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Assessment of Knowledge, Attitudes and Practices of Selected Staff Categories towards Healthcare Waste Management in District General Hospital Matale

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A B S T R A C T

Background:

Within the healthcare sector, effective waste management is crucial to mitigate environmental and health risks associated with the generation of healthcare waste. This study focuses on District General Hospital Matale, assessing the knowledge, attitudes, and practices of selected staff categories in healthcare waste management.

Objective:

To assess the knowledge, attitude and practice in healthcare waste management among selected healthcare staff in District General Hospital Matale.

Methodology:

A descriptive cross-sectional study was conducted, involving consultants, medical officers, and nursing officers. Data collection occurred from March 20, 2023, to May 26, 2023, utilizing a self-administered questionnaire. The questionnaire encompassed socio-demographic details, ten true or false knowledge questions, ten Likert scale attitude questions, and ten frequency questions assessing practices. The study population included 32 consultants, 147 medical officers, and 326 nursing officers (n=505).

Results:

Participants exhibited an overall knowledge accuracy rate of 89.48%, demonstrating strong awareness in critical areas such as needle stick/sharp injuries and radioactive materials. However, gaps were identified, notably in understanding the burial of solid wastes in rural minor institutions and the importance of covered carts for waste transportation within the hospital. Attitude assessment revealed a positive overall attitude of 81.66%, yet scepticism regarding the effectiveness of work improvement teams was observed. Practices were generally favourable (80.3%), but concerns arose regarding in-service training attendance and incorrect practices of handing over infectious waste.

Conclusion:

This study highlights the need to enhance knowledge, attitudes, and practices in healthcare waste management among different staff categories at District General Hospital Matale. Targeted educational interventions are recommended, focusing on areas of deficient knowledge and suboptimal practices, to establish an effective waste management system.

Keywords: Healthcare waste management, infectious waste, KAP study, DGH Matale

1.0 Introduction

Within the healthcare sector, waste arises from the treatment, diagnosis, and immunization of both humans and animals. Various terms, such as health facility waste, clinical waste, healthcare waste, medical waste, and biomedical waste, are used interchangeably to describe this waste. However, the prevalent term in the existing literature is "healthcare waste" (HCW). This waste can be categorized into hazardous and non-hazardous forms. According to the World Health Organization (WHO), approximately 75 to 90 percent of healthcare waste is non-hazardous, with the remainder classified as hazardous (World Health Organization, 2018). Hazardous waste is further classified based on the potential risks of illness and injury during disposal.

Examples include sharps (such as scalpel blades and contaminated needles), infectious waste containing blood and bodily fluids, dressings, intravenous (IV) lines, and pathological waste like microbiological cultures, blood samples, and anatomical body parts. Additionally, waste materials such as instruments containing mercury, PVC plastic, and radioactive substances fall into the hazardous waste category. In terms of their impact on human health and the environment, non-hazardous healthcare wastes are akin to household waste and can be disposed of similarly. However, if non-hazardous waste is mixed with hazardous waste, the disposal protocols for hazardous waste must be adhered too.

Numerous studies conducted in developing countries have uncovered instances of hazardous waste being improperly disposed of, including burning in open air, mixing with municipal garbage, illegal recycling, and subsequent resale. Such practices pose significant risks to both the handlers' health and the environment (Khan et al., 2019). As the global population continues to grow, the volume of generated waste also increases. Inadequate waste management within the healthcare industry can have severe repercussions for the environment and human health. Clinical waste alone can spread over 30 serious bloodborne infections (Yazie et al., 2019). More than two million healthcare workers worldwide are infected with diseases such as typhoid, hepatitis B, hepatitis C, HIV, Escherichia coli, Staphylococcus aureus, and Pseudomonas aeruginosa due to improper waste management. In developing countries, the lack of resources to control waste, coupled with the assignment of waste management duties to poorly educated and inexperienced laborers without proper guidance or protection, exacerbates the problem.

Consequently, it is imperative to establish an effective waste management system in every healthcare institution. In Sri Lanka, the regulatory authority overseeing healthcare waste management is the Central Environmental Authority, which has implemented regulations on waste management practices. Healthcare institutions generating healthcare waste are required to obtain specific licenses from this authority (Central Environmental Authority, 2021). Additionally, the Ministry of Health in Sri Lanka has introduced a national waste management guideline (Ministry of Health - Sri Lanka, 2006).

For this study District General Hospital Matale (DGH Matale) was selected as the study setting. It is the largest healthcare provider in Matale District. All Consultants, Medical Officers and Nursing Officers are chosen to assess their knowledge, attitude and practice toward healthcare waste management procedures.

1.1 General Objective

To assess the knowledge, attitude and practice in health care waste management among selected healthcare staff in District General Hospital Matale.

1.2 Specific Objectives

- To assess selected staff knowledge on healthcare waste management in DGH Matale
- To assess selected staff acceptable attitude on healthcare waste management in DGH Matale
- To assess selected staff standard practice on healthcare waste management in DGH Matale

2.0 METHODOLOGY

2.1 Study Design

This was a descriptive cross-sectional study carried out among selected clinical staff including Consultants, Medical Officers and Nursing Officers.

2.2 Study Setting

This study was conducted at DGH Matale. It is the highest-level apex healthcare institution in the Matale District, where 47 Divisional Hospitals and Primary Medical Care Units drain for service provision. DGH Matale has a bed strength of 900 spread among 26 wards and 6 special care units. The total workforce is around 1000 including 32 Consultants, 147 Medical Officers and 326 Nursing Officers.

2.3 Study Unit

The study unit was a consultant, a medical officer or a nursing officer as mentioned in the study design.

2.4 Study Period

The data collection for this study was carried out from the 20th of March 2023 to the 26th of May 2023.

2.5 Study Population

This included all the consultants, medical officers and nursing officers attached to all clinical units except those who fulfilled the exclusion criteria.

Table 1: Distribution of Study Population

No.	***1. Staff Category***	***2. No. of staff in position***
3. 01	*4. Consultants*	*5. 32*
6. 02	*7. Medical officers*	*8. 147*
9. 03	*10. Nursing officers*	*11. 326*
12. Total		*13. 505*

2.6 Inclusion Criteria

All consultants, medical officers and nursing officers working at DGH Matale for more than 3 months are included in this audit.

2.7 Exclusion Criteria

The following staff were excluded from this study population;

- Medical officers and nursing officers attached to supportive units such as the quality management unit and planning unit
- Any staff on maternity leave, vacation leave or any form of long leave

2.8 Sampling and selection of the Study Population

As the whole population was considered for the study, sample calculation was not done. The selection study population was carried out according to the following steps,

- The list of categories of necessary staff with the number in position was collected from relevant authorities
- Inclusion criteria were imposed on these staff to ensure their eligibility to participate in the study
- Exclusion criteria were applied to these selected staff to exclude those who were not eligible to participate in the study
- When anyone was refusing to participate or felt a ‘conflict of interest’, they were left out of the study

2.9 Study instrument

A self-administered questionnaire was used as the data collection instrument. The questionnaire was divided into following sections,

Socio demographic details

Knowledge

Attitude

Practice

To assess the knowledge of the staff ten true or false questions were prepared. The correct answer was given 01 points and the wrong answer was given zero points to facilitate the data analysis process.

For the assessment of attitude of the staff ten Likert scale questions were formulated. To reduce the central tendency bias, responses to these questions are collected using a 6-point Likert scale rather than a 5-point Likert scale. The midpoint is eliminated by using a Likert scale with an even number rather than an odd number, decreasing the central tendency bias. The points are allocated in the following manner for the responses,

Strongly Disagree : 1

Disagree : 2

Slightly Disagree : 3

Slightly agree : 4

Agree : 5

Strongly Agree : 6

These points were reversed for negatively structured statements.

And finally, to assess the practice of waste management ten frequency questions were selected. Three options were given to the participants and asked to select one appropriate answer. The most appropriate practice option is given two points and the worst option given zero points. The intermediate option is given one points.

For the development of this questionnaire four international studies regarding healthcare waste management with questionnaires for health staff were referred (Deress et al., 2018; Karki et al., 2020; Letho et al., 2021; Maaroufi et al., 2020).

3.0 Approval

The administrative approval was obtained from the director of DGH Matale prior to the commencement of this study.

3.1 Data collection

Prior to the data collection authors met the director, administrative officer and matron of DGH Matale. The importance and the method of this audit was explained. Consultants, infectious control nursing officer (ICNO) and overseer were also met by the authors to explain the importance and procedures. After these discussions the following persons were delegated with the data collection procedures for each category,

Consultants – principal investigator

Medical officers – ICNO / principal investigator

Nursing officers – ICNO / ward sisters / in charge nursing officer

Before the questionnaires were passed to the participants, all the necessary information regarding this study was clearly explained by the principal investigator or the allocated data collector. The participants were informed that it is completely a voluntary process and even if they agree to participate, they can withdraw from the study at any moment. Participants were clearly informed that they will not receive any personal benefits from participation and non-participation or withdrawal will not affect their career, service incentive or grade promotion in any way. They were also assured that none of their personal data will be collected in this audit which can identify them. The data collection was carried out from the 20th of March 2023 to the 26th of May 2023.

3.1 Data analysis

All the filled questionnaires were checked individually by the author prior to the data entry. Then the data were entered in the IBM SPSS Statistics (version 26) software and the data analysis was made using the same software.

4.0 RESULTS

The questionnaires were distributed to all 505 of the study population and 469 questionnaires were filled and returned within the given time. Therefore, the response rate of the whole population is 92.87%. The breakdown of this response rate is as follows,

14. Table 2: Response Rate of Study Population

Category	***No. of participants***	***Percentage of participants***	***No. in position***	***Response rate***
Consultants	*29*	*6.2%*	*32*	*90.63%*
Medical officers	*137*	*29.2%*	*147*	*93.2%*
Nursing officers	*303*	*64.6%*	*326*	*92.94%*
Total	*469*	*100.0%*	*505*	*92.87%*

The first part of the questionnaire was used to collect the basic sociodemographic details of the study population and the results of that analysis as follows,

15. Table 3: Sociodemographic summary of participants

	Frequency	*Percentage*
Gender		
Male	*76*	*16.2%*
Female	*393*	*83.8%*
Age group		
20 – 29 years	*69*	*14.7%*
30 – 39 years	*114*	*24.3%*
40 – 59 years	*276*	*58.8%*
>59 years	*10*	*2.1%*
Marital status		
Married	*402*	*85.7%*
Single	*67*	*14.3%*
Ethnicity		
Sinhalese	*437*	*93.2%*
Tamil	*8*	*1.7%*

Muslims	*24*	*5.1%*
Religion		
Buddhism	*427*	*91%*
Hinduism	*6*	*1.3%*
Islam	*24*	*5.1%*
Christianity	*12*	*2.6%*

The work experience of the participants was also collected through this section and the summary as follows,

16. Table 4: Work experience summary of participants

	Frequency	*Percentage*
Years of experience in the government health sector		
0 – 2 years	*52*	*11.1%*
3 – 5 years	*47*	*10%*
6 – 8 years	*30*	*6.4%*
>8 years	*340*	*72.5%*
Years of experience in DGH Matale		
0 – 2 years	*176*	*37.5%*
3 – 5 years	*47*	*10%*
6 – 8 years	*75*	*16%*
>8 years	*171*	*36.5%*

The second part of the questionnaire was designed to assess the knowledge of the staff in healthcare waste management. Ten true or false type questions were given, and the correct answer is given one point and the wrong answer is given zero points. The results are given below,

Table 5: Analysis of knowledge on healthcare waste management

True or False questions	*Answers*	*Frequency*	*Percentage*	*Mean*
Needlestick/sharp injury is an important concern.	*True**	*469*	*100%*	*1.00*
	False	*0*	*0%*	
Infectious waste containers should be labelled with biohazard symbol.	*True*	*47*	*10.0%*	*0.90 (±0.30)*
	*False**	*422*	*90.0%*	
Segregation of waste is not always to be done according to National colour coding.	*True*	*76*	*16.2%*	*0.84 (±0.37)*
	*False**	*393*	*83.8%*	
The sharp/needle waste should be placed in special cardboard or plastic boxes which are puncture proof and leak proof.	*True*	*9*	*1.9%*	*0.98 (±0.14)*
	*False**	*460*	*98.1%*	
Wearing personal protective equipment will not reduce the risk of infection.	*True*	*67*	*14.3%*	*0.86 (±0.35)*
	*False**	*402*	*85.7%*	
All waste generated at healthcare institution are hazardous waste.	*True*	*85*	*18.1%*	*0.82 (±0.39)*
	*False**	*384*	*81.9%*	
Radioactive waste is not harmful to humans.	*True*	*0*	*0%*	*1.00*
	*False**	*469*	*100%*	
Hospital waste can be transported in open carts within hospital.	*True*	*103*	*22.0%*	*0.78 (±041)*
	*False**	*366*	*78.0%*	
In rural minor healthcare institutions, the solid infectious waste can be buried at a significant depth of more than 1 meter.	*True**	*288*	*61.4%*	*0.39 (±0.49)*
	False	*181*	*38.6%*	
Hazardous waste should be collected in yellow polythene bags of minimum 300 microns (μ) thickness.	*True*	*57*	*12.2%*	*0.88 (±0.33)*
	*False**	*412*	*87.8%*	
Knowledge score				*0.8948 (±0.14)*

**Correct answers*

According to the points mean was calculated for each question. An overall knowledge score was calculated by obtaining the mean for all ten questions. It was 0.8948. Therefore, the participants answered 89.48% of the questions correctly.

The next part of the questionnaire consists of ten 6-point Likert scale questions to assess the attitude of the staff toward healthcare waste management. The results of the analysis are as follows,

Table 6: Analysis of attitude of staff toward healthcare waste management

Likert scale questions	*Mean*	*SD*	*Median*	*Mode*
Teamwork is necessary for healthcare waste management.	*5.43*	*1.38*	*6.00*	*6*
Healthcare waste management is an unnecessary extra burden to staff.	*4.66*	*1.80*	*6.00*	*6*
Patient safety and healthcare waste management are interrelated.	*4.89*	*1.70*	*6.00*	*6*
Healthcare waste management is the duty of all staff.	*5.23*	*1.54*	*6.00*	*6*
All staff are concerned with minimizing and avoiding waste generation in hospital.	*4.68*	*1.79*	*6.00*	*6*
All staff should practice personal protection measures such as distancing, respiratory etiquette, aseptic techniques and wearing mask (DReAM).	*4.65*	*1.74*	*6.00*	*6*
All staff are trained in correct hand washing techniques.	*5.21*	*1.53*	*6.00*	*6*
The systematic in-service training of all staff on healthcare waste management is necessary.	*5.04*	*1.64*	*6.00*	*6*
All units and wards have work improvement teams concerned on improving waste management practices.	*3.98*	*1.64*	*5.00*	*5*
Motivation programmes are necessary for successful implementation of healthcare waste management.	*5.19*	*1.42*	*6.00*	*6*
Attitude score	*4.9 (±1.13)*			

The attitude score was calculated by considering the means of all ten questions. It was 4.9, in other words, when considering the percentage out of 6 points, participants showed 81.66% positive attitude.

The final part of the questionnaire to assess the healthcare waste management practices among staff had ten frequency questions. The summary of results is given below,

Table 7: Analysis of healthcare waste management practices

Frequency questions	*Answers*	*Frequency*	*Percentage*	*Mean*
How often do you separate and put general waste in black/green containers and infectious waste in yellow containers?	*Never*	*10*	*2.1%*	*1.81 (±0.44)*
	Sometimes	*67*	*14.3%*	
	*Always**	*392*	*83.6%*	
At what level the sharp bins should be closed off?	*Fully filled*	*0*	*0%*	*1.98 (±0.14)*
	1/2 filled	*10*	*2.1%*	
	*3/4 filled**	*459*	*97.9%*	
How often the infectious waste from your unit is removed?	*Once in several days*	*0*	*0%*	*1.41 (±0.49)*
	Daily	*278*	*59.3%*	
	*Twice daily**	*191*	*40.7%*	
How often does the collected infectious waste were handed over to the local government authorities for disposal together with the general waste?	*Always*	*137*	*29.2%*	*1.17 (±0.85)*
	Sometimes	*116*	*24.7%*	
	*Never**	*216*	*46.1%*	
How often do you wear rubber gloves while handling infectious materials?	*Never*	*0*	*0%*	*2.0*
	Sometimes	*0*	*0%*	
	*Always**	*469*	*100%*	
After how many times of use a pair of disposable surgical gloves should be discarded?	*5 times*	*0*	*0%*	*2.0*
	3 times	*0*	*0%*	
	*After single use**	*469*	*100%*	

How often do you wash your hands thoroughly after a contact with an infective material even if you had worn gloves?	*Never*	*0*	*0%*	*1.98 (±0.14)*
	Sometimes	*10*	*2.1%*	
	*Always**	*459*	*97.9%*	
When a spillage of infectious waste occurs how often do you immediately clean according to proper procedures?	*Never*	*0*	*0%*	*1.94 (±0.24)*
	Sometimes	*28*	*6.0%*	
	*Always**	*441*	*94.0%*	
How many times do you reuse the plastic bags for infectious waste?	*Always*	*125*	*26.7%*	*1.42 (±0.88)*
	Sometimes	*20*	*4.3%*	
	*Never**	*324*	*69.1%*	
How many in-service training programmes on quality improvement have you attended within the last 2 years?	*None*	*354*	*75.5%*	*0.35 (±0.66)*
	One	*67*	*14.3%*	
	*Two or more than two**	*48*	*10.2%*	
Practice score				*1.6060 (±0.22)*

*Correct answers

A mean score for all the frequency questions is calculated as the practice score. It was 1.6060 out of the best score of 2. In other words, participants gave 80.3% correct answers for this section.

5.0 CONCLUSION

The assessment of participants' knowledge through true or false questions revealed an overall accuracy rate of 89.48%, computed from the mean values of each question. Notably, all participants correctly answered questions related to the significance of needle stick/sharp injuries and radioactive materials, indicating a commendable awareness in these areas. However, a concerning observation emerged as only 61.4% of participants provided the correct response to the ninth question regarding the burial of solid wastes in rural minor institutions. This suggests a gap in the participants' knowledge concerning the updated national guidelines. Furthermore, the eighth question, addressing the importance of using a covered cart to transport wastes within hospital premises, yielded a relatively low correct response rate, signifying a significant lack of awareness among staff regarding this aspect. The Likert scale questions assessing attitudes revealed a mean score of 4.9, indicating an overall positive attitude of 81.66% toward waste management practices. Despite this, participants expressed disagreement regarding the effectiveness of work improvement teams (WIT) in enhancing waste management practices. This warrants attention from hospital management, emphasizing the need to scrutinize WIT activities and underscore the importance of waste management practices in these teams. The assessment of current waste management practices, conducted through frequency questions, indicated an overall favourable practice rate of 80.3%. Notably, the least favourable responses were directed towards the final question regarding in-service training, with a majority of participants acknowledging a lack of attendance in training programmes on quality improvement within the past two years. The hospital management may find it beneficial to address this by organizing training opportunities whenever feasible. Another area of concern is highlighted in the fourth question, where a significant number of participants reported handing over infectious waste to local government authorities for disposal alongside general waste. It is imperative for hospital management to rectify this practice, ensuring adherence to correct procedures and disseminating accurate knowledge across all staff categories.

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