high (>90%), however, the criterion of "classifying common waste used for recycling into white bags and bins" only reached 66.7% in the group of doctors (Figure 1). The overall practice rate of medical solid waste classification achieved by nurses is higher than that of doctors (89.4% vs. 62.1%, respectively).

Qualitative research also showed similar results when during the process of monitoring medical solid waste classification in clinical departments, doctors often mistakenly classified common waste into other types of waste containers:

"... results from monitoring process in clinical departments showed that the rate of nurses performing better medical solid waste classification than among doctors. Checking waste containers in the waste generation area at the examination location of doctors, we still saw misclassification of general waste into non-sharp infectious waste containers, or doctors did not classify general waste for recycling into white containers." (IDI - Head of Infection Control Department).

"The nursing team performs more standard classification than doctors. Due to the characteristics of the nurses' work in taking care of patients in the ward, a large amount of waste is generated, so they should master the principles and practice classifying medical waste regularly and continuously." (FGD - medical staff of Internal Medicine).

Related factors influencing solid waste classification

Policy – Funding - Management/operation and Collaboration

The work of classifying medical solid waste at Tan Trieu K Hospital has received attention from the hospital's leaders and specific regulations and instructions have been issued according to the provisions of Circular 20/2021/TT-BYT based on the characteristics of the hospital. This decision regulated all terms to allocate enough tools/means, human resources and budget for the medical solid waste management in the K-hospital Tan trieu Brach. This is a positive factor for the current situation of classifying and collecting medical solid waste at the hospital. Moreover, good collaborration among departments and staffs is a possitive factor for solid waste classification. In every clinical department, there were at least 2 staffs (1 doctor and nurse) assigned into the infectious control network of the hospital with the respónibility to support for infectious control issue and collaboration in solid waste management, inclusing solid waste classification at departments and in the hospital.

"Understanding the importance and benefits of classifying and collecting medical solid waste, the Party Committee and the Board of Directors of the hospital provide great support, fully in terms of means, human resources and budget in accordance with regulations. We have also had and issued the Medical Solid Waste Management Process since 2021 right after the Ministry of Health issued instructions, and the departments have also collaborated well in implementation" (IDI - Head of Infection Control Department).

"The current process of classifying and collecting medical solid waste at the department is reasonable. The hospital sent notices to the departments to implement and has regular guidance and inspections from the infection control department. We have 2 staffs (1 doctor and 1 nurse) participated into the infection control network of the hospital and they will notice and remind us to implement solid waste management activities." (FGD - medical staff of the Surgery Division).

Human resources

Table 2. Practice of solid waste classification by characteristics of participants (n=245)

	Practice of solid waste classification		OR (95% CI)	p
	Correct n (%)	Not correct n(%)		
Sex				
Female (n=172)	152 (88.4)	20 (11.6)	2.3 (1.2 – 4.3)	< 0.001*
Male (n=73)	49 (67.1)	24 (32.9)		
Job title				
Nursing (n=179)	160 (89.4)	19 (10.6)	5.1 (2.6 – 10.2)	< 0.001*
Doctor (n=66)	41 (62.1)	25 (37.9)		
Highest level of education				
College/University (n=174)	153 (87.9)	21 (12.1)	3.5 (1.8 – 6.9)	< 0.001*
Postgraduate (n=68)	46 (67.6)	22 (32.4)		

The research results show that at K Hospital - Tan Trieu facility, women have 2.3 times higher correct classification practice than men, the nursing group has 5.1 times higher correct medical solid waste classification practice than the medical group, and the medical staff with college/university education have 3.5 times higher correct practice than the group with postgraduate education. The associations were statistically significant ($p<0.05$).

High workload

The huge number of patients, the high workload and pressure, and overload work were also identified as factors that negatively affecting the classification of medical solid waste of medical staff.

"In the department, on average, 1 doctor examines 30 - 40 patients/day, 1 nurse takes care of 20-30 patients/day, not counting the number of patients who need remote consultation/care. The current misclassification was mainly due to medical staff being overloaded, leading to confusion between normal waste and infectious waste" (IDI - Head of Surgery Division).

Knowledge about medical solid waste classification

The research results show that the proportion of medical staff with knowledge of medical solid waste classification was 79.2%. The proportion of knowledge of medical solid waste classification in the group of doctors was 63.6% and in the group of nurses was 84.9%. According to the assessment of department leaders, the factor of knowledge of medical solid waste classification according

to regulations affected the practice of medical solid waste classification of medical staff.

"...New medical staff who have not participated in training on medical solid waste classification, they do not have adequate knowledge about medical solid waste classification, leading to incorrect classification" (IDI-Leader of Internal Medicine Department).

DISCUSSION

The results shows that proportion of correct classification of medical solid waste among medical staffs at K Hospital – Tan Trieu Branch was 82.0%. The proportion of correct classification practice of medical staff in our study was higher than that of Nguyen Van Bang et al. (2022) at 57.4% (6), Nguyen Thi Thanh Tam (2019) at 62.9% (7) and Vo Van Hai (2019) at 65.1% (4). This shows that the proportion of medical staff correctly classifying medical solid waste in our study has improved compared to some previous studies. Some of the reasons given are due to high stress and work pressure or new medical staff who have not participated in training on medical solid waste management, leading to a lack of knowledge about waste classification. Therefore, improving working conditions, reducing work pressure and continuing to conduct training and retraining for all medical staff at the hospital should be done to improve the rate of correct classification of medical solid waste.

Our study showed that 98.8% of medical staff at K Hospital had good practices in classifying medical solid waste at the time and place the waste was generated. This result is higher than the study by Vo Van Hai at Thu Duc Hospital, Ho Chi Minh City (2019) with the rate of medical solid waste classified at the time of generation accounting for 89.8% (4). In the study by Dinh Nguyen Huy Man at the Ho Chi Minh City Tropical Hospital, the rate of medical solid waste classified at the source reached 90.0% and the rate of classification at the time of generation reached 85.5% (3). However, this is lower than the research results of Nguyen Thi Hong Hanh et al. (2022) with a rate of 100% (5). Therefore, it is necessary to continue to strengthen training and raise awareness of correct classification practices for the group of medical staff with incorrect practices at K Hospital.

Some other objective factors that negatively affect the classification of medical solid waste at the Hospital include: the overload of medical staff at the hospital, the high number of patients at the hospital, because the K Hospital is the largest referral medical center for cancer treatment, leading overloaded work situation among medical staffs. The phenomenon of misclassification of medical staff occurs mainly due to stress caused by work overload leading to confusion. The hospital has now developed a recruitment plan for additional medical staffs for clinical departments.

Our research results show that gender, job title and education level were related to the practice of classifying medical solid waste. The results of in-depth interviews also show that the current status of medical waste classification among medical staff was quite good, and the nursing staff group classifies better than doctors. The reason given is that, during the process of patient care, the volume of medical solid waste generated and classified by by nurses during patient caring process was higher than the volume of waste generated and classified by doctors, so that nurses' classifying skills was better. The results are different from the research results at Cao Bang Provincial General Hospital by author Nguyen Van Bang and colleagues (2022), doctors are the group with the highest classification rate (61.2%), followed by the nursing/midwifery group and the technician group (with the same achievement rate of 55.6%) (6). The

general knowledge of medical solid waste classification was higher in the group of nurses (84.9%) than in group of doctors (63.6%) in this study, which can also partly explain this difference. In addition, the difference in the results of different studies may come from the different workloads of professional positions and working at different hospitals.

Limitations of the study: The study only observed the practice of medical solid waste classification by medical staff but did not observe the practice of medical solid waste classification by patients and their relatives because this group often participates in irregular treatment or the treatment/care time is short, making it difficult to identify specific subjects.

CONCLUSION

The research results show that the proportion of medical staff correctly practicing medical solid waste classification was 82.0%. Some factors that positively affect the current status of medical solid waste classification included the support of the hospital directors; the reasonable medical solid waste management process according to regulations; good coordination between departments/offices; the reasonable budget allocated for medical solid waste management. Negative factors included not being trained about the medical solid waste classification and and high workloads.

Recommendation: Based on the research results, we propose some recommendations for Tan Trieu K Hospital to issue policies to reduce work pressure of medical staff. Strengthen the organization of training on medical solid waste classification for all medical staff at the hospital every quarter, especially for doctors and medical staff with postgraduate qualifications. Implement communication in many forms on medical solid waste classification within the hospital campus.

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REFERENCES

1. Ministry of Health. Circular 20/2021/TT-BYT dated November 26, 2021 Regulations on medical waste management within the premises of medical facilities. 2021.
2. K Hospital. Report on medical waste management results in 2023. 2023
3. Dinh Nguyen Huy Man. Current status of medical solid waste management and some influencing factors at Ho Chi Minh City Hospital for Tropical Diseases in 2021. Specialized thesis II on Healthcare Management Organization. 2022.
4. Vo Van Hai. Current status of medical solid waste management and some influencing factors at Thu Duc District Hospital, Ho Chi Minh City in 2019. Specialized thesis II on Healthcare Management Organization. 2019.
5. Nguyen Thi Hong Hanh, Nguyen Huu Thang, Nguyen Thi Hong Ngoc, Nguyen Xuan Thiem. Current status of classification, collection and storage of medical solid waste at Ha Dong General Hospital in 2022. Vietnam Medical Journal. 2023;532(2):4.
6. Nguyen Van Bang, Vu Van Huynh, Dinh Thi Phuong Lien, Nong Thi Chuyen, Tran Thi Thu Thuy. Study on the current status of medical solid waste management at Cao Bang Provincial General Hospital in 2021. Vietnam Medical Journal. 2022;512:5.
7. Nguyen Thi Thanh Tam. Current status of medical solid waste management and some influencing factors at Bac Ninh Provincial General Hospital in 2019. Master's thesis in Hospital Management. 2019.