

Critical Analysis of Clinical Waste Management System in National Hospital, Sri Lanka-Case Study Report

Author Details: Parimelalagapillai Karthikeyan

Management Development and Planning Unit (MDPU), Ministry of Health, Sri Lanka.
thirumagal@gmail.com

Abstract:

This case study was conducted to critically analysis and improves the clinical waste management system in the National Hospital, Sri Lanka (NHSL), with the goal to identifying major issues faced in the smooth functioning of the waste management process and to overcome those issues. The NHSL has been housed at its present premises for more than 150 years. It is the apex tertiary level health care institution in Sri Lanka with a bed strength of 3231 and daily average admission of 723. The total number of surgeries performed in its 21 theaters 78076 in 2017. Daily average general OPD attendance per day (including 1st and 2nd visits) was 1271, daily average accident service outpatient's attendance was 269 and Clinic patient daily average was 3249. As a result, total outpatient service daily average was 4789 (Annual hospital statistical bulletin - 2017, NHSL). Total staff members number around 7500. Therefore, waste generation at this institution is very high. Patient treatment procedures and staff members generate on average approximately 400 kg- 600 kg of clinical waste and 1200 kg – 1800 kg of general waste per day in the hospital (MO-Public health, 2019). Clinical waste generated each month comprises about 1200 kg sharp waste and 25000 kg decontaminated waste (Infection Control Unit- NHSL, 2019). The study learned that the segregation of waste at the units was satisfactory. Occupational safety measures taken while handling waste, however, were not satisfactory. Even though the wards practice segregation of waste using color codes, the transportation of waste from wards to the disposal area was unhealthy and did not meet established standards. Knowledge on safe handling and transportation of waste among waste handlers was inadequate. The process of disposing of clinical waste has several shortcomings, which have been aggravated by poor supervision and lack of coordination. Irregular waste collection by outsourced parties resulted in an accumulation of clinical waste in the temporary store facilities inside the NHSL, creating major issues for the administration. Building a comprehensive system to address responsibilities, safe handling and disposal of clinical wastes, strengthening overall supervision and following government procurement guidelines during the selection of outsourced service providers will improve the current clinical waste management process at NHSL.

Keywords: Clinical waste management, National hospital of Sri Lanka, Hospital administration, Waste management process.

1. INTRODUCTION

Every hospital is legally responsible for proper management of the waste that it generates until its final disposal in accordance with the National Environmental Act No 47 of 1980 and National Environmental (Amendment) Act, No 53 of 2000. National Hospital of Sri Lanka (NHSL), the ultimate referral facility of the country, consists of 3231 patients' beds. In 2017, 264011 patients were been admitted to NHSL with 723 average daily admissions. The average length of stay that year was 3.5 days and the bed occupancy rate were 79. Total 78076 operations were performed, and the number of live births was 258610 (Medical Statistics Unit, NHSL 2018).

The massive workload of the hospital indicates the amount of health care waste generated (Table 1). Patient treatment procedures and staff members generate on average approximately 1000 kg- 1200 kg of clinical waste and 5000 kg general waste per day in this hospital (MO-Public health, 2019). Of the clinical waste, there is about 70-80 kg of sharp waste and 2kg of pathological waste generated per day (Infection Control Unit- NHSL, 2019).

Table 1: Amount of solid waste generated per day

NHSL generates an average of 5000 kg general wastes and 1200 kg clinical wastes daily.

Table 2 is described the daily average weight of various types of solid wastes generated at the NHSL

Type of waste	Weight (Kg)
General waste	5000
Infectious wastes	1000 - 1200
Sharps	70 - 80
Pathological	2
Total waste	6177

Source: Public Health & Infection control units, NHSL

While waste can be theoretically categorized into many categories, at NHSL waste is divided in to three groups: General waste, infectious waste and sharps. Degradable waste is collected in black bags and general waste (polythene, papers etc.) is collected in black bins. Infectious waste collected in yellow bags.

The responsibility for this segregation process is with the sister in charge of the wards or units. This process is supervised, and problem identification is done by infection control nursing officers on their daily ward rounds. The hospital is divided into 13 supervisory areas; each supervisory area includes 10 to 15 units. Waste is transported by carts three (03) times a day at 6.00am, 11.00am and 4.00pm to the storage area by cleaning service workers. Waste storage is also done according to the designated colour codes and sharp bins are handled by hospital health service assistance (SKS).

Each day, around 1000-1500 kg of food waste is handed over to the Ja-Ella animal farm. The wastewater management system is currently linked to the sewerage system of the hospital. Before disposal, the liquid waste is treated with a hypochlorite solution. Although the blood bank and laboratory adhere to the above process, other places such as the kitchen, mortuary, and processes such as floor washing, mackintosh, and equipment cleaning are directly connected to rainwater drainage. Sewer and rainwater lines are directly fed to the Metro Colombo grid.

Table 2: Type of Waste and disposal methods

Type of Waste	Method of Disposal / Treatment
Yellow Bags (infectious and pathological waste) Sharps Saline bottles and tubes contaminated with cytotoxic drugs	Incinerated at Colombo East Base Hospital, Mulleriyawa (Outsourced)
Normal saline bottles Normal glass bottles	Given to recycler
Cytotoxic drugs	Thermal destruction at Cement Kiln of Puttalam Cement Works, Holsim Lanka Limited
General Waste	Dispose through Municipal Council

Source: Public Health & Infection control units, NHSL

1.1 Objective

To critically analyze and improve the clinical waste management system in the National Hospital, Sri Lanka

1.2 Methodology

- Key informant interviews with Consultant Microbiologist, Consultant Pathologist, and Sister in charge and nursing officers of the infection control unit, Senior Medical Laboratory Technologists of the Department

of Microbiology and Department of Hematology, Medical officer in charge of the infection control and waste management.

- Discussion with 10 randomly selected cleaners of the hospital
- Direct observations
- Desk review of available materials and records.

The study learned that the segregation of waste at the units was satisfactory. All units had a sharp bin to collect needles and other sharp material. Waste bins were color-coded. Occupational safety measures taken during waste-handling, however, were not satisfactory. No one wore protective gloves, masks or boots. Even though the wards practice segregation of waste by color code, the transportation of waste from the wards to the disposal area was unhealthy and not up to established standards. This was mainly due to the carelessness of the staff, supervisors and the cleaning service workers. Knowledge of safe handling and transportation of waste among waste handlers was inadequate -- they require training in healthcare waste management.

The process of disposing of clinical waste has several shortcomings, aggravated by poor supervision and lack of coordination. Irregular waste collection by outsourced parties resulted in an accumulation of clinical waste in the temporary store facilities inside the NHSL, which creates major issues for the administration.

2. PROBLEM ANALYSIS

2.1 Clinical Waste management system of NHSL and issues.

I. Waste avoidance and minimization

Visitors are banned from bringing certain items such as polythene and king coconut with shells to the ward with the aim of reducing waste. The ward staff is instructed to minimize clinical waste as much as possible with measures such as avoiding unnecessary contamination of materials, reducing the size of the gauze packs to the minimum required, etc.

II. Waste identification & segregations

The objective of identification and segregation in waste management is to prevent or minimize the chances mixing of hazardous waste with general waste. Though waste can be theoretically categorized into many categories, within the practical constraints, in NHSL waste is segregated in to three groups. Degradable waste collected in black bags. General waste (polythene, papers, etc.) is collected in black bins and stored temporarily until the Colombo Municipal council collects them for disposal. Yellow bags are used for infectious waste and sharp boxes, made manually using thick cardboard, are used to collect sharps, while and orange bins are used for plastics. Red bins are for glass waste.

III. Waste transport

The yellow bags are tagged with the relevant ward number before transportation. Carts are used to move containers of waste out of the wards.



Figure 1: Waste transport by outsourced worker

Infectious waste including sharps are generally transported by the health service assistants (HSAs) as per the agreements, but workers from the outsourced cleaning service can also be seen performing this task. Infectious and general waste are transported in the same cart, posing a significant risk of being mixed up. The waste, including clinical waste, are temporarily stored in the allocated storing area inside the NHSL. It was observed that infectious waste kept mixed with general waste at this store. The stagnated clinical waste at these temporary stores gives rise to several administrative issues.



Figure 2: Temporarily stored waste

IV. Waste disposal

General waste is disposed of by the Colombo Municipal Council (CMC) and degradable waste is used for biogas production.

Since there is no incinerator, the plan was to transform clinical waste into general waste using hydro-clave machines. For this purpose, there are two hydro-autoclave machines available at NHSL meant to treat and convert infected waste to general waste, which can then be disposed of as general waste. The hydro-clave machines in the hospital could treat 300 -500 kg waste per day, but these machines are not in operation, because the Colombo Municipal Council refused to take over the disinfected clinical waste.

Instead, clinical waste is handed over to a private firm to be incinerated at Mulleriyawa Base Hospital and the company is paid according to the weight of the clinical waste. Plastic and cardboard are sold.

There is no properly established liquid waste management system in the hospital. The biochemistry lab has its own mechanisms of disposing of clinical waste after disinfection. The hematology lab directly disposes of blood products into the sink with the assumption that it goes to a separate deep pit.

It was revealed during the current case study that all (100%) units of the hospital had a sharp bin to separately collect needles and other sharp materials. The color-coded waste bins were used in all units. But the safety measures taken during the handling of waste were not satisfactory. Some of the workers did not wear gloves, masks or boots while handling waste. It was noted that the supply of gloves and masks for the cleaners was neither adequate nor regular. All of them wore slippers. The safety measures taken during the internal transport and storage of waste were suboptimal.

Three waste trolleys were inspected, and it was found that they were not cleaned properly. The workers from the cleaning service were not given proper training on waste handling by hospital management or their employer.

Although the in-charges of the wards and most overseers seemed to have good knowledge of health care waste management, the level of supervision carried out on related activities within the facility was not up to standard. There was no well-planned scientific schedule for the cleaning service to follow regarding trolley types, collection routes, or priorities.

3. PROBLEM PRIORITIZATION

Stagnation of clinical waste at a temporary storage site in NHSL was selected as the most important and urgent problem by stakeholders among all the identified issues related to the waste management. This prioritization was made by using the nominal group technique.

Why Why diagram (figure 3) was used to identify the root cause of the prioritized issue.

Problem: Stagnation of clinical waste at temporary storage at NHSL

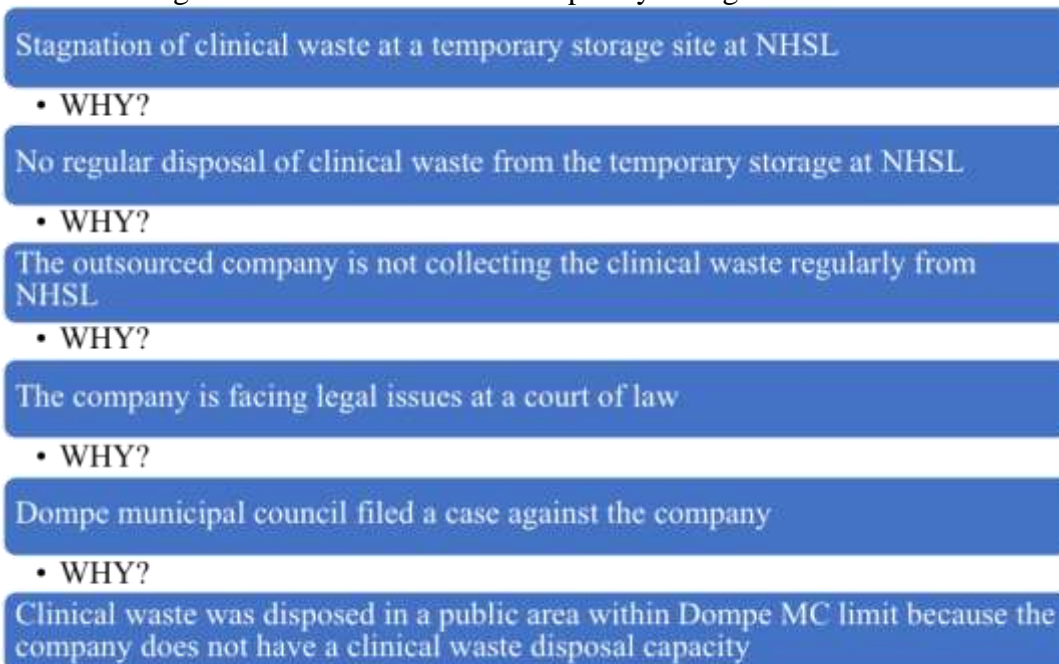


Figure 3: Why Why Diagram

Root Cause: Clinical waste disposed in a public area within Dompe Municipal Council (MC) of Gampaha District limit because the company does not have a clinical waste disposal capacity.

4. PROPOSALS

Stagnation of clinical waste at a temporary storage site at NHSL was the major problem faced by the administration. This is due to there being no regular disposal from a temporary storage facility inside the NHSL. The clinical waste disposal was outsourced to a private company by the Ministry of Health. For the past few months, this company removed the clinical waste in an irregular manner.

The root cause analysis revealed that this company faces a legal challenge from Dompe MC at a court of law because it was discovered that clinical wastes are scattered in the public area within the Dompe MC limits. The MC found that the private company was disposing of clinical waste irresponsibly within the Dompe MC limits. PHI filed a case against the private company. The company is now unable to dispose of clinical waste.

The Solution 1: Terminate the contract with current supplier and select an outsourced service with the capacity and expertise to perform the task using public procurement guideline 2006. If the selection is made according to the above guidelines, during the post-qualification verification the TEC can detect the technical and financial capacity of the selected substantially responsive bidder.

The Solution 2: NHSL establishes its own clinical waste disposal mechanism. The metamizaers can be built in the location identified by the Colombo town council. This way, the NHSL can have its own clinical waste disposal system.

Selecting a substantially responsive bidder who has the technical knowledge to perform the outsourced tasks is an advantage. There are no known disadvantages in this solution.

Establishing its own metarmizer will facilitate the NHSL in handling its own clinical waste, but it is not cost effective because the cost for disposal of 1Kg is 183 LKR while the outsourced company is charging only 103 LKR per Kg.

5. RECOMMENDATION

Terminate the contract with the current service provider and select a service provider with the capacity and expertise to perform the task by strictly following the public procurement process according to government public procurement guideline of Sri Lanka (2006).

6. IMPLEMENTATION

When the preparation of bid documents is initiated at the procurement planning stage, the administration of NHSL and Ministry of health should refer to the procurement manual and guideline 2006. This will ensure that the substantially responsive bidder with the appropriate legal and technical capacity will be selected.

7. CONCLUSION

The study learned that the segregation of waste at the units was satisfactory. However, occupational safety measures taken during the waste-handling were not satisfactory. Although the wards practice color-coded waste segregation, the transportation of waste from wards to the disposal area was unhealthy and not up to standard. Knowledge on safe handling and transportation of waste among waste handlers was not adequate. The process of clinical waste disposal has several shortcomings, aggravated by poor supervision and lack of coordination. Irregular waste collection by outsourced parties has resulted in the accumulation of clinical waste in the temporary store facilities in the NHSL which creates major issues for the administration.

Building a comprehensive system which addresses responsibilities, safe handling, and disposal of clinical wastes, strengthening the overall supervision and following government procurement guidelines during the

selection of outsourced service providers will improve the current clinical waste management process of the NHSL.

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Author Profile

Parimelalagapillai Karthikeyan received the MSc and MD in Medical Administration from Postgraduate Institute of Medicine, University of Colombo in 2016 and 2020, respectively. From December 2019- February 2020 he was attached in the National Hospital of Sri Lanka as a Postgraduate Trainee in MD Medical Administration. He is an employee of Ministry of Health Sri Lanka and currently undergoing his Post-Doctoral training under the supervision of Dr S Sridharan (Consultant medical administrator), Ministry of Health, Sri Lanka.