

# An Interventional Study to Improve the Healthcare Waste Management Among Nursing Officers in Type-A Base Hospital in Southern Province - Sri Lanka

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**Abstract:** Clinical waste management is a burning issue worldwide. Environmental pollution and associated health risks, including disease transmission and social problems are the main consequences of this issue. The most governments are paying more attention to develop effective and efficient healthcare waste management in the curative health sector. This intervention project was conducted among the nursing staff at the Type A Basic Hospital in the Southern Province of Sri Lanka to improve the healthcare waste management among Nursing Officers attached to the hospital. An initial assessment was conducted to determine the waste generation and segregation practices of the hospital. Staff knowledge and waste management practices were assessed, as well as available segregation facilities, and interventions were designed and implemented. A post-intervention analysis was conducted to evaluate the effectiveness of the intervention. The main problems identified were lack of equipment, poor knowledge on health care waste management, and lack of proper guidelines developed by hospital management for proper health care waste management. A new guideline with waste segregation colour coding and practice was developed to improve knowledge of waste segregation, temporary storage, transport, and final disposal. Several training sessions were held for nurses. The improvement in knowledge and practice after the intervention was statistically significant ( $P = 0.001$ ). The package of strategies such as improvement of knowledge, system change, transferring ownership of the project, provision of basic equipment, supervision and experience sharing has been successful in meeting project goals, and continuing professional training and supervision is recommended to ensuring sustainability.

**Keywords:** Healthcare Waste Management, Segregation, Clinical Waste, Base Hospital

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## 1. Introduction

Clinical solid waste (CSW) management continues to be a major problem, especially in most healthcare facilities in developing countries. Improper behavior and inappropriate disposal methods used in health care waste (HCW) management and disposal increase significant health hazards and environmental contamination due to the infectious nature of the waste [1]. Health care institutions (HCIs) produce waste in the process of providing care to patients which are

called HCW. This HCW can be divided into hazardous and non-hazardous. Non-hazardous waste is identified as ordinary waste, and it is approximately 75-90% of all waste is produced by health care providers. The remaining 10-25% of HCW is considered "hazardous" and can lead to various environmental and health risks [2].

The primary definition of waste management begins with all the events and activities required to manage all forms of waste from generation to the final disposal. This consists of the collection, transport, treatment, temporary storage, and

disposal together with monitoring, evaluation and regulation [3]. According to the World Health Organization (2014), healthcare establishments include hospitals, clinics, outpatient departments, pharmacies and rehabilitation centers that create and generate hazardous waste that should be managed properly as to mitigate and avoid its effect on human well-being and the environment. World Health Organization has recognized further stated, the most common issues faced by clinical waste management is the improper waste segregation at the source and mixture of general waste into clinical waste stream and vice versa [2-4].

### 1.1. Justification

The study is conducted in order to determine and assess the clinical waste management in Sri Lanka which focuses on HCW management at Type A Base Hospital in Southern Province. As there were many studies conducted on Teaching and bigger hospitals, base hospitals that have been more neglected in most of the instances, where they face greater problems in the HCW management due to many reasons. This study covers the critical aspects in the process of HCW generation, segregation, collection, transportation, storage, treatment, and final disposal. It also examines the level of knowledge and awareness of the hospital Nursing Officers towards the HCW management in the hospitals.

### 1.2. General Objective

To improve the clinical waste management among Nursing Officers in Type-A Base Hospital in Southern Province - Sri Lanka.

## 2. Methodology

This was hospital based interventional research conducted in three phases. The Qualitative and quantitative methods were used for data collection. Data were collected using in-depth interviews, Key Informant interviews, questionnaire, and document reviews. This research was conducted in type A Base Hospital in Southern province Sri Lanka from May 2019 to September 2019.

During Phase 1, assessed the current practices of clinical waste management among all Nursing offices who are

directly involved in the waste management process. This phase covers the critical aspects in the process of HCW generation, segregation, collection, transportation, storage, treatment, final disposal, level of knowledge and awareness among the Nursing Officers towards the HCW management in the hospitals. Using above finding, Principal Investigator, assess the current HCW management processes and practices and identified the gaps in HCW management processes. After identification of gaps, in phase 2 was develop and implement strategies for effective HCW management and assess the effectiveness of the interventions in phase 3.

Qualitative data collected through key informant interviews (KII) and focused group discussions (FGD) were recorded and transcribed with participants' consent. The statements were synthesized into common words and coded into thematic domains. Each topic domain was then converted to an information domain. Quantitative data collected through questionnaires and desk reviews were analyzed using the Statistical Package for the Social sciences.

## 3. Result and Discussion

The total sample size was 120. All of them 52, 14, 15, 11, 16 and 12 were attached to Wards, Clinics, Operation Theatre, Labour Room, Out Patent Department and Emergency Care Unit respectively. Age distribution among nursing officers were 20 to 60 years. The majority (72%) were between 30 to 49 years and 65% (N= 78/120) had service experience of more than 10 years. However, it was observed only 25.8% (N=31/120) had been vaccinated for Hepatitis B infection and this value is even way below with the values of studies conducted in a low socio-economic setup (49%). The main reasons for non-vaccination among health care workers reported the belief that they were not at risk, poor knowledge level and the high cost of vaccination [5, 6]. In contrast vaccination coverage was significantly high among the developed world and which was around 70.9-90% [7, 8].

Table 1 shows, nursing officers' knowledge and training on HCW Management, Infection prevention and control (IPC), and training on 5S concepts.

**Table 1.** Background information of the Nursing Officers knowledge and training on HCW management.

Variable	Frequency	Percentage (%)
Training on waste Management	Yes - 54	45
	No - 66	55
Training on Infection Control and prevention (IPC)	Yes - 31	25.8
	No - 89	74.2
Knowledge and familiarization on waste management circulars	Yes - 22	18.3
	No - 98	81.7
Training on 5S	Yes - 43	35.8
	No - 77	64.2

The prevalence of having ever had training on HCW management was 45% and the prevalence on IPC was 25.8%. From the total sample, 18.3% (n=22) had knowledge and familiarization on waste management circulars consumed

during their service. Out of them, only 35.8% had undergone training on 5S conducted by Ministry of Health.

Further, FGD revealed low priority from the top management, inadequate personal protective equipment

(PPE) and collecting material, poor segregation and unhealthy final disposal practices as main barriers for the improvement of HCW management process. Further, KII revealed poor and haphazard segregation, unhealthy and unhygienic transportation, temporary storage, poor knowledge on HCW management, non-adhering to available guidelines, unavailability of visual aids/signboards and non-availability of continuing professional education identified as the most important gaps in the current HCW management process. Based on the KIIs and FGDs it was identified substandard HCW management practices give rise to many burning issues. This intervention was aimed to improve HCW using weaknesses identified by the gap analysis in the current waste management practice. Further, to identify the gaps in the knowledge and practices among Nursing Officers, self-administered questionnaire was given to all selected nursing Officers. Interventions were developed to overcome the gaps identified in knowledge and practices.

In Phase 2, Strategies were developed with the hospital staff and management to overcome gaps identified in the phase 1. In the first place, regular annual training of trainer programmes on HCW was arranged with the help of the Directorate of Healthcare Quality and Safety. Secondly, with the help and guidance of the hospital staff, an internal waste management guideline was developed and distributed to

necessary units. The guideline mainly emphasized waste segregation, colour coding, and general instruction in handling HCW. Meanwhile, signboards, colour-coded bins, demarcation lines for proper positioning of the bins, waste transport carts, storage facilities after segregation were arranged with the help of the hospital management committee and well-wishers. In addition, for the overall supervision of the process, a supervisory team was appointed for each ward. Supervisory teams liaised with the infection control nurse of the hospital and every other week reviews were conducted with the supervisory teams to fine-tune the HCW management process.

In phase 3 strategies were successfully implemented officially through the hospital management following the staff training on HCW management. Post interventional FGD and KII interview revealed significant improvement in knowledge and practice on HCW management among Nursing officers. When handling and disposing of HCW, lack of trained staff, poor awareness, the lack of appropriate guidelines was identified as main reasons for substandard management of HCW.

Comparison pre and post-implementation results of knowledge and practice improvement of the Nursing Officers are listed in Table 2.

**Table 2.** Comparison of knowledge and practice improvement of nursing officers.

	Mean score		Statistics Wilcoxon Signed Ranks Test
	Pre	Post	
Knowledge			
Segregation	1.39	7.09	P=.001
Transport	2.32	3.65	P=.001
Final disposal	8.47	13.05	P=.001
Disease Transmission	14.2	19.14	P=.001
Temporary storage	6.62	11.63	P=.001
Practice	8.14	11.42	P=.001

NB: Total Sample size = 120

Remarkable changes in segregation of waste material were observed following several awareness programs and regular supervision carried out by the supervisory staff. Knowledge and practice significantly improved in the post-intervention phase. Mean Knowledge on segregation has improved from 1.39 to 7.09 (p=.001).

Most of the healthcare facilities of the developing world have encountered difficulties and looking for cost-effective disposal methods of HCW due to financial difficulties and unavailability of proper training and supervision mechanism [9]. Misra and Pandey (2005), point out that treatment and disposal costs can be significantly reduced by preventing mixing of non-hazardous waste with hazardous waste [10]. In addition, effective segregation can be achieved through providing education and training, establishing identifiable colour coding, providing suitable containers, redesign or reorganization of procedure and all waste must be easily, safely and properly segregated at the point of generation [11]. The study results show a significant improvement in the mean knowledge on final disposal from 8.47 to 13.05

(p=.001). Further, postintervention mean practices on HCW management too has improved from 8.14 to 11.42, which is also statistically significant at 1% level (Table 2).

The periodical constructive supervision by the supervisory team was highlighted by the nurses as one of the main factors for the success of the project. The openness of sharing of supervision findings by all the staff members of the hospital has motivated them to better practices. In literature most primary health care services acknowledge the need for proper supervision, to maintain better outcome especially in health care settings of developing countries [12-16]. Further, proper segregation of waste reduced the volume of general waste for disposal and was able to clear the segregation area in the central collecting site completely without storing HCW for a long time.

Acceptability, appropriateness and feasibility of the project interventions were achieved by incorporating the relevant stakeholders appropriately. It helped to avoid resistance and unavoidable failures in future. Continuous awareness programmes covering all categories of staff, involvement of

staff in the project development and handing over the ownership of the HCW management project to the hospital staff improved the sustainability of the project.

A report published on waste management in Portugal between 1996 and 2002 also highlighted the importance of having a waste management plan [17]. For the sustainability of the project, continuous awareness and close supervision and monitoring plan was established by the supervisory team with the help of the administration and planned to conduct review meetings every 4<sup>th</sup> Friday of the month.

## 4. Conclusions

The training of staff had a significant impact on knowledge and practice change. Improvement of knowledge and transferring the ownership of the project to the staff itself positively influenced the system improvement. Further, improved knowledge motivated the hospital staff to find cost-effective means to improve HCW management.

Eventually, the knowledge change, a proper system in place, availability of working guide, basic equipment, supervision and sharing experience can be named as the factors that led to the success of this project.

## 5. Recommendations

- 1) It is recommended to incorporate regular waste management training and health education programmes to all stakeholders.
- 2) Adequate facilities should be provided for proper waste segregation (colour coded bins, colour coded polythene bags labels) and transport facilities.
- 3) Regular supervision on waste management, sharing experience and good practices is recommended for better staff compliance.
- 4) Establishing an active waste management committee in hospital and central level is recommended to develop and monitor the waste management plan and developed plan should be introduced to all relevant stakeholders.

## 6. Limitations

Difficulty in arranging continuing professional education for all staff members has limitation due to insufficient cash flows.

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