

## Staff Nurses' Knowledge and Commitment toward Hospital Waste Management

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### Abstract

**Background:** Healthcare waste management should be strictly followed by all health team members, and nurses should have required knowledge and skills to deal properly with waste. **Aim of the study:** To assess staff nurses' knowledge and commitment toward hospital waste management. **Design:** A descriptive study design was utilized to meet the aim of this study **Setting:** This study was conducted at Sirs Elian hospital, El-Monoufyia governorate, the study sample consisted of 184 staff nurses in all units. **Tools of data collection:** two self-administered questionnaire sheets was used to collect data: I) Hospital waste management questionnaire sheet. II) Commitment toward hospital waste management questionnaire sheet. **Results** A great majority of the nurses had high total knowledge of workplace preventive measures. The majority had high knowledge and had adequate commitment, while had satisfactory knowledge of hospital waste management. The scores of knowledge and commitment are correlated. The knowledge score is positively influenced by the attendance of training in management, whereas the commitment score is positively influenced by nurse's age and by scores of knowledge. **Conclusion:** staff nurses in the study setting have high knowledge and commitment to waste management, while their related knowledge is variable. Their commitment is positively related to their age and their scores of knowledge **recommendations:** The study recommends more training courses in waste management. Further research is proposed to investigate the effect of training interventions and leadership on nurses' commitment towards hospital waste management.

**Keywords:** Commitment, Hospital waste management, Knowledge, Staff nurse

### Introduction

Effective medical waste management becomes more important than before. In developing countries, medical waste have not received sufficient attention (Patwary et al., 2011). Healthcare waste management is a process that help ensures proper hygiene in the health institution and safety of healthcare workers (Abor, 2007). The process of waste management comprises

key stages which are all very important and interrelated. These include segregation, collection, storage, handling, transportation, treatment and disposal (Ramokate, 2008). Hospital waste management means the management of waste produced by hospitals using techniques that will check the spread of diseases (World Health Organization [WHO], 2015).

A proper waste management of hospital biomedical waste has become a worldwide humanitarian topic. Although risks of poor management of hospital waste have aroused the concern all over the world, particularly in the light of its far-reaching effects on human, health and the environment (**Yadavannavar et al., 2010**).

Waste materials are generated in the healthcare setting. They require special procedures for collection, storage, transport, and disposal in efforts to prevent complications related to direct exposure of these waste products. The key step in waste management is to distinguish between infectious and noninfectious waste. Infectious waste has the potential to transmit disease and should be collected, transferred, and disposed of in a manner that decreases the risk of injury to healthcare workers, waste management workers, patients, and the community (**World Health Organization [WHO], 2015**).

Waste management continues to be a major challenge, particularly, in most healthcare facilities of the developing countries where it is hampered by technological, economic and social difficulties and inadequate training of staff responsible for handling of the waste (**Alagoz and Kocasoy, 2008**).

Poor conduct and inappropriate management and disposal methods exercised during handling and disposal of medical waste (MW) is an increasing significant health hazards and environmental pollution/hazards due to the infectious nature and unpleasant smell of the waste (**Patwary et al., 2009; Hossain et al., 2011**). Despite the fact that current medical waste management (MWM) practices vary from hospital to hospital, the problematic areas are similar

for all healthcare units and at all stages of management (**Tsakona et al., 2007**).

If the overall goal of waste management is to prevent disease transmission from waste products, then the emphasis should be placed on the “management” aspect of the process and not on the “technological fix” which time and again has proven to be an expensive diversion rather than an effective solution. Technology should fit the situation and work in the management system to achieve the final goal as part of the overall system, not as a replacement for the system. Technology choices will be made to meet local needs and conditions and cannot be uniformly applied throughout a state or country and there is no reason for any country to have standards any less stringent than those being modelled in the U.S. or Europe (**World Health Organization [WHO], 2015**).

In waste management, healthcare wastes hold higher priority due to their hazardous nature. Some parts of healthcare wastes are considered most hazardous that can affect human health and pollute the environment badly. Although the infectious and hazardous waste have a small portion in Medical Waste (MW), improper medical waste management, and mixing infectious waste with the general waste, can lead to the entire bulk of waste becoming potentially hazardous (**Chaerul and Tnaka, 2008**).

In a working environment that have unsafe healthcare waste management practices may result an exposure to infectious wastes by Healthcare workers (HCWs), patients, clients that could in turn create infection due to blood borne pathogens (**Sawalem et al., 2009; Azage and Kumie, 2010**).

In the process of healthcare delivery, medical waste is generated, which includes sharps, human tissues or body parts and other infectious materials (Chua et al., 2012). The World Health Organization (WHO, 2005a).

Meeting the legal and regulatory requirements to generate, use, store, treat and dispose of can be difficult and expensive. Although the regulations are extensive and complex to implement, but complete and documented compliance with the applicable regulations is essential to demonstrate that personnel and environment safety has been assured. Good medical waste management in hospital depends on a dedicated waste management team, good administration, careful planning, and sound organization, underpinning legislation, adequate financing and full participation by trained staff (WHO, 2005b).

In the Egyptian legislation, Law 9/2009 amended Law 4/1994 for the protection of the environment and regulates collection, treatment and disposal of hazardous waste. The new law prohibits open burning of garbage and solid waste and prohibits placement, sorting, and treatment of wastes in areas other than those specified out of residential, industrial and agricultural areas and waterway (The Regional Solid Waste Exchange of Information and Expertise [RSWEIE], 2010).

#### **Significance of the study:**

The improvement of the standards of waste management in hospitals should be initiated from personnel. In other words, all of the hospital personnel are considered as a team for waste management. As the WHO stressed, good health care waste management in a hospital depends on a dedicated waste

management team, good administration, careful planning, sound organization, underpinning legislation, adequate financing, and full participation by trained staff. Therefore, this study attempts to assess the knowledge and commitment of nurses toward the process of waste management.

#### **Aim of the study**

This study aimed to assess staff nurses' knowledge and commitment toward hospital waste management through:

1. Assessing the knowledge of staff nurses toward hospital waste management;
2. Assessing commitment of staff nurses toward hospital waste management;
3. Investigating the relationship between staff nurses knowledge and commitment toward hospital waste management.

#### **Research questions:**

- 1-What is the level of staff nurses knowledge toward hospital waste management?
- 2-What is the level of staff nurses commitment toward hospital waste management?
- 3-Is there a relation between staff nurses knowledge and commitment toward hospital waste management?

## Subjects and methods

### Research Design:

A descriptive design was used in carrying out this study.

### Setting

The study was conducted at Sirs Elian hospital, affiliated to the Ministry of Health in El Monoufyia governorate. This is a one-building hospital with 110 bed-capacity.

### Subjects

The subjects for this study included all available staff nurses working in all units in the aforementioned setting. Their total number was 184 staff nurses. All of them were included with no inclusion or exclusion criteria.

### Data collection tools

Two tools were used to collect data for this study, namely nurses' knowledge and commitment toward hospital waste management. It was modified by the researcher based on pertinent literature (Josef et al., 2004; WHO 2005; Infection control program of Egypt 2005; Manowan et al 2009; El-azab, 2013) It consisted of the following parts.

#### **Tool 1: Hospital waste management knowledge questionnaire sheet.**

This tool was aimed at assessing nurses' knowledge toward hospital waste management. It consisted of two parts.

▪ **Part I:** This part was used to collect information about the personal and job characteristics of staff nurses.

▪ **Part II:** (Hospital waste management knowledge questionnaire): This part aimed at assessing nurses' knowledge of hospital waste management. It has two main sections, one related to staff nurses' knowledge toward hospital waste management policy and workplace preventive measures, and related to staff nurses' knowledge toward hospital waste management practice.

▪ Nurses' knowledge toward hospital waste management policy and workplace preventive measures: This section consisted of 16 questions examining staff nurses' knowledge of hospital waste management policy and workplace preventive measures. It had questions about knowledge of waste management policy, storage, transportation, as well as the presence of infection control committee and its functions. The response to each question was either "Yes" or "NO."

Scoring system: Each item checked "Yes" was scored one. Likewise, each item checked "No" was scored zero. The item scores were summed-up and the total divided by their number giving a mean score, which was converted into a percent score. Staff nurses' knowledge was considered high if the percent score was 60% or more, and low if less than 60%.

• Staff nurses' knowledge toward hospital waste management practice. This section consisted of 24 questions intended to assess staff nurses' knowledge toward hospital waste management practice. The questions were in multiple choice (MCQ) form. They were categorized into five main areas of knowledge as follows.

**Scoring system:** For the knowledge practice items, a correct response was scored 1 and the incorrect zero. For each area of knowledge, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into percent scores. Nurse's knowledge was considered satisfactory if the percent score was 60% or more and unsatisfactory if less than 60%.

### **Tool 2: Commitment towards hospital waste management questionnaire**

This was intended to assess staff nurses' commitment toward hospital waste management. It was modified by the researcher based on related literature (Josef et al., 2004; WHO 2005; Infection Control Program of Egypt 2005; Manowan et al., 2009; El-Azab, 2013). It had 29 items on a 3-point Likert scale. They were categorized into three main areas of commitment as shown below.

**Scoring system:** For each item, the responses was scored on a 3 likert scale "Always/ Sometimes/Never" were scored 2, 1, and 0 respectively. For each area of commitment, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into percent scores. Nurse's commitment was considered high if the percent score was 60% or more and low if less than 60%.

### **Preparatory phase:**

During this phase, the researcher reviewed current and past, local and international related literature to gain in-depth theoretical knowledge of the

various aspects of the study topic. This was through using textbooks and scientific articles in periodicals, journal and internet. This was helpful in the selection and preparation of the data collection tool and in writing-up the scientific background of the study.

**Validity and reliability:** Once the tool was modified and developed in its preliminary form, it was presented to a panel of experts for face and content validation. The panel consisted of seven professors and assistant professors from the nursing administration, medical-surgical, and community nursing departments. These were three faculty members from Menoufyia University, two from Ain-Shams University, and one from each of Benha and Zagazig Universities. They revised the tool for relevance, comprehensiveness, and clarity. The tool was finalized based on their recommendations and suggestions.

As regards the reliability of the commitment questionnaire, it was tested through examining its internal consistency. It showed a very high degree of reliability, with a Cronbach alpha coefficient 0.931.

### **Pilot study**

The aim of the pilot study was to determine the clarity and applicability of the tool, and to estimate the time needed for filling-in the questionnaire sheet. It was conducted one week before collection of the data on 18 staff nurses representing about 10% of the main study sample. The data obtained from the pilot study were analyzed and modifications were made accordingly. The time needed for completion of the questionnaire sheet ranged between 20 and 25 minutes.

### **Field work:**

The researcher obtained all needed official permissions before starting data collection. Before distributing the data collection form, the purpose of the study and the components of the tool were explained to the staff nurses in the study settings. They were then invited to participate and asked for their informed verbal consent.

The researcher distributed the data collection sheet to participants individually in their workplace, and was present all the time for any needed clarification. Upon completion of the form, the researcher checked each returned questionnaire for completeness to ensure the absence of any missing data. The data collection phase lasted for two months, from the beginning of March 2017 to the end of April 2017. The work was done four days per week from 8:00 am to 2:00 pm and from 2:00 pm to 8:00 pm.

### **Administrative Design**

An official letter requesting permission to conduct the study was directed from the Dean of the Faculty of Nursing at Ain-Shams University to the Hospital Director and Nursing Directors to obtain their approval to carry out the study. The letter included the aim of the study and a photocopy of the data collection tool, in order to get the permission and cooperate in the collection of the data.

### **Ethical Considerations:**

Prior to the study conduction, the protocol was approved by the scientific research ethics committee in the Faculty of Nursing at Ain Shams University. In

addition, the researcher met the Director of Hospital and explained to him the aim of the study to gain his approval. Additionally, the researcher met with the staff nurses in their work place, and explained the aim of the study to them, and get their oral consent to participate before conducting the study. The study subjects assured that anonymity and confidentiality of the information that their participation is voluntary and that they have the right to withdraw from the study at any time.

### **Statistical design:**

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians quantitative variables. Cronbach alpha coefficient was calculated to assess the reliability of the developed tools through their internal consistency.

Qualitative categorical variables were compared using chi-square test. Whenever the expected values in one or more of the cells in a2X2 tables were less than 5, Fisher exact test was used instead. In larger than 2X2 cross-tables, no test could be applied whenever the expected value in10% or more of the cells was less than 5. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. In order to identify the independent predictors of the knowledge and commitment scores, multiple linear regression analysis was used, and analysis of variance for the full regression models done. Statistical significance was considered at  $p\text{-value} < 0.05$ .

## Results

**Table (1): Personal characteristics of staff nurses in the study sample (n=184)**

	Frequency	Percent
Age:		
<30	49	26.6
30-	51	27.7
40+	84	45.7
Range	20.0-59.0	
Mean±SD	37.2±9.2	
Median	38.0	
Gender:		
Male	13	7.1
Female	171	92.9
Marital status:		
Unmarried (single/divorced/widow)	18	9.8
Married	166	90.2
Nursing qualification:		
Diploma	150	81.5
Bachelor	34	18.5
Experience years:		
<10	46	25.0
10-	47	25.5
20+	91	49.5
Range	1.0-39.0	
Mean±SD	17.7±9.6	
Median	19.0	

The study sample consisted of 184 staff nurses whose age ranged between 20 and 59 years, median 38.0 years as illustrated in Table 1. The great majority were females (92.9%), married (90.2%), and carrying a diploma degree in nursing (81.5%). Their experience ranged between one and 39 years, with median 19.0.

**Table (2): Job characteristics of staff nurses in the study sample (n=184)**

	Frequency	Percent
Unit:		
Hemodialysis	24	13.0
ICU	21	11.4
Outpatient	20	10.9
Emergency	20	10.9
Incubators	18	9.8
NICU	16	8.7
Inpatient pediatric	15	8.2
Inpatient female	14	7.6
Ob/Gyne	10	5.4
Theater	9	4.9
Inpatient male	6	3.3
Insurance male	6	3.3
Sterilization	5	2.7
Had:		
Had pre-employment examination	139	75.5
Had periodic medical examination	66	35.9
Vaccination	174	94.6
Exposure to needle stick injury	112	60.9
Wounds at work	71	38.6

Table 2 indicates that the highest percentages of staff nurses were working in hemodialysis (13.0%), and ICU (11.4% units). On the other hand, the lowest percentage was from sterilization unit (2.7%). The table also shows that the majority of them had vaccination at work (94.6%). Although 75.5% had pre-employment medical examination, only 35.9% had periodic examination. Additionally, 38.6% had wounds during work.

**Table (3): Knowledge toward hospital waste management practice among staff nurses in the study sample (n=184).**

Satisfactory (60%+) practice knowledge of	Frequency	Percent
Waste definition and types	46	25.0
Waste segregation	169	91.8
Internal waste transport	80	43.5
Waste storage	41	22.3
Waste disposal	6	3.3

Concerning the staff nurses' knowledge of hospital waste management practice, Table 3 shows that the majority of them had satisfactory knowledge of waste segregation (91.8%). Conversely, only 3.3% had satisfactory knowledge of waste disposal.

**Table (4): Total commitment toward hospital waste management as observed among nurses in the study sample (n=184)**

Adequate (60%+) commitment of:	Frequency	Percent
Waste segregation	175	95.1
Dealing with body fluids	122	66.3
Internal transport to storage unit	173	94.0

In total, Table 4 indicates generally high commitment of staff nurses in the study sample, especially regarding waste segregation (95.1%) and internal transport to storage unit (94.0%).

**Table (5): Relation between nurses 'total knowledge toward hospital waste management and their commitment areas**

Commitment areas	Knowledge				x <sup>2</sup> test	p-Value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Waste segregation						
Adequate	128	73.1	47	26.9	Fisher	0.003*
Inadequate	2	22.2	7	77.8		
Dealing with body fluid						
Adequate	87	71.3	35	28.7	0.08	0.78
Inadequate	43	69.4	19	30.6		
Internal transport to storage unit:						
Adequate	128	74.0	45	26.0	Fisher	<0.001*
Inadequate	2	18.2	9	81.8		

(\*) Statistically significant at  $p < 0.05$

Concerning the relations between nurses' total knowledge of hospital waste management and their commitment in different areas, Table 5 shows statistically significant associations with the areas of waste segregation ( $p=0.003$ ) and internal transport to storage unit ( $p<0.001$ ). As the table illustrates, the percentages of staff nurses with satisfactory knowledge were higher among those having adequate commitment.

## Discussion

The current study assessed staff nurses' knowledge of hospital waste management. The results demonstrated that the great majority of them had satisfactory knowledge of waste segregation. Conversely, only a few of

them had satisfactory knowledge of waste disposal. This could again be attributed to their perception of the role of the nurse in waste management. Thus, while the step of waste segregation is considered as one of the main responsibilities of the nurse, the step of waste disposal is not considered so. However, this misconception needs to be corrected

given that the nurse should be knowledgeable of all the steps of hospital waste management .

A similar level of satisfactory knowledge was reported by **(Bhasker et al. (2012))** in a study in India on the knowledge about biomedical waste management among staff nurses. On the same line, a study on hospital waste management practices in Brazil **(de Jesus, (2015))** demonstrated that nurses have high levels of satisfactory knowledge of waste segregation and internal transport to storage unit. Moreover, and in contradiction with the present study results, they had high knowledge of proper dealing with the various types of body fluids.

Another main objective of the current study was the assessment of staff nurses' commitment toward hospital waste management. The findings indicate generally high commitment in most of the steps of segregation. However, it was noticed that approximately one-half of the nurses were not committed to ascertain the presence of a clear international signs on color waste bags, or to put a sticker with a clear international sign on these and on sharp boxes. This could be due to the shortage of supplies and the lack of such international stickers. Thus, the hospital administration and infection control committee should address this problem. Nonetheless, the costs of these supplies and the efficiency of their use could be limiting factors in waste management as outlined by **Chasseigne et al., (2018)** in a study in France.

Other two important factors identified as independent positive predictors of staff nurses' commitment towards waste management were their knowledge scores. This was revealed in bivariate analysis and then confirmed in

multivariate analysis. This would lead to the conceptual framework that the attendance of training courses has a positive influence on nurses' knowledge, and these latter when improved lead to better commitment among them.

## Conclusion

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The study results conduce to the concluded that the staff nurses in the study setting have high knowledge of the various workplace preventive measures related to waste management. Their knowledge of waste management is variable from very high concerning waste segregation to very low concerning waste disposal. Meanwhile, nurses' commitment with waste management is very high. The scores of knowledge and commitment are correlated. The knowledge score is positively influenced by the attendance of training in management, whereas the commitment score is positively influenced by nurse's age and by scores of knowledge.

## Recommendation

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**In view of the results, the study recommends the following.**

- The preventive measures at work need to be improved especially regarding the periodic medical examination and the injury prevention.
- Nurses' knowledge of workplace preventive measures related to waste management should be improved through orientation sessions for newly appointed ones, and refresher training courses for older ones.
- Nurses' knowledge of certain areas of waste management such as waste

disposal needs to be fostered through continuing education activities.

▪ The lower commitment of younger age nurses towards waste management should be addressed to identify the underlying factors and correct them.

▪ Further research is proposed to investigate the effect of training interventions and leadership on nurses' commitment towards hospital waste management.

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