

## Effectiveness of waste management interventions at the new District General Hospital, Hambantota

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### Abstract

**Background:** Healthcare waste management is a critical global issue and an effective waste management is essential to maintain a safe and hygienic healthcare environment. District General Hospital, Hambantota serves a significant population in the region and the hospital generates substantial medical waste including general non-hazardous waste, hazardous waste, infectious waste and recyclable waste.

**Objective:** To assess the effectiveness of waste management interventions at the hospital and to provide recommendations for improving waste handling and disposal strategies.

**Methods:** A comprehensive approach was adopted, involving a combination of quantitative and qualitative methods. Surveys and direct observations assessed current practices and infrastructure, while interviews with healthcare professionals provided in-depth insights. Compliance with waste management regulations and guidelines was evaluated through document analysis.

**Results:** Following the intervention, waste production per bed per day was significantly reduced from 2.03kg to 1.27kg, and most waste types showed a decrease in quantity.

**Conclusion:** Following the intervention, waste production per bed per day was significantly reduced from 2.03kg to

1.27kg, and most waste types showed a decrease in quantity.

**Keywords:** Waste audit, healthcare waste management

### Introduction

Healthcare waste management is a critical global issue that poses significant challenges to public health and environmental sustainability. It is a streamlined process for regular collection, transportation as well as processing and disposal or recycling and monitoring of different types of waste materials [1]. With the rapid growth of the healthcare industry, there has been a corresponding increase in medical waste comprising infectious, hazardous, and non-hazardous materials. Improper handling and disposal of healthcare waste can expose healthcare workers, waste handlers, and the public to various infections and increase the burden on healthcare facilities. Moreover, healthcare waste poses environmental risks [2].

To address these issues, a comprehensive approach including implementing strict waste segregation protocols, promoting recycling and waste reduction, adopting safer treatment technologies and providing training for healthcare workers and waste handlers is crucial. Collaboration between government, healthcare institutions, and waste management agencies is essential to develop effective strategies that can mitigate the potential risks and create a

safer and more sustainable healthcare system for future generations <sup>[3]</sup>.

Healthcare waste management in the hospital receives greater attention due to recent regulations of the National Environmental Act- No 47 of 1980 of Sri Lanka. The WHO also emphasized the member states to improve hospital waste management practices to maintain public health and environmental sustainability <sup>[4]</sup>. District General Hospital (DGH), Hambantota indicate a waste generation rate surpassing the WHO standards for healthcare waste in low-income countries, which typically ranges between 0.5 - 2.0 kg per bed per day. This discrepancy signifies a significant deviation from the optimal waste management levels recommended by the WHO <sup>[3]</sup>. Consequently, a strategic intervention in waste management is justified to align the hospital's practices with international standards, ensuring the efficient and sustainable disposal of healthcare waste <sup>[5]</sup>. This initiative aims not only to address the observed overgeneration of waste but also to enhance the overall effectiveness of the waste management process.

### ***General objective***

The main objective of this study is to assess the effectiveness of new waste management interventions in a tertiary care hospital in Sri Lanka.

### ***Specific objectives***

Specific objectives were to assess waste generation, identify existing challenges, and propose a set of effective waste management interventions.

## **Methodology**

This interventional study consists of a pre and post evaluation process. A comprehensive approach was adopted, involving a combination of quantitative and qualitative methods. Surveys and direct observations assessed current practices and infrastructure, while interviews with healthcare professionals provided in-depth insights. Compliance with waste management regulations and guidelines was evaluated through document analysis <sup>[6]</sup>.

The study setting is new DGH Hambantota, which is a healthcare facility located in the Southern region of Sri Lanka. The bed capacity of the hospital is 899 which includes 42 wards with all main specialties and other subspecialties. The old hospital was excluded from this study.

In the waste audits conducted at new DGH Hambantota, the different waste streams were identified, categorised, and quantified. Waste types included general non-hazardous waste, hazardous waste (e.g., pharmaceutical waste, chemical waste), infectious waste (e.g., used needles, contaminated materials), and recyclable waste (e.g., paper, plastic). Later for the purpose of composition analysis, a representative sample from each waste stream was collected and analysed to determine their percentages. This analysis provided insights into the types of waste being generated and their relative proportions <sup>[7]</sup>.

A set of interventions was developed by an expert group led by the Director and the Consultant Microbiologist. The intervention targeted all healthcare workers and supportive services in the institute, nursing students and the patients of the hospital. The intervention included

awareness programs and discussions, training sessions for hospital staff on proper waste segregation, disposal and its importance, and the establishment of a standard waste storage <sup>[8]</sup>. Those procedures were closely monitored by the Public Health Inspector and the Infection Control team, under the guidance of the Hospital Director and the Consultant Microbiologist. Focus group discussions with medical officers, nurses, other hospital staff and patients were conducted to see the effectiveness of the intervention. A thematic analysis was performed to assess the qualitative findings <sup>[9]</sup>.

Pre- and post-interventional audits were also done by the hospital infection control team to see the effectiveness of the intervention.

## Results

The following are the findings of the pre-interventional focus group discussions in 2020.

1. Awareness Gap: Hospital staff and patients expressed a noticeable lack of awareness regarding proper waste management practices, suggesting a need for comprehensive education and training programs to enhance understanding.
2. Perceived Risks: Both staff and patients voiced concerns about potential health risks associated with inadequate waste management. There is a shared perception that current practices may contribute to infections and other health-related issues.
3. Inconsistencies in Practices: Findings highlighted inconsistencies in waste management practices among hospital staff. Varied interpretations of protocols and guidelines contributed to a lack of

standardization in waste disposal procedures.

4. Patient Engagement: Patients expressed a desire for more involvement in waste management initiatives, indicating a need for increased communication and transparency about how waste is handled within the hospital premises.
5. Resource Constraints: Hospital staff highlighted resource limitations, including insufficient waste disposal infrastructure and inadequate training programs.
6. Environmental Consciousness: Both staff and patients expressed a growing concern for the environmental impact of hospital waste. There is a collective interest in exploring more eco-friendly waste disposal methods and reducing the hospital's overall environmental footprint.
7. Communication Challenges: Communication gaps between hospital staff and patients were identified as a barrier to effective waste management. Improved communication channels and platforms were suggested.
8. Accountability and Responsibility: There was a consensus among participants about the importance of establishing clear lines of accountability and responsibility within the hospital's waste management framework. This involves defining roles and responsibilities to ensure a cohesive and efficient waste management system.

These findings underscore the complexity of the issues surrounding hospital waste management, emphasizing the need for a comprehensive and collaborative approach to address awareness gaps, standardize practices, and implement sustainable solutions.

The post-intervention focus group discussions highlighted the following themes.

1. **Enhanced Awareness:** Participants noted a significant improvement in awareness regarding proper waste management practices following the intervention. Both hospital staff and patients reported a better understanding of the importance of correct waste disposal and its impact on health.
2. **Risk Mitigation:** Following the intervention, concerns about potential health risks associated with inadequate waste management were notably reduced. Participants expressed confidence in the effectiveness of the implemented measures to mitigate risks and maintain a safer healthcare environment.
3. **Standardized Practices:** The interventions led to a more uniform approach to waste management among hospital staff. Clear guidelines and improved training contributed to standardized practices, reducing inconsistencies, and ensuring a more systematic waste disposal process.
4. **Patient Engagement Success:** Patients reported increased involvement and engagement in waste management initiatives. Enhanced communication and transparency about waste handling practices fostered a sense of responsibility among patients, who now feel more informed and connected to the hospital's environmental efforts.
5. **Resource Optimization:** Following the intervention, participants observed improved waste disposal infrastructure and increased availability of resources.
6. **Eco-Friendly Practices:** Participants were pleased to witness a shift towards more eco-friendly waste disposal

methods. The interventions facilitated the adoption of sustainable practices, reducing the hospital's overall environmental footprint aligning with the collective environmental consciousness of both staff and patients.

7. **Improved Communication Channels:** Communication gaps were effectively addressed with the interventions, resulting in enhanced communication channels between hospital staff and patients, which contributed to overall satisfaction among participants.
8. **Established Accountability:** The interventions successfully established clear lines of accountability and responsibility within the hospital's waste management framework. Defined roles and responsibilities ensured that staff understood their contributions to the efficient waste management system.

These positive findings underscore the success of the implemented interventions in addressing the identified issues related to hospital waste management. The improvements in awareness, standardized practices, patient engagement, resource optimization, eco-friendly approaches, communication, and accountability collectively contribute to a more effective and sustainable waste management system within the hospital.

It was revealed that waste production per bed per day reduced from 2.03kg to 1.27kg after the intervention. At the same time different types of waste quantity were assessed before and after the intervention and it was noted that most of the waste types were reduced after the intervention.

Table 1 shows a reduction in almost all the waste types other than glass after the intervention. Average daily waste production also decreased by 66kg per day

even though the bed occupancy rate increased from 41% in 2020 to 60% in 2023.

**Table 1: Different waste types before and after the intervention**

Waste type	Before intervention (Kg/day)	After intervention (Kg/day)
Food	395	330
Paper	93	83
Polythene	36	27
Cardboard	13	12
Saline bottles & plastic	19	28
Sharp bins	6	7
Glass	4	27
Clinical waste	185	171
Iron	0	0
Average per day	751	685

## Conclusion

The waste audit conducted to measure the effectiveness of waste management interventions has provided valuable insights and recommendations for enhancing waste handling and disposal practices within the hospital. Accordingly, the study showed a reduction in almost all the waste types other than glass after the intervention. However, it shows a marked increase in glass waste after the intervention, and it is due to the proper segregation of waste in 2023. Average daily waste production also decreases by 66kg per day which is a marked reduction compared to the waste generation in the hospital.

In 2023, waste segregation at the source and storage facilities were also improved. As a result, potential cross-contamination and unsafe working conditions for healthcare personnel improved. Furthermore, recycling initiatives improved resulting in

recyclable materials being used to earn money by selling them. At the same time, it was observed that the training and awareness of hospital staff improved regarding proper waste management practices. Pre and post focus group discussions revealed that there is a significant improvement in waste management process.

Based on the study findings, it is evident that the implementation of a comprehensive waste segregation program at the source is crucial to effectively separate different waste streams. Therefore, it is recommended to establish a robust waste segregation program with colour-coded bins and clear signage to facilitate proper waste disposal. To prevent cross-contamination, to ensure the safety of staff and patients and to reduce environmental pollution, it is essential to invest in appropriate storage facilities for different waste categories. Another key recommendation is the establishment of a well-structured recycling program to divert recyclable materials from the general waste stream. Collaborating with local recycling facilities to manage materials like paper, cardboard and plastics will further contribute to sustainable waste management practices. To ensure that waste management practices are consistently followed, regular training sessions for hospital staff on waste segregation, handling, and disposal protocols should be conducted which will foster a culture of responsibility and environmental stewardship. In order to minimize odours, pests, and visual blight, it is recommended to optimize waste collection schedules and methods. This will not only improve the overall aesthetics of the hospital but also enhance the well-being of patients and staff. Additionally,

exploring the possibility of on-site waste treatment facilities for certain types of waste could further improve waste management efficiency and reduce the hospital's environmental impact. The waste audit at new DGH, Hambantota has highlighted areas requiring immediate attention and improvement.

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