

ORIGINAL RESEARCH

## Practical knowledge of medical waste management and some related factors of nurses at Hai Phong Medical University Hospital in 2023

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### ABSTRACT

**Objective:** To describe the practical knowledge of medical waste management of nurses at Hai Phong Medical University Hospital in 2023 and some related factors. **Subjects and Research Methods:** A cross-sectional descriptive study was conducted on 83 nurses in clinical departments of Hai Phong Medical University Hospital. **Results:** The nurses' general practical knowledge of medical waste classification was correct at 42.2%. The nurses' general practical knowledge of bag/bin color was correct at 73.5%. The nurses' correct practical knowledge of recognizing medical waste symbols on medical waste bags/bins was 77.1%. The proportion of nurses with correct practical knowledge of medical waste collection frequency and medical waste classification topics was 90.4% and 92.8%, respectively. The nurses' general practical knowledge of medical waste management was 77.1%. The proportion of surgical nurses with incorrect knowledge of medical waste classification was higher than that of internal nurses, 72.7% and 48%, respectively ( $p < 0.05$ ). Conclusion: The nurses' general practical knowledge of medical waste management was 77.1%. Surgical nurses have lower practical knowledge of medical waste classification than internal nurses.

**Keywords:** Knowledge; Medical Waste; Medical waste management;

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### INTRODUCTION

Medical waste management includes the work of classifying, collecting, storing and treating medical waste by medical staff working in medical facilities. The effectiveness of medical waste management will reflect the effectiveness of monitoring, inspection, responsibility and professional qualifications of medical staff.

The process of performing treatment and patient care, medical facilities have created a significant amount of medical waste. The

components of solid medical waste contain a large amount of infectious microorganisms that can penetrate the body through the skin, mucous membranes, respiratory tract, digestive tract... In particular, sharp waste is considered a very dangerous type of waste because it causes double damage: both causing damage and having the ability to spread infectious diseases [1]. In many developing countries, medical waste management is not properly carried out, and there are no clearly defined regulations and

a lack of operational standards [2]. In addition, nurses in clinical departments who classify waste correctly will not waste money on the treatment of hazardous medical waste and regular solid waste, and the hospital will have a budget from recycled waste. Recognizing the role of nurses in classifying medical waste in professional activities, we conducted a research on the topic: "Practical knowledge of medical waste management of nurses at Hai Phong University of Medicine and Pharmacy Hospital in 2023" with 2 objectives:

1. To describe the practical knowledge of medical waste management of nurses at Hai Phong Medical University Hospital in 2023.
2. To describe some factors related to the practical knowledge of medical waste management of nurses at Hai Phong Medical University Hospital in 2023.

## MATERIALS AND METHODS

### Setting and time research

*Setting research:* Clinical departments of Hai Phong Medical University Hospital

*Time research:* From May 2023 to October 2023

### Research objects

All nurses working at the clinical department of Hai Phong Medical University Hospital.

#### *Inclusion criteria*

Nurses working at the clinical department of Hai Phong Medical University Hospital.

#### *Exclusion criteria*

- Nurses on maternity leave or vacation
- Nurses who do not agree to answer the interview form

### Methods

*Research design:* Cross-sectional study

*Sample size and selection:*

- Sample size: Total sampling method
- Selection sample: According to the convenient sampling method

### Method of collecting information

Data collection tool: The set of tools was developed based on Circular No. 20/2021/TT-BYT of the Ministry of Health on "Management of medical waste within the premises of healthcare facilities [3]." The questionnaire consists of two parts:

- Part 1: Basic Information of the Study Subjects

- Part 2: Survey on Nurses' practical knowledge regarding Medical Waste Management, including 36 questions. Each correct answer is awarded 1 point. Each incorrect answer is awarded 0 points. The maximum total score is 36 points. Practical knowledge for each content area is considered achieved when the score is  $\geq 70\%$  of the maximum points for practical knowledge in medical waste management; it is considered not achieved when the score is  $< 70\%$  of the maximum points for practical knowledge in medical waste management. Overall practical knowledge is considered achieved when the overall practical knowledge score is  $\geq 25$  points ( $\geq 70\%$  of the maximum points), and not achieved when the overall practical knowledge score is  $< 25$  points ( $< 70\%$  of the maximum points) [4].

### Data processing

SPSS 20.0 software was used for data entry, analysis, and processing.

Descriptive statistics (percentages) were used to describe several factors related to nurses' practical knowledge regarding medical waste management.

Inferential statistics: The  $\chi^2$  test was used to compare differences between proportions. A statistical significance level of  $p < 0.05$  was used to test the relationship between the general characteristics of the study subjects and nurses' practical knowledge regarding medical waste management.

### Research ethics

This research was conducted under the consent of the Science and Education Council of Hai Phong University of Medicine and Pharmacy (according to decision No. 01.712/QD-YDHP dated April 11th, 2023). All of the participants agreed to

the study. Patient information was collected anonymously, accurately and honestly, in compliance with confidentiality principles and was uniquely used for research purposes.

## RESULTS

Through a survey of 83 nurses working at the clinical department of Hai Phong Medical University Hospital, we obtained several following research results.

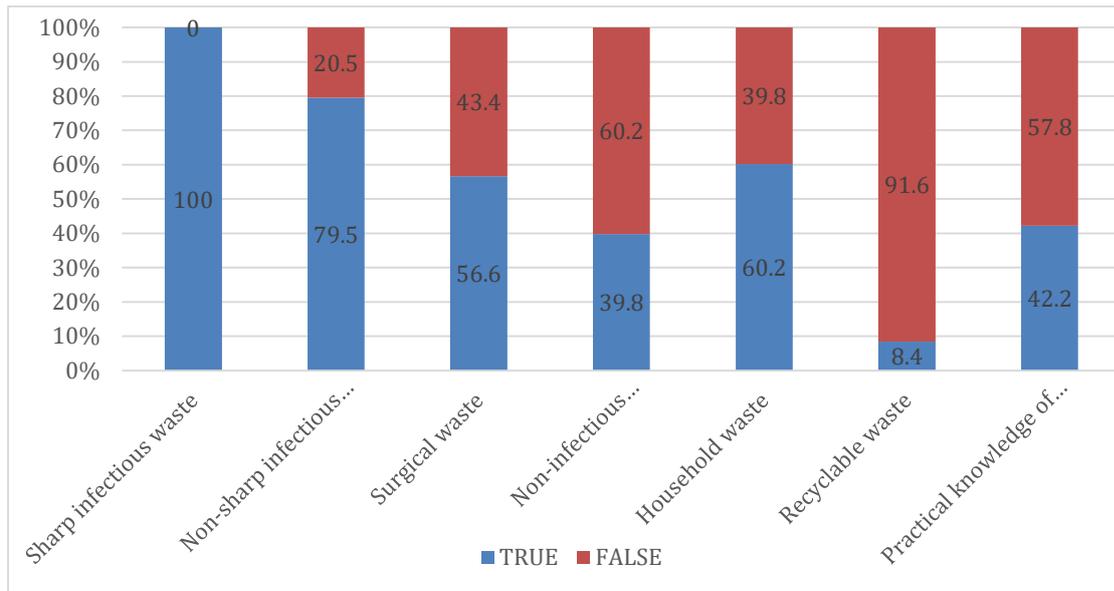
### General characteristics of the research subjects

*Table 1. General characteristics of the research subjects (n=83)*

General characteristics of research subjects		n	%
Sex	Male	12	14.5
	Female	71	85.5
Age	21- 30	27	32.5
	31 - 40	54	65.1
	41 - 50	2	2.4
Seniority	1 - < 10 years	51	61.4
	10 - 20 years	32	38.6
Specialty	Internal Medicine	50	60.2
	Surgery	33	39.8

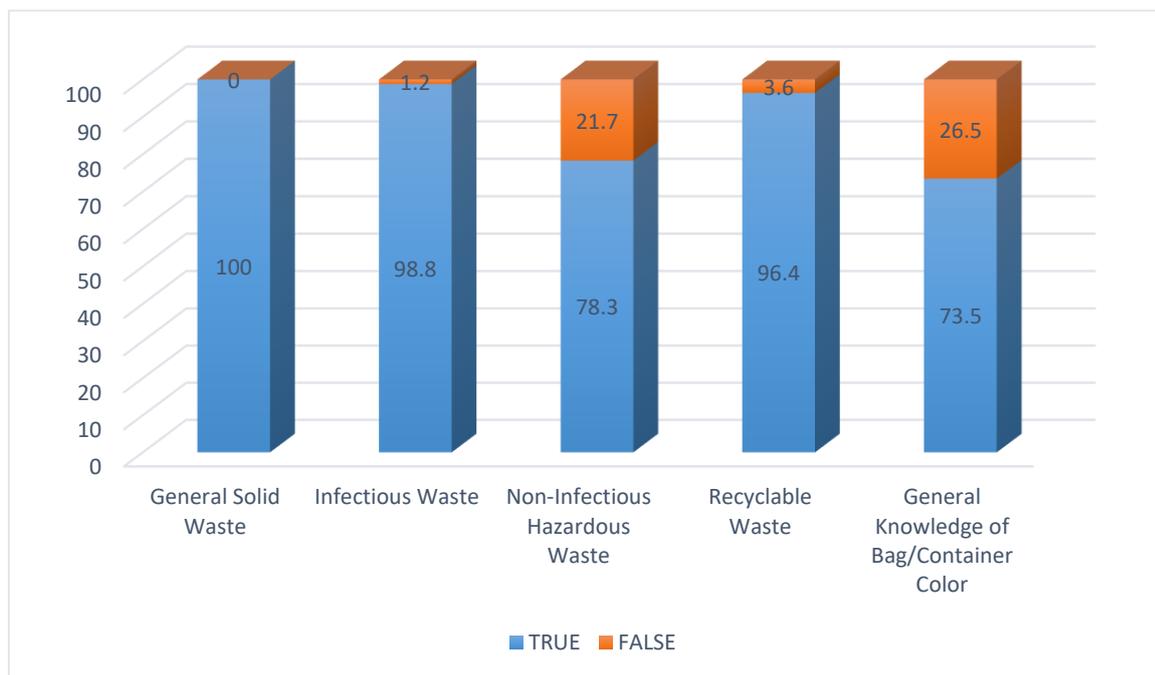
Female nurses accounted for a higher proportion than male nurses (85.5% compared to 14.5%). The proportion of nurses aged between 31 and 40 accounted for the highest proportion was 65.1%. Nurses with less than 10 years of working experience accounted for 61.4%. The proportion of research subjects who were nurses in the Internal Medicine department accounted for a higher proportion than the Surgery department, with the proportions being 60.2% and 39.8%, respectively.

### The practical knowledge of medical waste management of nurses at Hai Phong Medical University Hospital in 2023



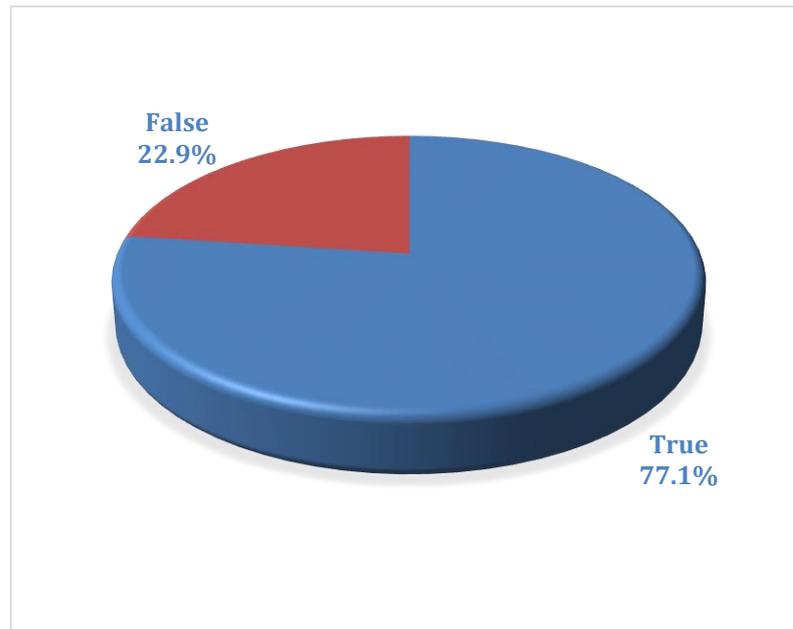
**Figure 1.** Practical knowledge of medical waste classification

The knowledge of correct practice in classifying sharp infectious waste reached 100%. The knowledge of correct practice in classifying recyclable waste reached only 8.4%. The rate of incorrect classification of non-sharp infectious waste was 20.5%. The rate of incorrect classification of non-infectious hazardous waste was 60.2%.



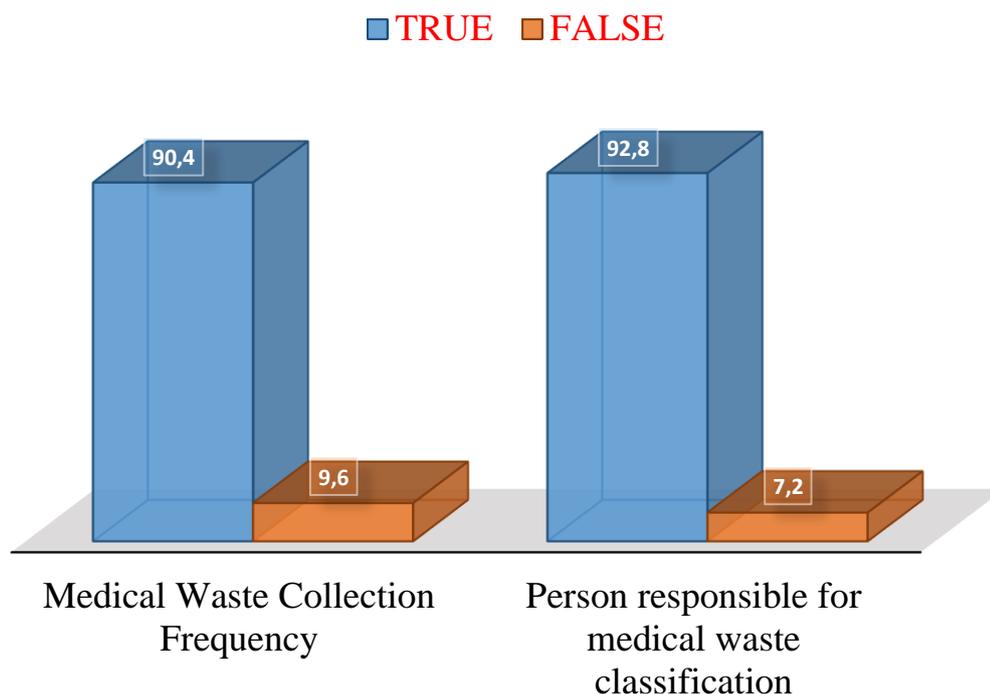
**Figure 2.** Practical knowledge of color coding of medical waste bags/containers

Of the 83 nurses participating in the study, 73.5% answered correctly about the color coding regulations of medical waste bags/containers.



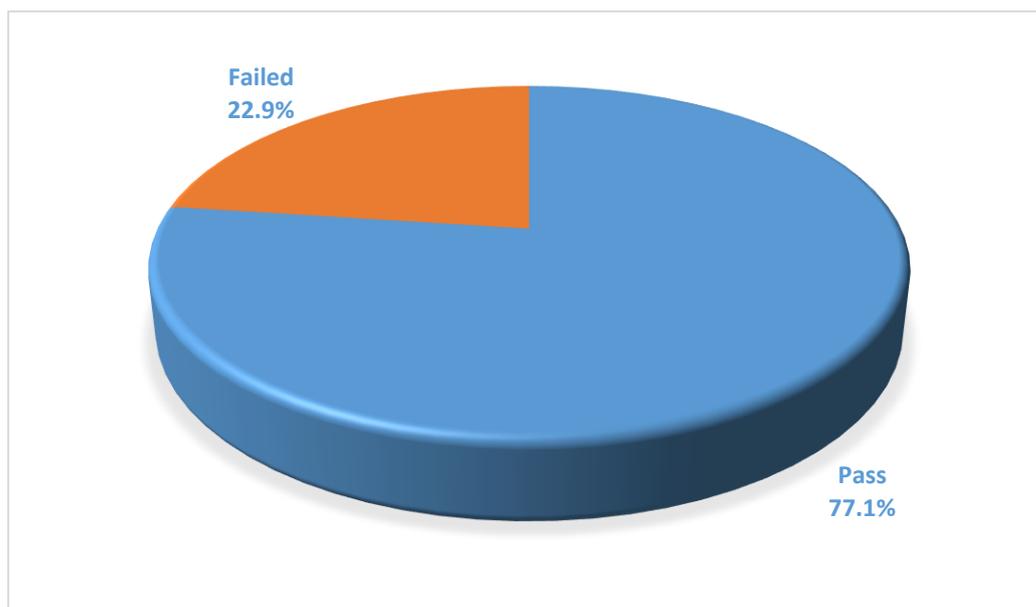
**Figure 3.** Practical knowledge of symbols on medical waste bags/bins

The percentage of nurses with practical knowledge of medical waste symbols attached to medical waste bags/bins is 77.1%.



**Figure 4.** Collection frequency and classification of medical waste

The proportion of nurses with correct practical knowledge about collection frequency of medical waste and classification of medical waste accounted for 90.4% and 92.8%, respectively.



The rate of nurses with correct practical knowledge of medical waste management was 77.1%, and the rate of nurses with inadequate knowledge was 22.9%.

### Identify some factors related to nurses' practical knowledge of medical waste management at Hai Phong Medical University Hospital in 2023

**Table 7.** Association between work unit and nurses' practical knowledge of medical waste management

Practical knowledge	Failed		Pass		OR	$\chi^2$ p-value
	n	%	n	%		
<b>Ward</b>						
<b>Surgical</b>	10	30.3	23	69.7	1.98(0.70-5.57)	p > 0.05
<b>Internal medicine</b>	9	18.0	41	82.0		

The rate of nurses in the surgical system with inadequate knowledge of medical waste management practices was higher than that of nurses in the internal medicine system, 30.3% and 18% respectively with  $p > 0.05$ .

**Table 8.** Association between seniority and knowledge of medical waste management practices of nurses

Practical knowledge	Failed		Pass		OR	$\chi^2$ p-value
	n	%	n	%		
<b>Seniority</b>						
<b>&lt; 10 years</b>	12	23.5	39	76.5	1.09(0.38-3.16)	p > 0.05
<b>≥ 10 years</b>	7	21.9	25	78.1		

The rate of nurses with less than 10 years of working experience who have inadequate knowledge of medical waste management practices is higher than that of nurses with more than 10 years of working experience, respectively 23.5% and 21.9% with  $p > 0.05$ .

**Table 9.** Association between work unit and nurses' knowledge and practice of medical waste classification

Ward	Practical knowledge	False		True		OR	$\chi^2$ p-value
		n	%	n	%		
Surgical		24	72.7	9	27.3	2.88 (1.12- 7.43)	p< 0,05
Internal medicine		24	48.0	26	52.0		

The proportion of surgical nurses with incorrect knowledge of medical waste classification was higher than that of internal nurses, 72.7% and 48%, respectively (p < 0.05).

## DISCUSSION

We conducted interviews with 83 nurses working in clinical departments of Hai Phong Medical University Hospital. The survey results on practical knowledge of medical waste management showed that 77.1% of nurses had general practical knowledge of medical waste management at a satisfactory level and 22.9% of nurses had general practical knowledge of medical waste management at an unsatisfactory level. Our research results are higher than the research results of Tran Thi Ly [5] on the current status of knowledge and practice of medical waste management of medical staff at the Central Eye Hospital in 2021 with the result that the percentage of medical staff with knowledge of medical waste management was 70.3%. This can be explained. We conducted the survey after the Infection Control Department of Hai Phong Medical University Hospital organized training sessions to update knowledge and practice for medical staff on the content of the new circular. However, the results of our study on knowledge and practice of medical waste management are still lower than the results of the study by author Le Thanh Binh at 83.21% [4].

The research results in Figure 1 show that the knowledge of medical waste classification practices of medical staff only reached

42.2%, this rate is lower than the study by author Tran Quynh Anh in 2018 which was 62.2% [6]. A notable point in this result is that the knowledge of correct classification of sharp infectious waste reached 100%, which shows that medical staff have awareness and strictly comply with the handling of hazardous waste such as needles, scalpels, or sharp objects that can cause infection. However, the results show that the knowledge of practice is not correct in classifying other waste: the rate of correct classification of non-sharp infectious waste is 79.5%, the rate of correct classification of non-infectious hazardous waste is 39.8%. This can be explained: because our research subjects work in clinical departments, the types of medical waste generated during patient care are mainly sharp infectious waste; non-sharp infectious waste; normal solid waste, with almost no anatomical waste; highly infectious waste; non-infectious hazardous waste, so when surveyed about practical knowledge of medical waste classification in general, the result was only 42.2%.

Of the 83 nurses participating in the study, 77.1% had practical knowledge of medical waste symbols attached to medical waste bags/bins and 73.5% answered correctly about the color coding regulations of medical waste bags/bins, this rate is higher than the study by author Tran Quynh Anh in

2018 with 69.9% of people answering correctly about the color coding regulations of medical waste bags/bins [6]. However, 26.5% of nurses answered incorrectly about the color regulations of trash bags/bins to contain each type of medical waste and 26.5% of nurses had incorrect practical knowledge about medical waste symbols attached to medical waste bags/bins. This may lead to incorrect classification of each type of medical waste, affecting the cost of treating each type of medical waste.

The proportion of nurses with correct practical knowledge about the frequency of medical waste collection and the objects of medical waste classification accounted for 90.4% and 92.8%, respectively. In our research results, nurses' correct knowledge about the objects of medical waste classification was higher than the research results of author Vu Huong Giang in 2020, which was 80.1% [7].

Our study results indicate no association between nurses' practical knowledge of waste management and their work unit or seniority. However, we found an association between practical knowledge of medical waste classification and the nurses' work unit. Specifically, nurses working in surgical departments were 2.88 times more likely to have correct practical knowledge of medical waste classification than nurses working in internal medicine departments.

## CONCLUSION

General practical knowledge of nurses on waste management reached 77.1%. General correct practical knowledge of medical waste classification of nurses accounted for 42.2%. The rate of correct practical knowledge of medical waste classification of internal nurses accounted for 52%, higher than that of surgical nurses (27.3%). This

difference is statistically significant with  $p < 0.05$ .

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**Institutional Review Board Statement:** This study was reviewed and approved by the Ethics Committee of Hai Phong University of Medicine and Pharmacy.

**Informed Consent Statement:** Not applicable

**Conflicts of Interest:** The authors declare no conflict of interest.

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